

Pacific Ocean



BELLINGSHAUSEN-1821

ANTARCTIC CIRCLE

Bellinghshausen Sea

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NEW ZEALAND

MARIE BYRD LAND
LITTLE AMERICA
BYRD 1929
AMUNDSEN 1911
SOUTH POLE

POLAR PLATEAU

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AUSTRALIA

WILKES-1840

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THE
ANTARCTIC
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BY RUSSELL OWEN



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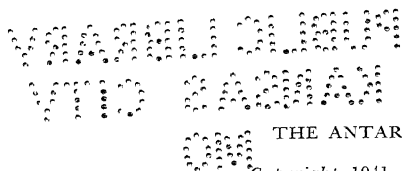
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THE
OCEANS OF THE WORLD

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THE ANTARCTIC OCEAN

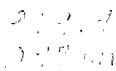


THE ANTARCTIC OCEAN

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To

FREDERICK T. BIRCHALL

for reasons that he will understand

Foreword

"Voyages toward the South Pole commenced so long ago, and they have exercised an influence on the trend of exploration so continuously, that a complete history of the search for the Antarctic would almost be a history of geographical discovery."

—HUGH R. MILL

THE history of the approach to the Antarctic Continent in the last 120 years has been so complicated, so filled with adventures and voyages, that it has been impossible to describe them all. That would have been repetitious and tiresome, for cruises in ice-filled waters often are alike. The only alternative was to select the voyages that definitely added to the knowledge of the Antarctic, those journeys which served to delineate large sections of the coast.

But, I think, the men mentioned in each one of these chapters carried on the work of predecessors, and their discoveries make eventually a connected pattern. The attack on the Antarctic, for it has been a siege, a continuous process, has been going on for so long that innumerable courageous men have taken part in it from different motives. Some have gone for trade, some for adventure, some for science, some just for glory. Some have achieved great things; even those who failed often have accomplished much. But not all could be included, unless one wished to write several volumes. That is why one will not find here the persistent and careful work of Sir Douglas Mawson; the unusual and unheralded achievements of those on the Norwegian ship *Norvegia*, who found new coast land; the detailed account of Bellings-

hausen's voyage; the considerable geographical work of the whalers. But, with variations, they met the same adventures and difficulties as those you will read of here.

Thanks are extended for the use of material in *The Siege of the South Pole*, by Hugh R. Mill (Stokes, New York); *Endurance*, by Frank A. Worsley (Cape and Smith, New York); *The Worst Journey in the World*, by Apsley Cherry-Garrard (Dial, New York); *My Life as an Explorer*, by Roald Amundsen (Doubleday, New York); *Through the First Antarctic Night*, by Frederick A. Cook (Doubleday, New York); *The Voyage of the Discovery*, by Robert F. Scott (Scribner, New York); *South*, by Sir Ernest H. Shackleton (Macmillan, New York); *Discovery*, by Admiral Richard Evelyn Byrd (Putnam, New York).

I also wish to express my gratitude for valuable suggestions and aid from Col. Lawrence Martin, Library of Congress; Professor Griffith Taylor, University of Toronto; Professor William H. Hobbs, University of Michigan; and Dr. Peter H. Buck, Yale University.

RUSSELL OWEN.

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THE ANTARCTIC OCEAN

The Ocean of Myth

THERE is no Antarctic Ocean on the maps. The cold waves that beat against the Antarctic Continent are from the southern portions of the Atlantic, Pacific, and Indian Oceans, and in their flow around the ice-rimmed land they mingle to form one vast gale-swept wilderness of water. But if a body of water may be known by its characteristics, there are few who have been to the Antarctic who would quibble at giving a specific name to the ferocious sea which is unique on our earth. An ocean on which float icebergs thirty or forty miles long and two hundred feet high, which is filled with pack ice in which many a ship has been crushed, and which is beset with gales that attain a velocity of more than a hundred miles an hour, is worthy of a designation of its own even if the map makers have been unable to find a reasonable line of demarcation for it. Most oceans are bounded by land, but the Antarctic Ocean begins only where more benign oceans end. When a ship meets a berg longer than Manhattan Island, there is no doubt that it is not in the Pacific, the Atlantic, or the Indian Ocean. It is in the Antarctic.

So let us draw an imaginary line about it, a line that follows no fixed parallel, no boundaries, but which includes within it everything that makes the Antarctic Ocean distinctive. Within that line will be found the things that have repulsed men's efforts and that have tugged at their imaginations and their emotions for centuries. There will be found winds that blow so hard that a ship under a steam engine going full speed ahead has been blown backward so that her

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wake has gone forward past her bow; winds that have coated a small ship with 200 tons of ice so that it nearly foundered; huge icebergs against which ships have been driven and by rare seamanship have fought their way free; blizzards that blind the sailor listening desperately for the sound of breakers on icy cliffs; pack that growls and throws cakes of ice weighing tons against the bulwarks. Then the sea is gray and dark and lifts high to clutch the tiny vessel, and men slip on the decks and grasp frantically at anything near them with frozen hands, and "the wind's like a whetted knife." Around them are obscurity and the threat of unknown things, for there are few soundings in the Antarctic, and there are many reefs not on the charts.

But this ocean has its moments of rare beauty. There are days in the pack when the wind howls through the rigging and the ship is motionless because the ice damps the sea, snow drifts horizontally before the gale, and there is the feeling of being alone in a vast white sepulcher. There is no such isolation elsewhere in the world. Nothing within hundreds of miles but ice and sea, and the living sea is shut off by the white plain that vanishes a few yards beyond the side of the ship. Man is helpless. He can only wait, wait for the storm to end, for the ice to open, to let him move again as a sentient thing toward his goal. But while he is caught in the ice, he must wait for the unpredictable Antarctic to free him once more.

When the wind dies down he may still lie awhile in the white silence. Around him are shadows. Above the ice lift hummocks and vague shapes, half seen through the mist. There is not a sound except the lost voices of men beating against emptiness. White wings of birds drift through the half-light, swinging swiftly like dim ghosts. Then the mist lifts, the blue sky breaks through the clouds, the sun shines warm, comforting, and you bask in it as when a boy you sat in the sun against the barn in the first warm days of spring.

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Flashes of light come back from uplifted ice, bergs caught in the pack glowing with color reflected from a sky that is like a magnificent batik of green and crimson and yellow and blue.

That is when the Antarctic offers a pageant of beauty unequaled anywhere else in the world, and one who has seen it can never forget. And the ship finds its way somehow through the ice, into open seas that are as calm as a yachtsman's dream, and danger is far away, even though it may lurk in tomorrow's evening. One never knows.

Until a little more than one hundred years ago the Antarctic was the most fabulous ocean since the Phoenician sailors, who probably rounded Africa, returned home with tales of monstrous things in the sea beyond the Pillars of Hercules. It was guessed at even before it was seen. The Greek philosophers, with their ideas of a symmetrical, spherical earth, postulated an Antarctic Continent even while the known world extended only slightly beyond the shores of the Mediterranean. Aristotle had argued that the earth was round because of the shadow cast upon the moon, and the approximate size of the earth was calculated by Eratosthenes, who argued that the habitable world of the Greeks occupied only one-quarter of it. Therefore, there must be three other habitable land masses to conform to the philosophy of symmetry. It was an astonishing idea.

H. R. Mill, in his splendid book *The Siege of the South Pole*, says that "the legacy of Greek wisdom to Christendom was the fact that the Earth is a globe and the belief that the southern hemisphere of that globe contained habitable land which could never be reached."

But long after the speculation of philosophers had led to the conception of a south polar ocean or continent, after the voyages of those who followed Columbus west had penetrated beyond Cape Horn to the Pacific, the legendary and awesome aspect of the Antarctic continued to dominate the minds of

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men. It is hard to believe that so short a time as one hundred years ago the Antarctic was regarded much in the light of St. Brandon's mystic isle. But so it is. Legend and fact and fancy have been a part of the history of the Antarctic, largely because of those storms and snows and waving curtains of mist which act as guardians of the south.

There is a legend that a Polynesian voyager was the first to see the icebergs of the Antarctic. These native navigators who traversed the Pacific in their big canoes, really ships nearly one hundred feet long, driven by paddle and sail, had reached many of the South Sea islands soon after the beginning of the Christian era. Among them, about A.D. 650, was an adventurous soul named Hui-te-rangiora. He may be only a part of Polynesian mythology, but there is one fact in the legend that is hard to disbelieve. It is easy to invent folk stories, but it is hard to invent something that cannot be known except by experience.

It may have been that Hui-te-rangiora had heard of New Zealand in his home at the Cook Islands from the story of Te Aratanga-nūkū, another explorer of his race who had glimpsed the land which they later called "The Long White Cloud"—a far more beautiful name than New Zealand—lying upon the waters of the South Pacific, and that he hoped to reach it. One day he pushed out to sea and steered south. It was only about two hundred years after the fall of the Roman Empire, about the time Mohammed died, and two hundred years before King Alfred of Britain. Hui-te-rangiora had no sextant, no compass, no chronometer. How the Polynesians navigated, for they did so with astonishing accuracy, is still doubtful, although they probably used the prevailing winds and the stars as their chief guides.

Hui-te-rangiora kept his ship afloat in the stormy waters, in latitudes where it almost always blows a full gale, for the early Polynesians were the greatest sailors of their time. Some of the Polynesian canoes were double, with a platform be-

tween, on which fire was kept and food cooked, and some were long single vessels with an outrigger. Which kind Hui-te-rangiora used can only be conjectured, but probably the single canoe would have been more suited to his purpose. Whatever his vessel, it was not the sort of craft with which anyone would now venture south of New Zealand.

How far Hui-te-rangiora penetrated the bleak, gray, storm-driven seas we can only guess, but there came a time when he found something white floating on the ocean. It was probably an iceberg that had drifted far north in an unusual season, for icebergs have come far from their parent land in that ocean, and have been seen not far south of New Zealand. He had never seen anything like it before—the possibility is that he had never seen ice. The only white thing he knew that floated was arrowroot, and so he called this ocean “*Tai-uka-a-pia*.” *Tai* is sea, *uka* (*huka*) is froth or sea foam, *a* is like, and *pia* is arrowroot. And after one glimpse at it he turned back for the Cook Islands, gladly exchanging ice for warmth, and breadfruit and coconuts for the remnants of food on which he must have been feeding during his voyage. He missed New Zealand altogether.

Dr. Peter H. Buck, who is partly Polynesian and is a leading authority on the history of Polynesian voyages and migrations, does not think that Hui-te-rangiora got very far south.

“My own feeling,” he wrote the author, “is that Polynesian voyagers when they struck cold weather by getting too far south would turn north again because of their scanty clothing. I think that the Roratongans heard of the frozen sea, icebergs, bull kelp, and sea lions from missionaries, traders, or whalers after European contact and that they incorporated their details in the legends of Te Aratanga-nūkū and Hui-te-rangiora, who were undoubtedly great sailors who did voyage into the sea south of Rapa.”

But there still remains the possibility that Hui-te-rangiora

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went far enough south, say, of Campbell Island, to meet a disintegrating iceberg and that he didn't like it. It was certainly a big chunk of arrowroot.

In Europe men's minds played with the idea of an Antarctic Continent and of an open Antarctic sea. There were some who thought that the south polar region was torrid, others that it was an ice-filled sea. A map was drawn to show an open sea surrounded by a ringlike continent, and it was even suggested that one could sail quite to the South Pole, a belief that did not die until 1840. The belief in an open sea was no more strange than the fairly modern hypothesis that there was a lost continent in the Arctic Ocean.

The hold that the Antarctic had on the imagination of men was shown by the result of the voyage of George Shelvoke, who in 1719 was driven south of 60 degrees by a storm, as many mariners had been forced south before him. But Shelvoke touched off something, for his experience inspired Coleridge to write "The Rime of the Ancient Mariner." Shelvoke did not want to go south, and the thought of finding a continent was farthest from his mind. But he wrote well, and his narrative was widely read. While he was off the River Plate in South America, he observed in the ocean long cylinders of white jelly "appearing like white snakes," and one may recall Coleridge's lines:

Yea, slimy things did crawl with legs
Upon a slimy sea.

When he got south of Cape Horn he was pushed south by a heavy wind until ice froze on the rigging; there were "prodigious seas," "misty weather," and "islands of ice."

"In short," says Shelvoke, "one would think it impossible that anything living could subsist in so rigid a climate, and indeed we all observed that we had not the sight of one fish of any kind since we were come to the southward of the Straits of Le Maire [south of Cape Horn], nor one sea-bird ex-

cepting a disconsolate black albatross, who accompanied us for several days, hovering about us as if he had lost himself, till Halley (my second captain) observing, in one of his melancholy fits, that this bird was always hovering near us, imagined, from his colour, that it might be some ill omen. That which, I suppose, induced him the more to encourage his superstition was the continued series of contrary tempestuous winds, which had oppressed us ever since we got into this sea. But be that as it would, he, after some fruitless attempts, at length shot the albatross, not doubting (perhaps) that we should have a fair wind after that."

But Halley was one of those lineal descendants of the early sailors who used to see the devil shove his hand up out of the ocean after a ship passed the Pillars of Hercules and went into the equatorial region of monsters and boiling water. Killing the albatross did not help. The head winds continued for some time, long after the albatross was killed, which gave Coleridge the idea for his famous poem:

The ship drove fast, loud roar'd the blast,
And southward aye we fled.

And now there came both mist and snow,
And it grew wondrous cold:
And ice, mast-high, came floating by,
As green as emerald.

And through the drifts the snowy clifts
Did send a dismal sheen:
Nor shapes of men nor beasts we ken—
The ice was all between.

The ice was here, the ice was there,
The ice was all around:
It cracked and growled, and roared and howled,
Like noises in a swound!

The odd thing is that Shelvoke did not mention that the icebergs were green. Usually they are just gray or white, or reflect the sky, and the grottoes in them eaten by the waves

are dark on dull days and a deep ultramarine blue in the sun. But there are times when holes in icebergs appear green, and Coleridge seemed to sense this. Also, showing how little was known of the Antarctic, Gustave Doré, who once illustrated "The Rime of the Ancient Mariner," sketched polar bears on the ice around the ship, and there are no polar bears in the Antarctic.

Perhaps one of the most remarkable examples of the fascination that the Antarctic had for speculative minds is that both Edgar Allan Poe and Jules Verne wrote novels about it, books which are little known now. About 1838 Poe, inspired perhaps by the discoveries of the New England sealers who had glimpsed Antarctic mountains a few years before, wrote a story called *The Narrative of Arthur Gordon Pym*. Pym put out from New England on a whaler for the Antarctic. After many adventures the ship met icebergs beyond 73 degrees south.

Inasmuch as only James Weddell, a British navy man, had been that far south in the sea that bears his name, apparently Poe took off from the end of Weddell's story. After passing the icebergs at this point Pym's ship went on into an open sea. A pelican was seen and shot, and as there are no pelicans in the Antarctic, he must have got Shelvoke's story mixed up in its ornithology. Pym also saw a bear, which perhaps helped Doré make his mistake. He found an island, and when he left it, went on beyond the 84th degree of latitude, which, of course, is impossible. The air had become warmer. A strong current helped the boat along on a milky sea which became hot, and ash began to fall.

A curtain of vapor spread over the southern horizon—a curtain that can be seen at some parts of the Antarctic at certain times of the year; it is really fog—and as the boat went faster and faster toward a cataract a flock of huge white birds went by, crying tékéli-li. Before the cataract was reached, there appeared on the mouth of the gulf a veiled human

figure, greater than any on earth, of the whiteness of snow.

That was written eighteen years after a Yankee sealer had seen the Antarctic Continent, and seven years after another part of the mainland had been seen by Biscoe.

So interested was Verne in this narrative that he wrote a sequel to it, called *An Antarctic Mystery*, a short time after the mainland had been seen by British and American expeditions. So little was known of the Antarctic even then that Verne invented a huge lodestone somewhere near the vicinity of what is now known to be the Ross Sea—again showing his uncanny intuition—the only practicable entrance into the Antarctic Continent, and had Arthur Gordon Pym drawn to it by the rifle swung across his shoulders. He was found pinned high up on the rock frozen to death.

This mixture of fact and fantasy about the Antarctic persisted for hundreds of years. Somewhat more was known about the Arctic, but the Arctic could be approached by land, as well as by sea, whereas between civilization and the desolate continent to the south were leagues of wind-whipped ocean filled with ice. And it was that which for so long kept the Antarctic inviolate.

The Long Quest

THERE have been few ideas to which men have clung with more tenacity than that of a Southern Continent. Originally merely a metaphysical hypothesis it dominated the minds of explorers for centuries. After the New World had been discovered it seemed to the savants more than ever necessary that a "third world" should exist to balance the other two, else the world would be unstable and would roll over.

Ptolemy, the famous Greek geographer, drew a map showing a continuous land from Africa to the Malay Peninsula, making an inland sea of the Indian Ocean. Leonardo da Vinci, that wizard of the early sixteenth century, placed a continent at the south almost included within the Antarctic Circle, coming closer to the truth than any others. He could not have known, but that he was able to guess so accurately is merely another awesome recognition of his almost super-human intellect.

When Vasco da Gama sailed around the Cape of Good Hope in 1497, he proved Ptolemy to be wrong. But in 1520 Magellan sailed through the strait that bears his name, finding a way into the Pacific, and reported seeing land to the south which he called Tierra del Fuego. This discovery again gave strength to the idea of a southern land. The map of Orentius Finné, published in 1531, was undoubtedly influenced by Magellan's discovery, for it shows a huge continent reaching almost to the tropics in the Indian Ocean, but coming closest to South America, so close as almost to touch it.

But perhaps one of the most remarkable of all these maps is that of Ortelius, published as late as 1570, which shows Terra Australis stretching clear around the world at the base of the southern hemisphere, almost touching Australia and Cape Horn, a bit farther from the Cape of Good Hope, and approaching the Dutch East Indies. There was no suggestion of doubt in the map of Ortelius, and what makes it even more interesting, and shows how he must have been influenced by the Greek school of geographers, is that he filled practically the entire Arctic Ocean with a continent which just missed the shores of America, Europe, and Asia. There was balance for you.

72 Within the last twenty years men have been looking for that Arctic land, and although the area in which it may possibly exist has been tremendously cut down, there are those who even now think that somewhere in the northern ocean lies a large island. Nothing dies harder than a supposition difficult to disprove.

The approximation of imagination to fact in the Antarctic is one of those things which arouse infinite speculation. The old geographers placed their Terra Australis Incognita closer to the southern tip of South America than anywhere else, and it is a fact that the Antarctic land does approach South America much closer than any other continent.

1 These old maps must have intrigued many an ancient mariner, and that they did not press farther south from Cape Horn is probably explained by the terrific gales for which the Cape is noted, and the forbidding ice-filled seas. The first seekers for Terra Australis (Australis means southern) had no desire to reach an ice-clad coast, where nothing human could support itself; they longed for a land of temperate climate, rich in gold and silver and precious stones, where there was an abundance of food, a land populated by millions of people who—according to the fancy of the explorer—

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might be exploited as slaves, or redeemed for the greater glory of the church.

When the blizzards froze ropes in their hands and covered the decks with ice—Mark Twain once satirized these stories by having a man's shadow freeze to the deck when he stood still for a few moments—they turned north for happier hunting grounds. The Antarctic was not to be wooed successfully at first by anyone who approached it with a motive other than unselfish curiosity.

After Magellan, there followed one of the strangest periods in all oceanic exploration, in which religious fanatics, hard-headed merchants, and roistering buccaneers, all had a part. Some of them deliberately sought *Terra Australis Incognita*, but even those to whom it was not an essential *ultima Thule* kept a weather eye open for signs of the vast continent in which nearly all believed. During two and a half centuries after Magellan, hopeful and deluded explorers thought they had found the edge of *Terra Australis* every time they sighted a large island. Indeed some active imaginations placed the outline of a continent in parts of the Pacific where land had never been sighted, and many a learned monograph was published urging that expeditions follow up "discoveries" that had never been made.

Such a memorial was that of Dr. Juan Luis Arias to Philip III of Spain, made at the instance of the Franciscans in Chile who wished to convert the heathen before they were reached by the English and Dutch heretics. Dr. Arias told, among other things, of the remarkable discovery by Juan Fernandez of a land west of Chile in latitude 40 degrees, "a very fertile and agreeable continent" inhabited by gentle and hospitable people. This was far southwest of the actual island found by Fernandez.

The first discovery that seemed to bear out the theory of a southern continent was made on the western side of the Pacific, where Portuguese and Spanish navigators stumbled

upon New Guinea. Yñigo Ortíz de Retes followed the coast for hundreds of miles without coming to an end, and decided this was undoubtedly part of Terra Australis. Forty years later, in 1567, Pedro de Sarmiento induced the Viceroy of Peru to fit out an expedition to search for the southern continent, and Alvaro de Mendaña, nephew of the Viceroy, was appointed commander. He found the Solomon Islands, and a little gold, and concluded that they were connected by land to New Guinea.

Then appeared the first Englishman to venture into low latitudes, Sir Francis Drake, the boldest buccaneer of his time, who cared nothing for the Pope's Line of Demarcation that gave the New World and most of the Pacific to the Spaniards. He was the kind of man who might have penetrated far into the Antarctic if he had had the desire. As it was, he was driven by a storm down to about 57 degrees south after passing the Strait of Magellan. This was the farthest south yet attained, and if Drake had been fired by the ambition to discover the southern continent he might have come very close to it.

But he was out for plunder and there were no rich Spanish galleons waiting among the icebergs. So he bore north again until he sighted land which, from the descriptions of the chaplain, Francis Fletcher, was in the latitude of 56 degrees south. He "came finally to the uttermost part of the land towards the South Pole; the extreme cape or cliff lying nearly under 56 degrees S., beyond which neither continent nor island was to be seen; indeed the Atlantic and the Pacific Oceans here unite in the free and unconfined open."

There seems no doubt that Drake had come from the south to Cape Horn, later discovered by Le Maire and Schouten in 1615, but his observation apparently was lost with the Cape Horn winds and nobody realized its importance. In fact, the English freebooter had his mind on other things, and although he appreciated the fact that he had been on the

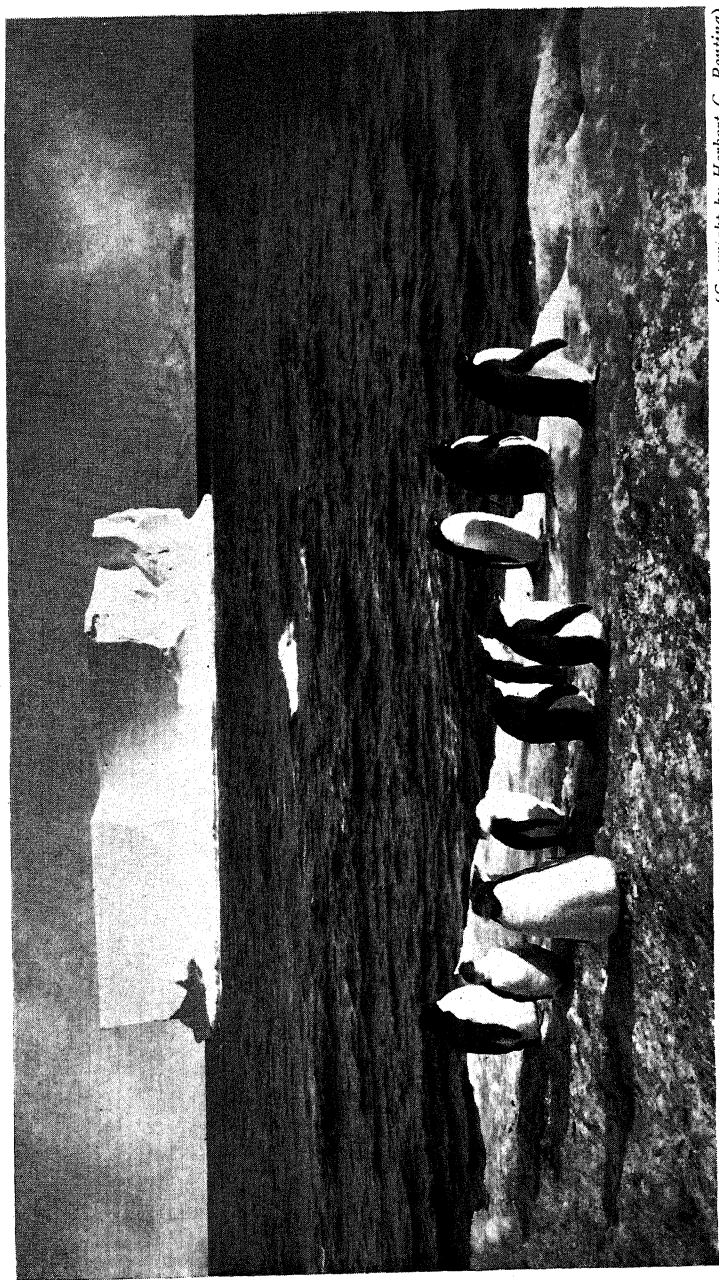
southernmost point of the American continent, had thrown himself down over the edge of the cliff in exultation, he later thought so little of his achievement that he did not even bother to give the point a name.

But if Drake was possessed of a thoroughly mundane desire to fill his ship with Spanish gold—which he did—and had no time for exploration, the temperamental and imaginative Latins were fired by the thought of greater conquests. It was a day when men sought land for the sake of power, and it seemed obvious that the nation that could annex the great southern continent would secure untold riches.

The church, also, was not averse to gaining spiritual dominion over the unknown lands. There arose an unsurpassed pleader in the person of Pedro Fernandez de Quiros, who had been a pilot with Mendaña on his second voyage. Quiros is an enigma. Whether he was a rogue or a true religious fanatic is difficult to determine. The probability is that in him were combined the fervid curiosity of the explorer with an equally burning religious zeal. Certainly no stranger figure has ever stepped into the history of exploration, and it is Quiros who now engages our attention.

Quiros first appealed to the Pope for aid, telling of the millions of benighted heathen who awaited redemption in their rich southern land. That he had never seen either them or the land did not deter Quiros. So eloquent was he that the Pope sent him to Philip of Spain, and as he had appealed to the Pope in the name of the heathen, so he appealed to the cupidity of Philip. He promised the king riches such as dwarfed all the wealth of America, and said that "the hidden part is one-fourth of the world, and of such capacity that double the kingdoms and provinces of which your Majesty is the Lord could fit into it." No wonder Philip was moved to grant Quiros' petition.

So the evangelist-pilot set out with three ships from Callao in December, 1605, to explore the coast of Terra Australis



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Plate 1.—Adélie penguins, and a typical, although small, antarctic iceberg.

from Tierra del Fuego to New Guinea, for obviously the land must extend that far in the Pacific. He was accompanied by six Franciscan missionaries. One cannot help thinking of Anatole France's *Penguin Island*. If the poor priests had only known what the real continent was like, and that if they reached Terra Australis their only proselytes would have been seals and penguins! Quiros finally reached some islands now known as the New Hebrides, but which he took to be part of the unknown continent. He gave it the name of Austrialia del Espíritu Santo. (The name Austrialia, not Australis, was bestowed because Philip III was also Archduke of Austria.)

Having done a good job of exploration, Quiros then proceeded to go slightly mad. The most superficial examination would have shown him that he had discovered islands, not a mainland, but nothing could persuade him that he had not discovered a continent.

He landed and set up a cross, and took possession in the names of the Holy Trinity, the Pope, the Franciscans, and the King of Spain. He kissed the ground, and said: "O Land, sought for so long, intended to be found by many, and so desired by me." He took possession of "this bay, named the Bay of St. Philip and St. James, and of its port named Santa Cruz, and of the site on which is to be founded the city of New Jerusalem, in latitude 15 degrees, 10 minutes, and of all the lands which I sighted and am going to sight, and of all this region of the south as far as the Pole, which from this time shall be called Austrialia del Espíritu Santo, with all its dependencies and belongings."

The natives did not want to be converted, and the robbing of their villages and the seizure of three young boys by Quiros did not speak well for his Christianity. So after misadventures he left, and returned to South America. Torres, his second in command, discovered the strait that bears his name, proving that New Guinea was not part of the

southern continent. But to his death Quiros insisted that the land he discovered was richer than all other Spanish possessions in the New World and as large as Europe and part of Asia.

Soon after Quiros, the Dutch set out from Java for New Holland, as Australia was then called. They outlined part of the northwest coast, and Tasman, the greatest of them, actually sailed around the southern part of Australia without sighting any land except the island of Tasmania, which is named for him. He also reached the west coast of New Zealand, which he called Staten Land, and which he thought might reach as far as Cape Horn. He was sure it was part of the southern continent.

Much later in the seventeenth century many English buccaneers rounded the Horn and were driven south to high latitudes, and so were a number of Dutch navigators. Edwin Swift Balch in *Antarctica* says that there was a statement published in Amsterdam in 1622 to the effect that there was land in 64 degrees south, south of Cape Horn, and that it was mountainous and resembled the coast of Norway. As Balch says, the land is there, possibly the South Shetlands, or even land farther to the south and east, and it does resemble Norway. "It seems," he adds, "as if it must be accepted as true that someone sighted some of the islands of West Antarctica before the year 1622." But this report apparently received little attention, for the belief grew that there was no possibility of reaching the continent to the south of Cape Horn.

In 1721, however, Jacob Roggeveen, sent out by the Dutch East India Company, reported reaching 64 degrees 58 minutes south, and he was convinced that land lay south of him because of the abundance of pack ice, then thought to form only near land, and the number of birds.

Men kept nibbling away at the southern unknown, but they found only infinitesimal bits of land. Lozier Bouvet, a

French naval officer, reported finding Cape Circumcision on an island which later could not be discovered by Cook but which is probably Bouvet Island. He did cut down the area in which a continent might have been. The abundance of seals and penguins on the ice along which Bouvet coasted were to him signs of land, and these observations were later used by French philosophers to buttress the argument that land did exist somewhere in the far south. Charles de Brosses, who compiled a history of the search for *Terra Australis* in 1756, said that:

“The most celebrated of modern sovereigns will be he who gives his name to the Southern World. This enterprise can only be carried out by a king or a state; it is beyond the resources of an individual or of a company, for a company seeks before everything profit and immediate profit.”

If de Brosses could see the way in which the Antarctic is now divided up into claims, with several nations, including the United States, attempting to stake out that ice-covered and forbidding territory, he would undoubtedly be astonished at the magnitude of the country and the extent of the task. But he was right in assuming that only a state might successfully subjugate *Terra Australis*. It has not yet been accomplished, although the work done by the Russian government in the Arctic shows that when the resources of a state are used in the determined conquest of a polar area there are few obstacles that cannot be overcome. But there is not much to reward men in the Antarctic, outside of scientific research and adventure. Even de Brosses thought that difficulties presented by the ice would become less as the explorer got farther south—the old fallacy of a temperate and habitable land would not down.

It was this unshakable faith, or hope, which led the French to send out an expedition headed by Marion-Dufresne, who found the Marion and Crozet Islands, outposts of the Antarctic. And Yves Joseph de Kerguelen-Tremarec, a French-

man, was encouraged to seek a fair southern continent. He sailed south from Mauritius in 1772 and found land in 49 degrees 40 minutes south, along which he coasted for about forty miles until he was blown off by a gale. This quick glimpse of land so far south was enough to persuade Kerguelen that he had found that which he sought. When he returned home he rhapsodized over it in a manner reminiscent of Quiros:

"The lands which I have had the happiness to discover appear to form the central mass of the Antarctic continent. The latitude in which it lies promises all the crops of the Mother Country from which the islands are too remote to derive fresh supplies. No doubt wood, minerals, diamonds, rubies, precious stones and marble will be found. . . . If men of a different species are not discovered at least there will be people in a state of nature living in their primitive manner, ignorant alike of offense or remorse, knowing nothing of the artifices of civilized society. In short South France will furnish marvellous physical and moral spectacles."

Kerguelen was led astray by the latitude in which he had found land. It had not yet been thoroughly appreciated that the southern hemisphere was actually somewhat colder than the northern, not only due to the vast ice-covered continent to the south—of which nothing was yet known—but also to the fact that the Antarctic winter is actually a few days longer than the northern winter, because the Antarctic summer takes place when the earth is farthest from the sun and its motion in the elliptic is slower. When Kerguelen found land in the approximate latitude of Paris, he could hardly be blamed for going so far astray as to think that it might have a temperate climate.

But he was doomed to disillusion. He went back to his South France, went ashore and found a less hospitable land than northern Greenland presents in the summertime, for Peary reports having heard a bee buzzing in Greenland about

the short-lived flowers, and there are no bees where Kerguelen went. He changed the name of the frigid, wind-swept mass of rock and ice to the Land of Desolation, but it is on the charts as Kerguelen Land. It was not even part of a continent, for Cook had passed south of it before his return. It is but right that the land Kerguelen discovered should be his monument, for his courage was as great as his imagination, and Kerguelen Land is famous in Antarctic annals.

The British then decided that something must be done about this southern continent. Men had thrust south to a considerable distance at widely separated points, but there was a tremendous ocean area between New Zealand and South America that had not been traversed. Nobody had sailed around Terra Australis in high southern latitudes. There still persisted a belief that the southern continent was attached to some known lands. And if so, and it were habitable, the English wanted it. If there were habitable islands on its fringe, they wanted those.

When the *Exeter* drew away from her battle with the *Admiral Graf Spee* off Montevideo (Dec. 13, 1939) she went to the Falklands for temporary repairs. These islands, colonized by Bougainville, the famous French explorer of the Pacific, were handed over by him at the command of his government to Byron, the British explorer of the Pacific, in 1765. The Falklands were held to be the key to the Pacific.

When Shackleton, after his famous journey from Elephant Island, after being wrecked in the Antarctic, went ashore on South Georgia, he landed on an island rediscovered by Cook and claimed by him, as had been directed by the British admiralty. And there are two British claims to sectors in the Antarctic Continent, between which lies the land claimed by the American explorers, Byrd and Ellsworth. (Land in one of these sectors, the Falkland dependency, was first seen by an American sealer, and there has been much controversy over it, as will be seen later.) But Cook was sent out to find

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the mythical continent and be the first to claim it, and although he did not do so he established himself as the greatest explorer the world has ever known.

When Captain James Cook was sent to look for Terra Australis in July of 1772 he had but recently returned from a voyage to Tahiti to observe a transit of Venus, a voyage on which he included the circumnavigation of New Zealand, first seen by Tasman, and proved it to be two islands. He also explored the east and northeast coast of Australia for some distance, and confirmed the discovery of Torres that New Guinea had no land connection to the south. He brought back the most complete record of research and observation of any explorer up to his time. It rather startled the admiralty. So when it was suggested that an expedition be sent south to settle this question of a southern continent, Cook was obviously the man to lead it.

One of the most enthusiastic supporters of such a venture was an irascible person named Alexander Dalrymple, who had become convinced of the existence of a southern land, and whose exuberant prophecies show how little was known even as late as 1772, when he suggested such an investigation. He wanted to lead the expedition himself, and well he might if he believed that:

"The number of inhabitants in the Southern Continent is probably more than 50 millions, considering the extent, from the eastern part discovered by Juan Fernandez, to the western coast seen by Tasman, is about 100 deg. of longitude, which in the latitude of 40 deg. amounts to 4596 geographic, or 5323 statute miles. This is a greater extent than the whole civilized part of Asia, from Turkey to the eastern extremity of China. There is at present no trade from Europe thither, though the scraps from this table would be sufficient to maintain the power, dominion, and sovereignty of Britain, by employing all its manufacturers and ships."

And yet, with two sectors of Antarctica established as Eng-

lish by Orders in Council, all that England has ever gotten out of the territory are sealskins, seal oil for lamps, and in recent years whale oil for soap. Of course, that amounts to something, but compared to Dalrymple's vaporings, it is practically nothing.

What Cook thought of all this is not known. He was a sailor and an officer in the King's Navy. A tall, six-foot man, not given to superficial enthusiasms, he had earned his rank and reputation by a real scientific curiosity and an intense application to the details that make a voyage of discovery valuable. He combined the daring of the hardy navigator with the caution of one who wishes to conserve his observations and get them home. He was a leader of remarkable quality, all too rare in men of more fervid imagination, and his men were willing to follow him anywhere he wanted to go, despite shoals, gale, or ice. Reciprocally, he looked out for their welfare, knowing that a healthy and contented crew can best be relied upon to follow orders to the last extremity, and there were no ships up to his time that were so well-provisioned and equipped, or kept so clean and free of damp. Cook was the first man to conquer scurvy, that scourge of early explorers by sea.

On this voyage Cook had two vessels, the *Resolution*, of 462 tons and 112 men under his own command, and the *Adventure*, commanded by Lieutenant Tobias Furneaux, of 336 tons and 81 men. They were stout, ship-rigged vessels, suitable to cope with ice and southern gales. They were provisioned for two years; the meat was salt pork and beef, but they also carried preserved vegetables, soups, sugar, and sweet worts, which Cook had decided were antiscorbutic.

The chronometer had just been invented, and Cook had several of them for ascertaining longitude. Although he made a few serious errors, most of his observations were astonishingly accurate. There were no time signals by radio in those days, and if the rate of a chronometer became somewhat

fickle, there was no way to check it. But Cook was a genius at navigation, largely because of his capacity for thoroughness.

He sailed from Plymouth on July 13, 1772, and left Cape Town on Nov. 22, headed for the Cape Circumcision reported by Bouvet. He never found it, and later sailed over the site given by Bouvet's observations, which shows how far out a conscientious mariner like Bouvet could get in those days. It will be seen as this narrative progresses that positions were frequently wrong, and that unfortunately men sometimes saw land where there was none. But "seeing things" which are not there is even now not unusual in the polar regions.

The ships met gale after gale, the livestock died of cold, and in 50 degrees 40 minutes ice was met, so much that it stretched to the east and west and south as far as the eye could see. So Cook sailed north again, and then south, working his way as far into the ice as he could go while pushing to the west. When he was stopped by ice, and found himself surrounded by huge bergs that, in the Antarctic mist, seemed like land, he again turned his ship and headed east and south. The ship was coated with ice, the rigging became like ropes of crackling crystal, the cold wind cut through clothing, and moisture condensed everywhere in the ship, despite the use of stoves.

Christmas was celebrated by a jolly, if somewhat bibulous, party, and a Scotchman played on his bagpipes, perhaps under the lee of an iceberg which sent some extraordinary Celtic echoes back to the ship. Rain, sleet, and snow fell on the sturdy ships, which continually dodged between floating islands of ice that could be as dangerous as a lee shore of granite. But on Jan. 17, 1773, the Antarctic Circle was crossed for the first time. That mythical land of Quiros was proved to be the frigid zone of the ancient Greeks, and so far as Cook could see there was not even land below the

mystic circle. But bergs, and a barrier of ice, again drove him north.

When he turned north, he had actually been south of the latitude of Enderby Land in the Antarctic, but a little too far to the west. If he had been more fortunate, he might have raised this land and been the actual discoverer of the Antarctic, but luck was against him, as it has been against many men who have tried to push their way through the icy ramparts of the southern continent. Ice plays no favorites, it is bad one year and yielding the next, and discovery has waited on its whims.

So Cook went north again looking for the islands found by Marion and Kerguelen, without sighting them. He reached a point almost midway between them in the same latitude, and then turned southeast again, passing between Kerguelen Island and the Antarctic coast, a passage that definitely ended the French discoverer's hope that he had found a southern continent. From there on his ships with their weary crews, longing for warmth and fresh food and the solid feel of land under their unsteady feet, worked their way to the east along the 60th parallel, until they turned east for New Zealand. They had earned a respite.

After searching for several months for the mythical continent of Quiros and Dalrymple in Pacific waters farther north, and after a visit to Tahiti, Cook returned to New Zealand and set out once more, on Nov. 26, 1773, for the south. He held to the southeast and met the ice in 62 degrees 10 minutes south, which is farther north than it has often been found by later explorers.

In fact, Cook's voyages in the Antarctic seem to have been during years of unusually heavy ice. But he pushed on eastward in a zigzag course until he again sailed south of the Antarctic Circle on Dec. 15. One cannot avoid speculating as to what might have happened if he had found during this period so little ice that he might have shoved his way

through into the Ross Sea, or even approached the coast of Victoria Land. The girdle of pack ice that binds the Ross Sea, the only practicable gateway to the continent in that region, is not always wide. Some ships have been through it in a few hours. But it was undoubtedly heavy that year, as it was in 1928 and 1930 on the occasions when the writer went through it. The first season it was 240 miles wide, probably looking much as Cook saw it, a vast solid plain studded with bergs glistening in the sun, or lying gray and grim under the clouds. No wonder it dismayed Cook at a time when there was no sure proof that land lay beyond, the prize of a continent worth taking risks to reach.

So Cook turned north again to 47 degrees 50 seconds south in 123 degrees west longitude, proving that there was no land connection between New Zealand and Cape Horn. Then south again stubbornly butting against the ice until on Jan. 30, 1774, the ship was stopped by an ice field that was solid as far as the eye could see. It was Cook's farthest south, 71 degrees 10 minutes in longitude 106 degrees 54 minutes west. Not until a few years ago was that record surpassed on that shore of the continent. Said Cook:

"I will not say that it was impossible anywhere to get farther to the south; but attempting it would have been a rash and dangerous enterprise, and which, I believe, no man in my situation would have thought of. It was, indeed, my opinion, as well as the opinion of most on board, that this ice extended quite to the pole, or perhaps joined on some land to which it had been fixed from the earliest time. . . .

"As we drew near this ice some penguins were heard but not seen; and but few other birds, or anything that could induce us to think any land was near. And yet I think there must be some to the south behind this ice; but if there is, it can afford no better retreat for seals or any other animals than the ice itself, with which it must be wholly covered.

"I, who had ambition not only to go farther than anyone

had been before, but as far as it was possible for man to go, was not sorry at meeting with this interruption, as it in some measure relieved us, at least shortened the dangers and hardships inseparable from the navigation of the southern polar regions. Since, therefore, we could not proceed one inch farther to the south, no other reason need be assigned for my tacking and standing back to the north."

He left the ice and sleet and blinding gales that had so tried both him and his men and turned the ship into a damp and chilly cave, and headed north for Juan Fernandez Land, which he proved did not exist. He stopped at Easter Island, that mysterious place of strange statues, and then went on to Tahiti. And just to check up on the vaporings of Quiros he called at *Australia del Espíritu Santo* and proved, what Quiros might easily have done, that it was merely a small archipelago. He renamed the group New Hebrides, as it is known to this day.

After another stop at New Zealand, which Cook seemed to have an especial liking for, and which made an excellent base for his extended voyages in the Pacific, he headed for home. But this time he ran clear across the southern Pacific to *Tierra del Fuego*, running his easting down, as later skip-pers called it, and after rounding the Horn he discovered the Isle of Georgia, an even more typical Antarctic land than Kerguelen Island. Its gaunt, ice-covered cliffs and its snow-capped peaks and glaciers resembled Greenland. It was even more forbidding, for there was not a bit of vegetation except a coarse long grass and a mosslike plant in the rocks. But Cook took possession of it, and later it became a whaling station, and the place where the great explorer Shackleton died and is buried.

Cook again turned south but was blocked by pack ice and bergs in 60 degrees south; taking a northerly course, he ran into some islands which he called Sandwich Land. Although he could not get near enough to tell whether the peaks he

saw were islands or continuous land, he felt that to the south there might be an extensive land—otherwise, why all the ice? He could not know that he was at that point much farther from the Antarctic Continent than he had been many times before. So he put about for Cape Town, having encircled Antarctica and having wiped off the map all the mythical lands of the early map makers except the Antarctic Continent itself. And as to that he had no delusions, saying:

“Countries condemned to everlasting rigidity by Nature, never to yield to the warmth of the sun, for whose wild and desolate aspect I find no words; such are the countries we have discovered; what then may those resemble which lie still further to the south? . . . Should anyone possess the resolution and the fortitude to elucidate this point by pushing yet further south than I have done, I shall not envy him the fame of his discovery, but I make bold to declare that the world will derive no benefit from it.”

Except for scientific achievements and the money derived from whaling, Cook was right in assuming that there was little benefit to be derived from penetrating the veil of mist and the ramparts of ice that hid the Antarctic Continent. But he was wrong in assuming that there was no fame worth having in pushing farther than he did. Men have won immortality in defying the Antarctic, some of them have remained there in their frozen shrouds, and others have acquired rank and fortune because they did what Cook, the greatest of all explorers, could not have possibly done. But there have been few who have dared and achieved so much.

The Lost Continent

BUT, as Cook seemed to realize, there was a continent behind the barrier of ice that repelled him. It is the strangest and one of the largest continents on earth. The United States, all of Mexico, and part of Canada could be contained within its boundaries. It is nearly circular, following somewhat roughly the outline of the Antarctic Circle, with two deep indentations, the Ross Sea and the Weddell Sea. Only the Ross Sea is a practicable entrance for ships.

The continent is almost entirely covered by ice of undetermined thickness, probably thousands of feet in some places. If all of it melted, it would raise the level of the seas to a point where many seacoast cities would be inundated. Only parts of New York would be habitable. And the probabilities are that the Antarctic is slowly getting warmer and melting. But that is something for generations a few thousand years from now to worry about.

The Antarctic—the name is derived from the Greek words *anti* (opposite) and *arktos* (bear), the bear being in the constellation that contains the North Star—is the most isolated continent on earth. It is isolated not only because of the storms and ice that make it inaccessible, but because of the ocean depths that surround it. Although the Antarctic Ocean is not now recognized on the charts—although it used to be before the continent was discovered—there are Antarctic Basins on all sides of the continent except where the Kerguelen-Gaussberg Ridge runs down from Kerguelen Island, and where Drake Strait, south of Cape Horn, runs to the east into the relatively shallow area between the South

Orkneys and the South Sandwich Islands. Elsewhere, the continental shelf drops off abruptly into deep water punctuated by tremendous depths.

The Antarctic is a lone continent, physically, as well as actually, the only one on earth. Asia and America are separated at Bering Strait by only forty-two miles, with an island between. But the nearest point to Antarctica from any other continent is Cape Horn, and that is 600 miles away through some of the worst water in the world.

There is another odd thing about the Antarctic. The average altitude for this area of over 5,500,000 square miles is probably about 5,000 feet. One says "probably" because so much of the Antarctic is unknown. But the polar plateau, discovered by Shackleton, is more than 9,000 feet, and Sir Edgeworth David on his trip to the Magnetic Pole on Shackleton's first expedition found an elevation there of between 6,000 and 7,000 feet. Lincoln Ellsworth, on his flight from Palmer Land to Little America, found an altitude which indicates that the altitude for the entire continent is probably 2,000 or 3,000 feet higher than Asia, which averages 3,200 feet. It is a huge dome-shaped continent of snow and ice, ice that has filled in between its mountain ranges, as the mountain fringe of Greenland encloses a cup of ice about 8,000 feet high.

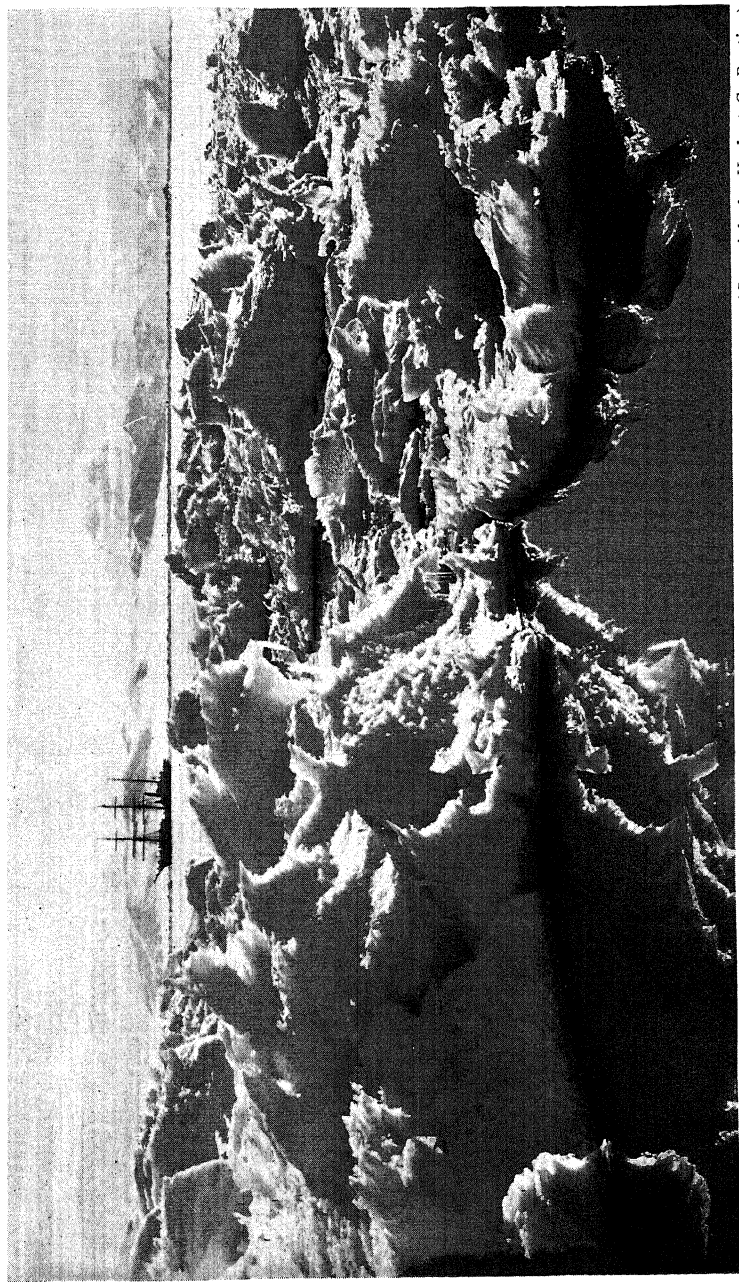
But opposite the Antarctic is the Arctic Ocean, a basin about 9,000 feet deep, surrounded by land. Why should the earth be pushed in on one end and out on the other in this way? Is there some physical correspondence there which may be explained? There have been geologists who have tried to explain this strange phenomenon by suggesting that as the earth shrinks it is adopting a tetrahedral formation, with the South Pole as the apex. But that does not seem reasonable to other equally distinguished geologists.

There remains the fact that all large bodies of water are

antipodal to large bodies of land, with a few minor exceptions, due largely to the fact that the Pacific Ocean, which occupies half of the earth's surface, balances land masses on the other side. And so it is that the Antarctic Continent balances the Arctic depression at the north, despite the fact that the Arctic coasts are not symmetrical and that the Arctic basin is not nearly so large as the Antarctic Continent. When one realizes that these heights and depths of 10,000 feet are mere pin pricks on the surface of a world of 8,000 miles diameter, their significance can be laid to chance or to some other fascinating theory, such as that of the drift of continents.

For there are those who believe that at one time the Antarctic was possibly joined to Africa, South America, and Australia. Whatever one may guess as to its origin, it is obvious that it was so far back in the realm of time and its history is so hidden beneath its snowy and icy covering that it will be a long time before geologists solve its mysteries.

There seems little doubt, however, that at one time the Antarctic had a warm and humid climate. Inasmuch as it is generally conceded that this earth was once molten, gradually cooled, and for a long time was extremely hot, that is not strange. Moisture and heat and vegetation are needed to make coal, and coal has been found within 300 miles of the South Pole. There is a long seam of it running from there to the north, and in it have been found fossil wood and the remains of plant forms. It also seems probable that at one period in its history the Antarctic was warmer than it is now, for otherwise it is difficult to explain the fact that there was in former times a much greater deposit of snow than at present. Glacial moraines and lines formed by ice have been found hundreds of feet above the present level of ice on mountainsides. How did they get there? The geologist guesses that it was warmer then, that there was a greater



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Plate 2.—The beauty of the Antarctic.

snow deposit—for comparatively little snow falls in Antarctica now—and that in later years, with colder weather, the evaporation of snow, the ablation of wind and sun, has been faster than the snowfall.

There is no doubt that Captain Scott found the famous Ross Ice Barrier much farther to the south than it had been observed by Ross, its discoverer. And in the last few years Lincoln Ellsworth, an amateur but observant geologist, has found indications that the Antarctic is again getting warmer. As has been said, the Antarctic is a region of contradictions and open to limitless speculation, and one man's guess is as good as another's.

The Antarctic Continent is also the only continent where a day is a year long. In those regions some 700-odd miles from the pole, where most explorers have spent the winter, the sun shines for about four months. Not that the day and night are divided sharply; they are not. When one arrives in the Antarctic, say in the Ross Sea, it is generally about the middle of summer. The sun shines all the time, circling in a flat arc about the horizon. It gets lower and lower and a little after the middle of April disappears.

For some time before the sun disappears there have been the magnificent sunsets peculiar to the Antarctic, when the sun is surrounded by false suns and halos, when gold drips from a rough-edged golden sphere to the snow plain below and ripples like waves on a lake, when the sky is colored with red and green and blue segments with the great, soft disk of the sun in the center. There is no sight like it in the world. And then the sun gradually falls below the horizon, and for weeks the light gets fainter and fainter while in the north a little remains to show that somewhere at noon there is warmth. One who has thought that there is complete darkness during the Antarctic night is always astonished at the reluctance of this little disk of pale light to

vanish completely. Of course, it does on cloudy nights, and in the middle of the winter.

Then it begins to come back again, and there are months when the sky to the north gets warmer and warmer, until the red, swollen sun stares above the horizon a few moments before disappearing, and the next day comes up again to remain a little longer, until finally it again travels in a tilted circle about the horizon to warm and bring comfort to those poor creatures who have been living in darkness. The return of the sun can be appreciated only by those who have been without it for months, who have watched its faint glow in the north, who have longed for warmth again to creep into them from the sky. But it takes a year to complete this cycle, a year that is as a day.

When one thinks of warmth coming back again, it may be well to consider what are the temperatures of the Antarctic. There are colder places where men have lived—northern Siberia, for instance. It is sometimes as cold in Minnesota or Wisconsin or some parts of Canada, which are well populated, as it is a good part of the time in the Antarctic. But all these regions have their summer warmth. Northern Canada is hot in summertime, people suffer from the heat in Alaska and Siberia, but in the Antarctic the temperature never gets above freezing except in the region just south of Cape Horn or in some parts of the seacoast.

No expedition on the Ross Sea has ever known temperatures above freezing while they were on land or ice. Ordinarily, after a winter there, a few degrees above zero seem hot, and men can be seen taking sun baths, stripped to the waist. It is the continuous cold that makes the region unique. In places where men have lived the temperature goes down to 74 or 76 below zero. A month of an average of 60 below is not uncommon.

It is this abnormal year-round temperature that makes the continent so unusual. It accounts for its silence. *There is no*

living indigenous thing in all Antarctica except the emperor penguin. In the summer as well as in the winter, when one gets away from an encampment, there is no sound. It is the silent continent. When the wind blows from the dark mountains in the winter, when it howls around the ventilators and the anemometer stays, then one is filled with a sense of awe and wonders what strange caverns it came through, what wastes it wandered over, and where it is going.

But aside from the wind, and the blinding drift, there is silence. A silence so profound that the footsteps of men two or three miles away are heard, their voices engaged in casual conversation almost carry the words, and the crunch of snow underfoot is loud.

I remember a Norwegian sailor one day, riding with me on a sled behind dogs, who said suddenly: "I can hear my heart. It is so still." There is no sound in the Antarctic when the wind does not blow, because there is nothing to make sound. Two miles away behind an icy cliff one summer, we heard the seals in their nursery barking.

And so you have this dome-shaped land of mystery, despite the inroads made on it by airplanes and dogsleds, still a land that is little known. We know some of its magnificent mountain ranges, running along the east and west sides of the Ross Sea, with their glaciers spilling down into the water, we know its great ice shelves where are born the vast bergs that move so majestically to the north, we know that in the interior there are mountains running across the foot of the Ross Ice Shelf and along the coast of the Ross Sea, we know the Antarctic holds one live volcano, Mt. Erebus, which spits fire into the winter darkness, we know a few outlines of its vast surface—but much of it is yet beyond the reach of man. What may be under its ice covering is a matter for conjecture. But it is a magnet that has drawn men and will draw them until all its great expanse is charted.

A sympathetic historian, Walter Hayward, once called it "The Last Continent of Adventure." It will be that for a long time.

The only life that is seen in the Antarctic is in the summertime, when the petrels, the skua gulls, the seals, and the penguins break the monotony of icy plains reaching to the sea. And the whales who blow continuously off the shore, in the rich, shrimp-filled waters.

The petrels are usually the snowy kind, their only black spots being their eyes and their beaks. One can row up to an ice cake on which they are perched, and all that will be seen are tiny dark spots, their bodies blending perfectly into the gray-white background.

The skua gulls, which are nasty things, scavengers and with other habits unnecessary to mention, inhabit the edge of the shore ice in the summertime.

The whales are of several kinds, the most numerous being the fin whales along the edge of the pack ice, and the killer whales, with their high, triangular fins, their dirty-colored underbodies and their mouthful of teeth. They are the sharks of the Antarctic, tigers of the sea. The big blue whales, sought by the whaling factories, are magnificent creatures of about 100 tons and nearly 100 feet long, the largest mammals that have ever lived.

The seals are nothing like the northern seals. The Eskimo hunts his seal with the utmost caution, always expecting him at the slightest alarm to pop overboard and disappear. The Antarctic seals, most of them, lie on the ice in a kind of stupor, completely indifferent to those who approach them, and making all sorts of incredible sounds. If they raise their heads with difficulty at the approach of a stranger, it is only to drop them again sleepily and, after giving vent to a combined whistling, gurgling, and grunting, relapse into another seal daydream.

They have never, since they were nearly exterminated in the islands surrounding the Antarctic Continent, been afraid of anything while they were on the ice. Their enemies, the killer whales, are in the sea. Man is regarded as a nuisance and quite harmless, for they see him seldom. So explorers, who need them for food, find it difficult to kill them. Who could stab a nice, fat hobo in the back!

The penguins are different, what all explorers remember gleefully, particularly the Adélies. These are the little fellows, about eighteen inches high, and as full of curiosity and devilment as a wire-haired puppy. Their shirt fronts are white, their backs a shiny black, their general sartorial appearance being that of the well-dressed man about town, with a manner of walking that out-Chaplins Chaplin. They have a sense of humor, I am sure; they stick their nose into everybody's business, and they are afraid of nothing on earth.

When we first went ashore on the floating ice at the Bay of Whales, about ten miles from Little America, in 1929, an airplane was assembled as soon as possible and sent on a few flights. As it was ready to take off on the third or fourth flight, an Adélie penguin popped up out of the water—they swim so fast that a leap of a few feet onto the ice is nothing at all—and after shaking its flippers and its ducklike tail, started on a run for the plane. This was a strange bird, it thought.

The motor was turning over slowly as the pilot warmed it up, and the Adélie got almost to the tail surface of the plane, running in that breathless way they have, when the engine was opened wide for the take-off. A cloud of snow blew back, the little penguin was engulfed, and when next seen he was turning end over end until he landed with a complete lack of dignity on his feet. He waggled his flippers, stalked to the edge of the ice, and dove overboard.

I am sure they have a sense of humor because of some of the games they play. Here is one that I have never seen de-

scribed even by much more competent observers who have seen them in their rookeries.

One day I came upon a group of penguins surrounding a little hillock of snow. One of their comrades was standing on top of the pile, preening his feathers occasionally, and for the most part gazing away into space as if totally oblivious of his friends below. He would turn around, look at the sky, heave a sort of penguin sigh, so it seemed, and relapse into boredom.

All this time his fellows below watched him intently. They let him get away with it for quite a while, and after five or ten minutes another Adélie would waddle up the snow pile, push him off, and also stand in a rather kingly dominance of the small world it surveyed. The displaced penguin would join the ranks below and be just as curious and respectful and intent in watching until another bird went up and assumed the throne after a healthy shove. This would go on for an hour or two. It must have been a game, and they must have got some sort of fun out of it. They made one think of extremely mischievous children.

It is not at all unusual for one of them to run at a dog team that is lying on the snow and run through it rapidly, pecking as it goes. The dogs do not quite realize that they have been insulted until the penguin has passed and is preening itself at a safe distance, laughing internally at the fight in which the dogs mix up themselves and harness so that it is twenty minutes' work to get them straightened out.

And if one wants to see human curiosity at its ultimate—and the word “human” is used deliberately because of the human qualities of these delightful creatures—there is nothing like watching an Adélie observing a man digging a hole in the snow. The shovel, the hole, the man's movements, are incredible. It will stand on the edge, almost in line with the shovel, bending its head to look at the snow, turning its bright little eyes, with their white outlines, up to the digger,

and back again, in a fierce concentration of astonished pre-occupation.

They are the sentinels of the frozen land, the first creatures one meets in the pack. They follow the ship, dropping off an ice floe, popping out on another after an underwater swim, waddling with all their Chaplinesque might to another open bit of water, and squawking defiance. One of the funniest sights ever seen is a tiny Adélie yelling at a 17,000-ton ship in the ice pack. Plucky—they would tackle a tank.

The emperor penguins are different. They are large birds, eighty pounds or more sometimes, and as dignified as their name. They are beautifully marked in purple and gold around their head and bill, and their shirt fronts are magnificent expanses of white on which they ski more rapidly than they can walk. Emperors will travel long distances, but when they want to get anywhere in a hurry they get down on that marvelous shirt front and propel themselves with feet and flippers.

They will stand and regard strangers with a disconcerting calm. Their manners are flawless. No emperor will ever come up to you without bending his head and neck in a most deferential bow. They will bow to the dogs, to Adélie penguins, to an inquisitive explorer, to anyone with whom they are not on intimate terms. One sometimes feels, on meeting them, that it would only be polite to take off one's hat and bow in return. They are perhaps the hardiest creatures on earth. They hatch their eggs at 70 degrees below zero, or more, in the middle of winter. And they can almost knock a man out with a blow of a flipper to the chin, or break an arm. They are slow to wrath, but not to be trifled with.

Magnificent creatures, these penguins, both the Adélies and the emperors. Perhaps thousands of years ago they had wings; now their flippers are scaly and used only for swim-

ming. But they are probably the only descendants of the original inhabitants of a land where birds could fly and creatures swim, where trees grew and there were warm mists, a land that has congealed and hidden nearly all its early history. The penguins and the ice and the craggy mountains remain above the ice; below it is buried a geological past that men still seek to solve. A strange, lost continent that appeals to the imagination, that has called to men since the first days of exploration, that will defy them for many years to come. But it is this very mystery that has brought about the invasion of the Antarctic Ocean.

Who Discovered Antarctica?

THE gray and black fogs that drift among the icebergs off the shore of the southern continent are no more confusing than the records with which one tries to penetrate the mystery of who first found this icebound land, who first saw its jagged black mountains etched with snow, or first looked upon its snowy cliffs that hid the land beneath. Men had stumbled upon islands, but the continent had eluded them, and, to indicate how difficult such exploration may be, it was not until 1936 that it was definitely determined by John Rymill, a British explorer, that the long peninsula that stretches out from the Antarctic toward Cape Horn is really part of the mainland and not a group of islands. Discoveries are elusive in the Antarctic; the determination of fact often waits long upon continued and disappointed effort.

It was this peninsula that was first the object of attack more than 120 years ago. The argument as to who saw it first has been for many years, particularly in the twentieth century, a matter of acrimonious debate between American and British scientists. Unfortunately, the science of geography is not one that rests upon absolute postulates until all the land reported has been surveyed, attached, and definitely placed in its position.

Many of the first discoverers in the Antarctic were much less concerned with geographical knowledge than they were with sealing or whaling, and their logbooks often bewilder rather than aid the inquirer. It is for this reason that verbal brickbats are even now being tossed back and forth across

the Atlantic in phrases that are not used in polite society. When one geographer of the United States calls another a forger of maps, and refers to a British explorer as a liar, it is not remarkable that a British reply should toss back the retort uncourteous.

The last word—and it seems definitive—in this contest was issued as late as October, 1940, in *The Geographical Review* of the American Geographical Society, showing how an old controversy can hang on and eventually be resolved. It must be added that its author, Colonel Lawrence Martin, of the Library of Congress, employs none of the vituperation that had made the question of who discovered the Antarctic a more bitter subject than the famous Peary-Cook argument over who first reached the North Pole. The Peary-Cook affair was settled long ago, but this little matter of who did what 120 years ago is still very much alive in academic circles.

It so happens that one of two men undoubtedly was the first to see Antarctica. One of the two was English, Captain Edward Bransfield, and the other was an American sealer, Captain Nathaniel B. Palmer. The weight of evidence inclines to Captain Palmer as first having seen the mainland, but Captain Bransfield came so close to it that he might be given a little more fame than his Yankee rivals would ascribe to him. Still the journey there began long before either of them had an opportunity to make a record of their voyages.

There is so far no definite record of when American or British sealers first went to the South Shetlands, which are the outposts of the Antarctic in their longitudes. A German professor, Heinrich Berghaus, a distinguished geographer, suggests that American sealers had been at work in the South Shetlands since 1812. Undoubtedly, both sealers and whalers from New England had been south in the Atlantic before that time.

They had ranged far, sailing around the Horn to whale

and seal in the Pacific, as Captain Edmund Fanning tells in his *Voyages*. That one of them might have lighted upon the South Shetlands is not at all unlikely, no more so than that they should have suppressed their discovery. Whalers and sealers did not disclose the places where they might find a cargo for their holds. It was possible, however, that a whaler, brushing the South Shetlands, might have told a friend engaged in sealing of the herds to be found there, or that a sealer might have mentioned to a whaling crony that there was a good ground for sperm whales somewhere off a certain coast.

Captain Fanning tells frankly of being told by a whaler, whom he knew, of the vast seal herds on Massafuero in the southern Pacific. So it is not impossible that a whaler chasing the cachalot into the South Atlantic might have found the South Shetlands, and kept quiet about them. These discoveries were sometimes not entered in the logs, and even in recent times Norwegian whalers in the Antarctic have kept their whaling grounds a profound secret.

When the first Byrd expedition was heading toward the whaler that was to tow the old wooden ship through the ice, we were not permitted for days to send our position lest other whalers discover where our friends were catching whales. These reticences, however, do not aid in clearing up the mysteries of the early Antarctic discoveries. They only make it reasonable to suppose that a lot more was known about the outlying Antarctic in the first decade of the nineteenth century than the logbooks reveal.

Such definite reports of sealing islands in the Antarctic apparently reached the United States that in 1812 Captain Edmund Fanning, who at that time probably knew as much about those seas as any other man, was appointed to head a government expedition to explore the southern oceans. War between Great Britain and the United States ended

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that venture, but when that dispute was over the sealers headed south again in ever-increasing numbers.

What they found may not be known in its entirety for many years, but the first definite Antarctic discovery came in February, 1819, when William Smith, in the brig *Williams*, made a wide sweep to the southward to aid him in rounding the Horn. On Feb. 19 he thought he saw land, and lay to until daylight when he again stood south. Land in 62 degrees 40 minutes south latitude, and 60 degrees west longitude, was unmistakable. However, he was not out for discovery, and not wishing to endanger his cargo, he hauled away for the northward and resumed his voyage to Valparaiso, Chile. When he told of seeing land in the far south, he was laughed at. When he got a cargo for Montevideo in June, midwinter in the Antarctic, he again went south, but did not see the land, which in view of weather conditions is not surprising.

At Montevideo, also, Smith's story was received with incredulity, although a group of Americans offered to charter his ship if he would give them the exact location of the islands. Sealing was then a very profitable business, and the rivalry between British and American sealers was keen. From the time of Fanning's first voyage around the Horn to Canton, China, seals usually brought tremendous sums. Skins frequently sold at \$5 each, so greatly did the Chinese mandarins covet them, although the price occasionally dropped to fifty cents because of an oversupply.

One ship took 45,000 skins at the Falklands and South Fernandez, sold them in China for \$90,000, and brought back goods that sold for \$260,000 in the New York market. Even the fore-castle hands made \$1,200 each from that voyage.

And here is one of those incomprehensible things that show how badly Antarctic history is confused, for it is recorded that one year after Smith first landed on the South

Shetlands, in the season of 1820-1821, sealers took 250,000 seals from the South Shetlands, of which Americans took 150,000, and the Stonington sealers took 88,000. The Stonington ships also carried 1,500 barrels of sea-elephant oil, worth \$10 a barrel. In 1821 there were thirty American ships sealing in the South Shetlands, only two years after Smith discovered them.

What does this mean? No wonder Smith, lacking knowledge of other discoveries, tried to keep his landfall to himself. But the fact that American sealers were so close on his heels suggests strongly that Smith was not the first or the only one to discover the islands before 1820. Still he is the discoverer of record.

On a return trip to Chile in October, 1819, Smith reached the southland again. He sent a boat ashore and claimed the islands for Great Britain, calling them New South Britain, although he later changed the name to New South Shetland, because they were in the same latitude as the Shetland Isles in the north. It has frequently been assumed that Smith believed he had found the continent and not a series of islands, and the name Antarctic Continent was applied to the land by German geographers. Even Nordenskjöld, the famous Swedish explorer, said that Smith was "the first who in a most indisputable manner made acquaintance with a part of the Antarctic Continent."

Nordenskjöld's mistake was probably due to the fact that Smith spoke of having seen the mainland, apparently believing that the islands were a connected bit of land. It is known that he did not get anywhere near the mainland, and even he had some doubts as to whether he had found islands or a main land mass.

After cruising along the coast for 250 miles Smith went on to Valparaiso, and this time Englishmen believed he was telling the truth. The British naval commander, Captain W. H. Shirreff—whose name is perpetuated in the Antarctic on

a cape of Livingston Island—was not slow to act when he heard Smith's story. He realized that in it lay not only opportunities for the British sealers, but also that the islands might be another Falklands, recently abandoned, useful both politically and militarily. Any station that controlled the Strait of Le Maire and the entrance from the Atlantic to the Pacific was not to be overlooked by a naval officer.

But, first, it was necessary to know something about these strange, ice-covered islands, their white jagged peaks rising from the sea. Shirreff chartered the *Williams*, and, although Smith apparently went along as pilot, in charge was Edward Bransfield, Master, R.N., with three midshipmen of H.M.S. *Andromache*, Poynter, Blake, and Bone. Also aboard was Dr. Adam Young of H.M.S. *Slaney*, who has left a vague and sketchy account of the voyage, one of only two accounts known to exist.

This was the first expedition fitted out solely for Antarctic exploration, and it might really be called a scientific expedition in view of Bransfield's instructions. He was ordered to determine whether the land consisted of islands, or was part of a continent (which again indicates that Smith thought he had seen the mainland, but wasn't too sure about it) and to "determine if connected with Southern Thule and Sandwich Land." He was to learn, also, if sperm whales, otters, and seals existed, the resources of the country for supporting a colony, and if inhabited to note the "character, habits, dresses and customs of the inhabitants, to whom you must display every friendly disposition." He was to note the rivers, streams, and lakes of fresh and salt water, specimens of plants, and to take possession in the name of His Majesty George III.

Could anything reveal more clearly the abysmal ignorance of the Antarctic even in those days, only a little more than 100 years ago!

Bransfield's voyage shows again how chance may deprive an explorer of a great prize. He reached the South Shetlands

on Jan. 16, 1820, and cruised among the islands, charting them, until Mar. 21. A record of part of this expedition is contained in Dr. Young's account, but another, and anonymous record, is contained in *The Literary Gazette and Journal of the Belles Lettres*, in November, 1821, near enough to the date of discovery to be received with credulity. This tells of Bransfield being in the strait between the South Shetlands—the strait that still bears his name—and the continent, on Jan. 30, in 63 degrees 16 minutes south latitude, and 60 degrees 28 minutes west longitude, which would put them just south of Livingston Island, or Friesland, as it was known to American sealers at that time. They turned south, and, the account goes on:

“At three o'clock in the afternoon . . . the haze clearing, they very unexpectedly saw land to the S. W., and at four o'clock were encompassed by islands, spreading from N. E. to E. The whole of these formed a prospect the most gloomy that can be imagined, and the only cheer the sight afforded was the idea that this might be the long-sought Southern Continent, as land was undoubtedly seen in latitude 64 degrees and trending to the eastward. In this bay or gulph there was a multitude of whales, and a quantity of seaweed, apparently fresh from the rocks. A round island was called Tower Island, latitude 63 degrees, 29 minutes, longitude 60 degrees, 34 minutes and the land Trinity Land, in compliment to the Trinity Board.”

From there they sailed northeast and landed on Clarence Island. It seems pretty clear from this account—and Colonel Lawrence Martin, who has made a most exhaustive study of the subject, believes so—that Bransfield saw Trinity Island, at least. The *Gazette* account describes a gulf south and east of Trinity Island, which exists, and speaks of land running eastward, as it does. The shore line runs just a little north of 64 degrees, where he claims to have seen land. Given the authenticity of this account, which was written soon after

the end of the voyage, it is possible that Bransfield did see the mainland.

At least he saw Trinity Island, which still bears the name he gave it, and Trinity is separated from the mainland by a very narrow strait. Columbus is credited with discovering America in 1492—although the Norsemen probably saw it first—and nobody disputes the Columbus claim merely because he first landed on San Salvador and did not see the mainland on that first voyage. Surely, Bransfield deserves a little better than the vituperation that has been heaped upon him.

Dr. Young's report does not agree with the report in *The Literary Gazette*, although he does speak of finding a gulf "nearly 150 miles in depth, out of which we had some difficulty in finding our way back again." That is an interesting observation, for it could apply only to Bransfield Strait, and if the doctor said it was 150 miles in depth it is obvious that Bransfield penetrated it for some distance, possibly to the southward. It is only about forty miles from where Bransfield turned South to Trinity Island. The other 110 miles would just about take him out of Bransfield Strait to the east.

The British admiralty has even been accused of faking a map to show Bransfield's discoveries. All the data are confusing, and one can interpret them in many ways. If it is contended that the doctor's 150 miles applies only to the length of Bransfield Strait, the ship must have traversed it from one end to the other, and certainly would not have "turned back again" after reaching the open. The doctor was obviously more interested in flora and fauna than in geography. One can only guess. It is a most unfortunate controversy, but it seems a pity that so much bitterness should be heaped upon British geographers when there is so little to support the criticism.

There are two minor incidents of that voyage—although

they may have taken place on Smith's first landing on the South Shetlands—that are worth repeating, even if they have been overlooked by the learned gentlemen who quarrel over charts. On Half Moon Beach in Blythe Bay, Smith found the anchor stock, sails, booms, and spars of a Spanish ship that had left Spain many years before, and had never been heard from. Of the crew there is no record that he found remains; probably they abandoned ship farther north.

While on shore—for the record says Smith landed on the Seal Islands—some of his men pitched a tent, and the ship's cat having been taken ashore, perhaps to cheer her up and relieve her of a diet of rats, made the tent her headquarters. Along came a penguin and discovered the cat, and they made friends as was evident by the contented purrs of the cat, probably because the penguin smelled fishy. Every day the penguin went to sea to feed, and every day it came back. Whether it brought its new friend a shrimp or two is not recorded. The sailors shut the tent door, but the penguin crawled underneath the edge of the canvas. Anyone who knows penguins and their curiosity will hardly doubt this story. As for the cat, the penguin smelled good, and if pussy had tried to claw that penguin she would have had the surprise of her life, for a penguin can fight with beak and flippers in a way to be respected by anyone.

The first known voyage by an American ship to the South Shetlands has about it an aura of romance mingled with fact, which is difficult to disentangle. In July, 1819, a few months before Smith made his landing on the islands and surveyed them for some distance, the brig *Hersilia* sailed from Stonington, Connecticut, under the command of James P. Sheffield. Her second mate was a young man named Nathaniel Brown Palmer, whose exploits at sea are almost as legendary as those of Crockett and Bowie on land. But Palmer is the first one whose sighting of the Antarctic Continent can be proved.

The story of how the *Hersilia* reached the Shetlands is worthy of any dime novel. The ship touched at the Falklands, and then went in search of the Auroras, those islands often reported and never found, but which were probably the Shag Rocks. On the Falklands young Nat Palmer was left to kill bullocks for provisions. While he was there, a ship called the *Espirito Santo* came in from Buenos Aires, and Palmer piloted her into the harbor and supplied her with fresh meat. Before she sailed, the captain told Palmer that he was on his way to a place where there were thousands of seal, but would not say where it was. (This account is based on a narrative by Mrs. Richard Fanning Loper, late of Stonington, who was a favorite niece of Palmer, and to whom he told many tales of his voyages.)

A few days after the *Espirito Santo* sailed, the *Hersilia* returned, and young Nat told Sheffield that he could follow the other ship. He did so, and discovered the crew of the *Espirito Santo* killing seal. Far from being annoyed, the British captain of the Spanish-named ship was so filled with admiration at Palmer's astuteness that when his own ship was filled, his crew helped fill the hold of the *Hersilia*.

Now, with all regard for the ability of Palmer, who was one of the ablest men who ever sailed out of Stonington, and who later commanded China clippers, that story is a bit too romantic. It does not quite jibe with the fact that the next year there were thirty American sealers in the South Shetlands. If the *Hersilia's* captain was the first American sealer ever to learn of the South Shetlands, it is not likely that he would have told thirty other sealing captains of his good fortune.

Somewhere there must have been a Nantucket whaler in the woodpile, or else a lot of sealers had a look at a crystal ball that told them where to find new herds. Perhaps old Captain Edmund Fanning had information that came to him from some source unknown, for the *Hersilia* was owned by

his brother, William, or perhaps an indiscreet whaler dropped a hint. These possibilities sound much more plausible than the romantic story of Nat Palmer's following a ship into unknown waters after three days and coming upon her in a group of widely distributed islands. It is very easy to miss a known landmark in the Antarctic.

That doubt about his tracking of the *Espirito Santo*, however, does not detract in the least from Nat Palmer's accomplishments. He came of tough, seagoing Yankee stock, and it was not by chance that after he discovered the Antarctic Continent, he went on to become a famous clipper captain, and finally a member of his state legislature, and a pillar of Connecticut society. He was a little more than six feet tall, with light complexion and light hair, a powerful, sinewy man, quick as a cat on his feet, and possessed of a daring initiative that made him notable even on this first voyage when he was only twenty years old. He came from a town that was the greatest of sealing towns in New England, and a famous shipbuilding center, Stonington, Connecticut.

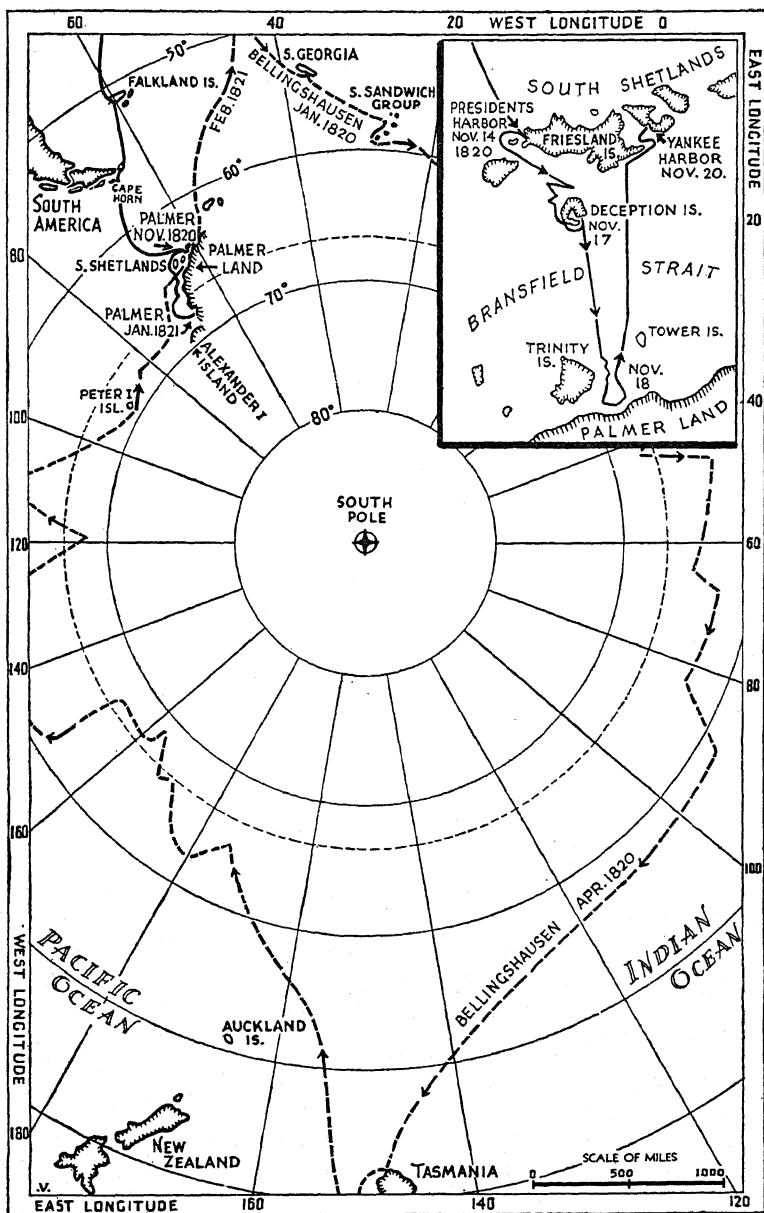
He was born Aug. 8, 1799, the son of Nathaniel Palmer and Mercy Brown. His father was a shipbuilder, and Nat played in the yards where hulls were built of oak, and masts and spars and ribs were shaped with thin axes in the old-fashioned manner of the men who turned out some of the fastest sailing ships that have ever graced the sea. Later Nat Palmer designed ships himself and sailed them. It was natural that in his home town he should have heard the story of Edmund Fanning, of the 100,000 skins he had taken to Canton in the *Betsey*.

They were tough folk, these Stonington men. They rejoiced in the tale of how they beat off a British fleet in the War of 1812, a fleet under the command of Sir Thomas M. Hardy, Nelson's captain, to whom Nelson said, as he was dying at Trafalgar, "Kiss me, Hardy."

Hardy's fleet had been sent to blockade the mouth of Long Island Sound, for blockade runners were bringing in flour worth \$7 to \$14 a barrel. In August, 1814, Hardy attacked Stonington with the 74-gun ship *Ramilies*, the 44-gun frigate *Pactolus*, the 22-gun brig *Despatch*, and the bomb brig *Terror*. There were 140 cannon against the two old 18-pounders and a 4-pounder that the Stonington men had for their defense. The *Terror* threw 200-pound shells. Rockets were thrown ashore to fire the town, and townsmen calmly put them out. When Hardy's men tried to land, the 18-pounders and a 4-pounder knocked the boats to pieces. After three days the British gave it up. In Stonington one man had been killed, but no houses had been destroyed, although fifteen tons of shells were picked up in the town.

That was the kind of background Nat Palmer came from, that and the tales of the whalers and sealers who put out every year for the southern and Pacific hunting grounds. Perhaps some can remember hair-seal trunks. A lot of those skins came from Stonington. When Nat was fourteen, he shipped on a coaster, and remained in this trade until he became second mate of the *Hersilia*. It used to be said of him that he could smell his way through a fog, and he had that uncanny method of orienting himself at sea by dead reckoning which is the heritage of only great sailors. His trip on the *Hersilia* was profitable, for she brought back 10,000 skins, worth \$2 each, and John R. Spears, Palmer's first biographer (Colonel Lawrence Martin is now writing a more detailed and accurate account of his life), estimates that Nat's share was \$560 for eight months' work, not bad in those days.

It was only natural that Nat Palmer should have been a member of the fleet that left Stonington the next year, 1820, for another trip to the South Shetlands. This time he was Captain Nat, as he was to be known the rest of his



Map 2.—Palmer was the first explorer who is known definitely to have sighted the Antarctic Continent. Insert shows his voyage to the south.

life, in charge of the sloop *Hero*, one of five ships in the sailing fleet, all under the command of Captain Benjamin Pendleton, master of the brig *Frederick*. The *Hero* was a tiny vessel for such an expedition, only 44 tons, a little over forty-seven feet long, sixteen feet ten inches in beam, and drawing six feet nine inches. But she was handy for scouting and ferrying sealskins. She required skillful handling in a following sea, but although Captain Nat was then only twenty-one he was an excellent sailor. The *Hero* carried spare rudder braces and pintles, and 200 sheets of sheathing copper.

Life was not easy on a sealer in those days. There was no fire except for cooking; the inner walls of the ship dripped continually in low latitudes from condensation due to the cold temperature of the sea. The cabins were cold and cheerless, and the only way to get warm was to get into damp bunks and wait for body heat to do its duty. Crews were often left on shore to get seals, and they lived on penguin eggs and seal meat.

Even on the ship the food was none too good. It consisted of hard navy bread, salt beef and pork, dried white beans and peas, codfish, corn meal, corn, potatoes, dried apples, rice flour, coffee, sugar, vinegar, mustard, tea, pepper, and several barrels of rum and gin. The sealers, as many explorers since, liked tea and coffee in the cold weather, and enjoyed the heart and liver of seals. It was a hard, rough life that called for stamina and determination, and no ordinary landsman could have enjoyed it for a minute. But these Stonington sealers went back year after year, daring the fog and gales, the heaving pack ice, and the drifting bergs, in small, damp ships that smelled to high heaven.

The Stonington fleet arrived at Presidents Harbor, on the northwest tip of Friesland, or Livingston Island (some day the changing place names of this part of the Antarctic, discovered and rediscovered, named and renamed, will be

cleared up) on Nov. 12, 1820. It was soon found that there were no seals to be had, at a point where the *Hersilia* had taken so many the season before. Two days later there was a conference on the *Hero*, between Captain Pendleton, Captain Dunbar, and Captain Nat, and it shows how much confidence was placed in Nat that his commanding officer should have come aboard his small ship for the conference. Captain Nat was apparently told to go and look for more seal islands. There were five ships waiting for cargoes, with nary a seal in sight. So he put off.

Apparently Captain Nat went through the strait between Friesland and Snow Island, and turned south to Deception Island, which he discovered, a volcanic island with a land-locked harbor, where the water is sometimes so warm that, as Captain Pendleton said, you could stand on the ice and cook an egg in the water. (The penguins seemed to like the warm water, which may explain the migration of some of them up the west coast of South America to the Galapagos.) Captain Nat discovered this harbor on Nov. 15, and that day climbed the hills overlooking Port Williams, as it was known, although many have misnamed it Yankee Harbor, and saw land to the southward. His niece, Mrs. Loper, recalls that he always had remarkable eyesight, and the mountainous mainland only fifty miles away might easily be visible on a clear day. So on Nov. 16, the next day, Captain Nat wrote:

“Got underweigh; at 10 we were clear from the Harbor stood over for the Land Course S by E $\frac{1}{2}$ E Ends with fresh Breezes and Pleasant.”

That logbook is now in the Library of Congress in Washington. It was bound with canvas by Captain Nat and the canvas looks as fresh as the day he put it there. It was a standard log, called *The Seaman's Journal, Being an Easy and Correct Method of Keeping the Daily Reckoning of a Ship During the Course of her Voyage*. There was a picture

of a ship under sail, and the name of the printer and man who sold it, Samuel A. Burtus, at his bookstore and "Lottery Office," No. 19 Peck Slip, corner of Water Street, New York. On the canvas cover Captain Nat drew in ink the picture of a schooner under sail.

The handwriting is small and neat, and even at this day easily read except where it is faded or has been worn by handling. The spelling is fairly correct. Opposite the first page is a list of places which Captain Nat apparently wished to put down as places he discovered, including Deception Island. The first entry is not on the first page, but at the bottom of the cover page opposite, showing that he sailed from Stonington on July 31, 1820. The first regular entry is Aug. 1, which many have taken as the date of his departure.

There have been few manuscripts so carelessly read as this of Captain Palmer's description of his voyage from Deception Island toward the "Land" to the southward. His first biographer overlooks it entirely. The tiny *Hero* crossed Bransfield Strait from Deception Island in about ten hours, a distance of forty miles. The record for Friday, Nov. 17, is as follows, the parts in brackets being the interpolations of Colonel Martin:

"These 24 hours commence with fresh Breezes from SWest and Pleasant at 8 P M got over under the Land [Trinity Island] found the sea was filled with imense Ice Bergs at 12 [midnight on the calendar day of November 17] hove Too under the Jib Laid off & on until morning—at 4 A M [on the calendar day of November 18, 1820] made sail in shore and Discovered—a strait—Trending SSW & NNE—it was Literally filled with ice and the shore inaccessible we thought it not Prudent to Venture in ice Bore away to the Nothard & saw 2 small islands and the shore every where Perpendicular we stood across towards friesland [Friesland or Smith's or Livingston Island] Course NNW—the Latditude of the

mouth of the strait was 63-45 S Ends with fine weather wind at SSW."

Some very nice work was done to show that Palmer approached Trinity Island rather than the mainland on this first course, as his course has been checked by the United States Hydrographic Office, and the magnetic variations since 1820 were found to have been about 25 degrees east, the basis for proving his course.

The strait he discovered was the Orleans Channel, lying between the Antarctic mainland and Trinity Island. 'The compass directions he gives for the Channel leave no doubt as to its position, for it is the only channel lying south-southwest and north-northeast in that particular spot. His reference to getting under the land undoubtedly refers to getting under Trinity Island at the mouth of Orleans Channel. He must have seen the mainland, only a short distance away and much higher than Trinity Island.

It appears conclusively that even though Bransfield came very close to seeing the mainland, it was Palmer who actually saw it. The day after he got under Trinity Island he made sail for the shore and found it "inaccessible."

With young Captain Nat when he made this momentous discovery were four men: Phineas Wilcox, the mate, twenty-eight years old; Richard Fanning Loper, second mate, twenty-one years old; Stanton L. Burdick, seaman, sixteen years old; and Peter Harvey, seaman, a Negro, thirty-one years old and the oldest man aboard. A tiny ship and a youthful crew to discover such a continent, but Yankees went to sea in those days as soon as they were big enough to go aloft or tail onto a rope.

After looking over the "inaccessible" shores, where there were no seal, and only a few sea leopards, Palmer sailed due north. He saw two small islands, Ohlin and Tower Island, which had been seen by Bransfield, and went on to find Yankee Sound, now called McFarlane's Sound, between

Friesland and Greenwich Islands. There also he discovered Yankee Harbor, a fairly good anchorage, where there were beaches covered with seal. Yankee Harbor has frequently, and erroneously, been placed on Deception Island.

It was not long before the young captain of the *Hero* was off on another cruise, after ferrying seals from the beaches to the larger ships. Palmer was the handy man of the fleet, but it was as their scout that he showed his ability for getting in and out of strange waters, and finding new lands. An old manuscript memorandum in the Library of Congress containing quotations from the logbook of the *Frederick*, Captain Pendleton's ship, mentions that "the sloop *Hero* Capt. N. B. Palmer Sailed to Eastward to look for more seal Is'ds," on Jan. 14, 1821. The memorandum continues: "same log book says on Jany 28th/21 [1821] 6 A M the sloop came in after examining North East and South West to their satisfaction for seal found none." So laconically did Captain Pendleton record the second voyage of exploration of the *Hero*, a voyage even more remarkable than the first, and lasting only two weeks.

There are almost no records of anything except weather in the logbook of the *Hero* for this period, for master as well as crew were all standing watch, and as they were sailing in unknown and treacherous waters, they were interested only in navigation and seals. But from a number of sources there has been put together in fairly convincing form a record that indicates that Palmer sailed down the coast of the land that bears his name, inside Anvers Island, the Biscoe Islands, and Adelaide Island, and to Marguerite Bay in 68 degrees south.

If only he had left a map of his course. He may have made one, and even made more extensive notes than are found in the log of the *Hero*, for the house in Stonington containing many of his records burned down years ago, and it is only by good fortune that the *Hero's* log survives. That he

probably did make notes and a chart is indicated by another remarkable story worthy of the Palmer saga. Indeed, there are so many extraordinary things ascribed to young Nat Palmer that one almost hesitates to record them. This one is confirmed in several ways. The oldest published account of it is in *Fanning's Voyages*, and as Fanning was a Stonington man and had an interest in Pendleton's fleet, and also must have been a companion of Palmer when both men were ashore, his version must be given credence.

"On the *Hero's* return passage to Yankee Harbor she got becalmed in a thick fog between the South Shetlands and the newly discovered continent, but nearest the former," wrote Fanning. "When this began to clear away Captain Palmer was surprised to find his little barque between a frigate and a sloop of war, and instantly run up the United States' flag; the frigate and the sloop of war then set the Russian colors. Soon after this a boat was seen pulling from the commodore's ship for the *Hero*, and when alongside, the lieutenant presented an invitation from his commodore for Captain Pendleton [he means Palmer] to go on board; this, of course, was accepted. These ships he then found were the two discovery ships sent out by the Emperor Alexander of Russia, on a voyage round the world.

"To the commodore's interrogatory if he had any knowledge of those islands then in sight, and what they were, Captain Pendleton replied, he was well acquainted with them, and that they were the South Shetlands, at the same time making a tender of his services to pilot the ships into a good harbor at Deception Island, the nearest by, where water and refreshments such as the island afforded could be obtained; he also informing the Russian officer that his vessel belonged to a fleet of five sail, out of Stonington, under command of Captain B. Pendleton, and then at anchor at Yankee Harbor, who would most cheerfully render any assistance in his power.

"The commodore thanked him kindly, 'but previous to our being enveloped in the fog,' said he, 'we had sight of those islands, and concluded we had made a discovery, but behold, when the fog lifts, to my great surprise, here is an American vessel apparently in as fine order as if it were but yesterday she had left the United States; not only this, but her master is ready to pilot my vessels into port; we must surrender the palm to you Americans,' continued he, very flatteringly.

"His astonishment was yet more increased when Captain Palmer informed him of the existence of an immense extent of land to the south, whose mountains might be seen from the masthead when the fog should clear away entirely. Captain Palmer, while on board the frigate, was entertained in the most friendly manner, and the commodore was so forcibly struck with the circumstances of the case, that he named the coast then to the south Palmer's Land; by this name it is recorded on the recent Russian and English charts and maps which have been published since the return of these ships.

"The situation of the different vessels may be seen by the plate; they were at the time of the lifting of the fog and its going off to the eastward, to the south, and in sight of the Shetland Islands, but nearest to Deception Island. In their immediate neighborhood were many ice islands, some of greater and some of less dimensions, while far off to the south, the icy tops of some two or three of the mountains on Palmer's Land could be faintly seen; the wind at the time was moderate, and both the ships and the little sloop were moving along under full sail."

This account, published in 1833, and despite its minor errors—for which Fanning is famous—undoubtedly relates one of the strangest encounters of ships at sea. The Russian, of course, was Admiral Bellingshausen, who had circumnavigated the continent, passed within the Antarctic Circle

several times at points not crossed by Cook, and who had discovered Alexander I Land and Peter I Island. His account of his voyage has never been translated in its entirety, but a German summary of it shows that Bellingshausen mentions his meeting with Palmer. Palmer also told the story years later in Hong Kong, and through the years it was embellished with more and more conversation and flowery words until the later versions would lose their authenticity if it were not for earlier confirmation.

For this reason the writer prefers Fanning's account, crude as it is. Some of the accounts, such as the one where Bellingshausen is quoted as saying: "What shall I say to my master? What will he think of me? But be that as it may, my grief is your joy; wear your laurels with my sincere prayers for your welfare. I name the land you have discovered in honor of yourself, noble boy, Palmer's Land," make Palmer sound like a pompous ass or a Horatio Alger hero, which he certainly was not. Krusenstern, the famous Russian geographer, put Palmer Land on his map as the result of this meeting.

The battle of the maps and memorandum as to whether Bransfield or Palmer first saw the mainland will go on for some time.

Unfortunately for Bransfield his log is not in existence, and it is difficult to prove his case from the contemporary accounts. They indicate that he saw land and I do not believe they were faked, having an allergy for that word after its reckless use in this controversy. At least one eminent geographer in this country believes that Bransfield saw Trinity Island, and if it were clear enough for him to do that, only a miracle, one of those Edgar Allan Poe fogs, could have kept him from seeing the much higher mainland, separated by four miles from Trinity Island.

But Nat Palmer's log is in existence, and no one can read it dispassionately without coming to the conclusion that he is the first recorded discoverer to see land south and

east of Trinity. We don't know about Bransfield; we do know that Palmer stood over for the "Land." And in view of his record, he simply could not help discovering land and harbors, even though all he was interested in was seals. So Palmer Land it is, although another name was to be given to it later.

The Merchant Discoverers

THERE are few men in the history of polar exploration who have been more vilified with less reason than James Weddell, son of a Lanarkshire upholsterer.

Much has been made of Weddell's temperamental early career. He entered the merchant marine, got into a dispute with his captain and knocked him down, which is mutiny in any language. So he was turned over to the Royal Navy, and eventually became a master. After Waterloo the size of the British navy was reduced and Weddell was glad to take command of the brig *Jane*, of 160 tons, in which he surveyed the South Shetlands and rediscovered the South Orkneys, and also searched vainly for the elusive Aurora Islands, which have never yet been found. He came to the conclusion that the Spaniards who reported the Auroras had seen some rock-discolored bergs—such as Weddell had seen himself—aground on the Shag Rocks. It is as good a theory as any.

Before going on with Weddell it would be well to make a point that has always seemed inconsistent with the vituperations of some of those who write polar history. It has been asserted, and not mildly, by some American chroniclers that Weddell was a liar in claiming to have reached 74 degrees 15 minutes south in the sea that bears his name, because no other ship has ever penetrated that far in the longitude that Weddell claimed.

It so happens that on either side of this longitude both Shackleton and Filchner have gone much farther south than

did Weddell. Shackleton lost his ship; Filchner was luckier and did not. But the mere fact that Weddell is the only man of credibility who penetrated the Weddell Sea to 74 degrees south in the longitude he gives is no reason for impugning his veracity. As a matter of fact, his severest critic is one who is ten degrees out in his record of the longitude of Weddell's course to the south.

But that is beside the point. Anyone who lays down a hard and fast rule about ice conditions, either in the Arctic or the Antarctic, is laying himself open to some vigorous counterattacks. For instance, it is common knowledge among polar explorers that ice conditions on the east coast of Greenland vary so greatly from year to year that no ship captain can predict just how far north he can get.

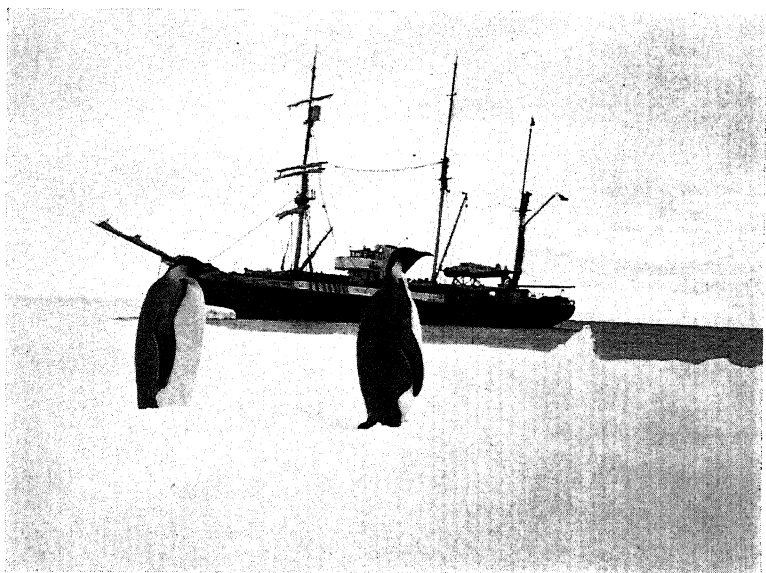
When Cook first stuck a bowsprit over the pack ice near the Ross Sea in the Antarctic, he found it much farther north than it has been in this century, and so heavy that he did not attempt to enter it, and nobody can say that Captain James Cook was timid. And yet, later explorers have been able to find their way through that pack in a few hours.

When I was with the first Byrd expedition in the Antarctic, it did not seem possible that any sailing ship could get through the heavy and wide pack in time to get us out in February of 1930, and it was only by extraordinary luck and good seamanship that the old wooden ship did buck her way south and escape foundering. On the way north a few days later we passed through heavy pack by the good fortune of finding a strait through the ice, with the wind at our stern, although the pack was then badly broken up. We could probably have gotten out without much difficulty even if that river through the ice had not been found. But Weddell is accused of lying when he says that he found open water at 74 degrees 15 minutes south, which is a lot farther north than Little America.



(Wide World)

Plate 3.—Adélie penguins. "What shall we do about these people?"



(Wide World)

Plate 4.—The magnificent emperor penguins, somewhat curious.

The Weddell Sea does have a bad reputation. No ship has ever been able to push through the pack to the shelf ice and lie there with immunity, as is possible in the Ross Sea, on the other side of the continent. The currents in the Weddell Sea move in such a way that a ship is much more apt to be caught and crushed than in the Ross Sea. But there are years in all polar seas when the ice disappears, when either currents or the wind or an unusually warm summer dissipates it.

Apparently 1823 was one of these seasons, for Edwin Swift Balch, an American who did some valuable research on early Antarctic exploration nearly forty years ago, says that 1823 was the most open season in the annals of the Antarctic, and that was the year which Weddell put on his chart for his farthest south. In his narrative he says it was in 1822, which seems improbable from a context that was rather vague as to dates. As for Weddell's own reputation, we can quote an American, Captain Benjamin Morrell—one of the most vainglorious seafaring men of his time, but whose egoistic vaporings make his appreciation of his English rival all the more worth while—that he knew Weddell as:

“A most excellent officer, and a highly worthy man: justly extolled as an active, correct and enterprising navigator. Being familiar with danger in its most appalling form, every emergency finds him cool, steady and undaunted. He is, in short, an honour to his country and to human nature. I speak with confidence, for I know him.”

There is also the tribute of his Commander on the *Avon* brig in 1812, afterward Admiral of the Fleet, Sir George Sartorius, who said of him in 1839 that he considered Weddell “one of the most efficient and trustworthy officers I have met with in the course of my professional life.” And a portrait of Weddell in the Royal Geographical Society showing a man with a firm, sensitive mouth, luminous eyes,

and a broad intelligent forehead, does not look like the picture of anyone who would deliberately invent a voyage, no matter how preposterous it may seem to others who have attempted vainly to follow his track.

It would not be necessary to support Weddell in this manner if he had not been subject to such bitter attack from other sources without definite knowledge of what ice conditions were in the Weddell Sea in 1823. If one studies the map of the American Geographical Society, it will be seen that the pack-ice outlines within and beyond that sea vary tremendously. Balch, from some investigation he probably made in logs of American sealers and whalers, found that 1823 was an open year. Ross, D'Urville, and Nordenskjöld all tried in later years to follow Weddell's track without success.

It may be recalled that Shackleton went to the Bay of Whales in the Ross Sea on his first expedition to the Antarctic as leader, and gave up any thought of landing because ice was fast in the bay for twenty miles inland. Also he found that a huge piece of the barrier that he had observed when there with Scott's first expedition had broken off, which did not speak well for the stability of the barrier. Later, Amundsen, who reached the South Pole from the Bay of Whales, found the bay also closed but cruised off it for a day or two until the ice all went out. He crowed a bit at his perspicacity, but when Byrd went there on his first expedition the ice did not go out of the bay either in the first summer season or the second. On his second expedition it went out much farther, and the basin on the barrier on which the first camp stood broke loose and moved up and down within the circumscribing ice, a happening that had taken place before, as was all too obvious to those of us who went down into the circular crevasse around the basin of floating ice at the time of the first expedition. When Ellsworth went to the Bay of Whales, the entire bay broke up without warning

and his plane was so badly damaged that he had to abandon any thought of flying that year. So one never knows.

Because of these varying conditions it seems unfair to call Weddell a liar when one was not on his ship.

He was a careful observer, and in his narrative of his southern journey to the farthest latitude yet reached, he is meticulous in noting ice formations. One of the largest seals in the Antarctic is named for him, and he brought back to England the first specimen of the sea leopard to be studied scientifically in Europe. Since he has been accused of "faking," it might be interesting to quote a reproachful paragraph from his book, in which he regrets not finding "South Iceland" in 63 degrees 21 minutes south latitude and 45 degrees 22 minutes west longitude. South Iceland was the name originally given by the Yankee sealers to the South Shetlands, which are much farther north, but somebody had placed their position in the spot where Weddell searched for them. There were many grave discrepancies in those days. Said Weddell:

"It is much to be regretted that any man should be so ill-advised as to propagate hydrographical falsehoods, and I pity those who, when they meet with an appearance that is likely to throw some light on the state of the globe, are led through pusillanimity to forego the examination of it. But the extreme reluctance I have to excite painful feelings anywhere, restrains me from dealing that just censure which is due to many of my fellow seamen who, by negligence, narrow views of pecuniary interest, or timidity, have omitted many practicable investigations, the want of which continues to be felt by the nation, and more especially by merchants and ship owners."

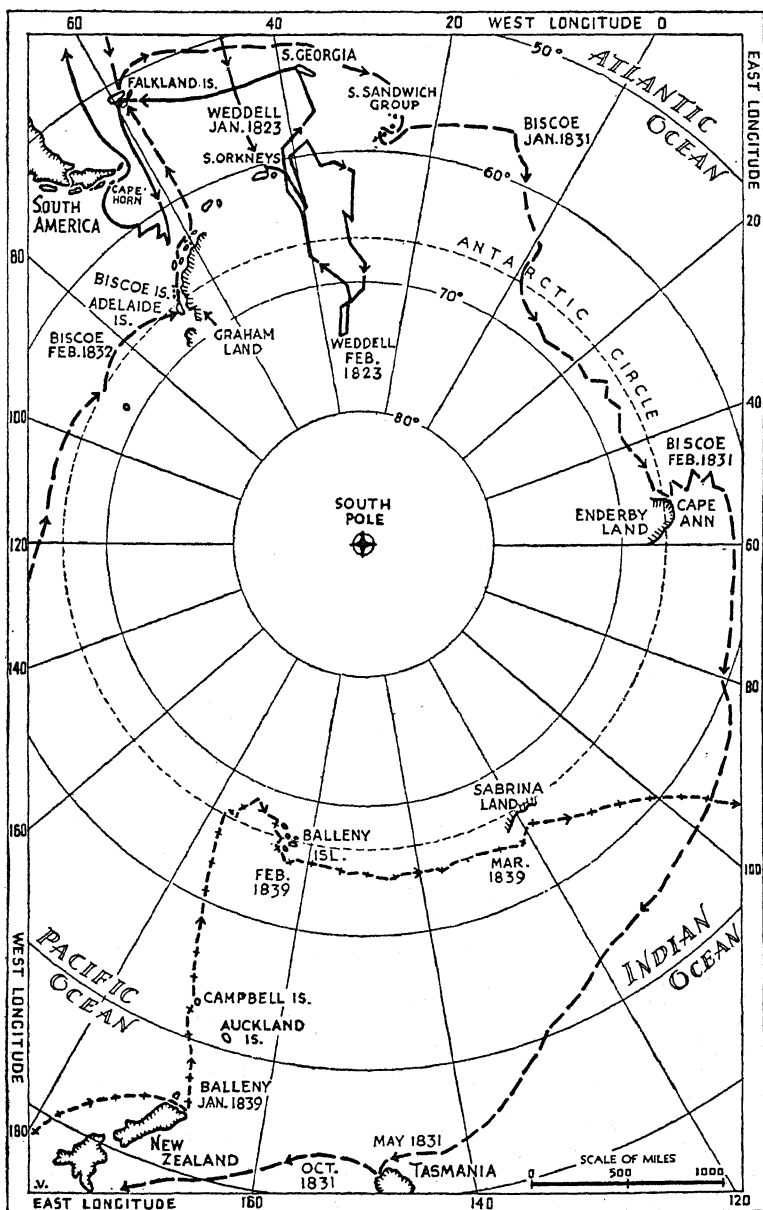
It is probable that Weddell was talking about Englishmen, not Americans, and although his reproach is pontifical and somewhat pompous and self-righteous, it seems to this reader, at least, that it is the expression of a man who was

not fundamentally a fraud. Out of some experience with explorers I have come to the conclusion that although they may repress much, they seldom invent anything. There are a few notorious exceptions to that generalization which prove the rule, but the average explorer of reasonable intelligence knows that geography will eventually catch up with him.

Weddell was out for seals primarily, and so when he found that the South Orkneys did not yield many, he went south for land, hoping to find a new sealing ground that would enable him to fill his ships quickly. By Jan. 27, 1823, he had gone southeast of the South Orkneys to 65 degrees south, but not finding any land he turned north again in the hope that if he did find a new island he would be able to get all the seals he wanted. And thereby James Weddell probably missed his greatest opportunity, for if he had kept on south he might have found his open sea, and he would have had enough provisions to keep going much farther than he could go later. But he turned north, when there was no land to be seen, and sought land between the Orkneys and Sandwich Land. He didn't find any.

In his wanderings about 61 south he had found heavy ice, although he was only 100 miles from land, and he concluded that Captain Cook was right when that master explorer decided that field ice is formed only near land. This had a strong effect on his later push to the south. "Had I not known," said Weddell, "of the existence of South Shetland, I might have fallen into the commonly received error, that this ice proceeded continuously from the South Pole."

The two little ships wandering around in the fog, partly in the twilight gloom of the approaching winter, made heavy going. They often hove to at night or in fog because Weddell wanted to make sure that he did not miss an island. He was once called on deck by the second officer who reported breakers, but Weddell concluded that the "breakers"



Map 3.—Weddell penetrated farther south than any other man before his time, and Biscoe and Balleny added to the outline of the land.

were merely the spouts of whales in the ghostly fog, and when the air cleared there was no land in sight.

Once he saw what looked like a rock, and the lead was cast without finding bottom. The rock turned out to be a dead whale. Spots are deceiving in the Antarctic; there is nothing quite so eerie as a south polar fog over a sea filled with ice. All this time those on the two tiny ships were looking for seals. Whenever they thought they saw land, it turned out to be icebergs, which Weddell called "ice islands."

On Feb. 1, 1823, he was in 58 degrees 50 minutes south latitude, 38 degrees 51 minutes west longitude, and after conferring with Matthew Brisbane, captain of the *Beaufoy*, a cutter, Weddell turned southeast. He offered ten pounds to the man who would first sight land, and they reported fog banks, clouds, and icebergs. Sometimes, in order to make sure the lookout was wrong, Weddell would sail through a bank of black fog.

Weddell gave up any hope of finding land to the east of the Orkneys and determined to go due south. It was not so momentous a decision as might have been expected, for the ice was not heavy. There were dense fogs and gales and wet decks, and the men had colds and rheumatism. The cookstove was put below decks on the *Jane* to warm the ship and enable the men to dry their clothes, and Weddell issued three wineglasses of rum a day.

Once the *Jane* almost rammed an iceberg in the fog. Weddell found that the best way to get around icebergs was to windward, because the wind blew the smaller, disintegrating pieces to leeward. A rock was sighted, but it turned out to be an iceberg, its north side full of black earth. That encouraged Weddell in his belief that land must be near.

On Feb. 11, at 65 degrees 32 minutes south, he found that the current had set the ships to the north and west,

which surprised him as the usual current in the Antarctic he had found to be to the east. However, he was merely anticipating later explorers, who also found this north and west current, a fact that might help to substantiate Weddell's story. On the eighteenth the weather was "remarkably fine." Both thermometers had been broken, but he did not think it was colder than it had been at 61 degrees south in December.

"Not a particle of ice of any description was to be seen."

(Weddell put that in his book in large type to emphasize it. It might at least be taken as indicating his own surprise, but most of his critics do not comment on the fact.)

"The evening was mild and serene, and had it not been for reflections that probably we should have obstacles to contend with in our passage northward, through the ice, our situation might have been envied."

On the twentieth it was clear, with a fresh south wind, which, had he known it, was from the cold land he was seeking.

"The atmosphere became very clear [and this confirms his position, as clear air almost always follows a strong wind from the ice-covered Antarctic], and nothing like land was to be seen. Three ice-islands were in sight from the deck and one other from the mast-head. On one we perceived a great number of penguins roosted. Our latitude at this time, 20th February, 1822 [obviously a misprint for the correct year, 1823] was 74 degrees 15 minutes, and longitude 34 degrees 16 minutes 45 seconds; the wind blowing fresh at south, prevented what I most desired, our making further progress in that direction. I would willingly have explored the S. W. quarter, but taking into consideration the lateness of the season, and that we had to pass homewards through 1,000 miles of sea strewn with ice islands, with long nights and probably attended with fogs, I could not determine other-

wise than to take advantage of this favorable wind for returning.

"I much regretted that circumstance had not allowed me to proceed to the southward, when in the latitude of 65 degrees, on the 27th of January, as I should then have had sufficient time to examine this sea to my satisfaction.

"Situating however as I actually was, my attention was naturally roused to observe any phenomena which might be considered interesting to science. I was well aware that the making of scientific observations in this unfrequented part of the globe was a very desirable object, and consequently the more lamented my not being well supplied with the instruments with which ships fitted out for discovery are generally provided."

It is submitted that that statement does not sound like the expression of a man who would deliberately fake a voyage. His little ships were not fitted out to withstand a winter in the ice; they were hardly suitable for such an adventurous plunge into unknown waters. The crew was bitterly disappointed at not finding land or seals, and Weddell tried to cheer them by firing a salute, hoisting the colors, and serving out extra rum. The sea was named after King George IV, but the name has been changed to the Weddell Sea, and that it still remains on the maps is some indication that there are those, even in this country, who do not completely believe that Weddell made it all up.

The ships made their way back to South Georgia, and then to the Falklands, where they spent the winter. In October, 1823, they sailed for the South Shetlands, and encountered heavy pack ice in 62 degrees south. When they sighted the islands, late in the month, they were hit by one of those terrific Antarctic gales which come up without warning and coat the ship with ice. Everything movable was swept overboard, the deck, bulwarks, and rigging became a solid mass of ice, the rudder was frozen fast, and ice on the fore-

castle and bowsprit and martingale brought the ship down so far that she could hardly rise above the seas. (The same thing happened to Byrd's ship, the *City of New York*, on its trip south to bring out the members of the first expedition. Ships can be sunk by accumulated ice.) The crew of Weddell's ship did not have good clothing; what they had started with was worn-out, and the captain parted even with his blankets to make stockings for his men. But they weathered the storm, despite many injuries, and after giving up the struggle to reach the South Shetlands, they made their way to Cape Horn and the islands off Tierra del Fuego, where they found some seals before sailing for England.

Weddell, like other navigators of the period, believed that there was a large land mass somewhere south of the South Shetlands. He sketched a vague Trinity Land, and put down the edge of a continent south of the Shetlands, which he called "South Shetland." Palmer Land was then on some charts also. That he did not find the continent, and that other discoveries overlapped and have since been disputed, is not surprising when his voyage is weighed impartially. There wasn't much known then about the Antarctic Continent; some farsighted seamen believed that it was there, but even those who had sighted its fringes did not know what they had found. James Weddell should go down in history as a man who did his best under grave difficulties, and had a most astonishing bit of luck, luck for which he has been abused ever since. And luck plays a big part in polar exploration.

There is a corner of the Antarctic in the Indian Ocean sector, about due south from Madagascar, called Enderby Land. Probably few people know anything about it or how it got its name. But it has the distinction of being named after one of a small group of men like the American Captain Fanning and the English Enderby Brothers who were in-

terested in more than whale oil and sealskins. Not that they would pass up a dollar or pound that came their way, but they also felt that when they were in unknown waters they owed something to geographical knowledge.

In the early decades of the nineteenth century the ships of Enderby Brothers sailed into far southern latitudes. Charles Enderby was an original Fellow of the Royal Geographical Society in 1830 and was interested in its work for forty-seven years. As a result of this interest in scientific work the Enderbys chose their ship captains partly for their education and training, many of them being ex-naval officers. They were instructed to do more than hunt seals, and that if they saw something that might be of value to the world, and particularly to Britain, to record it. As a result these ships sailed on what were voyages of exploration as much as profit, and frequently the pecuniary returns were much less than the intangible but valuable bits of information brought back.

One of the Enderbys' captains was a retired master in the Royal Navy, named John Biscoe, whose name is still on Antarctic charts. He sailed from England in 1830 in the brig *Tula*, accompanied by a fifty-ton cutter, the *Lively*, for experience had proved that these small ships were useful in scouting along the edge of the ice where a larger vessel might get into danger. Perhaps the *Hero* of Captain Palmer was the first of these little ships to go south, but they became a part of every expedition for a time. Biscoe found his cutter, however, a decided handicap because it was always getting lost and was finally wrecked.

Biscoe's entire first voyage was beset with difficulties and dangerous encounters with the ice, as well as storm. The full fury of the Antarctic was let loose on his small ships, occasionally for three or four days at a time, and he escaped wreck by miracles. After attempting vainly to reach the Sandwich Islands through fields of ice where the ships scraped

over sunken pieces, Biscoe gave it up and headed to the eastward, beating against the wind.

On Jan. 22 he crossed the Antarctic Circle in 1 degree east, and altogether he sailed for nearly fifty degrees within the Circle. On Jan. 28 he reached his farthest south, 69 degrees south in 10 degrees 43 minutes east, and was then within a comparatively short distance of the coast. But he did not see it.

Close to land and in the edge of the pack ice as he was, he frequently had narrow escapes, one of which he describes:

“At 6 p. m., while standing to the southward, we suddenly, on the weather clearing up, found ourselves completely beset with large pieces of drift ice. The helm was immediately put down, and by the careful management of the sails we were enabled to pass through two large pieces, of about the size of our hull, which showed under the bows just as the headyards were hauled, the vacancy between just sufficient to admit the vessel through; the cutter being a short distance astern, avoided the danger.”

One never knows what will pop out of an Antarctic fog. I remember moving slowly for hours in the half-light of an Antarctic night, shrouded in fog, huge pieces of drift ice looming up occasionally on either side, in as eerie an atmosphere as can be imagined. It was like moving through some ice-strewn purgatory, where nothing lived or moved except our two ships feeling their way slowly along. The feeling of helpless isolation is indescribable. A cold, dead, ice-cluttered sea. But that is the common portion of all, at some time or other, of those who go down to the Antarctic in ships, and they are fortunate if it is not blowing a gale at the same time, with a blizzard instead of fog.

Biscoe held on to the east, sometimes in severe gales, with weather so thick that he could not see chunks of ice until they were nearly aboard, any one of which might have sunk him, and seas breaking over his vessel and coating it

with ice. On Feb. 28, after two days of storm, they were able to make to the southward, and from latitude 66 degrees south and longitude 47 degrees 20 minutes east, he saw some black mountain summits standing above the snow.

For two days the ships tried to make their way through pack ice and bergs, and Biscoe named a prominent headland, undoubtedly land, Cape Ann. Before it could be reached, however, another storm broke, the cutter disappeared, boats were swept away, the bulwarks smashed, and the crew were so worn-out by cold that they could hardly hold to the ropes. The brig finally drove with the wind, and for five days faced disaster. When the hurricane ended, one of those storms that so often arise viciously out of the high, snow-covered continent, the *Tula* was a wreck, and had been driven 120 miles.

Biscoe tried to get south again, and did once more sight Cape Ann, but his crew were exhausted. Several of the men had lost the use of their legs from scurvy. Summer was over, the air rapidly getting colder, and the ship was covered with ice, both hull and ropes. He had stuck it out until Apr. 4, much later than any ship should stay in those latitudes. On the twenty-sixth only one member of the crew was able to stand, and the ship was worked by the captain, the two mates, a boy, and the one seaman. But finally the *Tula* dropped anchor off Hobart Town in Tasmania, where Biscoe met the cutter *Eliza*, in command of Captain Weddell.

The *Lively*, cutter, was separated from the *Tula* by storm but remained in the high latitudes until the ship's company was reduced to Captain Avery, one seaman, and a boy with an injured hand. They landed not far from Melbourne, and the cutter drifted away and was found washed ashore two weeks later.

The stouthearted Biscoe was not dismayed by these misadventures, however. In October, 1831, the two vessels were at sea again, repaired and remanned. It speaks well for the

hardihood of sailors that after two such crippled ships should come into harbor, other men would be found eager and willing to sail in them again to such bitter seas. There was always the possibility of large profit from sealing, and when have seamen ever failed to long for an adventure!

This time Biscoe spent three months sealing off the coasts of New Zealand and the Chatham and Bounty Islands. On the way home Biscoe stood to the southward to look for land west and south of the South Shetlands. It is one of the oddities of this early exploration that explorers seldom knew what their predecessors had accomplished. It was partly, of course, because sealers kept their own counsel as to lands they found, but it was also partly due to faulty means of communicating scientific and geographical achievements. International jealousies, both scientific and commercial, prevented the communication of new discoveries. Biscoe was sailing for the land previously seen by Palmer and, probably, by Bransfield.

On Jan. 28 they were south of the 60th degree of latitude in 131 degrees west, and Biscoe experienced for the first time that extraordinary fall of the barometer that occasionally takes place in the Antarctic. It went down to 27.30 inches, which would mean a hurricane almost anywhere else, and it must have been watched with anxious eyes aboard the *Tula* and the tiny cutter. But, as so often happens, the gale did not take place. The ships went on, sometimes being forced to the north by ice, but always turning south again, and finally at 78 degrees west longitude, where Bellingshausen had turned north after finding Peter I Island and Alexander I Land, Biscoe found open water to the southeast, another indication of how greatly conditions may vary from season to season.

Biscoe sighted land in 67 degrees south and 72 degrees west, and it was called Adelaide Island, which name it still bears. Later high mountains were seen to the southward, and

a row of islands known as the Biscoe Islands were passed. Again he saw high mountains to the south, and judged them to be part of a mainland, in which supposition he was correct, as that promontory has been proved since to be mainland. He went ashore on an island, and thinking it part of the mainland, which it might have been, he gave it the name of Graham Land—a designation that has caused headaches for map makers for many years. But H. R. Mill, that extremely fair English chronicler, whose narrative has been of great help, says:

“As a matter of historic justice, it seems to us that Powell’s name of Palmer Land ought to be retained for the whole group of islands, and possible continental peninsula south of the South Shetlands, Graham Land might well be restricted to the southern part of Adelaide Island, and the other names be fixed to definite members of the group.” In which expression Mr. Mill shows himself to be a far more objective commentator than some of his successors.

Biscoe returned to be awarded the second gold medal presented by the Royal Geographical Society, and although not much money was made from the sealing, the brothers Enderby were well satisfied. He remained in the service of the company and made other voyages, attempting several times to push through the pack ice south of New Zealand, which again shows his remarkable instinct for discovery, for it was there that the greatest gateway to the Antarctic was finally opened.

Biscoe came to some queer conclusions as to the formation of ice on the sea, believing that even the large bergs could have been thus formed, and he seems to have felt that ice forming on the sea extended all the way to the pole, although he conceded that there might be land at some points that held it together. But the exploit of John Biscoe takes an honorable place in Antarctic annals, and by his persistent driving south through seas that would have

daunted a less fearless man, he was undoubtedly the first to see the continent in the Indian sector. And when one considers that Cook was driven back there, that is enough glory for any man.

Then came a cruise of another of these daring sealer-explorers that for the first time placed land within the Antarctic Circle south of New Zealand. The Enderbys, not discouraged by financial loss due to their skipper's interest in exploration, sent out John Balleny in the schooner *Eliza Scott*, accompanied by the inevitable cutter, the *Sabrina*, commanded by Captain H. Freeman. They sailed from the Thames on July 16, 1838, on a voyage that overlapped some other momentous voyages in the Antarctic.

Balleny stopped at New Zealand, and after some difficulties with his crews, sailed south, lying to for a time in a harbor on Campbell Island, that wind- and rain-swept bit of land south of New Zealand, where a few men still live every year herding sheep. It is lush and green in the summer season, but it drips dampness and the cold winds of the southern seas sweep over it in the winter. There, by chance, he met John Biscoe, and probably talked with him of Biscoe's former trip on which he had sighted Enderby Land and barely escaped destruction.

From there Balleny headed south, and as luck would have it he went as far as 69 degrees south latitude in 172 degrees east longitude, which has been found to be fairly near the best point for pushing through the ice pack to the Ross Sea. If the ice had been broken that season, as it has been since then, it is possible that Balleny, instead of Ross, would have discovered the gateway to the Antarctic. However, he was stopped by heavy pack, and he coasted along it to the westward where it brings up against the northern cape of South Victoria Land. Late in the season the pack

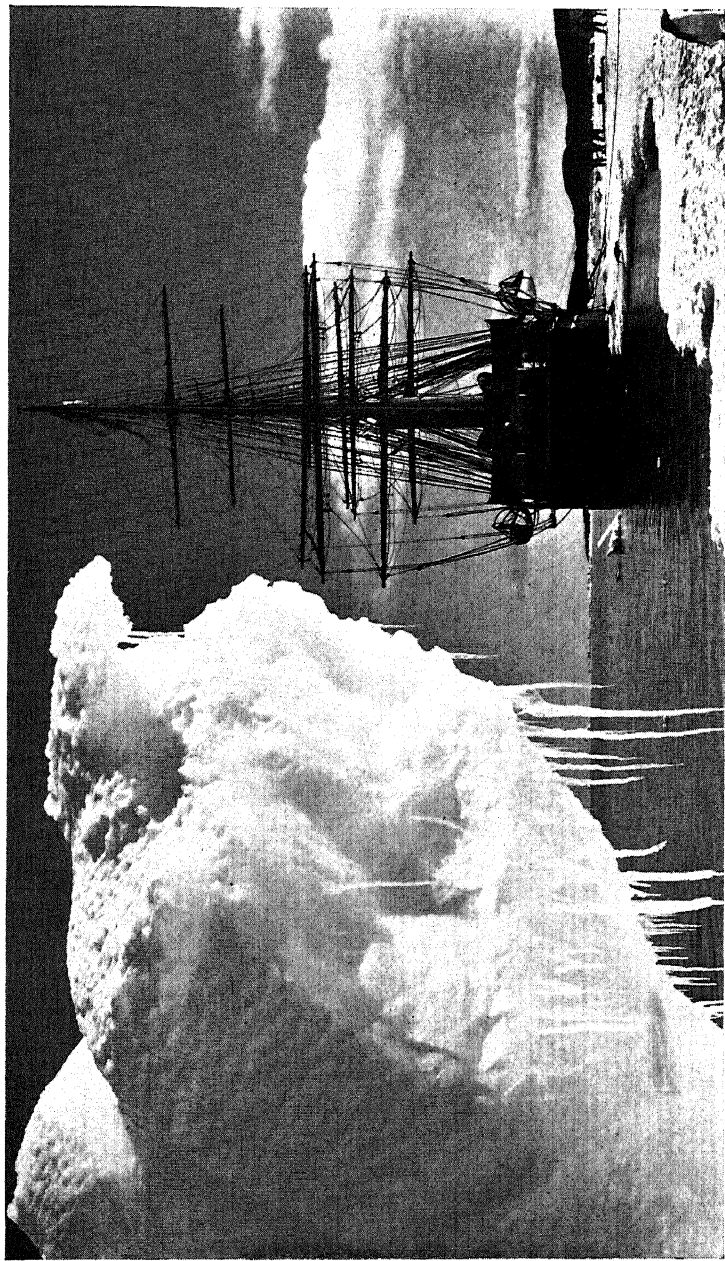
is frequently open here near the land, but Balleny was a little too early in the year.

On Feb. 9 the overcast sky cleared and Balleny found himself at 164 degrees 30 minutes east longitude, not far north of what we know now as South Victoria Land. He was just north of the Antarctic Circle, and in the southwest there was a dark spot that appeared to be land. A course was set for it, and in the evening, while only five miles away, it showed up as five large, high islands, with two smaller ones.

The next day the *Eliza Scott* got within a mile of the middle island, but it was so beset with ice that no landing was possible. One of the mountains on what is known as Young Island was 12,000 feet high, and on some of the mountains smoke appeared, indicating that they were volcanoes. Everything that has been learned of them since shows their volcanic origin. The ice came down sheer to the water, and there was not a bay or a cove where a landing could be made.

Further to the west Balleny again sighted land, between the Balleny Islands and Enderby Land, which he called Sabrina Land and which was undoubtedly part of the main continent. He also saw a large iceberg with a huge block of stone embedded in it, which indicated to him that it came from land to the southward. Soon after, Balleny set his course northward, but ran into a terrific gale in which the cutter *Sabrina* was lost. It was becoming obvious that these small vessels, valuable as they were for scouting, were not large enough or strong enough to withstand the punishment of icy Antarctic storms. Those that were lost were probably sunk by accumulations of ice, or rammed bergs.

Balleny's discovery of the islands that bear his name marked the end of adventure combined with sealing, which had added so much to Antarctic knowledge. In the greater accomplishments of larger expeditions, fitted out by gov-



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Plate 5.—The peace and beauty of the southern land.

ernments, the feats of these hardy seamen in craft that now appear so inadequate for the purpose have been somewhat eclipsed. But they have the honor that pioneers deserve, and it was because of their curiosity and unflagging courage that men became once more interested in that Terra Australis Incognita which had intrigued the ancients.

The sealers had proved that there was land in these strange, frozen waters. How great was its extent they did not know. There were some, as shall be seen, who still thought they might sail to the South Pole on open seas. But a new era in Antarctic exploration was about to open, a glorious period, when the magnificent size of that vast region was to be disclosed.

Beginning of the Golden Age

THE actual proof that there was an Antarctic Continent was not due to the thrusts southward of sealers, but to a determined assault on its barriers by three nations, France, the United States, and England, of which the latter two were the most successful. Three expeditions, one from each of these countries, were backed by the resources of their respective governments in the six years from 1837 to 1843. The Balleny expedition was an attempt by private individuals to do that which their government seemed reluctant to do. But it must be remembered that until these national expeditions headed south, there was no definite knowledge of what lay within the Antarctic Circle.

True, Palmer had glimpsed the land that is claimed for him on the charts; so in all probability did Bransfield sight Trinity Land. Bellingshausen had sighted islands, and Biscoe had found Enderby Land, which is a part of the main land mass. But all their efforts had not yet confirmed the existence of a continent. The mere fact that Ross, in 1840, after crashing through the ice pack guarding the sea that bears his name, thought he might be able to sail to the South Pole, indicates how fragmentary was their knowledge. Even Wilkes, the American explorer of the same period, had no idea that he might sight a shore that suggested a vast mainland behind it. When these three expeditions sailed, their commanders had no more idea than Palmer that the land he had sighted was the most extraordinary land mass on earth.

But the constant pecking away at the fringes of this continent, the sighting of land at widely separated points, had aroused the curiosity of all the great geographical societies. It was beginning to be realized that what the sealers had stumbled upon might be one of the two greatest discoveries left for man to make on this globe. (The other was the interior of Africa.) Even if the land sighted consisted merely of islands holding in place a great belt of ice with open water toward the pole, the entrance into that "silent sea" would be a magnificent achievement. Weddell's voyage did much to stimulate the imagination of geographers, for his record seems to have been widely accepted in those days.

There was another impelling motive for the resolution to learn what lay beyond the Antarctic Circle. The hitherto haphazard science of terrestrial magnetism had been reduced to a formula by the famous German physicist Gauss, who after laborious calculations had predicted that the Southern Magnetic Pole would be found somewhere near the latitude of 66 degrees south and longitude 146 degrees east. He was a bit out, but when one considers that nothing was known of the Southern Magnetic Pole at that time from actual observation, he was very near to its constantly changing position.

The determination of lines of terrestrial magnetic variation was most important because of rapidly increasing maritime commerce. The influences on the needle vary all over the world, and there are few places where it points constantly in the same direction. Even the magnetic poles shift their positions. The North Magnetic Pole had been located by James Clark Ross, and so the Southern Magnetic Pole was literally a lodestone that fascinated the minds of scientific men in the early decades of the last century, and the desire to locate it had great effect upon the progress of Antarctic exploration.

There is nothing more dramatic in all the history of

exploration than the nearly contemporary and progressive southward penetration of D'Urville, Wilkes, and Ross, which culminated in Ross's sailing parallel to a great range of mountains tending to the south, in the discovery of a live volcano covered with snow, and in the looming out of the sea of that 200-foot rampart of shelf ice that barred Ross's path to the pole.

It does not matter much who saw the mainland first. D'Urville and Wilkes were within a few days of each other, Ross a year later. The fact remains that these disconnected expeditions each contributed much to the knowledge of Antarctic geography, and laid the foundation for the solid work to be done later by men better equipped because of what had been bequeathed to them by their predecessors.

It was not coincidence that these three great expeditions went south at approximately the same time. For years the need for more extensive research in the southern hemisphere had been recognized by the British scientific societies. In the United States and France this effort to gain a fuller knowledge of the Antarctic was justified only because it might be a part of Pacific exploration, which was the major task of both D'Urville and Wilkes. But the British expedition was definitely aimed at the South Magnetic Pole.

It was unfortunate that the three expeditions could not have been coordinated, but national jealousies and varying purposes made that impossible. The result was wasted effort as well as misunderstandings and recriminations between the leaders of the expeditions. This is the more regrettable because they were men of similar interests, each one of them capable of appreciating the others' abilities.

When one looks at the records of D'Urville, Wilkes, and Ross, there is not much to choose between them. They were daring mariners, primarily interested in scientific research, and men who would normally be generous in the estimates of their rivals. But each had an unholy temper and was

quick to yield to it, which caused a good deal of the ensuing trouble. But, alas, this quibbling is all too common among explorers; there are few Darwins or Wallaces among them. They lack the contemplative detachment of the scientist, and if they had it they would probably never get anywhere.

An explorer with the name of Jules Sebastien César Dumont D'Urville should have been a romantic. One would like to picture him standing in the weather rigging crying out, "Damn the icebergs, go ahead." But D'Urville didn't like icebergs. He was more interested in the flora and fauna and people of the Pacific islands, and the ice rather bored him. He was interested in magnetism, which led him into an unfortunate controversy. Probably few people know, also, that it was D'Urville's ecstatic comment on a newly unearthed Greek statue that led to France's acquiring the Venus de Milo for the Louvre.

D'Urville made two long voyages of scientific exploration in the Pacific before his Antarctic venture, on one of which he discovered the wreck of La Pérouse's lost ships, and recovered many relics. So voluminous were the scientific notes of this second voyage that, with the narrative, they filled twenty volumes. He was not a superficial worker. After the revolution of 1830 he had the duty of taking King Charles X from France to Scotland.

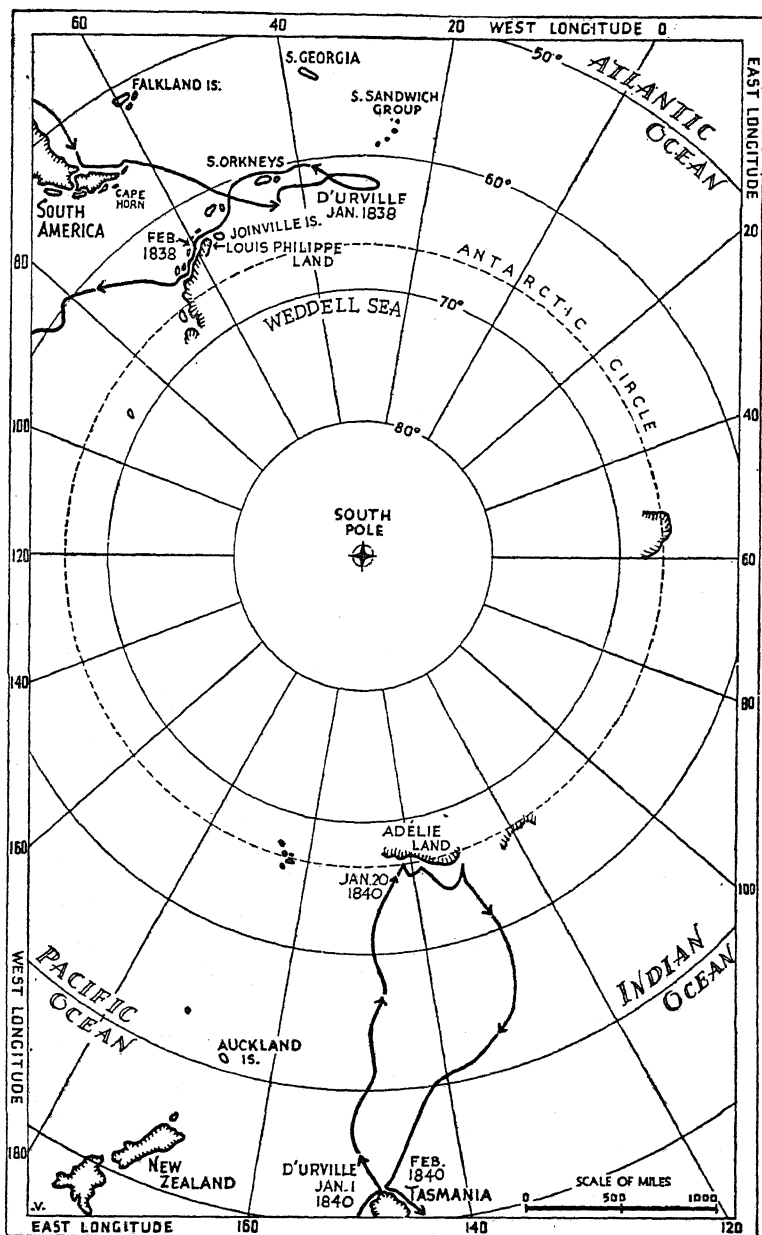
After a period of enforced retirement, during which time he was so poor that he was compelled to cancel his subscription to the Paris Geographical Society, which he helped to found, he again proposed a voyage to the Pacific to complete his ethnological and anthropological studies. The plan was approved, and it was also suggested by King Louis-Philippe that D'Urville go to the Antarctic in an attempt to surpass Weddell's southern record. D'Urville consented reluctantly to this modification of his plan, thinking it impracticable.

He sailed from Toulon on Sept. 7, 1837, with two corvettes, the *Astrolabe*, which D'Urville commanded, and the *Zélée*, under the command of Captain Jacquinot. The ships were not fitted to withstand the ice, and the admirable sketches of these men-of-war with their towering tumble-home sides pierced with gun ports, and their lofty masts, shows how unsuitable they were for polar work. But D'Urville did not intend to stay long in the ice if he could help it. He himself was in poor health, as he had gout, and his sailors laughed as he limped down to his ship and said, what H. R. Mill translates freely, "Oh, that old chappie won't lead us very far." D'Urville heard them and determined to take them a lot farther than they wanted to go. Even if the Antarctic did not appeal to him so much as his Pacific islands, he was a doughty seaman.

After surveying Magellan Strait for a time, D'Urville set a course for the south in an attempt to repeat Weddell's voyage. On Jan. 22, 1838, he reached the edge of the pack in the Weddell Sea at 63 degrees 39 minutes south, and 44 degrees 47 minutes west. The ice was heavy, and D'Urville did not get near the Antarctic Circle although the two ships cruised about looking for an opening for nearly two months. They were often hemmed in by the pack and by icebergs, and were frequently beset by storms.

D'Urville's failure to make any considerable southing caused him to disbelieve Weddell's story, which is not astonishing in the circumstances. He did, however, see land in 63 degrees south, part of the same land seen by Palmer and Biscoe, although farther to the east, and named it Louis-Philippe Land. An island to the northeast was named Joinville Land, and present-day maps show a small island that bears the name of D'Urville.

Two years were spent in the Pacific, and then he decided to make one more attempt to reach a southern latitude. By this time he knew that Wilkes and Ross were both heading



Map 4.—D'Urville, French explorer, discovered a bit more of the Antarctic.

toward the Magnetic Pole, and although his instructions contained no orders to enter those regions, and to encroach upon another explorer's territory is open to criticism, he wanted France to have a greater share of Antarctic laurels. On Jan. 1, 1840, the ships sailed from Hobart Town, and D'Urville set his course southeast in order to sail south along the line of no magnetic variation.

After passing the Antarctic Circle he had such open water that he hoped to reach 70 degrees south. The weather was perfect, the sun shining on a few icebergs of apparently recent birth, and with many penguins and seals in sight. On Jan. 20 a number of officers thought they saw land to the south, and late at night when the sun was on the southern horizon there appeared a sharp outline ahead of what was undoubtedly land.

The next day there was not a breath of wind, and D'Urville could see land stretching on either side as far as the eye could reach. It was dead level, apparently 3,000 or 4,000 feet high—although later found to be about 1,500 feet—without a trace of rock. The shore line was a vertical cliff of ice, which led to the conclusion that the icebergs so recently passed must have broken off from it. A breeze came up and the ships coasted eastward along the face of the icy rampart only a few miles away. On every side as they moved along were tremendous bergs, which at times came too near the ship for comfort.

While magnetic observers were working on the foot of a near-by iceberg, a bit of rock was discovered near the shore. Two boats put off, one from each ship, and that from the *Astrolabe* reached the small rock island first. It was one of eight or ten a few hundred yards from the clifflike shore of ice, and inhabited only by penguins. However, there was no doubt in D'Urville's mind that behind that rocky island was a land mass hidden by ice and snow, extending for some distance east and west and inland. He named it Adélie Land

after his wife, and the little penguins of the Antarctic are known as Adélie penguins.

For two days more the ships coasted along the icy cliffs, and then were hit by one of the sudden and terrific storms that are not infrequent in that part of the Antarctic. Sir Douglas Mawson, who wintered there, said that at times the wind must have reached a velocity of nearly 200 miles an hour. The *Astrolabe* lost her mainsail, and both ships narrowly escaped collision with the drifting bergs, but they weathered the gale. The weather remained bad, the ideal days they had had for so long did not return, and there were fogs, which make navigation along the edge of the pack very dangerous.

It was on the twenty-ninth, in thick weather, that another ship was sighted, a brig flying the American colors, and D'Urville rightly assumed that it was one of Wilkes's vessels. It was the *Porpoise*. The French flag was raised, and as the American ship was closing fast D'Urville gave orders to make sail so as to keep up with her and speak to her.

The commander of the *Porpoise*, however, thought that the *Astrolabe* was trying to run away, and turned to the south, vanishing in the fog. D'Urville later said that he wished nothing more than to exchange greetings and learn what the other expedition had been doing, but Wilkes's comments on the meeting annoyed him, as they well might. D'Urville assumed that the Americans wished to avoid contact and remain secretive about their movements. Of course, this was not the fact; it was one of those ridiculous misunderstandings that breed bad feeling out of nothing. Lieutenant-Commander Ringgold was captain of the *Porpoise*, and he made the following report to Wilkes:

"At 4h 50m, being within a mile and a half, the strangers showed French colors: the leeward and sternmost displayed a broad pennant: concluded now that they must be the French discovery ships under Captain D'Urville, on a similar

service with ourselves: desirous of speaking and exchanging the usual and customary compliments incidental to naval life, I closed with the strangers, desiring to pass within hail under the flag-ship's stern. While gaining fast, and being within musket-shot, my intentions too evident to excite a doubt, so far from any reciprocity being evinced, I saw with surprise sail making by boarding the main tack on board the flag-ship. Without a moment's delay, I hauled down my colors and bore up on my course before the wind."

Evidently Ringgold was a touchy person. He took it for granted that D'Urville would know that his intention was to pass under the stern within hailing distance, and also that when D'Urville made sail it was for the purpose of running away instead of keeping alongside. Neither of them thought of making a signal, or waving, or even trying to hail the other. A man in the rigging with a trumpet would have made the intentions of each quite obvious. But the worst construction was placed upon the incident on both sides, and Wilkes wrote:

"It is with regret that I mention the above transaction, and it cannot but excite the surprise of all that such a cold repulse should have come from a French commander, when the officers of that nation are usually so distinguished for their politeness and attention. It was with no small excitement I heard the report of it,—that the vessels of two friendly powers, alike engaged upon an arduous and hazardous service, in so remote a region, surrounded with every danger navigators could be liable to, should meet and pass without even the exchange of common civilities, and exhibit none of the kind feelings that the situation would naturally awaken:—how could the French commander know that the brig was not in distress or in want of assistance? By refusing to allow any communication with him, he not only committed a wanton violation of all proper feeling, but a breach

of the courtesy due from one nation to another. It is difficult to imagine what could have prompted him to such a course."

All that because no signal was made. Even a musket fired in the air would have been enough. Of such trifles is dissension born.

D'Urville saw more ice cliffs in 64 degrees 30 minutes south and 131 degrees east, similar to those of Adélie Land, and decided that the ice must rest on land or rocks, or a shoal. However, an ice pack barred their way. D'Urville felt that he had done enough in the Antarctic, and on Feb. 1, 1840, he started north and returned to France. The little islets in front of the ice cliffs of Adélie Land were all the actual land he had seen, but he was right in his assumption that land must lie under the domed ice behind them.

Wilkes Finds a Continent

THERE is no doubt that Charles Wilkes was one of the greatest explorers the United States has produced. But it is equally true that most of his fellow countrymen have never heard of him.

He was the first to prove that the Antarctic was a continent, not a series of ice-locked islands, and the tracks of his ships on the Pacific look like a cobweb. His expedition originated with one of the most fantastic theories of the earth ever held by man, and resulted in the establishment of the Smithsonian Institution. He took a ridiculed expedition to sea for four years of investigation that put the United States on the map scientifically, and came back to be court-martialed. It was ninety years after his expedition returned that his disputed claims were proved to be correct, and that he was shown to have been a daring and original explorer. His whole career as an explorer is a paradox.

There has been more fuss and pother about Wilkes's voyages in the Antarctic than over any other polar expedition that ever set sail. Even the Peary-Cook controversy is mere gentle raillery in comparison. The disputations over Palmer's discoveries were based merely on the element of time, but Wilkes was accused of inventing landfalls. There is a vast difference. But, after making all allowances for possible errors of observation—all too frequent—in the polar regions, it is hard to understand why a man who claimed to have coasted along nearly 1,500 miles of ice-covered land, who was supported by most of his officers and by reasonably accurate observations, should have been so bitterly criticized by his contemporaries and those who followed him.

His task was most difficult. When "The United States Exploring Expedition," to give it its official name, put to sea for a four years' cruise in 1838, it had come to be regarded with ridicule. Harley Harris Bartlett, before the American Philosophical Society at the time of the Wilkes Centenary, referred to the "lunatic fringe" of the expedition's background. And it is true that it had been put together in an atmosphere of distrust, controversy over objectives, squabbles for control, that would have made it notorious even if it had not originated in one of the weirdest conceptions of the earth ever held by mankind.

The chief promoter of the expedition in its early stages was Jeremiah N. Reynolds, whose memorials to Congress advocating an Antarctic and Pacific expedition gave little indication of his imagination and impetuous temperament. Reynolds first became known as a supporter of Captain John Cleves Symmes, Jr., who wanted Congress to send an expedition south to prove that the earth was made of five concentric spheres, with a hollow core and polar openings so wide that a voyager "might pass from the outer side of the earth over the rim and down upon the inner side a great distance before becoming aware of the fact at all." No wonder Edgar Allan Poe, who was fascinated by polar travels, grasped this idea for one of his famous stories. But it is a matter for even greater wonder that some members of Congress were influenced by it.

Reynolds later disavowed this odd theory, which is really ages old, but his former lectures on the subject caused him to be looked upon somewhat dubiously by naval officers, and it was probably one of the reasons for his being refused a part in the expedition that he did so much to get under way. What the Stonington sealers thought of it can well be imagined. Many a chuckle must have gone up over the stove on a winter's night when Symmes's theory was discussed. As a matter of fact, when the expedition was finally beginning

to take form, Reynolds wanted it confined to the Pacific, as he had in his impatience gone to the Antarctic with Stonington sealers and had seen enough of it.

However, for all his queer notions, and his dream of world empire for the American flag, it was because of Reynolds's insistence that the Committee on Naval Affairs of the House of Representatives authorized an Antarctic expedition in 1828. Reynolds was asked to gather data from whalers and sealers and he reported among other things:

"That they have been beyond 70° S. latitude in a few instances, in which latitude they experience moderate weather, a clear sea, and no land or ice to the south. [About 240 miles north of Weddell's latitude, and the same conditions described. Either they confirmed Weddell in certain seasons, or the old ideas would not die. There was no other place than the Weddell Sea at that time where the Stonington men could have gone so far south. If some of them had only left accurate records!] They all agree that the ice to be met with is first formed and attached to land, and that the greatest impediment to navigation from ice will be found from 62° to 68° S., except in those meridians where they have not been able to go far south at any time. They have seen lands to the east of the Shetlands, but give no account of the animal or vegetable productions on any of them."

This was a most provocative report, sufficient to tempt any nation into sending ships into that misty and little-known region. It suggested that south of 68 degrees there might be an open sea, the sea that Weddell had reported, and beyond that possibly the pole itself, a mathematical spot in an iceless ocean. But although it is probable that Reynolds had come around to the theory of an open sea enclosed by ice, held long before his time, the approaches to that ocean no longer had much attraction for him.

He had slipped on icy decks, skirted bergs in the fog, had laid to in the midst of grinding cakes of ice in the night, and

had been isolated for a time on an island, an experience so striking that he wrote an account of it. His thoughts now lay more in the direction of the warmer Pacific, the coral islands, and the whaling grounds, where American whalers needed the protection of the flag, and where there was an almost limitless field for geographical research, and also the opportunity to make himself one of the vanguard of those pursuing "national glory." From science he had turned to aggrandizement.

After his trip to the Antarctic, Reynolds kept pounding away at Congress and the Navy Department, with emphasis on the Pacific, and in 1834 preparations were again made to send out an expedition. In 1836 Congress appropriated \$300,000, and it seemed probable that Reynolds would go as head of the civilian scientific corps. But his constant acrimonious letters to Secretary of the Navy Dickerson, letters published in *The New York Times* over the nom de plume "Citizen," led Reynolds to be dropped from any connection with the expedition. In these letters he continually dwelt on the latter part of his report that told of the dangers of navigation for whalers in the Pacific and the great service this country could play in surveying there, and deprecated any attempt to penetrate high latitudes to the south.

Most of Wilkes's work was done in the Pacific, an accomplishment that places him second only to Cook in his explorations there. Why Reynolds should have turned so quickly from his first desire is hard to understand, except that he felt more "national glory" was to be achieved in a region where exploration was not so constantly dangerous and uncomfortably cold.

When the appropriation was first made, several ships were selected for the service and Commander Thomas Ap Catesby Jones was appointed to the command of the expedition. Lieutenant Charles Wilkes was sent to Europe to purchase instruments; there was so much confusion attending the out-

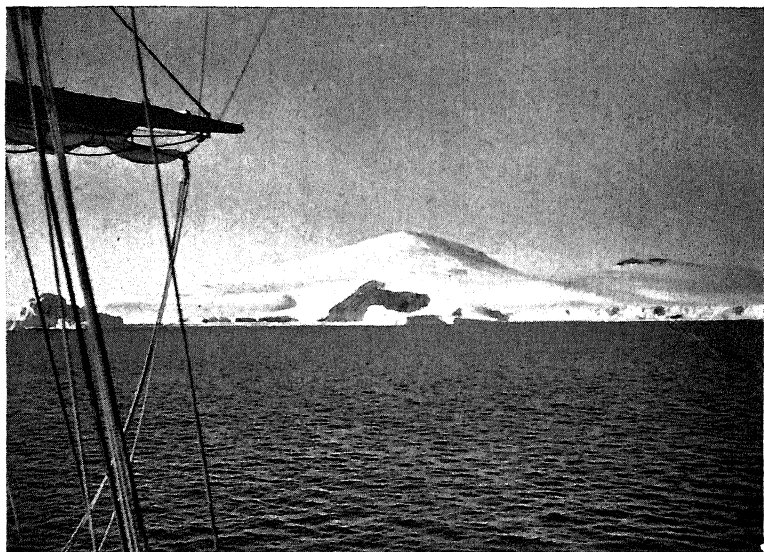
fitting of the expedition that he paid \$1,167.50 out of his own pocket for part of the instruments, and promised to pay \$3,248 for the others. Eventually, he had to apply to Congress for the money.

(In the same way Captains Benjamin Pendleton and Nathaniel Palmer had to ask Congress for money to defray the expenses of the expedition on which they took Reynolds south, an expedition to which the Government felt it had been committed by its instructions to Reynolds. Whether the sealers brought home a cargo also is somewhat problematical.)

Matters drifted along until in February, 1837, Congress asked when the expedition was going to start. Secretary Dickerson said that the vessels were required for urgent naval purposes, and finally it was announced that the appropriation was exhausted although nothing had been accomplished. It seems apparent that Dickerson was never enthusiastic about the expedition. Commodore Jones resigned. Other officers were offered the command and refused it. The expedition was so tied up in politics by this time and so far from being ready that it was a public joke, if not a scandal. Finally, the expedition was turned over to Secretary of War Poinsett and Secretary of the Navy Paulding, who succeeded Dickerson, and the command was offered to Wilkes, who accepted it after certain conditions were met.

This rather lengthy preamble is necessary to show the circumstances that led to the appointment of Wilkes, and the unhappy state of the expedition when he took command. As he said himself:

"The successive resignations of the different officers who had been appointed to the command, led everybody to look upon it with disgust, and, in consequence, my road was clear, or comparatively unembarrassed. The very things that brought the Expedition into general disrepute, were of great



(Wide World)

Plate 6.—Mt. Erebus, the only known live volcano in the Antarctic.



(Wide World)

Plate 7.—One of the original inhabitants looks over an intruder.

advantage to me, for I was left to perform my duties unmolested."

In other words, there were few who expected anything of this pretentious venture into the unknown, and expecting the worst most people were glad to disavow any connection with what might very probably turn out to be a fiasco.

The choice of Wilkes was fortunate. There was probably not another man in the navy better qualified to lead a scientific exploring expedition; for out of Reynolds's vaporings had come what he really had wanted originally, a scientific voyage, not one to advance the flag.

Charles Wilkes was born in New York City on Apr. 3, 1798, and entered the navy as a midshipman in 1818. After two cruises and promotion to lieutenant he was assigned to the Naval Depot of Charts and Instruments, now the Hydrographic Office. He had a naturally scientific mind, and is said to have constructed the first observatory in this country.

He was a determined, courageous man, a stern disciplinarian, and somewhat conceited and hot-tempered. Living with him amicably on board a ship must have been difficult, and there is no doubt that he often had disagreements, and even quarrels, with other officers and the civilian scientists. He himself hints at a distinct disciplinary crisis while at Orange Harbor in Tierra del Fuego, when he expresses "surprise, even at this distant day, that any officers embarked in this undertaking could have so far lost sight of their duty as to attempt to throw obstacles in the way of the prompt execution of the duties they owed to the country, and the service on which they were engaged, or would have allowed selfish feelings to predominate over those for the public good. Prompt and energetic action soon put an end to these small difficulties."

Although the civilian scientists of the expedition did work that has since been recognized as outstanding, Wilkes seems to have resented their presence, even if he did not look down

upon them. Neither the French nor the British expeditions could boast a similar group, for outside of Dr. Joseph Dalton Hooker, Ross had no eminent men of science with him. Wilkes's motives were not altogether contemptuous, for, proud of his service, he wanted to show that naval men could be good scientists and he wished to trust as much of the scientific work to them as possible. Wilkes himself insisted that the meteorological, hydrographical, and terrestrial magnetism observations be made by officers. He wrote the meteorological and hydrographical reports himself. But his attitude toward the distinguished and intelligent men of his scientific staff is shown by the fact that he himself says that he refrained from telling them anything as to his instructions, or what his immediate plans were. Such a condition does not make for harmony.

The scientific staff consisted of Horatio Hale, philologist; Charles Pickering, naturalist; Titian Ramsey Peale, naturalist; Joseph Pithy Couthouy, conchologist; James Dwight Dana, geologist; William Rich, botanist; William D. Brackenridge, horticulturalist; Joseph Drayton and Alfred T. Agate, artists. Many of these men became leaders in their fields, and Dana, in particular, was one of the most notable American men of science.

But the only ones to whom Wilkes pays tribute by name in the introduction to his narrative are the artists, possibly because of the disputes with the scientists which continued long after the expedition returned, during the period when the results were being tabulated. He does, however, commend them for their "perseverance, industry, zeal, and strict conformity to the rules and regulations laid down for the government of us all," although "the essential objects of the Expedition . . . were entirely unknown to them."

When Wilkes took charge of the expedition he found it in a deplorable state. The men had been in service for a long time without shore leave, although in sight of their homes,

and they were also disgruntled at being placed under the command of a new and younger set of officers. Wilkes immediately gave them shore leave, and to his delight they returned to a man.

He found great quantities of stores, but the squadron had been so reduced that there was difficulty in determining what to ship and what to leave behind. The clothing for the men to be used in the Antarctic was later found to be unsuitable and not up to sample, due, Wilkes believed, to the fault of contractors and inspectors both. Some of his requisitions for essential things were ignored until he demanded them. And the ships were not all in good condition.

The squadron consisted of the sloop of war *Vincennes*, 780 tons; sloops of war *Peacock*, 650 tons; the *Porpoise*, a gun brig of 230 tons; the tenders *Sea Gull* and *Flying Fish*, New York pilot boats, of 110 tons and 96 tons, and the *Relief*, a store ship. Wilkes had another deck put on the *Vincennes* for the protection of the men. The other ships were in fair condition with the exception of the *Peacock*. Her upper works were rotten, and she leaked like a sieve at the beginning of the cruise. Some of her yards were also rotten, and her pumps were in miserable condition. Apparently she had not been overhauled at all in the navy yard, and Lieutenant William H. Hudson, her commander and second-in-command of the expedition, said of her:

"Taken as a whole, the *Peacock* has been fitted out (so far as the navy yard was concerned), with less regard to safety and convenience, than any vessel I have had anything to do with."

But despite all these discouragements Wilkes decided that for the honor of the country and the navy he must put to sea. He received his sailing orders on Aug. 17, 1838, and the next day the squadron made sail for Madeira. Said Wilkes:

"It required all the hope I could muster to outweigh the

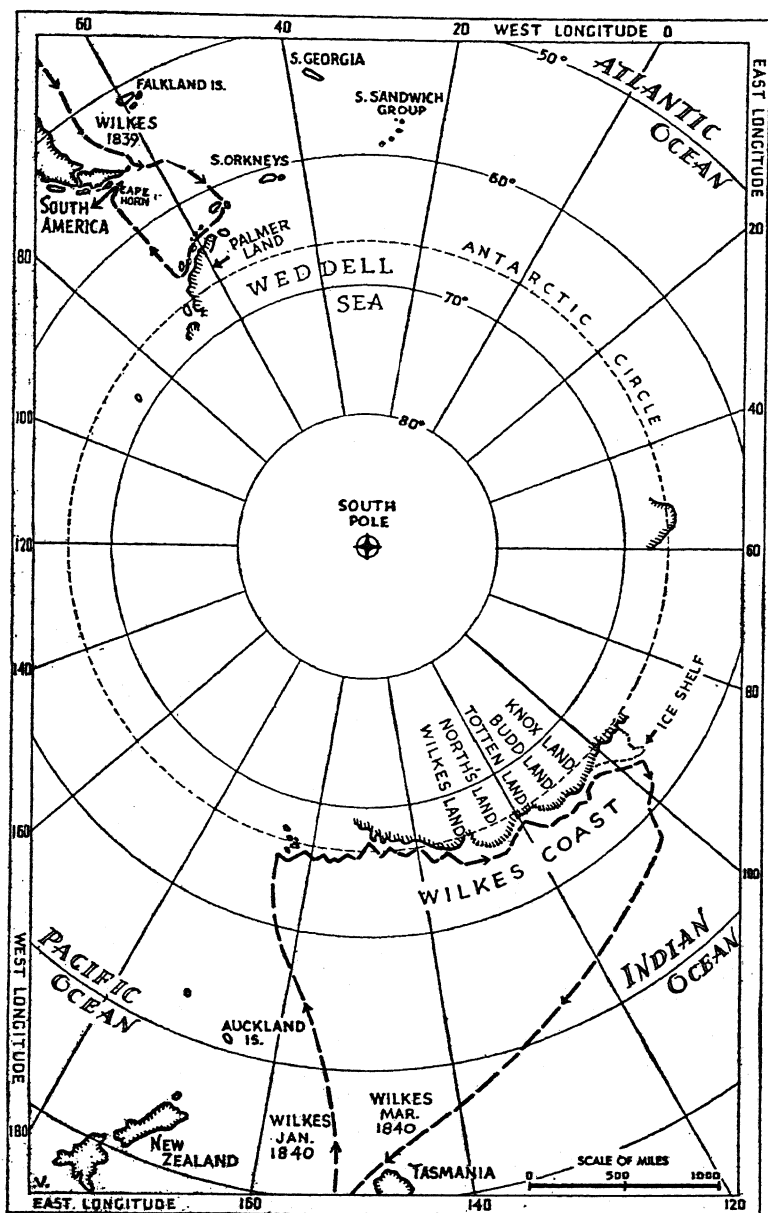
intense feeling of responsibility that hung over me. I may compare it to that of one doomed to destruction."

Not a very cheerful point of view for a man about to lead 82 officers and 342 enlisted men into the most perilous waters on earth, on a voyage that would last for four years. But Charles Wilkes was not to be daunted or depressed by difficulties for long. A less determined man could not have carried out his mission.

With the cruise to Madeira and from there to Tierra del Fuego we are not so much concerned. And Wilkes's first thrust into the Antarctic was not important, except to show him how badly his men were outfitted for polar seas. The *Peacock* and the *Flying Fish* were ordered to go to the westward toward Cook's farthest south, *Ne Plus Ultra*, as far as possible, while Wilkes joined the *Porpoise*, and with the *Sea Gull* pushed southward to Palmer Land. On the first leg of their voyage Wilkes had an opportunity of measuring the famous Cape Horn seas, which proved to be about thirty-two feet high, traveling at the rate of twenty-six and a half miles an hour. No wonder a high sea, which has about the impact of granite, causes such havoc even on a modern steel ship.

They did not leave Orange Harbor until Feb. 23, and the season was much too late for successful exploration along the Antarctic coast. They met mist and fog, sleet and snow and rain, which coated the decks of the ships and so thickly surrounded the ropes with ice that they would hardly pass through the sheaves.

It became difficult to work the ships, and the southern passage was abandoned, although Wilkes reached Palmer Land. The smaller pilot boats were frequently in difficulties, the men constantly suffering from exposure, and on several occasions they found themselves surrounded by ice floes that were freezing together and through which they barely forced a passage by ramming. The *Porpoise* was nearly wrecked on



Map 5.—Wilkes, American explorer, traveled 1,500 miles along the coast, sighting it at intervals, and established that it was a continent.

Elephant Island, saved only by a momentary rift in the fog that showed the desolate coast just ahead of them. It was not a propitious start, and Wilkes and his crew must have turned north up the west coast of South America, a voyage on which the *Sea Gull* was lost, with many misgivings about what their fate would be the next year when they pushed south again.

After nearly a year spent in the Pacific, Wilkes went on to Sydney, Australia, to refit. Inasmuch as it was known then that James Clark Ross, a navigator of experience in Arctic waters, was about to take out a thoroughly prepared expedition to the Antarctic, the ships of Wilkes were the subject of much curiosity. The Australians did not think much of them.

"They inquired, whether we had compartments in our ships to prevent us from sinking? How we intended to keep ourselves warm? What kind of antiscorbutic we were to use? and where were our great ice-saws? To all of these questions I was obliged to answer, to their great apparent surprise, that we had none, and to agree with them that we were unwise to attempt such service in ordinary cruising vessels; but we had been ordered to go, and that was enough! and go we should. This want of preparation certainly did not add to the character for wisdom of our government . . . but they saw us all cheerful, young, and healthy, and gave us the character, that I found our countrymen generally bear, of recklessness of life and limb . . . Altogether, as a gentleman told me, most of our visitors considered us doomed to be frozen to death. I did not anticipate such a fate, although I must confess I felt the chances were much against us, in case we were compelled to winter within the Antarctic."

Particularly disturbing to Wilkes was the condition of the *Peacock*. Captain Hudson had reported to Wilkes:

"I feel it my duty to state to you . . . that the *Peacock's* sheer-streak, to which the channels are bolted and ports

hung, is perfectly decayed, fore and aft, and that all the stanchions of the upper-deck bulwarks, are either rotten, or in an advanced state of decay. Against these defects, however, I feel it my duty to contend, without anticipating anything but favorable results, but at the same time prepared for the worst that may occur."

Hudson's report was mild compared with that of his carpenter, for the carpenter said that the stanchions supporting the bulwark on the spar deck were much decayed, "and with the exception of three or four of them, are unsafe, and not able to support the rail and boats attached to it, under any thing more than ordinary circumstances."

The captain of the *Peacock* was an unusually brave man. Wilkes was disturbed, also, but there was no time to make the necessary repairs. Here is an opportunity for a just criticism of Wilkes. He knew the condition of the *Peacock* before he left home, and he could easily have detached her from the squadron in time to have the necessary repairs made before the southern cruise. He was a stubborn man, determined to carry out his orders, and he did not take this precaution. Only by good fortune and the skill of Hudson was the ship saved when it got into a dangerous jam in the ice.

"We made up our minds," said Wilkes, "that it was absolutely necessary for the credit of the Expedition and the country for her to perform it [the southern cruise]; for we were well satisfied that improper imputations and motives, would be ascribed to us, if she did not, and was detained undergoing repairs, in a state of inactivity, during the season for operations in the high southern latitudes. The necessity I felt of subjecting so many lives in so unworthy a ship, caused me great anxiety during the whole cruise."

That was an outcropping of what has been called by one critic of the military services the "institutionalized mind." Wilkes could have forgotten his orders for a few weeks, and

given Hudson the opportunity to refit the *Peacock* properly.

His squadron set sail on Dec. 26, 1839, and steered south. All hands tightened ports to secure the interior from dampness as much as possible, although this cannot be done in a wooden ship in cold latitudes. Water drips down the sides in a constant cascade. Even a wooden ship with a boiler and engine in it will sweat inside when in polar seas, and what it must have been like in these thin-sided vessels with only stoves to keep out the damp, can best be imagined. The openings were calked, the seams covered with tarred canvas, and strips of sheet lead nailed over all. Additional stoves had been bought in Sydney, and thermometers were hung up to help provide an equable temperature of about 50 degrees. There were four ships in the squadron, the *Vincennes*, *Peacock*, *Porpoise*, and *Flying Fish*.

On Jan. 16, 1840, the *Porpoise*, *Vincennes*, and *Peacock* were near each other, and all saw signs of land to the southward. It was not pack, but a high mountainous and jagged land. The sky was clear and the sides of the peaks partly bare. Wilkes made a sketch of a height that he called Ringgold's Knoll. The next day the ship was tacking through an obscuring fog, going fast with the wind in a rough sea, when suddenly there was silence, no roll to the ship and the startling feeling that one had run into a harbor that could not be seen. It could only be a bay of ice. Said Wilkes:

"The feeling is awful and the uncertainty most trying thus to enter within the icy barrier blindfolded as it were by an impenetrable fog . . . yet I was satisfied that nothing could be gained but by pursuing this course. On we kept, until it was reported to me, by attentive listeners, that they heard the low and distant rustling of the ice: suddenly a dozen voices proclaimed the barrier to be in sight, just ahead."

Somehow the ship wore around in the thick gloom, the waves lapping audibly on the ice close at hand, only to be headed again by ice. Time after time, in the darkness of the

Antarctic twilight that passes for night at that time of year, the maneuver was repeated and the ship finally made its way out of the long arms of drifting ice that were enclosing it.

On the nineteenth, Wilkes was sure that he saw land to the southeast and southwest; high land, rising against the horizon, which later, in view of greater knowledge, came to have importance. From the *Peacock* the land seemed to tower 3,000 feet in height behind an ice island, "gray and dark." Wilkes called this land Cape Hudson, and it is now known on the charts as Cape Freshfield.

It was on the day when Wilkes discovered Cape Hudson that Captain D'Urville found land, probably at Piner's Bay, and the priority would go to the Frenchman if it were not for the fact that he had failed to add a day to his log when he crossed the 180th meridian. That has been made much of by American commentators because it put D'Urville some hours behind Wilkes.

The only difficulty is that D'Urville actually saw rock, while Wilkes saw a mirage, as has been pointed out by one of the severest critics of English discoverers, William H. Hobbs, Professor Emeritus of Geology at the University of Michigan. Professor Hobbs, who is not only distinguished in his own field of geology, but who has added much to the science of meteorology in the northern hemisphere, and who has made polar investigation a meticulous hobby, has explained Wilkes's discovery of Cape Hudson by refraction, which will be explained later.

They came to a field of disintegrating icebergs.

"Some of the bergs were of magnificent dimensions, one-third of a mile in length, and from one hundred and fifty to two hundred feet in height, with sides perfectly smooth, as though they had been chiselled. Others, again, exhibited lofty arches of many-colored tints, leading into deep caverns, open to the swell of the sea, which rushing in, produced

loud and distant thunderings. The flight of birds passing in and out of these caverns, recalled the recollection of ruined abbeys, castles, and caves, while here and there a bold projecting bluff, crowned with pinnacles and turrets, resembled some Gothic keep.

"A little farther onwards would be seen a vast fissure, as if some powerful force had rent in twain these mighty masses. Every noise on board, even our own voices, reverberated from the massive and pure white walls. These tabular bergs are like masses of beautiful alabaster: a verbal description of them can do little to convey the reality to the imagination of one who has not been among them. If an immense city of ruined alabaster palaces can be imagined, of every variety of shape and tint, and composed of huge piles of buildings grouped together, with long lanes or streets winding through them, some faint idea may be formed of the grandeur and beauty of the spectacle."

The ships moved westward and on the twenty-fourth the *Peacock* got into a mess that very nearly sunk her. It will be remembered that her upper works were rotten and that she had not much resistance to ice. She had put into a bay in the ice in an attempt to approach closer to the land, which was distinctly seen—the same Cape Hudson seen on the *Vincennes* by Wilkes.

An attempt to box the ship off from some ice under the bow put her aback; the ship went astern and crashed into another mass of ice that canted her rudder so badly as to make it unserviceable. It could not be moved. All hands were called, and attempts to handle the ship only by her sails proved impossible. A stage was rigged over the stern, and it was found that the rudder could be repaired only by unshipping it.

"In the meantime the position of the vessel was every instant growing worse, surrounded as she was by masses of floe-ice, and driving further and further into it, towards an

immense wall-sided iceberg. All attempts to get the vessel on the other tack failed, in consequence of her being so closely encompassed, and it was therefore thought expedient to attempt to bring her head around, by hanging her to an iceberg by the ice anchors, and thus complete what had been partially effected by the sails. The anchor was attached, but just at that moment the hawser was passed on board, the ship took a start so suddenly astern, that the rope was literally dragged out of the men's hands before they could get a turn around the bits.

"The ship now drove stern foremost into the midst of the huge masses of ice, striking the rudder a second time. This blow gave it the finishing stroke, by nearly wringing off the head, breaking two of the pintles, and the upper and lower brace."

Then the wind began to freshen. Spars were rigged up and down the ship's sides as fenders. Boats tried to take the ice anchors to the ice and plant them and finally succeeded. But the ice closed in, grinding and crushing and carrying away the fenders, and the wind kept rising. Finally, the ice anchors broke loose and the ship drove sternward toward an ice island. The ship struck quartering on a piece of ice between it and the ice island, and then went stern foremost and struck with her port quarter—larboard it was called then—with a "tremendous crash."

"The first effect of this blow was to carry away the spanker-boom, the larboard stern-davit, and to crush the stern-boat. The starboard stern-davit was the next to receive the shock, and as this is connected with the spar-deck bulwarks, the whole of them were started; the knee, a rotten one, which bound the davit to the taffrail, was broken off, and with it all the stanchions to the plank-sheer, as far as the gangway.

"Severe as was this shock, it happened fortunately that it was followed by as great a rebound. This gave the vessel a

cant to starboard, and by the timely aid of the jib and other sails, carried her clear of the ice-island, and forced her into a small opening. While doing this, and before the vessel had moved half her length, an impending mass of ice and snow fell in her wake. Had this fallen only a few seconds earlier, it must have crushed the vessel to atoms."

By working the sails the ship was moved out of immediate danger, but the weather was stormy, and there was little hope of avoiding being crushed. The ship was laboring; every few minutes something was carried away by the grinding ice alongside. Boats were sent out to plant anchors so as to warp the ship a little, or hold it fast to a large floe. Ice-bergs alongside made the water between ship and berg a seething cauldron of foam filled with ice particles. Finally the ship was worked to a point where she lay in the floes, and the ice anchors were again put out. The rudder was unshipped and brought aboard in two pieces, so badly was it smashed. All the carpenters went to work on it as it lay on the quarter-deck.

It began to snow and it seemed that the ship would be caught there forever. But the weather cleared a little, and by amazing seamanship, with the aid of the ice anchors and sails, the bow was pointed toward the open sea. As they neared it the wind increased, the sea rose, and the ice redoubled its shocks. Three of the chronometers were thrown out of their sawdust beds upon their sides. Little headway was made and the ice between the ship and the open sea was increasing. The stem was being eaten away, but the only thing to do was to drive the ship through the thickening ice. Finally they found themselves in clear water, "without a rudder, the gripe gone, and, as was afterwards found, the stem ground to within an inch and a half of the wood-ends."

The carpenters repaired the rudder so that it could be hung by only two pintles, and Captain Hudson decided

that it would be wise to go north. Two of the officers thought the rudder might last if they stayed away from ice or icebergs, but Captain Hudson decided that would not be worth while, so he put north for Sydney. Even if the ship had been in the best of condition when she started the cruise, such injuries to her rudder and bow would have made her dangerous.

After the *Peacock* put north the *Vincennes* and the *Porpoise* went on, not knowing what had happened to their companion ship. On the twenty-eighth Wilkes found himself entirely surrounded by icebergs, more than a hundred of them, from one to three miles long. The land was in plain view, undoubtedly part of the Adélie Land that D'Urville had seen. The *Vincennes* had made her way far into the ice and when a gale rose Wilkes determined to retrace his steps to the opening forty miles away. He was cut off by bergs, however, and lost his position completely, so that the only thing to do was to keep on the course that he hoped would bring him to the open sea.

The ship became coated with ice from the spray, and under reefed topsails and trysails dodged between bergs that loomed suddenly in the gale and then dropped astern. Often they loomed alongside so close that the ship appeared to scrape them. The helm was constantly shifted. After a time the ship was so covered with ice that she was almost unmanageable, and all hands were called. The gunner fell on the deck and broke some ribs.

"The gale at this moment was awful. We found we were passing large masses of drift-ice, and ice-islands became more numerous. At a little after one o'clock it was terrific, and the sea was now so heavy, that I was obliged to reduce sail still further.

"A seaman, by the name of Brooks, in endeavoring to execute the order to furl, got on the lee yardarm, and the sail having blown over the yard, prevented his return. Not

being aware of his position until it was reported to me from the forecandle, he remained there some time. On my seeing him he appeared stiff, and clinging to the yard and lift. Spilling-lines were at once rove, and an officer with several men sent aloft to rescue him, which they succeeded in doing by passing a bowline around his body and dragging him into the top. He was almost frozen to death. Several of the best men were completely exhausted with cold, fatigue, and excitement, and were sent below. This added to our anxieties, and but little hope remained to me of escaping: I felt that neither prudence nor foresight could avail in protecting the ship and crew. . . .

"We were swiftly dashing on, for I felt it necessary to keep the ship under rapid way through the water, to enable her to steer and work quickly. Suddenly many voices cried out 'Ice ahead!' then, 'On the weather bow!' and again, 'On the lee bow and beam!' All hope of escape seemed in a moment to vanish; return we could not, as large ice-islands had just been passed to leeward: so we dashed on, expecting every moment to crash.

"The ship, in an instant, from having her lee guns under water, rose upright; and so close were we passing to leeward of one of these huge islands, that our trysails were almost thrown aback by the eddy wind. The helm was put up to pay the ship off, but the proximity of those under our lee bade me keep my course. All was now still except the distant roar of the wild storm, that was raging behind, before, and above us; the sea was in great agitation, and both officers and men were in the highest degree excited.

"The ship continued on her way, and as we proceeded, a glimmering of hope arose, for we accidentally had hit upon a clear passage between two large ice-islands, which in fine weather we would not dare to have ventured through. The suspense endured while making our way between them was intense, but of short duration; and my spirits rose as I heard

the whistling of the gale grow louder and louder before us, as we emerged from the passage. We had escaped an awful death, and were again tempest-tost."

That was not their last bad gale, but it was their worst. Although it was still summer in the Antarctic, the fickleness of the weather, the sudden storms that roared down from the domed continent, the crash of all the storm furies out of hell tearing at the helpless ship, followed by a day or two of warmth and pleasant seas, made Wilkes realize that he was in a region where he could not predict even a few hours ahead what sort of torment lay in wait for him.

The day after this storm, the sun shone on a smooth sea, and all about the ship were icebergs. "How could we have passed through them unharmed?" was the exclamation, as the officers and sailors looked at the ice castles through which they had been driving in blindness only a few hours before. Life is like that on a sailing ship in the Antarctic; one wanders in gloom before a bitter wind, and is warned of danger only by the sound of unseen waves beating on the riven ice.

After two or three of these gales in close succession, as the ship gradually pushed westward, dodging bergs, the men under intense strain, the medical officers of the *Vincennes* advised that the crew were in no condition to go farther. The sick list was growing, largely from fatigue and exposure, and Wilkes asked his officers to give their opinion as to whether they should push on or go north. He also restored to duty one of the surgeons who had, for some reason not stated, been taken off the active list. This shows the tension that must have existed. Such things are small indications of a larger disagreement as a rule.

Being taken off the active list means that you cannot perform your normal duties; you may be confined to quarters or just permitted to move about as you will and twiddle your thumbs. It is not much fun, even though temporary.

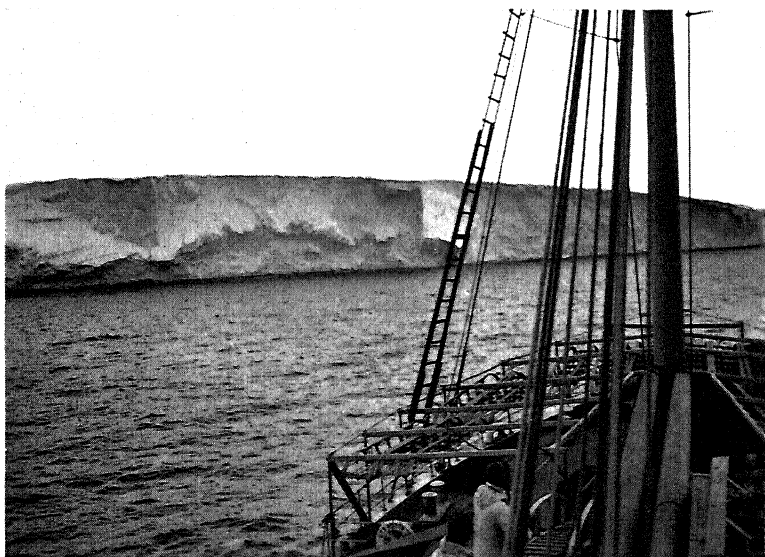
Despite all the advice against continuing to the westward,

and despite the growing sick list, Wilkes showed then that even though he was a stubborn commander, he was determined and intelligent. He was confident that the men would recover.

"I came to the conclusion, at whatever hazard to ship and crew, that it was my duty to proceed, and not give up the cruise until the ship should be totally disabled, or it should be evident to all that it was impossible to persist any longer. In bringing myself to this decision, I believe that I viewed the case on all sides with fairness, and allowed my duty to my country, my care for those whom it had committed to my charge, and my responsibility to the world, each to have its due weight."

So he went on, even though the sick list increased to thirty, and the men had boils and ulcers. Nevertheless, they ate well and were cheerful. They were passing high land again, and it excited their curiosity. On Feb. 7 they saw the land so clearly in longitude 131 degrees 40 minutes east, and latitude 64 degrees 49 minutes south, that Wilkes named it Cape Carr. Day after day, when there was good visibility the land stood out clearly, and as the weather improved, so did the health of the men. After seeing rocks in Piner's Bay at Adélie Land, Wilkes had no doubt but that he had glimpsed a continent, and thereafter referred to it as "the land" or "the Continent."

Beating along the edge of the barrier he sighted Budd Land and North Land and Knox Land. The coast was far inland, of course, but at one time he had a sight of seventy-five miles of shore line, and was not at all in doubt. Nowhere could he get close enough to set foot upon the land, and neither did anyone else until the end of the century. Toward the end of his voyage he ran across a huge ice tongue that he named Termination Land, and which is now known as a northern extension of the Shackleton Ice Shelf, a formation similar to the Ross Ice Shelf.



(Wide World)

Plates 8 and 9.—Two views of the Ross Ice Barrier, 400 miles long, from which come the icebergs.

Wilkes had no doubt by this time, having cruised along 1,500 miles of coast, that he had actually proved the existence of a continent. He established the existence of a relatively shallow continental shelf by soundings. No open strait was found, and he did not believe that a chain of islands holding back ice could extend so nearly in the same parallel of latitude. Neither could he believe that ice would not become disengaged from islands, and came to the conclusion that "there is some extensive nucleus which retains" ice islands "in their position."

Finally on Feb. 21, he determined to turn north, and called the men forth to congratulate them on their good conduct and their efforts. And he said:

"I have seldom seen so many happy faces, or such rejoicings, as the announcement of my return produced. But although the crew were delighted at the termination of this dangerous cruise, not a word of impatience or discontent had been heard during its continuance."

This did not end Wilkes's expedition, but it did end his Antarctic adventures, and left them so muddled that they almost immediately became a matter of controversy. This was not Wilkes's fault, but was the result of the unusual conditions of polar exploration, which were then not understood. Although some European geographers placed his claims upon the map, they were soon challenged.

While Wilkes was in the Bay of Islands, New Zealand, after returning from his second Antarctic cruise, he had an opportunity to communicate with Captain James Clark Ross, commanding the British expedition that soon followed the American ships into high southern latitudes, having been planned two years later than the American cruise. Wilkes, in the good fellowship of a naval officer, sent Ross a letter in which he described the ice, winds, currents, and dangers to be anticipated, and also enclosed a chart on which he

traced his discoveries. On this he included the appearance of land reported by Captain Ringgold of the *Porpoise* and called Ringgold's Knoll. Wilkes explained later that he had merely put on the chart the reported position of the Balleny Islands as given to him by Biscoe. Whatever Wilkes had intended, the sending of this chart was the initial cause of all the defamatory charges against him, and one cannot but feel that Captain Ross's indignation was unjustified. He felt that Wilkes had forestalled him, which was quite unfair, particularly as it led to his own much greater discoveries.

But there has been an adequate explanation of Wilkes's apparent mistakes put forward by Professor Hobbs, that militant investigator and defender of everything American in the polar regions. This dynamic professor of geology has taken up the cudgels for Wilkes as energetically as he has for Palmer, and much more efficaciously.

A number of discoverers sailed over what Ross had contemptuously called "Wilkes Land," the land sighted by officers of the Wilkes expedition before Jan. 19, when Wilkes was first sure he saw land, Cape Hudson. It was proved definitely that Cape Hudson could not exist where it was represented on the map by Wilkes, therefore all his other discoveries were thrown aside. Sir Douglas Mawson, the famous Australian explorer of the Antarctic, even sailed over Wilkes's Cape Carr, and said that Wilkes's discoveries were false.

However, there was to be a belated triumph for Wilkes, although he has been dead much too long to appreciate it. Professor Hobbs points out that although there may be much doubt about Ringgold's Knoll and some of the earlier "sights" of land, the charge that Cape Hudson did not exist was most serious because Wilkes was sure of it and even sketched the high, mountainous country behind it. And he then proceeds to prove in a most ingenious way that Wilkes was right. It must be understood that before this century

not much was known about atmospheric conditions in the Antarctic, although some weird and beautiful aerial fantasies had been seen.

Mawson had sledged over the land to Cape Freshfield, and looked out to the north without seeing any land, although he was 200 miles south of Cape Hudson, as reported by Wilkes. That confirmed Wilkes's bad judgment until 1915, when the British ship *Aurora*, under Captain J. R. Stenhouse, drifted to a point only a few miles from where Cape Hudson had been seen by Wilkes. And there, to the south, lo and behold, was a cape, just as Wilkes had sketched it. The next day the cape had disappeared, and there was no land in sight. As Stenhouse entered in his journal, "No wonder Wilkes reported land."

Professor Hobbs explains this by a polar mirage, and in London hunted up a sketch that had been made by one of Stenhouse's officers and that is almost exactly the same as Wilkes's sketch of Cape Hudson. Evidently, concludes Hobbs, and many observations in the polar regions as to the phenomenon of mirage or looming bear him out, the peculiar conditions of refraction at the time Wilkes sighted Cape Hudson showed him a cape 230 miles away that was apparently only 30 miles away. What Wilkes saw was Cape Freshfield. There are well confirmed instances of such mirage, or looming, at much greater distances and Captain Bob Bartlett once saw an Iceland mountain while off the Greenland coast.

It is amusing, but pertinent, that Professor Hobbs points out two similar errors into which Mawson and Ross, the severest critics of Wilkes, fell. Mawson in 1929-1930 mapped about 500 miles of coast west of the tiny Wilkes Land allotted to the American on the English maps. The next season he went south again and found that the season before he had mapped a coast at a distance of from 150 to 200 miles. The second time he used an airplane to fly inland, and he

found that he had mapped land so far to the north the year before that on his second season he had sailed over it for a distance of 400 miles.

What is more, he confirmed the existence of land where it had been seen by Wilkes at several points west of Adélie Land within a few miles of where Wilkes had reported it. This, allowing for the fact that Mawson had radio time signals and Wilkes merely chronometers with indifferent rates to guide him, is sufficient confirmation of Wilkes's discoveries, and led to the Australians' largely extending on their maps the coastal area seen by Wilkes.

But the most amusing backhanded support of Wilkes resulted from a mistake made by Ross, his rival as well as critic. In 1841, when Ross had sailed into the sea that bears his name and made the first really great Antarctic discovery, he saw a range of mountains about thirty miles away that he called the Parry Mountains. Sixty years later, Professor Hobbs points out, Captain Robert Falcon Scott found no mountains there at all, but only floating shelf ice. What Ross had seen was a mirage of mountains 275 miles inland.

It is easy to make mistakes in the polar regions. Things seen are not what they appear to be. Anyone who has lived far north or south of either Circle can testify to that. And as time goes on, Wilkes, who received the Founders' Gold Medal of the Royal Geographical Society, is further upheld. And it is enough fame for any man to have first established the existence of a continent that had been a myth for ages, to have led the first great American sea expedition, and to have brought back material that resulted in the formation of the Smithsonian Institution. Even if one of the early curators did grind up prehistoric bones for fertilizer, the Institution is as much a memorial to Wilkes as to James Smithsonian.

Ross Finds the Gateway

THE culmination of this golden age came when James Clark Ross crashed through the ice pack into the sea that bears his name, and made the most remarkable discoveries yet achieved in the Antarctic. Ross was a great leader and a great explorer, but one cannot study his work in the Antarctic without being puzzled by the contrasting lights of his character. He was brave, impetuous, guided by a sure instinct, and could be both generous and unfair.

Ross came of a distinguished family, and before his southern trip he had reached the North Magnetic Pole and planted the British flag there. He was said to be the handsomest man in the British navy, and was as stubborn as a mule. He was vain also, for one cannot but be impressed by his eagerness to reach the South Magnetic Pole when he had before him the greatest discovery man had yet made beyond the southern Circle. The magnificent mountains, the vast barrier that also bears his name, are dismissed with a few paragraphs, while he returns continually to his desire to be the first to reach both magnetic poles, which, after all, would have been a minor conquest compared to what he actually accomplished.

Sir John Franklin, who later perished in the Arctic, was a staunch friend of Ross, but he mentions that Ross never encouraged initiative on the part of his subordinates, and that he attempted to do everything himself. And yet he could be gracious, and had a high sense of honor. Next to Cook he was the greatest of the early Antarctic explorers, and he had luck—that fundamental ingredient in any great polar suc-

cess. Man cannot contend unaided, cannot look and plan far ahead, in those troubled waters. Like Weddell, he must be more fortunate than other men to achieve great things.

The expedition had as one of its main objectives the study of terrestrial magnetism. Ross took command of the *Erebus*, on Apr. 8, 1839, and Commander Francis R. M. Crozier was appointed to command the other ship, the *Terror*. They were bombers, strongly and heavily built of wood, and with a large hold. The *Erebus* was of 370 tons and the *Terror* of 340 tons, both of them with bluff bows, slow sailers, and rounded so that they rolled even in a light sea.

They were by far the strongest ships that had been sent to the Antarctic, making Wilkes's ships look like ill-found yachts in comparison. Their scientific equipment was not very good, and only one real scientist was aboard, Joseph Dalton Hooker. The men and officers, with the exception of Ross and Crozier, were said by Franklin to be merely "run of the service" men, good sailors but not distinguished for the work in which they were to engage. But they accomplished much.

They reached Hobart Town in Van Dieman's Land, now known as Australia, on Aug. 16, 1840. The governor, by one of life's ironies, was Sir John Franklin, whose disastrous expedition to the north in those two ships later on was to strew King William Land with the bones of his crews. It was on that same King William Land, or island, that Ross had previously reached the North Magnetic Pole. The connection does not mean anything, except that the paths of men and ships and ambitions cross in mysterious ways.

It was at Hobart that Ross first had news of the voyages of D'Urville and Wilkes. He had had Wilkes's letter, sent in spite of Wilkes's instructions, telling of the work of the American expedition, and enclosing a map that was the subject of controversy for ninety years.

Ross was very much upset, which seems strange in view

of what he later wrote in his narrative. He said that he "felt indebted to the kind and generous consideration of Lieutenant Wilkes, the distinguished commander of the expedition, for a long letter on various subjects, which his expedition had suggested as likely to prove serviceable to me, under the impression that I should still attempt to penetrate to the southward on some of the meridians he had visited; a tracing of his original chart accompanied his letter, showing the great extent of his discoveries, pointing out to me those parts of the coast which he thought we should find most easily accessible." Ross also expressed "the deep sense of thankfulness I feel to him for his friendly and highly honourable conduct."

He added that Wilkes's voyage should "excite the admiration of all who are in the smallest degree acquainted with the laborious and difficult nature of an icy navigation: but I am grieved to be obliged to add that at the present time they do not seem to have received either the approbation or reward their spirited exertions merit." This was after the return of both the Wilkes and Ross expeditions, and one cannot help wondering how Ross could have penned those lines in view of the fact that it was his criticism that did so much to discredit Wilkes. Perhaps he reflected later that he had been unfair and wished to make amends, for certainly his words were a generous tribute to a man who he said had put nonexistent land upon a chart and sent it to him.

The probability is that Ross's vanity—and Wilkes was not devoid of that quality—was disturbed by the prior discoveries of the French and American explorers, who also had their little spat in the ice. Ross expressed surprise that they had "forestalled" him, although his own instructions were written a full year after those of Wilkes, and the British Association for the Advancement of Science did not even suggest the Ross expedition until August, 1838, when Wilkes had

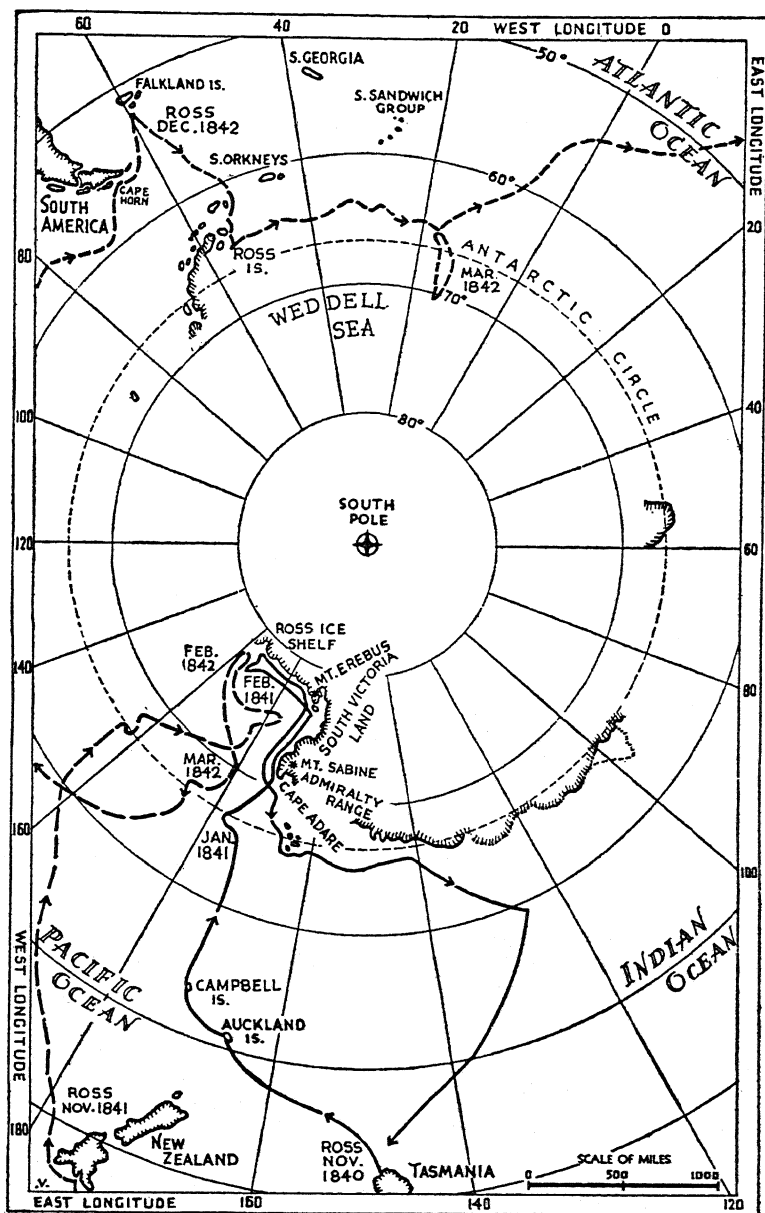
been busily preparing for some time for the American expedition, proposed ten years previously. It was one of those unfortunate occurrences that dot all the history of exploration.

As a matter of fact, Wilkes's voyage in waters where Ross had been instructed to explore, led the Englishman to a decision that immeasurably increased his fame. We know now that if he had tried to follow Wilkes's track he would have had little more success; that stretch of coast is icebound beyond the possibility of any ship's penetrating close to the land except in a few spots. Ross had been given considerable latitude in his instructions, much had been left to his discretion. So he made a momentous decision.

"Impressed with the feeling that England had ever *led* in the way of discovery in the southern as well as in the northern regions, I considered it would have been inconsistent with the preeminence she has ever maintained if we were to follow in the footsteps of the expedition of any other nation. I therefore resolved at once to avoid all interference with their discoveries and selected a much more easterly meridian (175°E), on which to endeavor to penetrate to the southward, and if possible reach the magnetic pole."

Out of that determination came great things, for Ross had picked a longitude that ever since has been within a few degrees, varying with the season, of the best route into the Ross Sea. If he had only realized it, Wilkes had done him a greater service than giving him a map on which some lines were dubious; Wilkes had pushed him into an entrance to the continent. It was the route that Scott and Shackleton and Amundsen and Byrd have followed, not to speak of the whalers. Ross was inclined to go there because Balleny had found open water in 69 degrees south.

As the bluff-bowed ships swung south from desolate and dripping Campbell Island, off the southern coast of New Zealand, they began to see the albatross, swinging with that



Map 6.—Ross broke into the Ross Sea through pack and found his way barred by the great barrier.

indescribable gracefulness on the updrafts from the waves, or sliding alongside the weather rail to peer with quickly shifting eyes at the strange creatures on two legs. The albatross never flaps its wings in flight, but by movement at the tips guides itself with infallible accuracy. Ross thought the birds promised land, but in this he was wrong, for they disappear before the Antarctic pack is sighted. But when penguins began to pop up on ice floes and squawk defiance, there was reason to believe that something tangible was near by. And then, on Dec. 31, early in the morning, they sighted the ice pack.

An ice pack in the Antarctic is a formidable opponent. The Ross Sea pack, while not so dangerous as some others, is a weird phenomenon. In calm weather it lies as immobile as a cube of ice in a highball glass, with gentle waves lapping at the edge; in a storm the broken cakes at the edge heave and sough, crash together and throw water in spurts between their points of contact, and growl with a low and distant sound. But the day Ross sighted the pack there was little movement, and the two ships lay in front of this great barrier, which held so many speculative possibilities, waiting for wind. Ross had picked the right time of year and the right place. He was not unfamiliar with pack, and he said:

"We had, indeed, met with the pack in a much lower latitude than we had anticipated, but from the little we had seen of it we were by no means dispirited by the early appearance of so serious an obstruction to our progress, for it presented none of those evidences of impenetrability we had been led to expect."

The possibility of penetration was due to the fact that the pack did not lie against land, that on the other side of the 200-mile belt—for it was that wide—there was open water. There is no predicting the condition of the pack or the time that may be consumed in going through it. Four or five days is not an unusually short time, and the *Nimrod*, Shackleton's

ship, went through it in twelve hours. Ross was fairly fortunate, and had sufficient experience not to be alarmed by ice in which open leads could be seen. Also his ships were strong. The ice did not worry him. With the knowledge acquired since his first penetration, steel ships have been conned through pack ice that once would have been considered deadly.

They were blown north, and made their way back south again, and on Jan. 5 reached the pack early in the morning, and cruised along it looking for an opening. The weather was unsettled, and the wind blowing on the ice, conditions that might have appalled an ordinary ship captain, but that were just what Ross wanted. He wanted to get into that ice, and the north wind would help.

"The signal was made to the *Terror*, and we bore away before the wind, selecting the most favorable point to break through the outer edge of the pack, which as usual, was formed of much heavier ice than the rest, and which we accomplished without sustaining any serious injury, although receiving some very heavy blows."

At noon that day they were at 66 degrees 55 minutes south, and 174 degrees 34 minutes east. They drifted to the southeast and were blown to the north, but no longer could see the open water. When the wind died on Jan. 8, the ice opened and then a breeze from the north, followed by an easterly gale, helped to force them through. Penguins followed the ship, as they always do, waddling along on cakes of ice, popping overboard and swimming rapidly around the ship, showing every sign of indignant curiosity and yelping at the intruder. On Jan. 10, the ships came out into the open sea, and not a bit of ice was to be seen to the south.

Ross's feelings at that time may be imagined; one finds nothing of them in his narrative. Emergence into the open sea in the midst of the Antarctic summer is a startling experience. It is like sliding out of an icy mountain path into

a green field where flowers grow. Ross's ships had been bumped and pushed; the winds had howled through their rigging as they lay in the fields of ice or rumbled across a lead, or lake of open water, in the ice.

And then they were engulfed in fog and drifted on, and when the fog lifted, and the sun shone again, in all its stimulating warmth, there was nothing around them but water. A soft breeze blew, and men basked in the sun on the decks, throwing aside their heavy wraps so that they might relax more comfortably. There is nothing quite so comforting as the Ross Sea on a summer day, even when bits of ice drift by, and there is no place that can more quickly be changed into a seething terror as the icy hurricanes blow down from the mountain peaks. But while the calm lasts it is beautiful, and tempting.

Ross knew he was far south, much farther south than anybody but Weddell had been before. The ice, which had checked Cook and Bellingshausen, Wilkes and D'Urville, was absent. It was the beginning of an epoch, the end of the nibbling at the edges as baffled men felt their way around the continent. Columbus must have felt the same way when he reached land, or Magellan when he pushed his way into the broad reaches of the Pacific. This continent, into which Ross had found a passage, is not a small continent; it is one of the largest on earth. Men had been confused and beaten back by the pack.

And then came along a handsome English naval officer, hard-boiled, stubborn enough to defy a pack, who sailed through the barred gateway. Ross must have dreamed great dreams the day the fog lifted and he saw himself in an open sea. He hoped to sail to the Magnetic Pole; could he sail to the South Pole, too? Possible. There was nothing but water in sight.

He set his course for the Magnetic Pole, the point he wanted to reach more than all others, but on Jan. 11 at 2 A.M.

—for the sun shines all the twenty-four hours at this time of year in those latitudes—land was seen. A range of mountains gradually lifted above the horizon, and Ross realized that he was seeing something that no other man had ever been fortunate enough to glimpse, a great mountain range stretching to the south.

The highest point he called Mt. Sabine, after one of the most zealous supporters of the expedition. Cape Adare was sighted, that cape which has been so famous since, and those aboard the ships “gazed with feelings of indescribable delight upon a scene of grandeur and magnificence far beyond anything we had before seen or could have conceived.” The range of mountains was called the Admiralty Range, the individual peaks being named after the Lords of the Admiralty.

Ross and his men landed on a small island inhabited by a vociferous and belligerent colony of penguins, which pecked and fought against intrusion. Possession Island, it was called. A strong wind and heavy seas drove them off the land, and they were in constant danger of hitting some uncharted reef or rock, or even driving on an island, or a stranded iceberg. The perils of fighting one’s way through unknown Antarctic waters, in mist and snow and gale and fog, even with the aid of the not always reliable leadline, was one of the things Ross faced constantly.

The ships beat south along the coast after the weather cleared, but the wind was adverse and they did not make much headway in their clumsy vessels. Once they had a slight clearing in the fog just in time to haul away from Coulman Island, named for the father of Ross’s fiancée. Finally, a fair wind came, and with studding sails spread the ships drove down to the south. More mountains were seen and named—there seemed to be no end to the range. Then on Jan. 22, 1841, the ships reached 74 degrees 20 minutes south, farther than Weddell had gone. An extra allowance of grog was

served, and Captain Ross spent the evening in the gun room with his officers, drinking toasts. It was a great day.

They discovered Franklin Island, named after Sir John. As a landing was being made, the world nearly lost a great scientist, for Hooker slipped and fell between the boat and the rocks. Fortunately he was not injured.

After landing at Franklin Island came the most astounding sight of all, although Ross dismisses it with a few words. (Later explorers have paid tribute to its beauty and rhapsodized over it.) On the horizon was seen a mountain from which snow seemed to be drifting at the summit. The snow was found to be smoke, and as the astonished men watched, gleams of fire shot up through the smoke. They had discovered a live volcano, a volcano covered with snow, more than 12,000 feet high, and which Cherry-Garrard says is the loveliest and most peaceful mountain in the world, because of its horizontal slopes more beautiful even than Fujiyama. They called it Erebus. To this day it is unique, the only living volcano on the Antarctic Continent, so far as is known, and still erupting occasionally, in a dignified and graceful manner.

By this time Ross knew that he was cut off from approach by sea to the Magnetic Pole, but he had no idea how far he might go toward the South Pole. There was land to the west of him, to be sure, and a volcano to the south, but the hopes of men die hard, and Ross had read too much of the ancient beliefs, despite a natural skepticism, not to hope that after all the old men might have been right and that there was an open polar sea. At least he said: "We had already, in expectation, passed far beyond the eightieth degree, and had even appointed a rendezvous there." And why not, with an open sea before one, and the traditions of hundreds of years behind.

And then occurred a most astounding discovery. To the left of the land on which was Mt. Erebus, there appeared a

white line rising out of the sea and extending as far as the eye could see. When the ships approached it, they found it to be a wall of ice, nearly 200 feet high, and even the phlegmatic Ross remarks on its "extraordinary appearance."

"What was beyond it we could not imagine."

He saw some mountains in the distance to which he gave the name of Parry Mountains, since proved to be nonexistent, although the appearance might be caused by refraction from mountains far beyond, refraction that would lift them far above any normal horizon. Ross was probably fooled by some of the same deceptive phenomena that fooled Wilkes—he saw mountains, but much farther away than he could have imagined. But the sight of the mountains was poor payment for the disappointment of the barrier. Ross said that one might as well try to "sail through the cliffs of Dover."

The declination of the magnetic needle showed that they were south of the Magnetic Pole, so Ross determined to turn eastward and coast along the barrier wall in the hope of finding a way around it. Nothing so illuminates the courage and initiative of pioneers as afterknowledge of what they were attempting to do. Now it is common knowledge that that barrier of ice stretches for more than 400 miles to the east, that it cannot be penetrated except at two places by a ship, and then for only a few miles. But Ross was the first to see it, and the thought of an ice wall 200 feet high and 400 miles long was incredible, or would have been if it had been suggested.

So they cruised along it, and of all the dominant spectacles on this globe that rampart is perhaps the most formidable. It is so monstrous in its proportions that it does not excite the senses. It merely lies there, a sharply cut, flat-topped wall, a white cliff glinting in the sun and reflecting the darkness of the sea, dull, heavy, ominous. Most people who see it for the first time merely look at it; there isn't anything to say. It is not even inspiring. It is the end of the world.

From the masthead it was impossible to see over it. The swell broke along its base and cut caves. Sometimes there was a square indentation where an iceberg had broken out. Whales played along its front, spouting and rolling in the seas. And Ross looked at it with his officers, and the thing stared back at them, implacable and silent. That wall reduces a human being to the dimensions of a slightly sentient dwarf and leaves him wondering how such things can be in a world that also supports palm trees with coconuts on them.

While they were gazing at the barrier, Erebus put on one of his finest recorded shows, throwing up a column of smoke 200 to 300 feet in diameter to a height of about 2,000 feet. The eruption went on in spurts half an hour apart, and the contrast between the immobile white barrier and the pulsing volcano on its edge must have been a sight such as few men have ever seen. The Antarctic, in whatever phase one sees it, always succeeds in overpowering the observer with its grandeur. In its calm moods it absorbs the soul and gives it peace; in its violence it makes all human effort futile.

Soundings showed that most of the great barrier was afloat—as a matter of fact, since Ross's day it has receded to the south nearly thirty miles. The ships beat to the eastward, getting into pack and working out of it with difficulty. They found a remarkable bay—which has since disappeared—and went into it despite the danger from the forming of pancake ice. It was getting late in the season. Frequently they could not see open water from the masthead; the ice around the ship was what Norwegians know as shish ice because of the noise it makes as a ship goes through it.

But these bluff-bowed ships were not intended for speed, and one needs a sharp prow and good lines, or an engine, to get out of that sort of ice easily. Sometimes they had to lower the boats over the bows, and the sailors would rock them back and forth, breaking the ice so that the ships would slowly advance. It was getting to be late in February, and

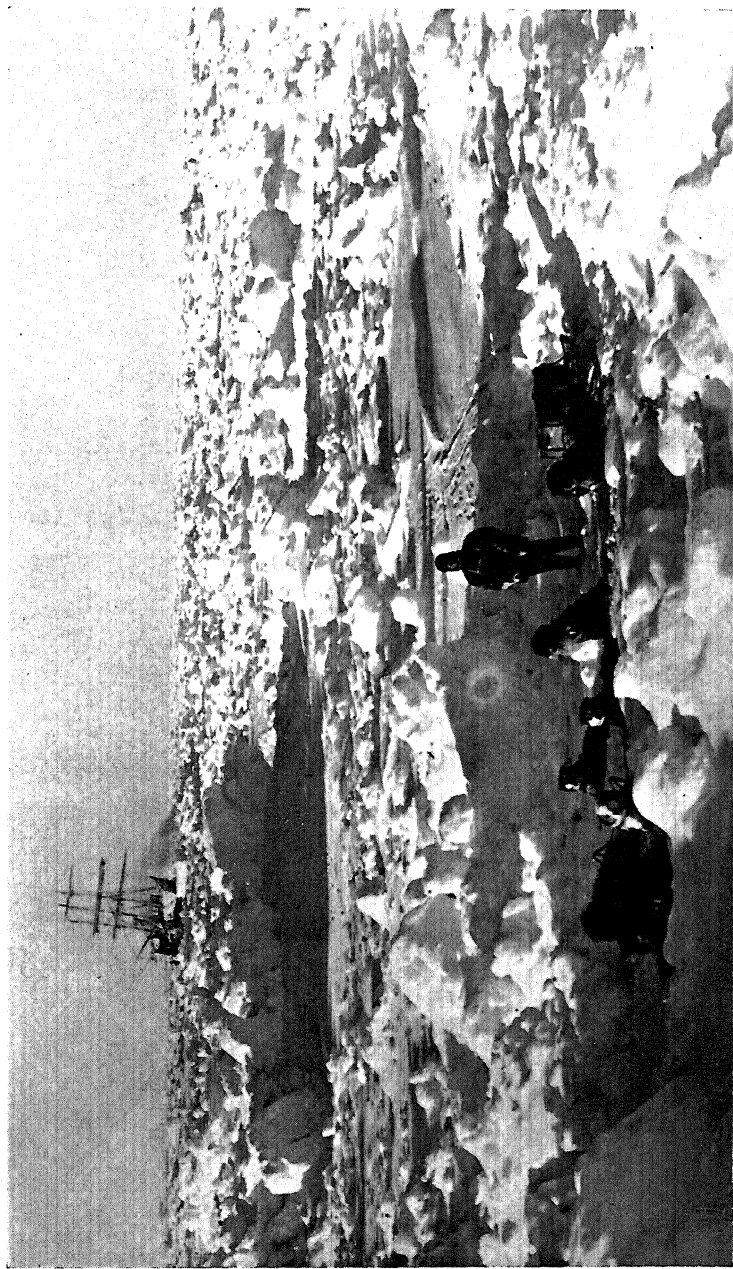


Plate 10.—A ship caught in the pack—no way out.

(Underwood & Underwood)

Ross decided to leave his new sea, a wise decision. They had reached 167 degrees west.

He hated to turn back, even when within sight of the mountains beyond which lay the Magnetic Pole. The flag that had been flown at the North Magnetic Pole was in his locker. That ambition had to be abandoned. On his northward journey Ross sailed over the point where Wilkes had put some mountains on his chart, mountains that Wilkes later said he assumed to be the position of the land seen by Balleny as given to him by Captain Biscoe at Sydney.

The worst of this unending discussion, which should be forgotten eventually, is that Ross in his own narrative admits that Wilkes saw land, but when he found that the land over which he sailed was nonexistent, he did not put a single discovery of Wilkes on his chart. Wilkes never claimed the land that Ross disputed. Ross was very frank in his comment, and Commander J. H. Aulick of the U. S. S. *Yorktown* heard of it in Sydney and repeated it at Oahu in the Hawaiian Islands, which led to a serious controversy between Wilkes, Ross, and Aulick. It is long past, and few people know about it, but it almost led to the complete discrediting of Wilkes, who, in his way, was as good a man as Ross.

Ross's first voyage to the south was the high-water mark of his endeavor. He had spent 145 days in the Antarctic, and had come out with his men and his ships in good condition. What he did after that proved his excellent seamanship, and his courage, but added little to his geographical discoveries. Ross was a splendid sailor, and so was Crozier, the captain of the *Terror*. And seamanship in the Ross Sea demands not only unusual qualities of judgment, but also the sort of daring that enables a man to take a chance when that chance is the only way out.

After a short time in Sydney and a call at the Bay of Islands in New Zealand, Ross put to sea again late in November of 1841. This time he made the mistake of going too far to the

east, trying to find a way south at about 156 degrees west longitude, probably hoping to get somewhere near Cook's south, much farther to the east. He did not know that an enormous amount of pack ice was there jammed around a jutting peninsula from the Antarctic on the east side of the Ross Sea. For three weeks he butted against the ice without much advance.

The ships got into the pack and drifted for weeks; on Jan. 18 a gale drove them apart, and a heavy northwest gale caused havoc. They had been moored to an ice floe, but the hawsers broke, and the vessels kept company by firing guns and heaving to under the shelter of an iceberg. And then:

"The sea quickly rising to a fearful height, breaking over the loftiest bergs, we were unable any longer to hold our ground, but were driven into the heavy pack under our lee. Soon after midnight our ships were involved in an ocean of rolling rocks of granite, which were dashed against them by the waves with so much violence that their masts quivered as if they would fall at every successive blow; and the destruction of the ships seemed inevitable from the tremendous shocks they received. By backing and filling the sails, we endeavored to avoid collision with the larger masses; but this was not always possible; in the early part of the storm, the rudder of the *Erebus* was so much damaged as to be no longer of any use; and about the same time I was informed by signal that the *Terror's* was completely destroyed, and nearly torn away from the sternpost.

"We had hoped that, as we drifted deeper into the pack, we should get beyond the reach of the tempest; but in this we were mistaken. Hour passed away after hour without the least mitigation of the awful circumstances in which we were placed. Indeed, there seemed to be but little probability of our ships holding together much longer, so frequent and violent were the shocks they sustained. The loud crashing noise of the straining and working of the timbers and decks,

as she was driven against some of the heavier pieces, which all the activity and exertions of our people could not prevent, was sufficient to fill the stoutest heart, that was not supported by trust in Him who controls all events, with dismay; and I should commit an act of injustice to my companions if I did not express my admiration for their conduct on this trying occasion; throughout a period of twenty-eight hours, during any one of which there appeared to be very little hope that we should see another, the coolness, steady obedience, and untiring exertions of each individual were every way worthy of British seamen.

“The storm gained its height at 2 p.m., when the barometer stood at 28.40 inches, and after that time began to rise. Although we had been forced many miles deeper into the pack, we could not perceive that the swell had at all subsided, our ship still rolling and groaning amidst the heavy fragments of crushing bergs, over which the ocean rolled its mountainous waves, throwing huge masses one upon another, and then again burying them deep beneath its foaming waters, dashing and grinding them together with fearful violence. The awful grandeur of such a scene can neither be imagined nor described, far less can the feelings of those who witnessed it be understood. . . .

“The squalls came on with unabated violence, laying the ship over on her broadside, and threatening to blow the storm sails to pieces; fortunately they were quite new, or they never could have withstood such terrific gusts. At this time the *Terror* was so close to us, that when she rose to the top of one wave, the *Erebus* was on the top of the next to leeward of her; the deep chasm between them filled with heavy rolling masses; and as the ships descended into the hollow between the waves, the main-top-sail yard of each could be seen just level with the crest of the intervening wave, from the deck of the other: from this some idea may be formed

of the height of the waves, as well as of the perilous situation of our ships."

The gale finally blew itself out, and the ships were fastened to a big piece of floe while their rudders were repaired. The pack loosened a bit on Jan. 26, and the ships struggled on again, but after forcing their way through 800 miles of pack they were only thirty miles south of Cook's farthest south. They had picked one of the most difficult parts of the Antarctic Ocean to penetrate, a region that was not surveyed until one hundred years later when it was first done by airplane. As Ross puts it in a way that explains many vagaries of polar exploration:

"This is only an example of the uncertainties of polar exploration in ignorance of the laws of drift-ice or the causes which make one season differ so remarkably from another, and there was nothing for it but to struggle on."

To struggle on in such circumstances requires the greatest resolution. The ships eventually gained the open sea in 67 degrees 29 minutes south and 159 degrees west. Ross was trying to hit the barrier east of where he had been on his former trip, but as many explorers have found out since, he was attempting a most difficult task. It was also past the middle of February, and the Ross Sea begins to freeze over about that time. It was so cold that a small fish that was dashed against the bow of the *Terror* was frozen fast to the ship, and buried in a block of ice. When it was chopped out for scientific inspection, the ship's cat caught sight of it, and the specimen vanished.

Ross got very near King Edward VII Land, later discovered definitely by Scott, and Ross thought he saw mountains to the south. The "mountains" are hardly more than low rocky hills projecting from the snowy surface, but it would be easy to mistake them for high mountains even though the weather was clear when Ross saw them.

When he decided to turn back on Feb. 24, the sea was a

continuous sheet of new ice. If a strong southerly wind had not come up, and every bit of sail made, including studding sails, the ships would have been frozen in for the winter. But his troubles were not over, for he soon after had an adventure with icebergs in which he executed a maneuver that ever since has been regarded as one of the most daring and skillful ever performed by a sailor. He actually backed his ship, stern first, from a berg in a howling gale.

Here is how it happened:

"A large berg was seen ahead and quite close to us; the ship was immediately hauled to the wind on the port tack, with the expectation of being able to weather it; but just at this moment the *Terror* was observed running down upon us, under her top-sails and foresail; and as it was impossible for her to clear both the berg and the *Erebus* collision was inevitable. We instantly hove all aback to diminish the violence of the shock; but the concussion when she struck was such as to throw almost everyone off his feet; our bowsprit, fore-topmast, and other smaller spars were carried away; and the ships hanging together, entangled by their rigging, and dashing against each other with fearful violence, were falling down upon the weather face of the lofty berg under our lee, against which the waves were breaking and foaming to near the summit of its perpendicular cliffs.

"Sometimes the *Terror* rose high above us, almost exposing her keel to view, and again descended as we in our turn rose to the top of the wave, threatening to bury her beneath us, while the crashing of the breaking upperworks and boats increased the horror of the scene. Providentially they gradually forged past each other, and separated before we drifted down amongst the foaming breakers, and we had the gratification of seeing her clear the end of the berg, and of feeling that she was safe.

"But she left us completely disabled; the wreck of the spars so encumbered the lower yards, that we were unable

to make sail, so as to get headway on the ship; nor had we room to wear round, being by this time so close to the berg that the waves, when they struck against it, threw their sprays back into the ship. The only way left for us to extricate ourselves from this awful and appalling situation was by resorting to the hazardous expedient of a stern board, which nothing could justify during such a gale and with so high a sea running, but to avert the danger which every moment threatened us of being dashed to pieces.

“The heavy rolling of the vessel, and the probability of the masts giving way each time the lower yard-arms struck against the cliffs, which were towering high above our mast-heads, rendered it a service of extreme danger to loose the main-sail; but no sooner was the order given, than the daring spirit of the British seaman manifested itself—the men ran up the rigging with as much alacrity as on any ordinary occasion; and although more than once driven off the yard, they after a short time succeeded in loosing the sail.

“Amidst the roar of the wind and sea, it was difficult both to hear and to execute the orders that were given, so that it was three-quarters of an hour before we could get the yards braced by, and the maintack hauled on board sharp aback—an expedient that perhaps had never before been resorted to by seamen in such weather: but it had the desired effect; the ship gathered sternway, plunging her stern into the sea, washing away the gig and quarter boats, and with her lower yard-arms scraping the rugged face of the berg, we in a few minutes reached its western termination; the ‘undertow,’ as it is called, or the reaction of the water from its vertical cliffs, alone preventing us from being driven to atoms against it.

“No sooner had we cleared it, than another was seen directly astern of us, against which we were running; and the difficulty now was to get the ship’s head turned round and pointed fairly through between the two bergs, the breadth of the intervening space not exceeding three times her own

breadth; this, however, we happily accomplished; and in a few minutes after getting before the wind, she dashed through the narrow channel, between two perpendicular walls of ice, and the foaming breakers which stretched across it, and the next moment we were in smooth water under its lee."

There they found the *Terror*, burning a blue light and anxiously awaiting them. Probably never has there been such a narrow escape from complete disaster in the Antarctic, and never more consummate seamanship. Even to bump against an iceberg in calm weather is not pleasant; what it must be in a gale is beyond imagination. So alarming was the situation that one officer ran on deck in his nightshirt and stood clinging to a capstan in the freezing weather.

That was the real end of Ross's adventures, for the ships made the Falkland Islands safely, and the next season made a fruitless cruise to the southeast of Palmer Land, down into the fringes of the Weddell Sea. Ross was turned back by ice, but being a good Englishman he did not cast doubt upon Weddell, as so many others have done. He merely commented out of the richness of his experience that it must have been an open year when Weddell got so far south, and that he was glad so venturesome a man was there to take advantage of his opportunity.

The Drift of the Belgica

AFTER Ross there was a long interlude, during which discovery was left to a few whalers, this time driven by steam, which went down the east and west coasts of Graham Land and made some interesting discoveries, although their chief desire was to find the whales that had been reported. Then in 1895 the International Geographical Congress declared that the most important piece of geographical work remaining was the exploration of the Antarctic. A young Belgian, Lieutenant A. de Gerlache, who for years had been fired by a desire to enter the polar regions, organized a Belgian expedition.

His ship was a Norwegian vessel, which he named the *Belgica*, of 250 tons, and built for the ice, with a stem five feet thick. His scientific expedition was of the best, and although the geographical results obtained were not startling, what was accomplished in other scientific fields was of great importance. The *Belgica* had the distinction of being the first ship to be frozen in the ice, and those on board spent the first Antarctic winter under the most dangerous conditions. But their greatest danger came from not knowing how to live in the Antarctic, which nearly cost them all their lives. As it was two men became insane.

Officers and crew were of several nationalities. Most of them were Belgians, of course, but five of the crew were Norwegians. The naturalist was a Rumanian, Emile Racovitza; Henryk Arctowski, a Russian, was geologist, oceanographer, and meteorologist; and the doctor, anthropologist, and photographer was a man later to become famous in claiming to

have reached the North Pole, Dr. Frederick A. Cook, a Brooklyn physician. The mate was a young man destined to great things in both polar regions, Roald Amundsen.

It may be well to speak of these last two a moment, for different as they were they became fast friends and remained so. Dr. Cook at that time had been on one of Peary's expeditions to Greenland. He was fascinated by both the Arctic and Antarctic, and Amundsen once told the writer that he considered Cook one of the ablest men in the ice he had ever known. After the famous Cook-Peary controversy as to who had reached the North Pole, and after Cook was thoroughly discredited, Amundsen said he believed that Peary got there, was sure that he did, but he would never say anything critical of Cook. When Cook, who died only recently, was convicted of fraud and sent to jail, Amundsen visited him whenever he could. Amundsen felt that he owed his life to Cook, that Cook extricated the *Belgica* from the ice. After a visit to Cook in prison, Amundsen wrote in his short autobiography:

"I did not then, nor will I now, discuss the career of Dr. Cook in his later days. I am wholly unfamiliar with the facts that led to his imprisonment, and I have no desire to know them or to have an opinion regarding them. . . . Whatever Cook may have done, the Cook who did them was not the Dr. Cook I knew as a young man, the soul of honor and kindliness, lion-hearted in courage. Some physical misfortune must have overtaken him to change his personality, for which he was not responsible."

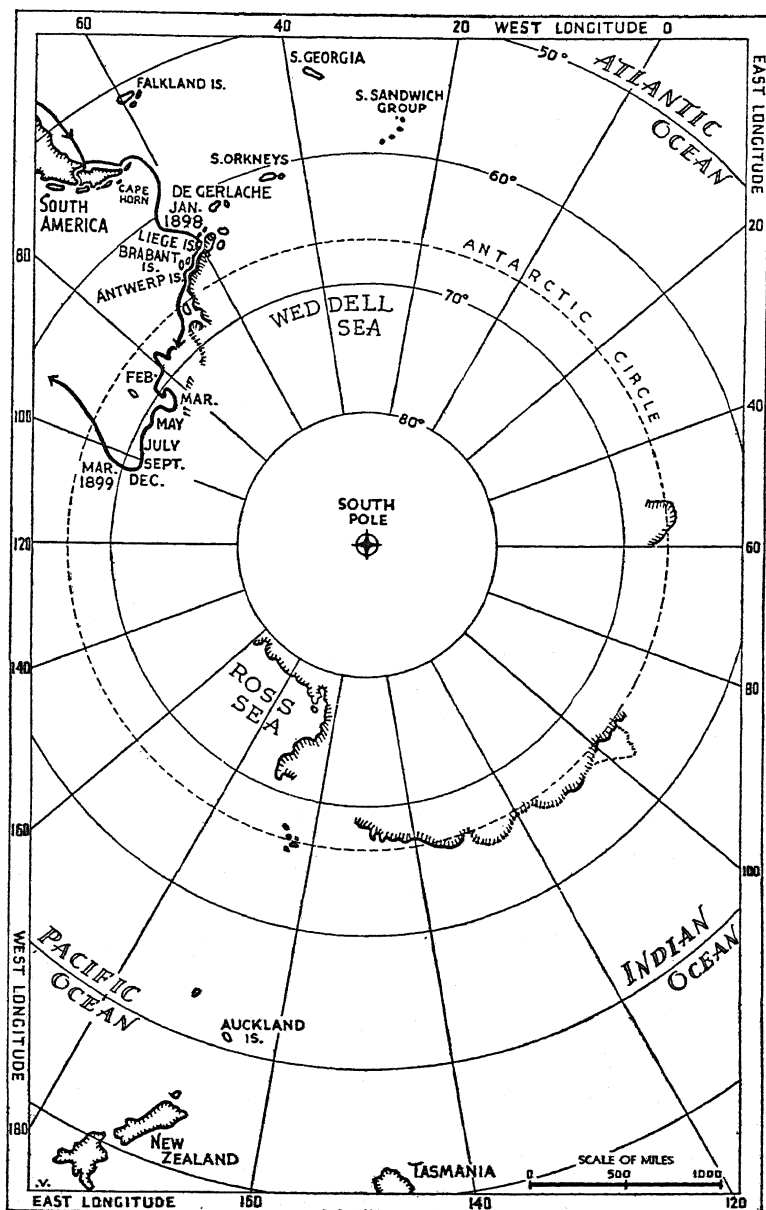
This digression seems worth while, not only as generous praise from a great explorer, but also because of the obloquy later heaped on Cook and his unfortunate last years. It puts the Cook that Amundsen knew in the right perspective, for the most readable book, and the only one in English, on the *Belgica's* adventure is Cook's. Amundsen himself was on the voyage deliberately to fit himself for a life of exploration.

But it was an oddly assorted group of men that the *Belgica* carried south, many of them able, the scientific staff of the best, a polyglot crew if ever there was one. As Cook says, they spoke French in the cabin, German and French in the laboratory, and a mixture of English, Norwegian, French, and German in the forecastle.

They left Belgium on Aug. 24, 1897, and Cook joined them in South America. De Gerlache wasted a good deal of time at Tierra del Fuego on scientific work, excellent in its way, but something that could have been done later. The result was that they did not reach the South Shetlands until Jan. 20, 1898, very late in the season to begin exploration in the Antarctic. However, they pushed south and discovered and explored de Gerlache Strait, and proved that what had been known as the Graham Land coast was really a group of large islands, which were named Liége, Brabant, and Antwerp. To these de Gerlache gave the name of the Palmer Archipelago. The coast east of the islands was named Danco Land, after the lieutenant and magnetician on the ship.

De Gerlache was confident that somewhere he would find a large continental land mass, which probably surrounded the South Pole, and he intended to land on it with a wintering party, send the ship back, and do some sledging inland. He had consulted Nansen, to whom everybody went in those days, for advice on sledges and equipment. But that plan was not to be carried out, although he headed south as near the coast as possible, hoping to go a long way with the ship before landing. They passed many small islands on the first part of this stage of their journey, and Cook had the privilege of naming two of them—although the names do not appear on the charts—Brooklyn and Van Wyck, the last named after the first mayor of Greater New York.

They attempted to reach Alexander I Island, and on the way were beset by a terrific gale, with sleet and snow. Said Amundsen:



Map 7.—De Gerlache drifted in the ice for the first winter night in the Antarctic and brought back valuable scientific information.

"Ice bergs were visible in all directions. The captain pointed to one not far distant to the north and explained that he had been manoeuvring all through the watch to keep the ship in the lee of this berg, which, by sheltering us from the heaviest of the wind and swells, saved us from being driven off our course. His instructions to me were to continue these manoeuvres until I should be relieved for the night watch, and to pass them on to my successor. This I did, transmitting the instructions to the young Belgian who took the watch. When I turned into my bunk I could feel the ship rolling in response to the swell, which, however, was not the tremendous heave of the main Pacific, but was a modified rolling of the current which came around the ice berg to us. I was rocked to sleep by this rolling motion.

"Imagine my astonishment when I awoke in the morning and found the ship dead becalmed! Certain that something extraordinary had happened, I hastened into my clothes and hurried to the bridge. There I found that we were in a small basin, ice-locked on every side by a complete circle of towering ice bergs. I asked the young Belgian how in the world we ever got into this place. His response was that he had no more idea of how it happened than I myself. In the darkness of the night and the driving snowstorm, he had been unable to keep the ice berg in view, and the ship had been driven aimlessly by the wind, with the result that she had been lifted on one of the mighty Pacific swells through an opening between two ice bergs and had landed us in the becalmed basin where we now lay. Nothing short of a miracle of coincidence had saved us from being dashed to pieces by the bergs that formed the shallow entrance we had hurdled on the back of that swelling wave."

While they were trying to extricate themselves from that circle of bergs, they speculated on what the bergs looked like, and Cook comments:

"It is curious that the eye merely sees what the mind in-

tends to picture. . . . The Captain points to a berg, not particularly attractive to anyone, but he insists on describing upon it the form of a beautiful woman, chisled in walls of alabaster. We look and try to be interested while Lecointe grows enthusiastic, but we see only dead white cliffs. There are some irregularities, delicate blue lines, some suggestive hummocks, and various dark cavities, but these we see in every berg, and with our different mental attitudes we fail to recognize the ascribed topography of a human figure. We dare not, however, admit our ignorance, for such a lack of sympathetic support, especially in a sentimental subject, would be equal to a challenge to a duel on the *Belgica*."

There was a huge tabular berg on which was a mass of ice blocks. To Cook it looked like a statue of Lord Salisbury, Arctowski said the sphinx, and Racovitza said it was a polar bear. Others thought it moved. Michotte, the cook, however, after looking through the glasses, said it looked like a pot of boiling soup. He won.

"We can afford to dispute with the naturalist somewhat, we can even doubt the Captain's eyesight, but we cannot dream of endangering the good will of Michotte—it is, then, a pot of boiling soup, and I think Koren added it was 'hot stuff';—even this is granted."

After they got out from among the bergs, they went south until they saw Alexander I Island, but were stopped by the pack twenty miles from it. They hauled off to the west along the pack, always trying to find an opening, occasionally seeing a water sky to the south. They were sure they were near land because of the numerous birds and seals, and the cold dry wind from the south-south-east, which they reasoned must blow from high land, although they were not within 1,000 miles of any known land.

They were stuck for a time in 69 degrees 17 minutes south latitude and 82 degrees 24 minutes west longitude, far to the east of Alexander I Island, but worked loose and again

headed south, in and out of the ice and always working to the west. To get out of a gale they again went south into the pack. Tons of ice were thrown against the complaining ship, but when the gale subsided the ice opened and again they pushed southward. At the end of February they were at 71 degrees 22 minutes south and 84 degrees 55 minutes west, drifting five to ten miles a day in the pack.

"It is a strange sensation," said Cook, "to know that, blown with the winds, you are moving rapidly over an unknown sea, and yet with nothing to indicate a movement. We pass no fixed point, and can see no pieces of ice stir, everything is quiet. The entire horizon drifts with us. We are part of an endless frozen sea. . . . We do not know our destination, and are always conscious that we are the only human beings to be found in the entire circumpolar region at the bottom of the globe. It is a curious situation."

It was, indeed, and it affected them all. When on the ship they brooded over their helplessness, but when on the ice among the seals and penguins, even this form of lowly life, for at least it was life, the only life they could see, they became quite cheerful and contented. They had rammed into this pack to get away from a gale, but many of the men and some of the scientific staff thought that de Gerlache had made only halfhearted attempts to extricate the ship, and that he really wanted to winter in the ice, a venture for which they were not at all fitted. They had no winter clothes to speak of, nothing that a well-equipped ship would have for a winter stay.

"Most of us have assumed the responsibility of criticizing the management," said Cook, "and all blame the director for entering the main body of the pack at the season's end." But, he remarked, this talk acted as a good safety valve, and nobody thought much of it. Even Amundsen remarked that it was "a truly dreadful prospect."

The ship became dripping wet inside. They had hardly

enough lamps to light all parts of the ship, and no stoves to dry it out. The men grew more and more gloomy and morbid, and the atmosphere on the ship was such that they all wanted to get away from each other, which was impossible. One night, to escape the atmosphere of the ship and to see the aurora, Cook took his sleeping bag out on the ice. It was quite warm, only 4 degrees below zero, but when Cook took off his clothes and crawled into his bag, he shivered and shook for several minutes. Then a warm glow came over him, like the reaction from a cold shower, and he lay comfortably and watched the aurora and listened to the silence.

"The silence and the solitude were curiously oppressive," he said. When he awoke in the morning, he found that he could not turn his head. The hood of his bag had frozen around it until he felt as if encased in a diver's helmet, and his hair was frozen to the mouth of the bag, where he had arranged a hole to breathe through. While he lay there, getting up courage to jerk himself loose, he heard some penguins coming up to look him over. He rolled over and peered through his hole to see them and they scampered off, so with a yank that pulled out some hair he got free and crawled out of his bag. When he got back to the ship, Lecoinge, the captain, told him that he had thought Cook was a seal and nearly shot him.

In the cabin the officers and scientists, when not at work about the ship, tried to pass the time away by planning what they would do when they got home. Some intended to write, others thought of the celebrations they would have. In the forecabin the sailors were much more interested in discussing food, fresh food, and particularly meat. They also missed their girls. But food was uppermost, for the only fresh meat they had at this time was penguin, and most of them didn't like it, and some wouldn't eat it. Amundsen mentions that Lecoinge and de Gerlache had a horror of penguin, and even gave orders that it and seal meat must not be eaten, despite

the danger from scurvy, but Cook continually mentions penguin meat. In fact, he says of it, soon after they were frozen in the ice:

"If it is possible to imagine a piece of beef, and odoriferous codfish, and a canvas back duck, roasting in a pot, with blood and cod-liver oil for sauce, the illustration will be complete."

It isn't quite so bad as that, although it does taste fishy. However, the men hated it. But they hated the Norwegian tinned fishballs and meat balls worse, and one of the officers who lost a bet had to eat four of the fishballs. They made him ill for days. Amundsen and one other ate them with a grim determination. There was no taste to them.

Most of the food they had brought with them was tinned, and all of it soft. It lacked natural food fibers, and they longed to get their teeth into something. So far as food was concerned, as well as clothes, the *Belgica* was badly equipped. Little thought had been given to avoiding scurvy, although it would have been easy to do so, and they all got it before the winter was over.

To cheer themselves, one dull day, they had a beauty contest based on pictures from a Paris magazine, and the points set forth for competition showed a continental influence. It wasn't a howling success, because it was hard to decide among the many charms exhibited. But they finally agreed, putting the unclad beauties aside, that Cleo de Merode and the Princess de Chimay were the most beautiful women. That was a long time ago—those names are mere memories nowadays.

In sharp contrast came Easter Sunday, and their thoughts turned back to home where well-dressed men and women were going to church on a spring morning, where there were flowers and sunshine, and soft breezes. Around these outcasts from civilization, alone at the bottom of the world, was nothing but the endless pack surrounding their wet, stinking



(Underwood & Underwood)

Plate 11.—The crew of the *Endeavour* after their ship had been crushed. Shackleton at the left.

ship. There was no religious feeling that Easter Day, in fact Cook remarks that he never saw anyone on board with a Bible or Prayer Book in his hands. But that is not remarkable on some expeditions.

By this time they had drifted far south of Peter I Island, and the lack of pressure indicated that there was no extensive land south of them. One night they saw a queer light not far from the ship, and wondered if it were some strange being come to visit them. The night had begun to affect them all by this time. Amundsen, who was the biggest man in the group and generally the best-dressed for an emergency, went off on his skis to investigate. He came back looking rather sheepish. The light had been caused by some sort of phosphorescence in the snow, probably by sea algae, Cook thought. They saw this several times later, and were always puzzled and a bit startled by it; it must have been a ghostly sight to these lost men.

Many of them were in really bad shape by this time, and with the winter yet before them. Cook wondered, "Who will be here to greet the returning sun?" The men didn't eat so much, they were tired of everything, they wanted to get away from each other more and more. They retained weight, some even increased in weight, but lost strength. Cook is one doctor who has accurately described the symptoms of men in such a situation. Their faces were puffy, their muscles soft, their hair grew rapidly, and their skin was oily. The heart action was irregular. They had headaches and suffered from insomnia, although some were always sleepy. They were dizzy, had digestive difficulties and muscular pains.

The sun disappeared on May 16, and left the men "sad and dejected, lost in dreams of melancholy." About this time Lieutenant Danco's heart began to fail. He had a lesion and a slight murmur, but while the sun was warm and there was work for him to do, he got along fairly well. Cook said that he had undoubtedly had a bad heart for a long time with-

out realizing it. Had he remained at home or been on an ordinary voyage, he would have remained well for years, but the hardships of the *Belgica* upset the delicate equilibrium of his heart, and he grew steadily worse. When he went for a walk, he had to stand still and gasp for air.

On May 31 they were in 71 degrees 36 minutes south and 87 degrees 33 minutes west, steadily drifting to the westward. Again Cook commented on their increasing debility. They were pale, with a greenish hue, their organs sluggish, and both hearts and minds affected. The men were incapable of concentration, and one sailor was forced to the verge of insanity, but recovered with the return of the sun.

On Cook's birthday they had a party. The American flag was hoisted, and Captain Lecointe and Cook put on their dress suits for the occasion. Lecointe gave Cook a certificate of honor which included a promise that he would repair one pair of Cook's knitted stockings. Lecointe and Cook nearly froze in their stiff-bosomed shirts and tight collars, for they sat around after dinner talking about the United States and how some day a United States of Europe would be formed. Later Lecointe, in a spirit of bravado, went to his observatory near the ship in his dress suit for the purpose of taking a star sight and came back shivering so he could hardly stand. They decided to stow the dress suits permanently.

It was not long after this that the condition of some of the men became alarming. Everyone aboard had scurvy, although some were much more affected than others. The ship had a coal stove, which Cook believes is much better than any other kind of stove in the polar regions because it not only ventilates the house properly, sucking in poisonous air, but exposure to its direct heat acts as a tonic. He began trying "baking treatments" on those who were most sick. Lecointe was one of them, both de Gerlache and the captain having taken to their bunks and made their wills.

Lecoing's recovery was uncertain; he was anemic and his heart action was bad. Cook put him in front of the open fire and found after an hour's treatment that he was much improved. But it was a long time before Cook could persuade him to eat penguin. At last he promised to eat as much penguin as the doctor prescribed, and in a week he was completely recovered. So it was obvious that what they suffered from mostly was a lack of fresh meat, with fresh meat all around them.

Amundsen says that when the commander and the captain were both confined to their beds, and the command of the ship devolved upon him, he ordered seals excavated from the snow alongside the ship where they had been since de Gerlache had forbidden anyone to eat them, and that the men recovered in a week after eating the meat. But either Amundsen's recollection was faulty when he wrote his memoirs many years later, or Cook completely misrepresented the picture in his own book written only a short time after the event, for Cook tells of desperate illness long after Lecoing recovered.

Perhaps some of the men refused to eat seal, which would reconcile the two statements. There is no doubt that there was a great squabble about whether penguin and seal were fit to eat or not. Amundsen, himself, was ill at this time, according to Cook, which might account for his faulty recollection.

Even the cat lost its appetite. It had bounded gaily all over the ship while the sun was up, but when the sun went down Nansen (the cat's name) curled up in a bunk or some other warm place in the forecabin and became morose. It slept most of the time and when it was disturbed would spit and scratch. Now the lack of fresh food hadn't affected the cat before, and it is probable that it had plenty of penguin meat. In order to amuse Nansen a penguin was brought in, but there were no mutual amenities between them as there had

been between the cat at the South Shetlands and the penguin, many years before. They withdrew as far apart as possible and glared at each other. It was not long before Nansen gave up the ghost. It must have been plain lack of sunshine that killed him.

During all this difficult time much of the responsibility fell on Cook. It was he who with Amundsen went after penguins and seals, the seals especially being far from the ship and scarce. It was difficult for the two weakened men to drag them home. Amundsen says of Cook at this time:

"He, of all the ship's company, was the one man of unfaltering courage, unfailing hope, endless cheerfulness, and unwearied kindness. When anyone was sick, he was at his bedside to comfort him; when anyone was disheartened, he was there to encourage and inspire. And not only was his faith undaunted, but his ingenuity and enterprise were boundless."

(Strange that such a man should have come to such an ignominious end. I have always thought that Cook, who had made a splendid trip out on the ice of the North Polar sea, and who had returned to winter on Devon Island, according to stories told by Eskimos to the Northwest Mounted Police who told them to me, said on his reaching Greenland that he had gone to the North Pole without realizing what he had committed himself to. And from that moment he had to live up to what he had said. That one careless statement was the beginning of his downfall, and everything that followed was a natural consequence. He may have dwelt moodily all that winter on Devon—an achievement in itself—on his inability to raise funds for an adequate expedition, while Peary had everything. One white man with a few Eskimos, living off the land, on a few musk oxen and sea lions, perhaps, thinking, thinking, thinking. I doubt if Cook was quite himself after that winter.)

The time drew near when the sun was to appear again.

They had watched the sky become lighter, the long twilight that precedes the sun had lengthened every day, and the men looked eagerly to the north, waiting and hoping for a little warmth to steal into them from the sky. By this time both Amundsen and Lecointe, Amundsen the strongest man on board, showed the effects of the winter; their faces were drawn and lined and tired. On July 23 a lopsided sun appeared over the horizon for a little while, a red, huge sun, that shot a gleam over the ice before it rolled over below the horizon again. But it was enough.

The next day it was a little higher, and the next, until men could feel the warmth of it, and they ran about on the ice "like bears," and lay and basked in the sunshine. It had an amazing effect; men recovered almost miraculously.

In fact, one cannot help getting the impression that there was something more than the food conditions that reduced them to such a pitiful state. It may have been in part that their many races caused misunderstanding or lack of comradeship, for others have lived through an Antarctic night with nothing to eat but seal meat, and being a homogeneous, cheerful group, have come through well and fit. This was true of Campbell's northern party with the second Scott expedition, who were in a much worse pickle than those on the *Belgica*. So long as the sun shone, and there was work to do, the polyglot society on the *Belgica* got along together contentedly. When they were thrown completely on their own resources, huddled together, they went to pieces. Their troubles were psychological even more than physical.

With the return of the sun and warmth, seal hunting began in earnest, and they also found some of the big emperor penguins. These were so heavy and the men were so weak that it was all one man could do to drag three of them on a sledge. But if the penguins were tied together and hauled on their smooth feathers, six or seven could be hauled with ease. This discovery provoked an obsession in Cook, for he

wanted to experiment with fastening penguin skins on the runners of the sleds so that they could be dragged more easily over the ice. He never seems to have gotten around to that experiment, but he talked of it often.

They had found, quite accidentally, a way to catch penguins that hardly seems sporting. A cornet was used one day to call the men to dinner, and much to the surprise of those on the ship the penguins also answered the call and came right on board. After that, whenever any penguins were needed the cornet was played lustily and the penguins would come trooping like the rats of Hamelin, to find themselves on the way to the cooking pot. It has been well established since, that penguins do like music. Even seals would pop out of the water to the ice in answer to the call, but they didn't oblige by waddling aboard ship.

Amundsen and Cook, on one of their short trips from the ship, took along a sailor whose mind had been affected by the winter experience, hoping that the exercise would do him good. But it had just the opposite effect, for when the poor fellow got back to the ship Cook found that his mind was hopelessly deranged.

Many miles from the ship there was a large iceberg that interested Amundsen and Cook, although the probability is that they wanted chiefly to get away from the ship and be by themselves for a time. So Cook devised a tent that could be easily put up and was quite strong, a tent of which he was very proud, and they went off with a sledge toward the berg. It had seemed only a few miles away when they started, but as they marched and marched the berg seemed to recede from them. After a whole day's journey they found themselves a few miles from it, only to discover their way blocked by open water. So they camped for the night, peacefully, on the ice, and far away from the too-familiar faces and voices. A second time they attempted to reach the berg, but were prevented by open water.

But this gave Cook an idea. About half a mile ahead of the ship was a pool of water in the midst of the almost solid floe, and he became convinced, according to Amundsen, that when the ice split it would break into that pool. Therefore they must get the ship into the pool. But how? If the sun melted the snow and ice to form a pool in one place, why wouldn't water in a ditch absorb enough heat to weaken the ice beneath? It was worth trying. So two long ditches were dug from the ship to the pool, ditches in which some water soon gathered. But the next cold spell froze the water, and the ditches were merely lines along the surface.

Then Cook proposed sawing a channel to the pool. It seemed a mad idea, for there were only a few four-foot saws on board, and a ton of explosives. But everybody turned out, weak as they were, and took turns sawing. The pieces were cut in triangles, and after the cut had been made a stick of tonite was used to blow them loose. At first they merely cracked and then clung together again so that they could not be rafted out into the large pool, but cutting off one corner of the triangle and pushing it away remedied this defect.

They spent weeks at the work, and it did the men good. Their appetites increased to such an extent that they ate seven times a day, with meat at two meals. They all enjoyed penguin and seal now, and ate as many steaks as they could hold. One could hardly imagine them to be the weak, gaunt crew who had first turned out in garments fashioned from red blankets.

"Finally the job was done," wrote Amundsen, "and we went to bed one night planning to tow the ship to the basin the following morning. Imagine our horror on awakening to discover that the pressure from the surrounding ice pack had driven the banks of our channel together, and we were locked in as fast as ever. Our dejection was turned to joy shortly after, however, when a shift of wind opened the

channel again. We now lost no time in towing the ship into the basin."

But the sea was still as far away as ever, and they waited, week after week, for the ice to break. All this time they were drifting west and somewhat to the north. Their farthest south in the ice had been just about on a latitude with Cook's most southern position to the west. It had been a remarkable drift because of the lack of pressure. Nansen had much more pressure in the open polar sea.

When they had almost given up hope of getting free, for the second summer was nearly at an end, and another winter in the ice would have finished them, the ice opened and a lane to the sea ran right through the basin. Cook had guessed right. They started for the open, but to get there they had to pass between two huge bergs. Let Amundsen tell it, for it sounds incredible:

"For several days we were held as in a vise between them. All day and all night we were subjected to a terrific grinding pressure, and the noise of the ice cakes battering against our sides and splintering off incessantly was at times so loud as to make conversation trying. Here again Dr. Cook's ingenuity saved the day. He had carefully preserved the skins of the penguins we had killed, and we now made them into mats and lowered them over the sides of the vessel, where they took up and largely mitigated the impact of the ice."

Saved by penguin skins! Shades of Adélies and emperors! Amundsen was a romantic, and liked to exaggerate both the ease and difficulty of doing something. He had a sense of the dramatic.

However, they were free once more. It was the middle of February, 1899, and they had spent nearly a year locked in the ice and had escaped by a penguin feather. They returned to Punta Arenas, and so home, having accomplished little geographically, but with a tale to tell, and with a rich harvest of scientific observations.

The Renaissance—Scott's First Voyage

IT HAS always seemed strange that for sixty years after Ross discovered the gateway to the Antarctic Continent nobody made a determined effort to follow his footsteps and determine what this strange land might be like, or how great was its extent. This despite the fact that Wilkes had sighted land at intervals along a tremendous coast line, that Ross had found a magnificent stretch of mountainous land to add to what had been seen farther to the east.

Apparently men refused the obvious evidence before them that there must be a continent within the Antarctic Circle. The famous voyage of the *Challenger*, the oceanographic ship, under Sir George Nares, which crossed the Circle in 1874, finally bore fruit. The men on the *Challenger* were exploring the edge of the continental shelf, and so many rocks of obviously continental origin were brought up from the sea bottom that geologists were convinced that a vast land lay somewhere to the south. English scientists began to be stirred again, but it was not until the turn of the century that they did anything about it, by which time a German expedition was also being planned, under Erich von Drygalski, who discovered King Wilhelm II Land.

The guiding spirit of the British expedition, which left home in 1901 for a two years' stay in the Antarctic, was Sir Clements Markham, who had the shrewdness and good sense to realize that Ross had found the key to a new world. It was at one of the meetings in 1893 while the expedition was being discussed in leisurely fashion that the Duke of Argyll pointed out that we knew more about the planet Mars than about a large area of our own globe.

Sir Clements was a scientist, and interested in many things, but he was also inquisitive as to what lay beyond the mountains and the ice that Ross had seen. His instinct told him it was worth investigating, and that the Ross Sea was the only reasonable approach. Other nations, including Germany, France, and Sweden, were sending out expeditions to other parts of the continent, but the Ross sector was essentially British.

So more than £90,000 was eventually raised, and a new ship, the *Discovery*, was built. She was one of the most powerful ships ever built for the Antarctic, constructed not for resisting pressure entirely, like the *Fram*, Nansen's ship, but for crushing her way through pack ice. She was of 485 tons, 172 feet long, and 34 feet wide. Her stern was rather round, which made her lively in a heavy following sea, but she proved herself in every emergency.

Captain Robert Falcon Scott of the Royal Navy was appointed to command her, and on board were three men who were to become famous in Antarctic exploration, although this was their maiden voyage there. Indeed Scott himself had never been in the southern ice. The three were Ernest H. Shackleton, Dr. Edward A. Wilson, and Frank Wild, a descendant of Captain Cook on his mother's side, who went as a seaman. Scott does not mention Wild in his first discussion of his crew, although he does pay him tribute later on for his coolness and qualities of leadership, but it seems to have been Shackleton who first penetrated under Wild's calm and unruffled exterior to the man inside.

Dr. Wilson was one of those rare characters who quietly influence every group in which they happen to be a member. He was a brave gentleman—he died with Scott on the return from the South Pole years later. His color sketches are the best that have ever come out of the Antarctic; they are not only authentic but transmit the rare beauty of that colorful land.

And what of the leader himself? He is worth dwelling upon a moment, not only because he accomplished so much, and died so magnificently, but because his character was so complex. Sir James Barrie once wrote an appreciation of Scott in which he quoted from a letter that told how Scott, then a second lieutenant, took charge of passengers on an overcrowded ship bound from San Francisco to British Columbia, where he was to join his own ship. There was a drunken crew and a rowdy lot of miners, and when a gale came up the conditions on the ship were almost intolerable. Scott, at the head of volunteers, washed and fed the babies, cared for the helpless women, cleaned up the saloon where they were camped, and settled arguments with his fists, when necessary. Anyone in trouble appealed to him. And Apsley Cherry-Garrard, who was with him on his last expedition, and was one of those who found him, wrote:

"England knows Scott as a hero; she has little idea of him as a man. . . . Few who knew him realized how shy and reserved the man was, and it was partly for this reason that he so often laid himself open to misunderstanding.

"Add to this that he was sensitive, femininely sensitive, to a degree which might be considered a fault, and it will be clear that leadership to such a man may be almost a martyrdom, and that the confidence so necessary between leader and followers, which must of necessity be based upon mutual knowledge and trust, becomes in itself more difficult. It wanted an understanding man to appreciate Scott quickly; to others knowledge came with experience. . . .

"Temperamentally he was a weak man, and might very easily have been an irritable autocrat. As it was he had moods and depressions which might last for weeks, and of these there is ample evidence in his diary. The man with the nerves gets things done, but sometimes he has a terrible time in doing them. He cried more easily than any man I have ever known.

“What pulled Scott through was character, sheer good grain, which ran over and under and through his weaker self and clamped it together. It would be stupid to say he had all the virtues; he had, for instance, little sense of humour, and he was a bad judge of men. . . . Scott was the strongest combination of a strong mind in a strong body that I have ever known. And this because he was so weak! Naturally so peevish, highly strung, irritable, depressed and moody. Practically such a conquest of himself, such vitality, such push and determination, and withal in himself such personal and magnetic charm. His triumphs are many. . . . Surely the greatest was that by which he conquered his weaker self, and became the strong leader whom we went to follow and came to love.”

This was written long after Scott was dead, and none of those who were with him on his first expedition left an account of what he was like at that time. But it indicates the fundamental characteristics of the man who set out to follow the footsteps of Ross while still in his abundant youth.

On this first voyage Scott and his companions were a happy group of men, probably the most harmonious that has ever gone south. Anyone who has read Scott's account of his first voyage and the diary of his last expedition cannot but be impressed by the contrast. The voyage of the *Discovery* was a gay adventure, despite its dangers and one grim tragedy. There was a buoyancy of spirit in it, a comradeship, a sense of zestful seeking, that is so often lacking in expeditions. A new world lay before them and they leaned to it eagerly.

Early in August, 1901, the *Discovery* headed out of Cowes, where she had been surrounded by trim and graceful yachts, and set sail for the south. She was a good ship, but Scott soon found that her sturdiness did not spell speed, and that he was lucky if he could get seven knots out of her in

a fair wind, which was not bad as compared with the sailing qualities of similar vessels. Such ships are not built for speed.

Scott took the usual route for sailing ships, around the Cape of Good Hope, to New Zealand. Toward the end of this stage of his voyage he got below the 60th parallel, and eager eyes soon picked up ice. It was not long until the ship lay becalmed in gently tossing floes and the men wondered at the strangeness of their surroundings as ice bumped against the side of the ship, and the cakes rose and fell with a gentle shushing sound as the water poured over their edges. It was a delicate introduction to the edge of the world in which they were to spend so long a time, and they were reluctant to leave it, but Scott knew there was much outfitting and provisioning to be done in New Zealand, so pushed on until he arrived at Wellington.

The *Discovery*, heaped high with coal and supplies, left that port on Christmas Eve, all on board anxious to head south. They had one of the easiest and pleasantest voyages to the pack yet recorded. The winds, which generally blow great guns between New Zealand and the pack, were gentle, almost too gentle, and they were at first beset with fog, through which they went warily, keeping a sharp outlook for bergs, for at that time of year they come far north. The first berg was sighted on Jan. 2, and by evening they had seen seventeen, although not very large ones. The next day they crossed the Antarctic Circle, and soon found themselves passing through loose streams of ice from the pack.

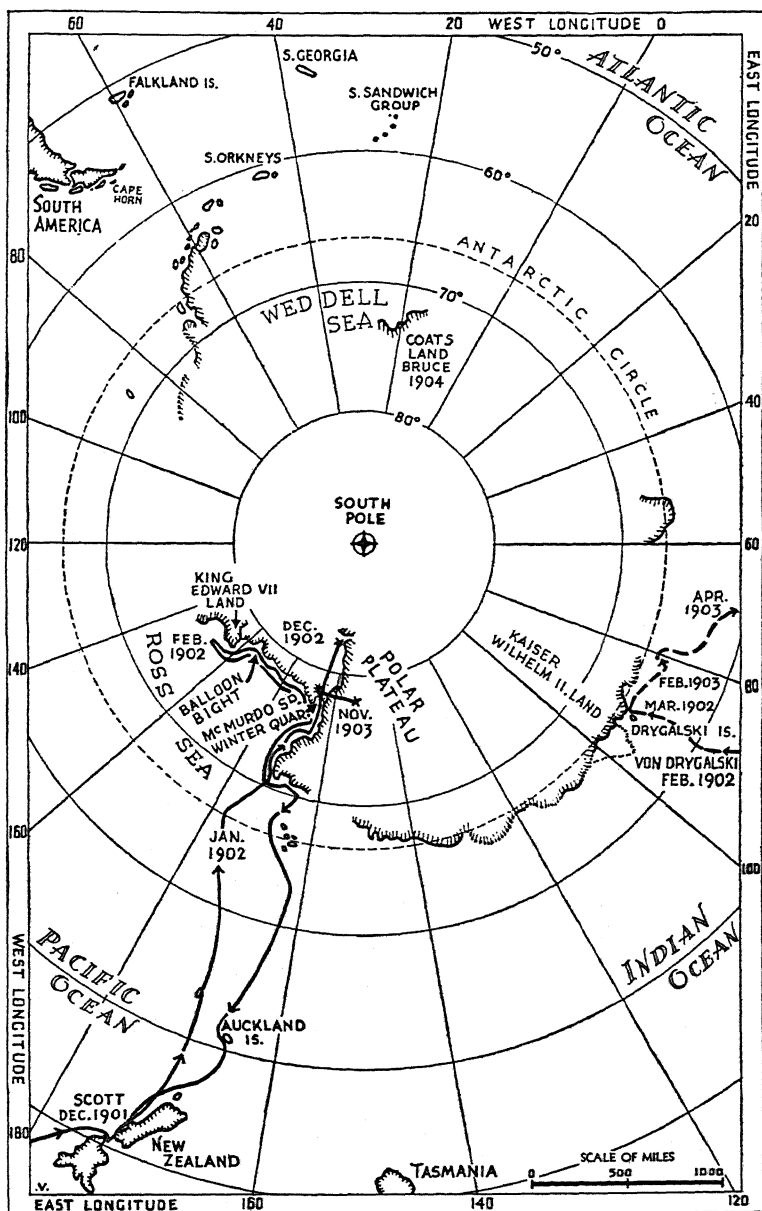
As Scott approached the pack after crossing the Circle, he passed within a few miles of two isolated islands that were later discovered by the captain of one of the relief ships, and named after Scott. They could hardly have been farther away than just below the horizon line, probably the two loneliest islands in the world, for they rise out of a great waste of water, the nearest Antarctic land hundreds of miles away.

On the first Byrd expedition we passed within three or four miles of them, and thought at first that they were icebergs. One is just a rounded piece of rock, but the other is in the form of an elephant, with forelegs going down into the sea, and with a trunk hanging down in front of a typical elephant's head. The whalers said they had never seen these islands, which I doubt, for they had hunted in that vicinity for years, but even so we were only the second exploring group to sight them. They are strange things to come upon in that wilderness.

Just beyond the latitude of the islands Scott hit the main pack, right where its northern edge has been, apparently, since Ross first plunged into it. Now Scott was to follow him into the little-known waters beyond. Scott was to come to the conclusion, after spending two winters in the Antarctic and watching the ice near the shore of the Ross Sea break up and move north, that the pack was formed by this ice during the early spring, and that it was largely dissipated by fall, to be formed again the next year. But that its action and width varies greatly from year to year, even if its northern edge holds about the same position, is obvious from later experiences.

As they entered the pack they at first found so much open water that they used only sails, but soon were forced to get up steam in both boilers to force their way through. For days they broke through the ice from pool to pool, watching the bird and seal life, stopping to water ship from the floes, and thoroughly enjoying themselves. They made only thirty or more miles a day, although the ship bucked her way strongly forward.

When they could, they towed nets and brought up "the strangely beautiful forms revealed by the microscope." Diatoms, the grass of the sea, the fundamental source of marine life, take on exquisite shapes when magnified so that they may be seen. They remind one somewhat of snowflakes. But

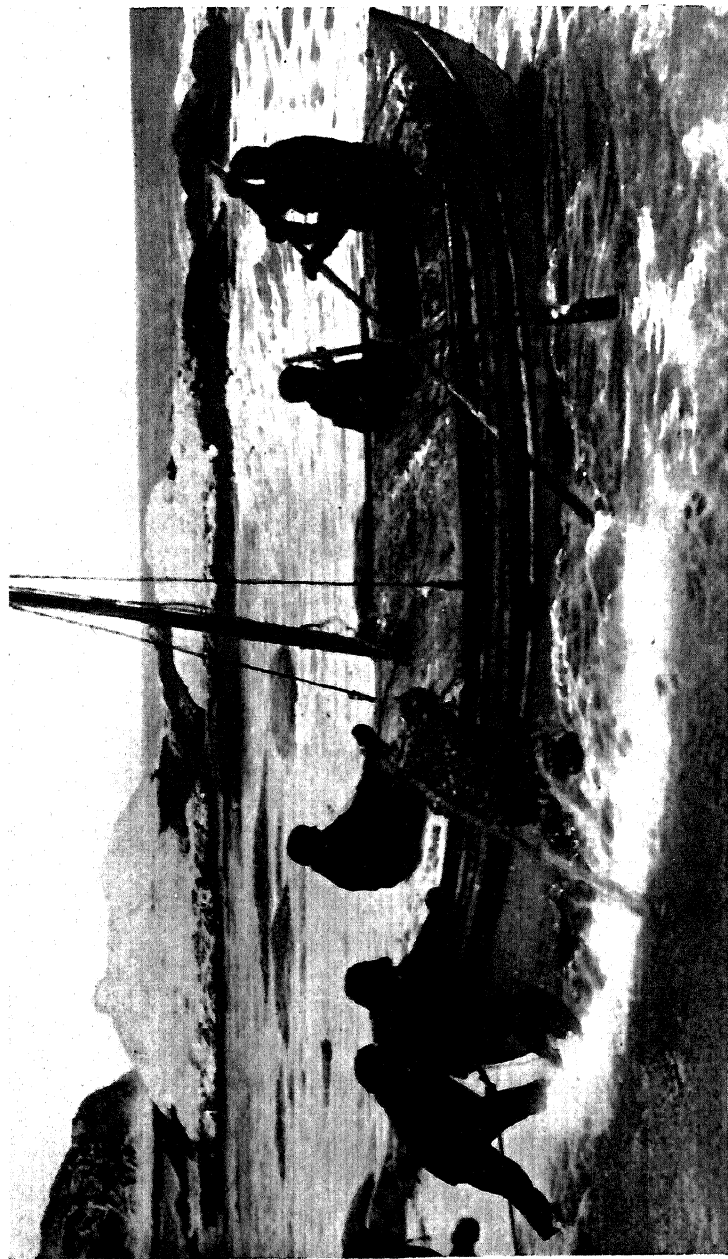


Map 8.—Scott extended Ross's discoveries and first reached the high Antarctic Plateau. Drygalski helped fill in the continental outline.

all one can see of them with the naked eye is a brown smudge along the water's edge of the ice. On these feed the shrimps, on the shrimps feed little fish, on the fish feed the penguins, on the penguins feed the sea leopards. And the tiny crustaceans which feed on the diatoms are the food of the greatest of all mammals, the big blue whales of the Antarctic, which are sometimes 100 feet long and weigh about a ton to the foot. So diatoms are very important, as well as beautiful, and the enthusiastic young explorers looked and wondered and speculated, and deduced many interesting things that are much too scientific for treatment here.

They were living on seal meat regularly since entering the pack, and "found it palatable." But the smell or taste of blubber, to which they were later to be accustomed, nauseated them. On the eighth the southern edge of the pack was seen, sharply defined, and they glided out into the open water. The ice had been heavier than when Ross went through it, but not nearly so heavy as some later expeditions have found it. As so often happens when clear water is reached in the Ross Sea, the clouds rolled away, the sun came out, and they found themselves in such calm weather that they furled their sails and used their engine.

They spliced the main brace and at dinner drank to the future in champagne, and their happiness was not dulled when at 10:30 that night there came the cry of "Land in sight." The sun was shining over the southern horizon, and to the southwest could be seen the peaks of Victoria Land, 100 miles away. They forced their way through some drifting ice, and within the bay came to anchor. Naturally, it was not long before the boats were overside, and they made their way to the grounded floe ice along the shore, and to the pebbled beach beyond which the Adélies met them. Near by also was the hut used by the *Southern Cross* party which had wintered there without exploring, and high up on the hill stood the plain wooden cross over the grave of Hansen,



(*Underwood & Underwood*)

Plate 12.—The start of Shackleton's famous 1,200-mile boat journey through the worst ocean in the world.

the naturalist. Beyond were the lofty summits of the ice-covered mountains.

They had a narrow escape from disaster as soon as they left the bay and turned south in an attempt to find a path through the pack along the shore. They moved ahead at fair speed for a time, but then the tide changed and the heavy pack charged down on the ship, forcing it back toward a point where the floes were grinding and piling up against several grounded icebergs. For the first time they realized how helpless a ship may be in the pack. With every bit of steam they could obtain for the engines, the ship barely moved.

"It was one of those hours which impress themselves for ever on the memory," said Scott. "Above us the sun shone in a cloudless sky, its rays were reflected from a myriad points of the glistening pack; behind us lay the lofty snow-clad mountains, the brown sun-kissed cliffs of the cape and the placid glassy waters of the bay; the air about us was almost breathlessly still; crisp, clear and sun-lit, it seemed an atmosphere in which all Nature should rejoice; the silence was broken only by the deep panting of our engines and the slow, measured hush of the grinding floes; yet, beneath all ran this mighty, relentless tide, bearing us on to possible destruction. It seemed desperately unreal that danger should exist in the midst of so fair a scene, and as one paced to and fro on the few feet of throbbing plank that constituted our bridge, it was difficult to persuade oneself that we were so completely impotent."

And then, in the mysterious way such things take place in the Antarctic, the tide slackened, hours before a turn had been expected, the floes parted and the ship began to move ahead. It taught Scott a lesson, "not to undervalue the enemy."

After being held by a gale under Coulman Island for a day, and landing in an inlet near Cape Jones, they continued

on down the coast, being continually perplexed by the aberrations of the compass. The compass is sluggish near the Magnetic Pole, and the ship was so far south that the pole was north of them. As the southern end of the compass pointed to the pole, the ship appeared to be sailing north, according to the compass, although it was going south. Not only that, but at times it was deflected wildly by the influence of volcanic rocks on shore, and when passing over a shallow spot. Altogether a navigator's life near the South Magnetic Pole is one of continued exasperation.

Soon they could see Mt. Erebus 120 miles away, and could even see the vapor rising from the summit. The day was so clear they could see Coulman Island to the north, a range of vision of 240 miles, which shows how clear the Antarctic can be when the cool dry air is blowing off the icy interior. After running into McMurdo Sound, where they were to winter, they turned to the east. Even this far they had been much closer to the coast than Ross, so close as to prove the continuity of the land, of which Ross had been somewhat doubtful. Mt. Terror, which had been snow-covered when Ross saw it, was found to be almost denuded of snow, which caused Scott to wonder what had caused this change.

As they passed Cape Crozier, east of Mt. Terror, the great barrier stretched before them as far as they could see. They had clear, fair weather, little of the fog and gales and drifting pack that beset Ross, and they clung close to the barrier face, recording its height and every twenty-four hours taking a sounding. It was not more than sixty or seventy feet high at first, and they thought Ross had exaggerated its height and its uniformity. But in a day it had risen to 240 feet.

They were fascinated by it, as nearly all have been who have sailed not far from that magnificent wall. The alterations in height, the inlets from which bergs had broken out, and the shoaling and deepening of the ocean floor, caused them to wonder. They passed many bergs, and two that had

evidently just calved. So strong was the current against them that they had to fire up their second boiler, and on two days they made practically no headway. Occasionally they ran into small inlets in fog, not realizing their position until they found ice on both sides of them. If a berg had calved just then! One of these indentations was Discovery Inlet, which is a deep opening running to the east, and with high ice on each side of it, although the lower end is filled with bay ice. Scott probably did not see it all in the fog.

By Jan. 27 they were east and south of Ross's farthest position, at a point where he had reported an appearance of land to the southeast. They could see nothing at first, and concluded that Ross must have been deceived, although they all felt that there must be something ahead—they could sense it. Not encountering the heavy pack that had beset Ross they were encouraged. Everybody on deck peered ahead or to the south, and land was more than once reported, only to turn into clouds. Then the ice cliff turned to the east, and they saw the shore ice gradually ascending in steps and long slopes to where there were rounded ridges. It was undoubtedly land, but as Scott exclaimed: "What a land!"

As they pushed east they found themselves moving along a series of capes, which turned out to be strange domed islands of ice, linked to the shore by ice. Several times they tried to pass between them and the land without success. And at this time they had fog to add to their uncertainty. On the evening of Jan. 30 they were about to go to dinner when they saw several black patches above the slopes, and they knew for the first time that they were looking at indisputable evidence of land, bare rock. The land was named King Edward Land, and the rocks are now known as the Alexandra Mountains.

The next day, when the fog lifted, they found themselves among ice islands and huge bergs, one at least six miles long. Under the dark sky it was as if they had strolled into the

home of the ice giants, these lofty and ominous and blue masses being their castles. But ahead the lifting fog also showed them the solid pack, the sort of pack that had turned back Ross. They pushed through a narrow channel between two bergs, and followed the open water to the north. On the ice sheet were hundreds of emperor penguins, which made them think for a time that they had found a rookery. These penguins probably account for the numbers of them that visit the Bay of Whales farther to the west.

On the thirty-first they saw a cloud hanging low on the horizon east-north-east, and as it was still there the next day Scott wondered if it might not indicate land. It was probably a cloud above the land later discovered there by Byrd. By this time the ship was in an enclosed bay in the ice, with no way out to the east, north, or west, so Scott had to turn back and find the narrow channel by which he had entered. The young ice was forming, and they could not find a landmark in the bergs around them to give them any clear indication of what their course should be, until suddenly they recognized a feature of one of the bergs that they had formerly passed, and with some relief they hastened to get out of a situation that might easily have become a trap.

There seemed no hope of the pack opening, and as their coal supply was limited they turned westward again. On the way they got a better view of the new land and determined that it ran up between 2,000 and 3,000 feet. They were convinced that the high land extended far back, and that it was not a collection of islands, but a connected land of considerable extent.

As Scott sailed west he again showed his qualifications as an explorer. For hundreds of miles he had coasted along the barrier, which he believed to be afloat, and had then come to unmistakable evidences of high land. Somewhere at the point where the floating barrier ended, and where the land began, he reasoned, there must be an inlet where the

junction would be obvious. So he headed for an inlet he had seen on the way east and steamed into it, tying up to a wall that was hardly more than twenty feet high. He called this place Balloon Bight. (When Shackleton went south on his own expedition a few years later Balloon Bight had disappeared, and he gave up his intention of landing and wintering there. When the first Byrd expedition reached the Bay of Whales, there was no sign of Balloon Bight from ship or airplane.) It may be that the ice that formed the bight broke out to make the larger Bay of Whales, which could not have been quite so extensive then as now, or Scott would have mentioned it. He said that the inlet had "several branches," which might indicate that they led to the deep indentation at the foot of the Bay of Whales. Remember that Ross found the barrier much farther to the north, thirty miles, at which time the bay would have been merely a cup in the barrier.

Whatever the cause, Balloon Bight has gone. It got its name from the fact that Scott, and later Shackleton, ascended there in a balloon brought for the purpose of seeing as far as possible to the south of the barrier edge. So Scott was the first man to ascend in the Antarctic. Airplanes had not been flown then. What would he not have given for one? From the balloon he could see that the surface to the south rose in gradual undulations, and a bank of cloud had all the appearance of high land. But the highest land south of his position anywhere within his possible vision is actually only an elevation of about 1,000 feet of barrier surface. It is, however, over land.

Balloon Bight was left behind and the ship headed for McMurdo Sound, where it was to winter. No ship had ever wintered in the Antarctic except the unfortunate *Belgica*, and selecting a harbor where the *Discovery* could lie safe from pressure for a year required much thought. In McMurdo Sound they were in unknown waters, and what the

winter conditions might be they could only imagine. They found a little bay on the south side of Cape Armitage in which the ship would be completely protected from pressure, and in water shallow enough to keep off the bergs. It was an ideal location.

They erected a hut on shore, the hut in which they had intended to live if a safe anchorage could not be found. Now the hut could be put to any use, as a workshop or playroom, or even a well-provisioned shelter for those on sledging parties if the ship should be driven off shore. While the large hut and smaller ones were being set up, the men learned to ski down the slopes, tried to master their dog teams, and went on explorations on foot. It was on one of these foot-sledging trips that the expedition had its only disaster.

Twelve men had started from the ship on a journey to Cape Crozier, which is a point on Ross Island below Mt. Terror about where the barrier meets the island. After three days they met such deep snow that only those on skis—and they had only three pair—could possibly continue.

So nine men were sent back. They reached a point where they decided to climb up and over a ridge that lay between them and the sea, believing that it would be a shorter route. All the men put on their frozen ski boots except two, Vince and Hare, who could not get their boots on and continued in their slippery fur boots. No sooner had they gained the top of the ridge than it began to blow and the air was filled with drift. They made for the shelter of some rocks and put up their tents, exhausted and frostbitten.

None of these men, of course, had had any experience in the Antarctic before. They could not get their cooking apparatus going, and in their stiff leather boots their feet nearly froze. Nothing more uncomfortable than a hard leather boot can be imagined when one is forced to be inactive in low temperatures.

They began to fear their tents would blow away, although they learned later that they would withstand a gale, and the thought of the comfortable ship so near—they thought it was only a mile or two away—was too great a temptation. Not realizing the danger of venturing into unknown territory in an Antarctic blizzard, they started for the ship, a man in leather boots on either side of those wearing fur boots. In not more than ten minutes Hare was missing in the blinding drift. They spread out in a line to intercept him and yelled. While they were doing this, Evans stepped on a piece of smooth ice, fell, and shot out of sight.

Barne, in charge of the party, slid after him and soon found himself going at a tremendous pace, but brought up beside Evans. Next came Quartley. The three men started forward, and found themselves at the edge of a steep precipice beyond which was nothing but whirling snow. They did not know it then, but it was an ice cliff that ended in the sea. Even as they drew back in dismay, a dog came sliding down and disappeared over the edge. They moved along the cliff until they suddenly caught a glimpse of the sea beneath them and realized with sinking hearts what that patch of snow on the cornice had saved them from. They found a boulder and sheltered themselves behind it.

The party that had been left above were gathered together by Wild, who had the wisdom not to slide down that slope. He did not know what had happened to the others, but anything was better than to attempt the unknown from which the men had not come back. So they headed toward the ship again in single file, when Wild also found himself on the edge of the cliff with the sea below. He sprang back and dug his heels into the ice, yelling to the others to stop. All succeeded except poor Vince, who had no heels to dig in with, and in an instant he shot forward and disappeared over the edge.

Horror-stricken, the men stood still for a moment, and

then painfully made their way up the slope again. They had only the edge and heels of their boots on which to rely, for if they had tried to crawl they would have slipped over the edge after Vince. How they made it they never knew. Once in a while they found a stone frozen in the ice to which they could cling, and eventually reached the rocky top of the ridge. From there it was comparatively easy to find the ship.

A whale boat, in charge of Shackleton, was sent off to make a hopeless attempt to find Vince, while Armitage went out with several men to hunt for the others. Barne, Evans, and Quartley were found and guided back by Ferrar, while Armitage went on in search of Hare, only to give up after hunting all over the section in which he had been lost. Hope was abandoned for him also.

But two days later, on the thirteenth of March, a bitter month in the Antarctic, the beginning of winter, a man was seen coming down the hill toward the ship. It was Hare, who although weak, did not have frostbite, and who after a drink of milk went quietly to sleep. When he was lost he had shouted to the others that he was going back to the sledges to put on leather boots. He couldn't find the sledges, and made for a patch of rock where he found some shelter and went to sleep. When he awoke he was covered with snow, which had probably kept him from frostbite. He recognized some landmarks, now that the storm had died down, and started for the ship, so stiff that at first he had to crawl on his hands and knees until warmth came back into his chilled limbs. He had slept under the snow for thirty-six hours! He had pulled his arms inside his blouse, covered the opening in his helmet, and the skin boots, which had caused Vince's death, had kept his feet from freezing.

Vince was never found, and a cross was later erected to him, like the cross over Hansen's grave, farther north.

The expedition settled down for the winter, which was

to be two winters before the ship was relieved from her icy berth, and during the two summer seasons Scott accomplished a tremendous amount of work. Man had never blazed a trail across the Antarctic snows. Ships had skirted it and sighted land, had even landed at some places far apart, and one small group had spent a winter at Cape Adare but had not ventured into the interior. What lay behind the icy ramparts, the lofty mountains, was as unknown as the unseen surface of the moon. Indeed, men knew more about that half of the moon turned toward the earth than they did about the interior of the Antarctic. To Scott it was an explorer's paradise.

He made good use of his opportunities. The first summer he sledged south across the barrier to 82 degrees 16 minutes latitude, discovering the mountains that fringe the western edge of the barrier, and the great glaciers that tumble down between them. The next year he climbed up to the domed plateau to the west, and traveled out on the 78th parallel to 156 degrees 33 minutes east longitude, about 9,000 feet above sea level. So he discovered the famous plateau. It was terribly hard traveling, and the impression it made on him was overwhelming. Before he turned back he wrote:

"We see only a few miles of ruffled snow bounded by a vague wavy horizon, but we know that beyond that horizon are hundreds and even thousands of miles which can offer no change to the weary eye, while on the vast expanse that one's mind conceives one knows that there is neither tree nor shrub, nor any living thing, nor even inanimate rock—nothing but this terrible limitless expanse of snow. It has been so for countless years, and it will be so for countless more. And we, little human insects, have started to crawl over this awful desert, and are now bent on crawling back again."

In addition to these trips, Barne went south to the mountains to an inlet that bears his name, and Royds went far out on the barrier surface to the southeast. When their second

summer was ended, they were laden with knowledge of this new world, rich with the treasure they had recorded in geography and other sciences. They had proved beyond all doubt that the Antarctic was a continent, an astonishing continent, although they had seen so little of it, comparatively. There is a lightheartedness and even gaiety in this part of Scott's narrative, which reflects the pleasure they all felt at good work well done. It was fortunate that they had had to spend that second year.

The *Discovery* was still frozen in her dock, with twenty miles of ice between her and open water. Scott determined to saw a channel to the sea, as those on the *Belgica* had tried to do. But what a difference in the men of the two ships! When Scott came back from his trip on the plateau, he found his men with their clothing torn and looking like a lot of tramps, but their faces were burned to a deep bronze. "In each dark face one has not to wait long for the smiles which show the white of teeth and clear healthy eyes." And this after two years in the Antarctic. Surely, Scott had dissipated the terrors of merely living there. But despite the hearty cooperation of the men, the sawing was soon given up; it was useless.

So Scott and Wilson went on a picnic to a penguin rookery, lay in the sun and watched the penguins, ate penguin liver and seal kidneys, and decided that life in the Antarctic was quite pleasant even though they must prepare for another winter. There was plenty of food. One morning as they sat in the tent door dreamily looking out to sea, a ship hove in sight, so unexpectedly that Scott was startled. And then appeared another ship. They thought the first was their relief ship, the *Morning*, but what could the second be? They soon learned.

When the *Morning* had gone back the year before, the admiralty got the idea that Scott's ship would never be released, so the *Morning* and the *Terra Nova* were sent back

with orders for Scott to abandon the *Discovery* if she were not freed from the ice, and to return home. It was a blow to Scott, who did not want to leave the *Discovery*. But in the meantime, after sighting the ships, he had gone on to the tent of the penguin hunters who were getting a supply of meat for the winter, and told them of the ship. They had seen it, but were leisurely finishing their meal, and weren't in any hurry for their mail. "We thought that would be all right," they said nonchalantly.

"They as good as said that life was so extremely easy and pleasant that there was no possible object in worrying over such a trifle as the arrival of a relief expedition. And these are the people whom, not unnaturally, some of our friends appear to imagine in dire straits and in need of immediate transport to civilized conditions!"

It was the thought of leaving the *Discovery* that brought gloom to the group, perhaps the most successful group in its objectives and the happiest expedition that has ever gone to the polar regions. If the ice did not break out in six weeks, they must leave the ship that had been their home for more than two years. It was enough to make any sailor miserable. Also it hurt their vanity to be hauled home this way, when they felt they were perfectly able to take care of themselves. When Scott told his men what the orders were there was silence, and there wasn't a smile for days afterward.

The relief ships appeared on Jan. 5, 1904, but it was a long time before there was any change in the ice. Then came a swell that broke out the ice to within a few miles of the *Discovery*, and the ship moved groaningly up and down in its icy casing. The swell died, and Scott tried cracking the ice with explosives, which had some effect, but not much.

It was not until Feb. 14 that the ice began to break up fast. It all went out in a few hours as the two relief ships battered and cracked it, helping the unseen current that was causing this rapid disintegration. Finally, all three ships

were close together. But the *Discovery* was still held by the ice in its little bay. Not much ice, but enough to form a prison unless their luck held, for the ice there was fifteen to seventeen feet thick. Two huge charges were put out ahead and astern of the ship, and one after the other they exploded. The ice cracked, the water gurgled through, and on Feb. 16 the *Discovery* lay freely riding at anchor, ready to sail the sea again.

"It would have been hard to find a prouder or happier ship's company than we were that day."

Their troubles were not yet over. During all the period the weather had been fairly good, often with sun shining warmly down, and no wind. But the Antarctic is treacherous. A strong wind sprang up, and the *Terra Nova* made for the open sea. The *Discovery* could not follow because the engineers were working over her boilers, pipes, and engines, and Scott did not want to hurry them. The wind was blowing the ship toward a cliff despite her anchor, and just as the stern of the ship struck the cliff word came that there was enough steam to go ahead slowly. They pulled up to their anchor and got it in, and then the current stopped them.

Scott knew there was a shoal off the point which he must clear, but as soon as he got beyond the point the ship was caught in a swift current, whirled around, and thrown forward onto the shoal. They were in an awful position, with the gale, sea, and current all tending to drive them faster ashore. Each time the ship lifted with a wave she came down with a thud that shook her from end to end. Scott tried to force the ship ahead with steam and sails, hoping that she would lift over the narrow shoal, but soon found it hopeless.

"The situation," said Scott, "seemed to have no ray of comfort in it. On deck the wind was howling through our rigging, the ship was swaying helpless and rising each moment, to crash down once more on the stony bottom; the seas were breaking heavily over the stern and sending clouds

of spray high up the masts; the breakers on the shore flung the backwash over our forecastle; the water was washing to and fro on our flooded decks. Towering above us within a stone's throw was the rocky promontory of Hut Point; on its summit, and clearly outlined against the sky, stood the cross which we had erected to our shipmate. I remember thinking how hard it seemed that we had rescued our ship only to be beaten to pieces beneath its shadow.

"If the situation on deck was distressing, that below fairly rivalled it. Each time that the ship descended with a sickening thud into her rocky bed the beams and decks buckled upwards to such an extent that several of our thick glass deadlights were cracked across, every timber creaked and groaned, doors flew to and fro, crockery rattled, and every loose article was thrown into some new position. With the heavier blows one could see the whole ship temporarily distorted in shape; through all and directly under one's feet could be heard the horrible crunching and grinding of the keel on the stones below."

The hours went by, and then came a lull in the wind. While they were at dinner, there was a cry from the deck that the ship was moving astern. As suddenly as the storm had come up, it began to calm down, and so did the sea. Curiously enough, the current had turned and was running as swiftly south as it had been to the north. The engines were put full astern, and slowly the ship ground her way off the shoal and floated free again. Apparently the wind had driven the water out of the sound, and with the lull the water came back as fast as it went out. So strongly was the ship built that she did not make any extra water despite the terrific pounding she had received. Scott could not help feeling that her release was extraordinary.

They worked all night coaling from the *Terra Nova* under the shelter of a glacier tongue, and everybody—scientists, officers, and men—took a hand in the grubby business, till they

were streaked with black. But they got their coal aboard. The *Morning* also gave them all the coal she could spare. They finished coaling on the morning of Feb. 19, and the little *Morning*, with just enough coal for her needs, started for Port Ross in the Auckland Islands, where all three ships would rendezvous before going on to New Zealand together. The *Terra Nova* and the *Discovery* were to keep on up the coast.

Scott was always having trouble with his pumps, and this was one of the times. The *Discovery* leaked a little, due to some defect which they never could find because of her hull construction. The pumps refused to work soon after they started north, and the water gained so fast that it was soon over the stokehold plates and threatening to put the fires out, so they were drawn. The hand pumps wouldn't work because they were still clogged with ice. Finally they found that the bilge suction, which had been in a mass of ice when they left, had thawed out and was clogged with ashes. When this was remedied, the pumps worked perfectly, but for a time the situation was serious.

Then it was found that the rudderhead was shattered, so that there was a big lag as the rudder was turned from one side to the other. They put into Robertson Bay and installed their spare rudder, which was only about half the size of the original. But it was sufficient to steer them through the heaviest pack they had seen, some of it reaching to their decks, big hummocky stuff. This ice covered the whole sea south of the Balleny Islands.

Soon after, Scott was in the position where Wilkes had plotted Eld's Peak and Ringgold's Knoll, and later Cape Hudson. Finding these nonexistent in the position Wilkes gave them, Scott decided that there could be no land eastward of Adélie Land and gave up any idea of trying to find it. Poor Wilkes. We know that there is land east of Adélie Land now, lots of it, although Wilkes did not actually see it.

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So Scott turned north, his first expedition such a success that Sir Clements Markham said that no polar expedition had ever returned with "so great a harvest of results." Scott had opened up a field of exploration that promised great things for years to come, had even to a certain extent shown the way to the pole itself. He had reason to be proud.

The Great Onslaught

AFTER Scott had pointed the way to the South Pole by his southern journey which led him far into the interior over the barrier ice, it was inevitable that men should be drawn to that pathway in attempts to reach the pole itself. Whatever may be the pull of exploration for the sake of science, the simple unknown has always had a stronger call to the adventurous, and the mathematical pin points at the top and bottom of the world were irresistible so long as they had not been reached. This is not a nautical chapter, but it could not be omitted, for it contains briefly the climax of centuries of effort.

These efforts filled three crowded years, from 1908 to 1911, years filled with great achievement and marked by the greatest tragedy the Antarctic has known. Three men took part in this onslaught, Shackleton, Scott, and Amundsen, great names in Antarctic history. All of them are now dead, each passing dramatically. It is doubtful if there will ever again be three such mighty men in their chosen field.

Shackleton was the first to seek the pole, restless soul that he was. He left New Zealand in the *Nimrod* on Jan. 1, 1908. The *Nimrod* was a forty-year-old sealer, grimy and smelly when he bought her, but strong and sound when reconditioned. It was fortunate that she was, for few ships have been through such a battering as she took on the way to the pack. Both Scott's and Shackleton's second journeys through the howling seas between New Zealand and the pack were dismal compared with the pleasant voyage south of the *Discovery*. Shackleton was the first to have his ship towed to the pack



(Underwood & Underwood)

Plate 13.—Shackleton's ship, the *Endurance*, caught in the ice for the winter.

to save fuel, an example later followed with success by Byrd on his first expedition. The towing ship was the *Koonya*, a small steamer.

They were hardly at sea before it began to blow, and as the *Nimrod* was loaded so that she was sluggish in the water, and also held down at the head by the heavy towing cable, she was a wet and uncomfortable ship. Before the first night was over, seas were breaking over her, and it was necessary to rig life lines along the deck to keep men from being swept overboard. A cheerful beginning! They call that region the "roaring forties," and rightly so, but the farther one goes south the harder the wind roars.

They had ponies on board, a mode of travel that has since been abandoned as impracticable, and the water washed through their stables on the foredeck, frightening the poor animals that were hard put to it to keep their feet. Now and then a wave would come aboard, roar through the stables, tear the mats out from under the ponies' feet, and knock over their keepers. Even far aft the whinnies of the animals were heard, as their keepers sought to calm them, talking to them and soothing them while holding on to the stall with one hand.

After a short lull, the wind picked up again, and this sort of thing continued day after day. It was so bad at times that Shackleton signaled to the *Koonya* to pour oil on the water, which helped some. The *Nimrod* was rolling 50 degrees, a terrific swoop. One pony was knocked over, and as it was too weak to get up, it was shot. On Jan. 6, the winds were of hurricane force, and even the *Koonya* was making bad weather. The straining of the ship had weakened the deck of the *Nimrod* so that the sailors' quarters were soaked, as was every other place in the ship, and the seams opened so much that the *Nimrod* began to make about three feet of water an hour. The steam pumps couldn't keep up with it, so the hand pumps were manned in two-hour shifts.

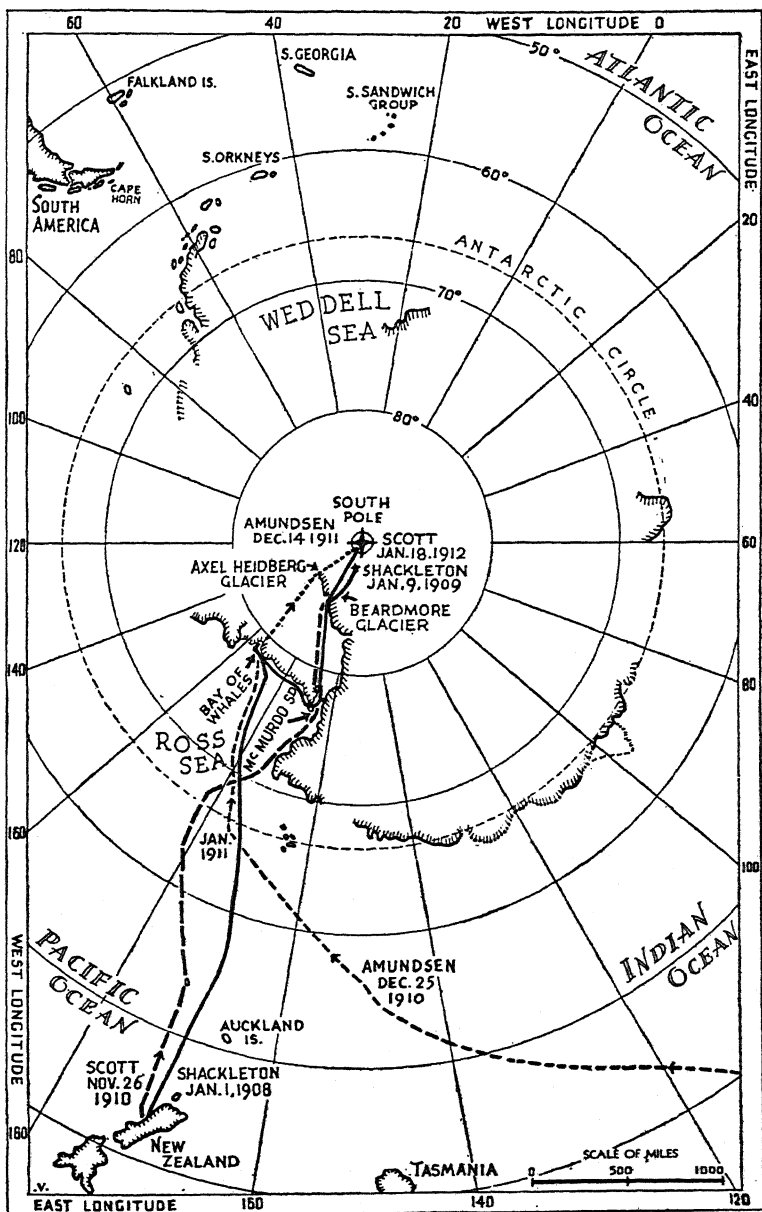
At night even the masthead light of the *Koonya* would disappear behind a wall of water at times, and Shackleton estimated the height of the waves as forty-two feet. Everything that could break loose had done so, and Shackleton heard a sailor going around the deck precariously picking up potatoes from a broken sack, and singing, "Here we go gathering nuts in May."

On Jan. 8 they had to heave to, and as they did so an enormous wave rose up and came aboard. When those on deck could see again, part of the starboard bulwarks had been smashed in, and a small house on the upper deck destroyed; water swept in through broken ports and rolled across the deck, and even the handrails of the poop deck were cracked. The galley was washed out and the fire extinguished.

On Jan. 11 an enormous sea came aboard, taking away the starboard bulwarks forward, so that the water rushed solidly through the stables. It shifted the starboard whaleboat from its chocks and landed it amidships; it swept fodder and drums of oil together on the main deck where they lurched back and forth until secured. Then came a respite with a gentle wind and sun, and those on board brought up their belongings to dry them out. They were a sorry mess.

But that was the worst of it, for they were nearly at the pack and the weather afterward was reasonably fair. The *Koonya* left them to return to New Zealand, and the *Nimrod* started through the pack alone. They passed through thousands of small bergs and broken pack, but did not hit the solid pack at all. It was one of the quickest of all passages through that icy belt, and the *Nimrod* was never once halted by heavy ice.

Shackleton had intended to winter at Balloon Bight, but when he arrived he found that the bight had disappeared, and that there was a wide entrance where it had been, wide and shallow. He tied up to the bay ice to think over the



Map 9.—Amundsen and Scott reached the South Pole, and Scott and his companions perished on the return trip.

situation. About eight miles to the south he could see rising slopes of ice, with apparently some peaks beyond, and a great valley that ran east and west at the bottom of the bay. He called the place the Bay of Whales, because of the numerous whales there, but decided after what had happened to Balloon Bight that it would be a treacherous place in which to winter. And yet at that Bay of Whales Amundsen spent a winter, and Byrd's expeditions have spent three winters there. What Shackleton could not know from his position was that winter quarters there are protected by land that rises to the south, and prevents any forward movement of the barrier on the east side.

So he made for McMurdo Sound where he landed near Cape Royds, and made his camp, sending the *Nimrod* back. The next season he started on his trek to the pole, one of the greatest efforts ever made. He discovered the famous Beardmore Glacier, one of the largest in the world, reached the polar plateau on which he was the first to put foot, and got to 88 degrees 33 minutes south, or within ninety miles of the pole. As he said later, he could have reached the pole, but he would not have returned to tell about it. He had the courage and good sense to turn back. But as an example of manhauling over unknown territory, and finding a way up a tremendous glacier, over countless crevasses and ice falls, it was a magnificent job. The men fell into so many crevasses, they lost count. In the meantime Edgeworth David, the geologist, had reached the South Magnetic Pole for the first time.

The next attempt to reach the pole was that of Amundsen, although actually he started from home after Scott. Amundsen's intention had originally been to go to the North Pole, but when in 1910 it was announced that Peary had already reached there, he quickly altered his plans and headed south. He had Nansen's old ship, the *Fram*.

There has been much dispute as to whether Amundsen deliberately set out to forestall Scott. He claimed that after going to the expense of preparing an expedition, there was no reason why he should not go somewhere to "maintain my prestige as an explorer," and the Antarctic was the only place left open to him. He sent word from Madeira to Scott of his intention, so that the latter would know the Norwegians would compete with him.

Amundsen has been much criticized for this, largely because of Scott's tragic death, but to anyone who has read Scott's diary it is obvious that it was not discouragement at being beaten to the pole that killed Scott, but manhauling and bad weather and insufficient food. Except for the long storm at the end of his return trip from the pole, he would probably have lived. But for many years Amundsen's sudden reversal of his announced intentions, and his easy success while Scott was dying, caused much bitterness.

Amundsen cared little about science; he was a geographical explorer, an adventurer in the wilderness. Any cold and difficult journey in a region where nobody else had ever been appealed to him. On this journey his only objective was the pole. His whole equipment, everything he took with him, was arranged to that end. And he was probably the fastest and most efficient polar traveler ever known.

Obviously, he could not go anywhere near Scott's base, and he had no desire to. His eyes had been fixed for years on that indentation in the barrier called the Bay of Whales. He thought that Ross had seen it, knew that Scott had glimpsed it, and felt that any bay that had lasted so long must be protected by land. So he made for there. His trip through the pack took only four days, even in the fat-bellied *Fram*, which had not been designed for crashing her way through ice.

When he reached the Bay of Whales he found it full of ice, but stood on and off for a day or two until, by rare

chance, the entire bay was emptied of ice, something that has not happened since in the knowledge of those who have been there. He was able to sail to the head of the bay, past the point where Byrd would later be forced to camp because of ice, and tied up only a short distance from where he erected his hut. He went ashore on skis, came to a slight elevation above the bay ice, hopped up on it, and exclaimed, contemptuously, "So this is the great barrier."

The contrast between his outfit and Scott's could not have been greater. Amundsen was a keenly intelligent man, who had deliberately fitted himself at an early age to become an explorer. His mother wanted him to become a physician, and to please her he had spent two years in a university, until her death. Then he went to sea to get his master's ticket, had been south in the *Belgica*, which gave him some priority over Scott in the Antarctic, and had been the first to make the Northwest Passage. He was a powerful, disciplined man, to whom the unknown beckoned like a siren. And all his knowledge and ability he had put into the preparations for this journey.

Scott's ship was jammed with men, provisions, coal, all sorts of equipment, and ponies. The *Fram*, on the other hand, used Diesel engines, and there were only nineteen men aboard her, nine of whom were to stay ashore. Every man aft had a cabin to himself. There was not a single extra thing aboard to clutter up the ship, except the 116 dogs which had the run of the deck.

Scott had sent his ship, the *Terra Nova*, over to the Bay of Whales in the hope that a party might find a place to winter there, and much to their surprise they found the *Fram* tied up to the ice. Priestley and some of the others visited the Norwegians, who returned the call, and Priestley said of them:

"The impression they have left with me is that of a set of men of distinctive personality, hard, and evidently inured

to hardship, good goers and pleasant and good-humored. All these qualities combine to make them very dangerous rivals, but even did one not want to, one cannot help liking them individually in spite of the rivalry.

"One thing I have particularly noticed is the way in which they are refraining from getting information from us which might be useful to them."

Amundsen invited half of these on the *Terra Nova* to stay with him and use half of his dogs, which, of course, they refused. They would probably not have been able to handle the fierce animals anyway, for Scott was always singularly inept in his handling and feeding of dogs, which is really not difficult. I knew a dog driver who made a 1,100-mile trip after only a few weeks of practice with his team. But it was these dogs which made Amundsen's trip easy compared with Scott's, although any journey, even with dogs, on the barrier and up through a glacier to the polar plateau is desperately hard work. Dogs are the only motive power worth while on the surface in the Antarctic; they can pull tremendous weights, seem to enjoy it, and the men are relieved of the heartbreaking work of hauling. Amundsen used teams of ten dogs on the polar trip.

It was obvious that there was to be a race for the pole the next season, and Amundsen would be able to start first, long before the surface was fit for Scott's ponies. In the fall he set out depots at 80 degrees, 81 degrees, and 82 degrees to the south. When he started for the pole early in the summer season he took with him sufficient provisions to establish depots a degree apart up to 85 degrees south, which brought him to the Queen Maud Mountains, a continuation of the mountains seen on the left by Shackleton when he went up the Beardmore.

Amundsen had no intention of using Shackleton's old route; he wanted to find a new passage to the plateau, and he found it in Axel Heiberg Glacier, a shorter glacier but

equally as dangerous as the Beardmore. As the weight on the sledges was reduced, Amundsen killed dogs and fed them to the others; at the Butcher's Camp, halfway up the glacier, he killed a number of dogs, and the men themselves ate some of them.

When Amundsen reached the plateau, the traveling was nearly as easy as on the barrier, and he reached the pole on Dec. 14, 1911. After making the necessary observations he turned back, leaving a tent, and the Norwegian flag flying above it. Down the glacier again, where he barely avoided disaster at an ice precipice, and then across the barrier to the bay. His progress was so easy, guided by the 150 beacons of snow he had erected, and the lines of flags on either side of the depots, that he deliberately killed time, lying in his tent for hours when he might have been traveling. He had said he would get back at a certain date, and he did so, even if he had to dawdle on the way. The men rode most of the way across the barrier on the journey home, or were towed on their skis.

Amundsen did not have much more favorable weather than Scott. He met the same blizzards and the same hazards, but by using dogs he was able to conserve the energy of himself and his companions, and also to carry more food than he actually needed.

How different was Scott's trip, from the very beginning. The *Terra Nova* left Lyttleton on Nov. 26, 1910, and on Dec. 1 she ran into a gale that nearly finished her. The deck cargo worked loose from the rolling of the ship and the pounding of waves that came aboard, until the deck was a mess of boxes, tins of gasoline and coal, which men were continually securing, only to have them break away again. The ship was practically hove to, with the engines just turning over. To add to their difficulties fine coal sifted down into the bilges where it got mixed up with grease and clogged

the pumps so that they could not keep up with the water coming aboard.

Most of this water went below through the strained decks, where the seams were opening from the working of the ship. The hand pumps were manned, but these also were half choked. Water came aboard solidly over the bulwarks, and found its way below, not only into the bilges, but into the cabins and every part of the ship, until the wardroom was a swamp. Part of the lee bulwarks were swept away. Things became so desperate that three men went below, cut a hole through the bulkhead, crawled over the coal, and down below to where they could get at the suction for the pumps. But to get at it they had to dive into the wildly swinging water, time after time, until the suction was cleared and the pumps worked again.

In the meantime they had been bailing with buckets, bailing out a ship! The buckets were passed from hand to hand to the deck, and then back again, an unending relay that went on for hours, but it helped. When the pumps got the water down below the fireboxes, the boiler was fired again, and the steam pumps went into action. The waves were carefully calculated at about thirty-five feet high, waves that swept green and solid over the waist of the ship. Once the ship rolled until the lee combings of the main hatch were under water. As the ship slowly righted itself, one of the officers said, calmly, "She won't do that often."

They met the pack on Dec. 7, farther north than it had been met by any ship. Progress was slow and they were often held up for days at a time. Then the pack would open, for no apparent reason, and the ship would forge ahead again, until once more checked by heavy ice. Their precious coal was being used up, so that time and again they would let their fires go out and then light them when there seemed a chance to force a way through a crack. The ship charged and banged and pounded away at the ice, sometimes split-

ting it, and more often bouncing off as if it were steel. Occasionally the *Terra Nova* was among floes that were eight feet above water, with hummocks as much as twenty-five feet high, great masses of ice that would have squashed her if there had been any pressure. But there never is in that pack.

They had a gale in the pack on Christmas, a gale that disturbed the ice so much that they thought it was opening. When the wind died down and the sky cleared three days later, they saw water sky ahead, a dark shadow on the sky, and by Dec. 30 they were in the open sea. They had come through 400 miles of heavy pack; Amundsen, more fortunate, did it in four days farther to the east.

Scott went into McMurdo Sound, where he had made his former camp, and this time selected a spot about halfway between his old hut and Shackleton's hut at Cape Royds. There they unloaded for the winter and sent the *Terra Nova* back to New Zealand. Scott's plan this time was to try for the pole the next season, and he was much upset and depressed when he found that Amundsen was at the Bay of Whales, prepared for a rapid dash to the pole and back.

There is a strain of melancholy all through Scott's diary on this expedition. His former diary was never published as a whole, so it is impossible to compare them, but he seems to have had on this trip a sense of foreboding which could hardly have been with him on his former venture. As has been said, he was a moody man at this time, often irritable. He was the same kind and gentle Scott, but he was frequently miserable.

Scott laid his depots on the barrier that fall, and the next spring began his march south on Nov. 1, 1911 (it must be remembered that our winter months are summer months down below). There were four men in the polar party, Captain R. F. Scott, Dr. E. A. Wilson, Lieutenant H. R. Bowers, known as "Birdie," and Edgar Evans, seaman, who had proved himself such a willing and cheerful traveler on the

Discovery expedition. Several other men went as two supporting parties, one to turn back on the glacier and the other on the plateau. Scott said in his diary at the start:

"The future is in the lap of the gods; I can think of nothing left undone to deserve success."

The ponies did not prove a great success, although some of them lasted to the mountains. On the way up the Beardmore, they wearily hauled their loads up that gigantic and crevassed highway on a different route from Shackleton's. They slogged on, mile after weary mile, over the deep snow and hard sastrugi (hard ridges of snow, with cutting edges) of the plateau, until at last they saw some ski tracks running parallel with their own, dogs' tracks, and the remains of a camp. They knew what that meant. Amundsen had been ahead of them.

On Jan. 17, 1911, a full month after Amundsen, they reached the pole and found there the tent that the Norwegians had left. It was a terrible blow to Scott and his companions. He was convinced that the Norwegians had found an easy way up. So great was their depression that even the weather bothered them more than usual. It was blowing hard, with a curious damp chill that went to the bone. Scott spoke of the monotony and exclaimed:

"Great God! this is an awful place and terrible enough for us without the reward of priority."

They put up their "poor slighted Union Jack," took pictures, and then prepared to return. "We have turned our back now on the goal of our ambition and must face our 800 miles of solid dragging—and good-bye to most of the day-dreams!"

In contrast to Amundsen's method of erecting snow cairns short distances apart, Scott depended on following his own ski tracks back, and he found them often drifted over. They got more and more hungry, and Evans was frostbitten easily, while Oates' feet were constantly cold. As they went down

the glacier, despite their run-down condition and weariness Scott sent Bowers ahead on skis to get some rock specimens. Later Wilson stopped to get more specimens and then caught up with the party.

These rocks show as much as anything the kind of man Scott was. They weighed nearly thirty-five pounds, but he clung to them until the end, knowing that they should be valuable. In them were found fossils, so inconspicuous that they could hardly be seen, but fossils that did much to prove the age and past history of the continent.

Evans, who had been worn out on the summit, got worse as they came down the glacier, and hit his head in falling into a crevasse. He became weaker and weaker, then somewhat dazed and rambling, and finally dropped back and was found crawling on his hands and knees, his hands frostbitten and a "wild look" in his eyes. They lifted him to his feet, but in a few minutes he sank back again. He died quietly that night.

They kept losing the track, and at times missed a camp. The weather was thick and overcast, the hauling dreadfully hard, and Scott was low in spirits. At one camp they found a shortage of biscuits, at another a shortage of oil. These shortages in provisions left by the supporting party have never been explained. The fuel shortage might be explained by leakage, but not the biscuit shortage. The pulling was so difficult that Scott apparently became irritated at Bowers, who, he said, had not quite the trick of hauling. Scott mentions that Bowers was "a little hurt at my criticisms, but I never doubted his heart."

They came to another food depot and found a shortage of oil, and Oates' feet were found to be badly frostbitten. Also they lost the track again. "God help us, we can't keep up this pulling, that is certain. Amongst ourselves we are unendingly cheerful, but what each man feels in his heart I can only guess."

Oates got steadily worse, and while the others were off hunting for tracks—if they had only built cairns!—Oates would sit on the sled and try to rest his painful feet. He never once complained, but grew more silent. From Scott's diary:

"Sunday, March 11—Titus Oates is very near the end, one feels. What we or he will do, God only knows. We discussed the matter after breakfast; he is a fine brave fellow and understands the situation, but he practically asked for advice. Nothing could be said but to urge him to march as long as he could. One satisfactory result to the discussion: I practically ordered Wilson to hand over the means of ending our troubles to us, so that any one of us may know how to do so. Wilson had no choice between doing so and our ransacking the medicine case. We have 30 opium tabloids apiece and he is left with a tube of morphine. So far the tragical side of our story."

Things steadily became worse. The wind was against them and the temperature was abnormally low for that time of year, 37 degrees below zero, which is terrible weather with a strong wind blowing. "It must near the end, but a pretty merciful end. . . . Must fight it out to the last biscuit." Then:

"Friday, March 16 or Saturday 17—Lost track of dates, but think the last correct. Tragedy all along the line. At lunch, the day before yesterday, poor Titus Oates said he couldn't go on; he proposed we should leave him in his sleeping-bag. That we could not do, and we induced him to come on, on the afternoon march. In spite of its awful nature for him he struggled on and we made a few miles. At night he was worse and we knew that the end had come.

"Should this be found I want these facts recorded. Oates' last thoughts were of his mother, but immediately before he took pride in thinking that his regiment would be pleased with the bold way in which he met his death. We can testify

to his bravery. He has borne intense suffering for weeks without complaint, and to the very last was able and willing to discuss outside subjects. He did not—would not—give up hope till the very end. He was a brave soul. This was the end. He slept through the night before last, hoping not to wake; but he woke in the morning—yesterday. It was blowing a blizzard. He said, 'I am just going outside and may be some time.' He went out into the blizzard and we have not seen him since.

"I take this opportunity of saying that we have stuck to our sick companions to the last. In case of Edgar Evans, when absolutely out of food and he lay insensible, the safety of the remainder seemed to demand his abandonment, but Providence mercifully removed him at this critical moment. He died a natural death, and we did not leave him till two hours after his death. We knew that poor Oates was walking to his death, but though we tried to dissuade him, we knew it was the act of a brave man and an English gentleman. We all hope to meet the end with a similar spirit, and assuredly the end is not far. . . .

"We are at No 14 pony camp, only two pony marches from One Ton Depot. We leave here our theodolite, a camera, and Oates' sleeping bags. Diaries, &c., and geological specimens carried at Wilson's special request, will be found with us or on our sledge."

The calm courage of that last entry is beyond all words.

"Monday, March 19—Lunch. We camped with difficulty last night, and were dreadfully cold till after our supper of cold pemmican and biscuit and a half a pannikin of cocoa cooked over the spirit. Then, contrary to expectations, we got warm and all slept well. To-day we started in the usual dragging manner. Sledge dreadfully heavy. We are 15½ miles from the depot and ought to get there in three days. What progress! We have two days' food but barely a day's fuel. All our feet are getting bad—Wilson's best, my right foot

worst, left all right. There is no chance to nurse one's feet till we can get hot food into us. Amputation is the least I can hope for now, but will the trouble spread? That is the serious question. The weather doesn't give us a chance—the wind from N. to N.W. and —40 degrees temp. to-day.

"Wednesday, March 21—Got within 11 miles of depot Monday night; had to lay up all yesterday in severe blizzard. To-day forlorn hope, Wilson and Bowers to depot for fuel.

"Thursday, March 22 and 23—Blizzard bad as ever—Wilson and Bowers unable to start—tomorrow last chance—no fuel and only one or two of food left—must be near the end. Have decided it will be natural—we shall march for the depot with or without our effects and die in our tracks.

"Thursday, March 29—Since the 21st we have had a continuous gale from W.S.W. and S.W. We had fuel to make two cups of tea apiece and bare food for two days on the 20th. Every day we have been ready to start for our depot *11 miles* away, but outside the door of the tent it remains a scene of whirling drift. I do not think we can hope for any better things now. We shall stick it out to the end, but we are getting weaker, of course, and the end cannot be far.

"It seems a pity, but I do not think I can write more.

R. SCOTT.

"Last entry.

"For God's sake look after our people."

In the last days Scott wrote letters to Mrs. Wilson, to Mrs. Bowers, Bowers's mother, to Sir James M. Barrie, Scott's great friend, and to a number of others. The writing was quite strong and legible—even the last entry in his diary. In a message to the public he outlined what he believed to have been the causes of their disaster, and added:

"Had we lived, I should have had a tale to tell of the hardihood, endurance, and courage of my companions which would have stirred the heart of every Englishman. These

rough notes and our dead bodies must tell the tale, but surely, a great rich country like ours will see that those who are dependent on us are properly provided for."

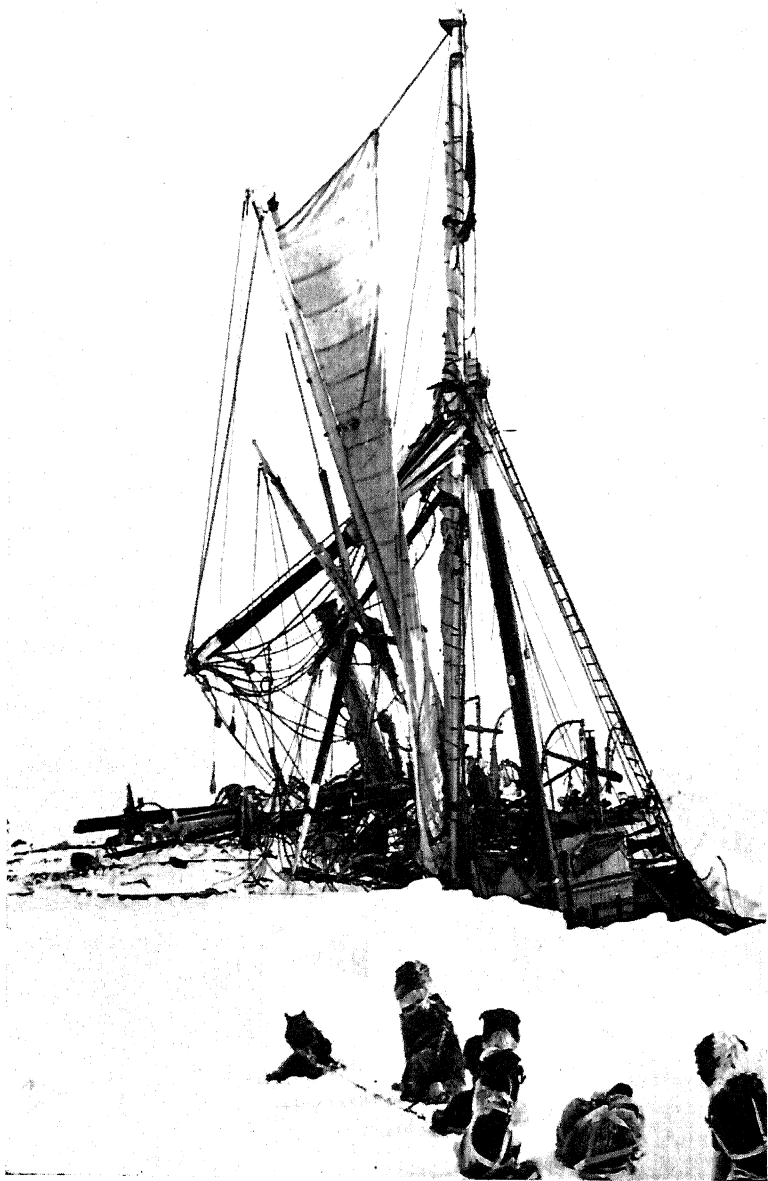
And so died these very gallant gentlemen.

It was a depressed group that lived through the second winter at the base, after the ship had gone. It was evident after a time that their leader was not coming back. In November of the next year a search party went south to try to find some trace of them. The tent was found on Nov. 11. Cherry-Garrard, in his excellent book, tells in moving words of how they were found:

"That scene can never leave my memory. We with the dogs had seen Wright turn away from the course by himself and the mule party swerve right-handed ahead of us. He had seen what he thought was a cairn, and then something looking black by its side. A vague kind of wonder gradually gave way to a real alarm. We came up to them all halted. Wright came across to us. 'It is the tent.' I do not know how he knew. Just a waste of snow: to our right the remains of one of last year's cairns, a mere mound; and then three feet of bamboo sticking quite alone out of the snow, perhaps a trifle more pointed. We walked up to it. I do not think we quite realized—not for very long—but some one reached up to a projection of snow, and brushed it away. The green flap of the ventilator of the tent appeared, and we knew that the door was below.

"Two of us entered, through the funnel of the outer tent, and through the bamboos on which was stretched the lining of the inner tent. There was some snow—not much—between the two linings. But inside we could see nothing—the snow had drifted out the light. There was nothing to do but to dig the tent out. Soon we could see the outlines. There were three men here.

"Bowers and Wilson were sleeping in their bags. Scott had thrown back the flaps of his bag at the end. His left hand



(Underwood & Underwood)

Plate 14.—The last of the *Endeavor*.

was stretched over Wilson, his lifelong friend. Beneath the head of his bag, between the bag and the floor-cloth, was the green wallet in which he carried his diary. The brown books of diary were inside: and on the floor cloth were some letters.

"Everything was tidy. The tent had been pitched as well as ever, with the door facing down the sastrugi, the bamboos with a good spread, the tent itself taut and ship-shape. There was no snow inside the inner lining. There were some loose pannikins from the cooker, the ordinary tent gear, the personal belongings and a few more letters and records—personal and scientific. Near Scott was a lamp formed from a tin and some lamp wick off a finnesko. It had been used to burn the little methylated spirit which remained. I think that Scott had used it to help him to write up to the end. I feel sure that he had died last—and once I had thought that he would not go so far as some of the others. We never realized how strong that man was, mentally and physically, until now.

"We sorted out the gear, records, papers, diaries, spare clothing, letters, chronometers, finnesko, socks, a flag. There was even a book which I had lent Bill [Wilson] for the journey—and he had brought it back. Somehow we learnt that Amundsen had been to the Pole, and that they too had been to the Pole, and both items of news seemed to be of no importance whatever. There was a letter there from Amundsen to King Haakon. There were the personal chatty little notes we had left for them on the Beardmore—how much more important to us than all the royal letters in the world.

"We dug down the bamboo which had brought us to this place. It led to the sledge, many feet down, and had been rigged there as a mast. And on the sledge were some more odds and ends—a piece of paper from the biscuit box: Bowers' meteorological log: and the geological specimens, thirty

pounds of them, all of the first importance. Drifted over also were the harnesses, skis and ski-sticks.

"Hour after hour, so it seemed to me, Atkinson sat in our tent and read. The finder was to read the diary and then it was to be brought home—these were Scott's instructions written on the cover. But Atkinson said he was only going to read sufficient to know what had happened—and after that they were brought home unopened and unread. When he had the outline we all gathered together and he read to us the Message to the Public, and the account of Oates' death, which Scott had expressly wished to be known.

"We never moved them. We took the bamboos of the tent away, and the tent itself covered them. And over them we built the cairn.

"I do not know how long we were there but when all was finished, and the chapter of Corinthians had been read, it was midnight of some day. The sun was dipping low above the Pole, the Barrier was almost in shadow. And the sky was blazing—sheets and sheets of iridescent clouds. The cairn and Cross stood dark against a glory of burnished gold."

The Indomitable Shackleton

SIR ERNEST SHACKLETON failed in the main objectives of his two Antarctic expeditions, but in his failure he wrote a greater success than if he had reached his ultimate goal. I regard him as the greatest of all Antarctic leaders. He had a good deal of Scott's enthusiasm for science, but regarded it somewhat as a means to an end. He had all of Scott's sympathy and tenderness and understanding, was a romantic, but had iron in his soul when pressed to the breaking point. He always knew when to quit, and it takes courage to quit in the Antarctic. Twice in his career he had to make decisions on which the lives of all his men depended; and he did the right thing.

What pulled him through was, as with Scott, sheer character. The man was spiritually tough, intellectually romantic, and physically strong. He had the gift of backing his cold and considered judgment. Somewhere I have read, and have hunted endlessly for it, a description of him which might be paraphrased from memory as:

"For scientific leadership give me Scott; for swift and efficient travel, Amundsen; but when you are in a hopeless position, when there seems no way out, get down on your knees and pray for Shackleton."

I remember meeting Shackleton once, for I was sent to interview him when he was planning his Weddell Sea journey. I knew little of him, or of the Antarctic, for it was some time before the first World War. But I shall not forget him. He was tall and broad-shouldered. His face was sharply modeled, and he had keen eyes under dark brows, eyes which

looked at his rather floundering interviewer with polite amusement and kindness. He knew I didn't know what he had done, why he had done it, or what he wanted to do, and he guessed that the Antarctic was a dimly remote and unknown land so far as I was concerned. He had consideration, and I remember him gratefully, as one does having seen something that was tremendous in its simplicity—like the Antarctic itself. Shackleton was a rock; the sort of rock men cling to when they have no hope.

But despite that great spiritual and physical strength of his, he had lights and shades which came from his Irish background. Most people who know anything of Shackleton think of him as a merchant sailor who became a great adventurer. He was much more than that. The son of a teacher, of good family, he was possessed of a vivid imagination. He tried to dig a shaft to Australia in his father's backyard once just to provide a quicker route than by sea, although possibly the digging was incentive enough.

His father loved poetry, and the boy grew to love it, also. He was apprenticed in the merchant marine when he was sixteen and got seasick on his second voyage. He wrote poetry, and the sight of the stars as he paced the deck at night had so profound an effect on him that they kept him from the petty and sometimes ignoble mischief into which lads are tempted when on shore in a foreign port. There was nothing soft about him; he was tough and hard and when angry his eyes were like blue steel.

And he was ambitious. He once told a fellow officer—after he was in love: "I would like to make a name for myself—and for her." Shackleton was of the romantic adventurer group who make history; if he had lived in the days of chivalry he would have ridden with Roland and broken many a lance. L. D. A. Hussey, who was on the *Endurance* when it was crushed in the ice, the beginning of Shackleton's great sea epic, said of him:

"What appealed to me more than anything was the fact that he was so human. He had his faults, and knew it too, and he expected perfection in no man; but he was quite willing to overlook what was bad and remember the good in everyone. He had a way of compelling loyalty. We would have gone anywhere without question just on his order. And his personality left its mark on all our lives."

So it can be seen that this dark-browed sailor, with the glint of humor barely showing in his eyes, was very much of a man. Even when Shackleton was nowhere near by, his men did not do anything which they knew he would not have approved. I know no better tribute.

When I saw him, for the first and only time, I did not know this of him, unfortunately. Now he lies under a stone cairn on South Georgia, and it will be a long time before we see his like again.

Shackleton had always been interested in polar adventure, and when Scott was organizing his first expedition, Shackleton applied for a post and was accepted. He was already known as an excellent ship's officer, as a man who would undoubtedly make his mark at sea. But the Antarctic appealed to him. It is significant that one of his closest companions on the expedition was Dr. Wilson, Scott's second-in-command, and probably one of the finest characters who ever went south of the Circle. Wilson was the backbone of the group, the one to whom everybody, including Scott, turned when they were perplexed or in trouble.

Shackleton used to go to him with questions on faith and religion, this huge man who was to lead others being disturbed about his own thoughts. With Wilson, Shackleton helped get out the *South Polar Times*, a paper so highbrow that it was abandoned. It contained some of Wilson's most beautiful sketches and Shackleton wrote verse for it—not terribly good, but not bad. His companions recalled that "Shackle" or "Cautious Jack," as he was called, was never

at a loss for a quotation, that poetry was always on his lips, and that he loved Browning best. Once he and another man took part in a poetry contest to determine who was more popular, Browning or Tennyson, and "Shackle" won for Browning by one vote.

He went on Scott's inland sledging journey, and despite the fact that he was one of the strongest men in the group, he got scurvy badly and on the latter part of the journey home had to be pulled on a sledge. Scott and Wilson saved his life. Scott's rations were never sufficient for manhauling, and Shackleton's huge frame probably demanded much more than the daily fare.

On his own first expedition to the Antarctic, he discovered the famous Beardmore Glacier, up which he traveled to the polar plateau, and got within ninety-seven miles of the South Pole. He had the wisdom to turn back, so that his rations would last. He often said—before the Scott tragedy—that he could have reached the pole but that he would not have returned to tell about it. Another branch of that expedition reached the South Magnetic Pole for the first time, and Shackleton discovered more Antarctic land than all his predecessors. On the South Magnetic Pole journey was a young man named Douglas Mawson, later to lead an expedition to Adélie Land.

It is interesting to observe how leaders in the Antarctic grew out of other expeditions, probably not such an extraordinary result. It indicates the effect the limitless and desolate places south of the Circle have on certain types of men. Shackleton was a subordinate on Scott's first expedition, and went on to lead two of his own. Mawson was a subordinate on Shackleton's first expedition, later led his own expedition south to one of the most vicious spots on the continent, and ever since has been poking around the edges of that most difficult part of the Antarctic coast south of his homeland of Australia—the coast first discovered by Wilkes. Mawson has

contributed a tremendous amount of scientific knowledge about that region, for he is fundamentally a scientist.

These men grew out of other organizations, and because of their experience and ability came to achieve great results. But one always wonders whether their real purpose was not to go back to the strange seas and icy land. The ice tugs at one's heartstrings, whatever those who have not seen it may say; men return because they want to be there. Its beauty, its aloofness, its weird isolation, are compelling. In the midst of discomfort and danger one can find peace, so rare.

Explorers talk of science, but they mean the wish to be where other people cannot go. Perhaps, some day, somebody will explain this call of the ice, for it is the call of immobility, of silence, of death, and of a beauty one can realize only by being fortunate enough to have seen it.

For his Weddell Sea trip Shackleton planned just the sort of expedition that might be expected of a poet-adventurer. Having been within a few miles of the pole, which Scott and Amundsen later reached, he contemplated on this expedition a journey across Antarctica, a trifling journey of 1,800 miles in a wilderness of snow where nothing could be found to support life. It was a plan so bold that no explorer since has attempted it on the surface.

Of course, bases were to be carried inland from the Ross Sea sector, so that he would find food and fuel after passing the pole—and these bases were laid down—but he had to assume that no disaster would overtake the base-laying party, and that in the midst of a white desolation he would be able to find a tiny cache, marked, perhaps, with a flag. The probabilities are that if he had been able to establish a base on the Weddell Sea side he would have succeeded. He had learned by bitter experience that men travel best with dogs, not by manhauling or with ponies, in the Antarctic, and he had modeled his sledging journey after the pattern of

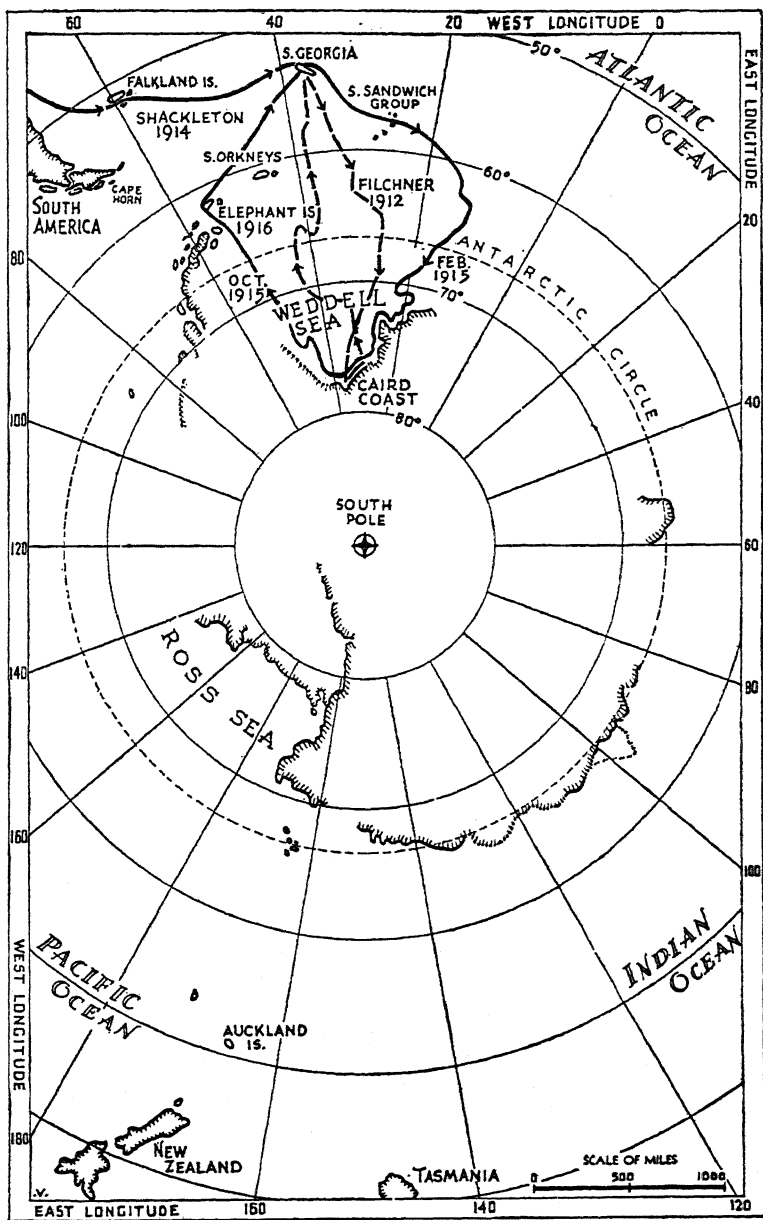
Amundsen. It is a pity that he could not have carried it out, although his failure led to a polar epic.

His ship, the *Endurance*, sailed from London Aug. 1, 1914. Off Margate he anchored and there heard that war was to be declared. He offered the services of his men and himself as a unit, but Winston Churchill told him to go ahead, and the King sent for him and gave him a Union Jack to carry on the expedition. And so for nearly two years Shackleton and his men knew nothing about the war; when they returned many of them were plunged into it and died, as did members of Scott's expedition.

He knew what he faced in the Weddell Sea, that that ice-filled ocean was "notoriously inhospitable," and that the ice circled so that it jammed against the east coast, forming heavier pressure than is found in any other part of the Antarctic Ocean. He hoped, inasmuch as Weddell and Filchner had both been far south, that he would be able to find a harbor somewhere, or if not, that he could land his dogs and supplies and send the ship back to South Georgia. It was a gamble.

Shackleton found early on his voyage into the Weddell Sea that he had an unusually heavy ice year to contend with. He met heavy pack ice on the edge of the Weddell Sea. The ship was caught in it and a heavy swell threw huge pieces against the sides and bows. This was early in December, and the ship circled, retreated, and advanced again, gradually working its way down along the eastern shore of the Weddell Sea.

They rammed through ice, conning the ship with a semaphore, and Shackleton records one amusing moment when the captain yelled back to a scientist at the wheel—for everybody with muscle takes turns at this strenuous exercise—"Why in Paradise don't you port?" and the answer came back: "I'm blowing my nose." Once, as happens occasion-



Map 10.—Shackleton's drift in the Weddell Sea. His ship was crushed, but he saved all his men.

ally, a man was thrown clear over the wheel when ice struck the rudder.

Early in January the ship reached open water and ran southward for a hundred miles, with big blue whales blowing alongside, but then hit pack again at about the same time that land was seen. It was Coats' Land, discovered by W. S. Bruce, of the *Scotia* expedition. Soon after, new land was seen, which Shackleton named Caird Coast. In it was a huge glacier, with a bay in the ice foot that would have afforded an excellent landing place leading up to the barrier beyond. Later, Shackleton had reason to regret that he had not landed there, but his desire to push as far south as possible in order to cut his sledging distance urged him by.

Late in January the land was clear to the south and east and only about sixteen miles away, but the movement of the pack and the heavy ice around the *Endurance* forbade any attempt to land there. The ice gathered around the ship as it drifted south and east, and late in February, on the twenty-second, the ship reached her farthest south, 77 degrees latitude in longitude 35 degrees west.

"I could not doubt now," he said, "that the *Endurance* was confined for the winter. Gentle breezes from the east, south, and south-west did not disturb the hardening floes. The seals were disappearing and the birds were leaving us. The land showed still in fair weather on the distant horizon, but it was beyond our reach now, and regrets for havens that lay behind us were vain."

The *Endurance* was doomed.

At first there was no great apprehension, for Shackleton believed that the ship would drift west and north, and if subjected to pressure, as was inevitable, would lift above it. He kept the loose ice alongside cleared away so there would be nothing to check the lift of the ship as the ice came together around and under her. But early in April the grinding and growling ice made those on board realize that they

might have underestimated the crushing power of the Weddell Sea in winter. At one time they began to drift toward a stranded berg, where they could see the ice splitting and piling up. If the ship once got into that mess, it would be lost in no time. Once the ship drifted to within seven miles of the berg and Shackleton could see ice piled up sixty feet against its side. But finally the current drifted the ship to one side, and before the end of the month the berg had disappeared. The sun set on May 1, and the long winter began.

"One feels our helplessness as the long winter night closes upon us. By this time, if fortune had smiled upon the Expedition, we would have been comfortably and securely established in a shore base, with depots laid to the south and plans made for the long march in the spring and summer. Where will we make a landing now? . . . In the meantime we must wait."

They had an amusing experience with some emperor penguins about this time. Several men headed off a few of the largest and shut them up in an igloo for the night. Soon after five other emperors were seen. When Kerr tried to seize one, the penguin knocked him down and jumped on his chest. That may seem unbelievable to those who have not seen an emperor penguin in action, but they weigh eighty or more pounds, and a blow from one of their scaly flippers will nearly knock a man out. The men finally caught a penguin that weighed eighty-five pounds, bound his bill, and two men led him to the ship "like an inebriated old man."

The calm and cold weather that had trapped the *Endurance* by bringing about an early cementing of the pack, continued and the ship drifted slowly north-north-west. Shackleton's mind was perplexed by the difficulties confronting him, for no human will could control the inexorable movement of the floes. He kept his usual calm demeanor, but in the mornings he was sometimes pretty gruff. But he did not allow his mind to dwell too long on the uncertainties of the

future, and the spirits of the men remained remarkably high. They were a good crew. They ran races on the ice, played games, and had a celebration whenever there was an excuse for one. Given enough food and shelter, the polar night is not nearly so bad as might be assumed. But there were ahead days when there was no shelter, when every hour was filled with danger.

The ice began to press on the ship in July. Far away could be heard rumblings of breaking ice, as it rafted and piled up, a sound like distant, heavy surf. Cracks appeared and all the sledges were taken aboard the ship. About the time the northern horizon began to be lighted by the returning sun, early in August, the big floe in which the ship had been "docked" all winter broke up, and the *Endurance* was pushed around and nipped a few times. Then heavy pressure began, the rudder was damaged, and beams buckled slightly.

"The effects of the pressure around were awe-inspiring. Mighty blocks of ice, gripped between meeting floes, rose slowly till they jumped like cherry-stones squeezed between thumb and finger. The pressure of millions of tons of moving ice was crushing and smashing inexorably. If the ship was once gripped firmly her fate would be sealed."

As if in mockery, during this period of increasing peril the pack was beautiful.

"The distant pack is thrown up into towering barrier-like cliffs, which are reflected in blue lakes and lanes of water at their base. Great white and golden cities of Oriental appearance at close intervals along these cliff-tops indicate distant bergs, some not previously known to us. Floating above these are wavering violet and creamy lines of still more remote bergs and pack. The lines rise and fall, tremble, dissipate, and reappear in an endless transformation scene. The southern pack and bergs, catching the sun's rays, are golden, but to the north the ice-masses are purple. Here the bergs

assume changing forms, first a castle, then a balloon just clear of the horizon, that changes swiftly into an immense mushroom, a mosque, or a cathedral.”

But in this beautiful, almost fairylike environment, were building up destroying forces in the ice that wracked the *Endurance*. Under this sky that would have charmed a painter was going on the crushing power of ice that no ship ever built has been able to withstand. Beams and deck planks buckled, the sides opened and closed again, the worried ship was thrown out of the pack to lie on its side on the ice and dropped again. Fires were put out when the ship heeled to 30 degrees so that coals would not start fires, men ate sitting on the floor, with their feet against bulkheads, to keep from sliding. And in a few hours the ship would be upright again. No vessel ever withstood more torture, not even Nansen's magnificent *Fram* in the Arctic, but no thing of wood or steel could have lived indefinitely under the grinding force of those huge ice floes.

Men went about their work cheerily. They did what must be done, and did it with the spirit of those who do not know what may happen, but who face disaster with the knowledge that they are doing their best. Hurley took his pictures of the canted ship. Wild, imperturbable as usual, stood beside the silent Shackleton and watched the ominous power of the ice with a cold eye. They were a great team, those two.

Early in July Shackleton had predicted what was to happen. Frank Worsley, captain of the *Endurance*, tells about it in his interesting narrative, one of the most human and frank that have come out of the Antarctic. He and Shackleton and Wild were sitting in Shackleton's cabin while the gale shrieked outside and the ship quivered like a wounded thing. Worsley was new to the ice, the other two were veterans. Shackleton looked at Worsley and said:

“She's pretty near her end.”

"You mean that the ship will—go?" Worsley said to the commander.

"I do," was the answer. "The ship can't live in this, Skipper," said Shackleton. "You had better make up your mind that it is only a question of time. Wild and I know how you feel about the *Endurance*, but what the ice gets, the ice keeps."

"Yes, but we are not going to let the ice get us," said Wild.

"We shall hang on as long as we can," said Shackleton. "It is hard enough on the men as it is. Without a ship in which to shelter from these blizzards, and in this continuous cold—"

Then came a sailor to announce that a diversion, a play, was about to start, and Shackleton looked up at him calmly and said he would be there in five minutes. He had announced the doom of his ship, guessed at what lay before him—he could never have known all the dangers they were to encounter—and then went to the play to laugh heartily, while the ship groaned and the wind howled through the rigging.

But it was not until October that the end began to be obvious to all. The currents that forced the ice to the west and north, toward the land, began to create areas of disturbance that spread rapidly toward the ship. Those aboard could see them coming. Ice floes piled on ice floes, rammed up and broke and became a mass of confused detail, each with a jagged point directed at the ship. The solid ice became more and more broken. The whole mass of the field in which the *Endurance* lay began to yield. As the ship shivered and beams buckled, even the dogs seemed to feel the tension and were strangely nervous and quiet.

Cracks opened and frost smoke appeared from them, as the water met the colder air, mist which drifts up like smoke from a chimney along the line of cleavage. It looked at

times "like a prairie fire," drifting off in dark masses. The temperature jumped from 10 degrees below zero to nearly the freezing point, uncomfortably warm, and disturbing. Seals, penguins, and whales reappeared and played about in the cracks.

"The pressure-ridges, massive and threatening, testified to the overwhelming nature of the forces that were at work. Huge blocks of ice, weighing many tons, were lifted into the air and tossed aside as other masses rose beneath them. We were helpless intruders in a strange world, our lives dependent upon the play of grim elementary forces that made a mock of our puny efforts."

Greater pressure developed on Oct. 25. The ship bent like a bow, her sides opened, and water poured in. Shackleton had the boats, provisions, and sledges put overside on the ice. A few emperor penguins came out of a crack and walked toward the ship uttering cries like a dirge, sounds that the men had never before heard from them. Two days later the ship was crushed beyond any hope that it might be used again, and it was abandoned.

"It is hard to write what I feel," said Shackleton. "To a sailor his ship is more than a floating home, and in the *Endurance* I had centered ambitions, hopes, and desires. Now, straining and groaning, her timbers cracking and her wounds gaping, she is slowly giving up her sentient life at the very outset of her career."

The death of a ship is a terrible thing to watch. To her commander it is like watching the death throes of one who is intimate and deeply loved. A sinking ship is a sad sight, but the sight of a ship torn to pieces, buckling and snapping, fighting to the end, is something that anyone who loves ships would give anything to avoid.

But more than the loss of the plucky *Endurance* was the predicament of the men. The ship had drifted about 1,500

miles. It was 346 miles across the milling ice to the nearest stores, left by an Argentine relief ship in 1902, stores purchased by Shackleton. And it was farther, much farther, to any land from which there might be hope of rescue. So when the *Endurance* went down, as she finally did, after being caught in her icy tomb for many days, her crew were in about as desperate a situation as ever explorers have known. And it was then that Shackleton showed his courage, his judgment, and his moral grandeur.

Even the seamen took their predicament cheerily. They watched the sides crushed, the masts sway, and one of the crew said happily:

"Damn, we'll have to pack our portmantles."

But as for Shackleton:

"The thoughts that came to me as I walked up and down in the darkness were not particularly cheerful. The task now was to assure the safety of the party. . . . The task was likely to be long and strenuous, and an ordered mind and a clear programme were essential if we were to come through without loss of life."

Shackleton at first hoped that he could sledge to Graham Land. Everything possible was taken out of the ship before she sank, and they had sufficient food, but it was essential to cut down weight to the minimum, and to provide an example Shackleton threw away a gold watch, a gold cigarette case, and some sovereigns. You can't eat gold. He kept the flyleaf of the Bible that Queen Mary had given to the ship, and the page of Job containing the verse:

Out of whose womb came the ice?
And the hoary frost of Heaven, who hath gendered it?
The waters are hid as with a stone,
And the face of the deep is frozen.

The night the ship sank, Shackleton said to Worsley that he wished the Admiralty had let them get into the war be-



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Plate 15.—The barrier edge, 240 feet high, near Mt. Erebus.

fore undertaking the expedition, that the men would be safer on a battleship, anyway.

After a desperate effort to pull the boats across the floes toward the land, Shackleton wisely gave up the idea, because progress was slow and the men were worn out. So they picked out the biggest floe they could find and settled down on it. They lived on seals and penguins until the creatures left them for the more hospitable north. Twenty-eight men and three boats stranded far beyond any human aid! Even killer whales poked their heads up in the few open places in the ice, and made life unpleasant, for these killers can break an ordinary ice floe from beneath.

Once when Shackleton was drifted away on a piece of broken ice, a killer snorted alongside as the boat was launched, and anyone who has ever looked a killer whale in the eye at short range is seeing something very unpleasant. I happened to be chased onto the ice by two of them, with four companions, and it was slightly nerve-racking. These men met them time after time.

In March, 1916, after they had drifted 2,000 miles in the pack ice since being beset, they saw Joinville Land, only sixty miles away. But they knew that close to the land leads opened and closed quickly, that the boats might be crushed or separated, and Shackleton determined not to take the risk. A little farther to the north lay clear water. The men were disappointed, but they had such faith in their leader that they suppressed their feelings.

Emergencies arose almost daily. As Worsley says:

"Two bergs had been moving towards us in the night. Suddenly, at sunrise, these accelerated their speed and came charging towards us, ploughing through the great masses of pack-ice as though these had been tissue paper. Bergs of this size weigh over a million tons apiece, so that nothing stands any chance against them. Imagine each to represent the weight of forty battleships; our floe was being charged by

the equivalent of a fleet of eighty men-of-war. Huge floes were lifted and flung aside by the cliff-like fronts of these monsters, while others were ground to fragments. For miles behind them there was a wake of chaos, floe piled on floe and crashing in all directions. Our camp was straight in their path and it seemed as though destruction was inevitable.

"Shackleton, clinging to what then seemed a forlorn hope, had all preparations made to try to move out of their track, although this would necessitate leaving all our supplies, since it would have been impossible to transport them in the time. Nearer and nearer the mountains of ice approached. We stood together watching them, Shackleton waiting to give the word which would send us scrambling over the heaving ice-floes—on which we should have small chance of escaping starvation. He was quite cool, and smoking a cigarette.

"Suddenly, some freak or eddy of the current—or was it some greater Power?—swept the bergs off on a new line. The danger was over. But fresh ones followed swiftly."

The ice floe cracked underneath a tent, and the two pieces separated. Shackleton looked down into the crack and saw a man in his sleeping bag, just his head above water. With a tremendous heave Shackleton pulled him out just before the two halves of the floe closed again with a crash. And the sailor grumbled about losing his tobacco!

When the floe reached open water, Shackleton decided to run in the boats for the northern tip of the Antarctic Continent, which lies south of Cape Horn, but finding that that was impossible due to the currents and storms, he laid his course for Elephant Island. The men huddled together for warmth, winter was setting in, with its storms and sleet, and ice formed on the boats. They were so miserable under their meager covering of a tent fabric that they often crawled out just to stand up and smoke and be more uncomfortable, to the point where they became numb and didn't mind so much

the biting wind and wet clothes. A lot of them were seasick. They couldn't get fresh water, and chewed raw seal meat to get the blood.

When they finally sighted Elephant Island, owing to Worsley's good navigation with only occasional glimpses of the sun or stars, they landed at a beach that was exposed to any heavy gale, and with a high wall of rock behind them.

"Thank God I haven't killed one of my men," said Shackleton. "I knew that one more night of exposure would do for some of them."

And Worsley said:

"As I looked at him I realized with something of a shock, all that the ordeal had meant to him. His forehead was scarred with lines, his face was haggard, and his shoulders, so often hunched for battle, were now bowed as those of an old man."

He soon threw that mood off, but Shackleton had a feeling of responsibility for his men that has never been duplicated. Other men talk about it, but Shackleton meant it.

"Shackleton has always insisted that the ultimate responsibility for anything that befell us was his and his only," said Worsley. "But until then I had not understood the painful seriousness with which he viewed his relation to us. My view was that we were all grown men, going of our own free wills on this expedition, and that it was up to us to bear whatever was coming to us. Not so Shackleton. His idea was that we had trusted him, that we had placed ourselves in his hands, and that should anything happen to any one of us, he was morally responsible."

They wondered about their position, and found they couldn't possibly stay where they were. They moved seven miles to the west where they found a doubtful beach that might shelter them. The gales tore their tents to pieces and they upturned a boat and lived under that. Even so they had to pile rocks on her and pack snow around to keep her

from being blown away. They ate stews of penguin meat, limpets, and seaweed, the latter proving a good tonic.

Shackleton decided that he must reach a point where he could get a ship. The food supply was not sufficient. But—

“If things went wrong it might be said that I had abandoned them,” he said.

So he told them his plan, and said it was a forlorn hope in winter to make a long journey in a small boat. He asked for volunteers, and every man offered to go. “Thank you, men,” said Shackleton, after a long pause.

There were five chosen to make the journey, 1,000 miles away to South Georgia, in the worst ocean in the world, and in a boat only twenty-two feet long. They were Worsley, Tom Crean, Timothy McCarthy, McNeish, the carpenter, and Vincent, the boatswain. Bligh’s journey in the South Pacific, after the mutiny of the *Bounty*, was longer, but Bligh did not have the conditions to face that these men did. It is probably the greatest small-boat journey in marine history, greater even than some that were made by whalers in the Pacific after their ships were sunk.

The small boat they used was named the *James Caird*, and it now is in a museum in England. It was double-ended, like a whaleboat, and was light and buoyant. The tanks were taken out and her seams filled with lampwick. The mast from another boat was lashed along her keel to stiffen her. She was ballasted with more than a ton of rock, which Worsley protested because it made the boat too heavy, and later Shackleton agreed that less ballast would have been advisable.

Then they got ready to push off. It was a hard task. Those going in the boat knew that they might never reach inhabited land; those who stayed knew that if the boat did not succeed they were doomed. So they talked about what would happen when the boat came back in a month.

Frank Wild was to stay behind and take care of the shore

party. There could not have been a better leader for that difficult task. Wild never got rattled, his judgment was excellent, and his control of men absolute. He had been in bad places before, when he had faced starvation with Shackleton, and when he moved a camp back from the edge of an ice shelf on Shackleton's first expedition in time to prevent its falling into the sea with a calving iceberg. He was hard-boiled and tough and reliable.

There was a moan in the wind before the *James Caird* put off. It made Worsley think of the wind souging through the rigging of the *Endurance* the night that Shackleton told him the ship was doomed. When they launched the boat, two men fell overboard, and two on shore changed clothes with them. It was two weeks before the clothes dried out. The boat hit a rock also, and Worsley took a "treasured possession—almost the last thing remaining to remind me that I had once been a civilized man: a handkerchief, now black with soot and grime—and jammed it in the hole with a marline-spike." Then they took on their stores and set sail.

The first night Shackleton sat beside Worsley, who was steering, with an arm thrown over his shoulders, so they could warm each other, and decided to make for South Georgia, 1,000 miles to the east.

"We've had some great adventures together, Skipper," said Shackleton, "but this is the greatest of all. This time it is really do or die, as they say in the story books."

They drank some hot milk, and Shackleton broke into a desultory conversation with:

"Do you think there could be gold on the Antarctic Continent?" He was always romantic about the subject of treasure, and Worsley told him that years before he had found a pearl lagoon in the Pacific. They agreed to go back to it one day. The long seas tossed the boat, and the wind bit cold, and Shackleton went on:

"I wonder what we should have seen if we had been able

to go a few miles deeper inland. Perhaps the highest mountain in the world or a chain of volcanoes; or who knows what else?"

Does that give some clue to the mind of an explorer, to why men go to strange places? Possibly. And a little later he said:

"I wonder how the boys are feeling on the island. Thank God they've got a good man like Wild to look after them. . . . One of poor Wild's troubles will be to find sufficient occupation for them to keep them from being bored. Suspense is bound to get on their nerves, and when that happens they'll be difficult to handle."

Shackleton had more sense about food than any of his predecessors. Every four hours in the daytime they had a scalding hot souplike mixture of rich condensed food, and every four hours at night they had hot milk. When a man seemed almost overcome with cold, there would be hot milk again. The sufferer never knew that it was particularly for him, for all shared in it, and the coldest got the most benefit. It was bitter going. A gale sprang up that drove the small boat back nearly to the ice pack. That was a grave setback, and Shackleton said:

"Skipper, if anything happens to me while those fellows are waiting for me, I shall feel like a murderer."

But the boat drove on. The small space under the canvas deck that had been placed over her was their only sleeping room; it was a region reached only by struggle over the provisions and ballast, and at the end the only solace a wet sleeping bag into which a man crawled wearily. Water dripped down on them, and they were tossed about unmercifully by the gyrations of the small craft. Going to bed was as unhappy as getting up. In fact, they preferred to be outside. Somebody was always pumping out the water that came aboard.

"Every swell that rushed toward us hid the horizon astern and towered, an over-arching wall, above us. As the seas

broke all around us the boat was lifted dizzily upwards, and we would heel over to the force of the gale. At these moments we could see for miles in all directions—but we saw nothing but grey, grey, grey—an unending series of grey hills and grey valleys. The dominant noises were the whistle of the wind through the sails and the shrouds, and the roar of the crashing seas.

“We were getting soaked on an average of every three or four minutes. The action of the sea is too irregular always for any statement to be true of it all the time, but with few exceptions each hour saw us get about fifteen wettings. The gales which blew continuously in that fearsome climate were responsible for it, and the procedure was something like this. A great sea would break over us, pouring water in streams over everything and making us feel for a moment or so that we were under a water-fall. Then, before the next wave would break, we would get several minor seas that would just manage to cover the boat and wet us again. This went on day and night. The cold was intense.”

Their feet and legs got completely numb. Shackleton assured them that it was only superficial frostbite, but to Worsley he worried about keeping the men warm, and Worsley twitted him with his nickname on his first expedition “Cautious Jack.” There had never been such a cautious daredevil. He was devoid of fear, but never took a chance if it could be avoided. When the seas became too great, he lay to with a sea anchor out. Water froze on top of the canvas covering the thin deck over the forward part of the boat, and three times they cut it away.

Often men nearly rolled into the sea, for they had merely handholds cut in the ice to cling to and their fingers were so numb they could barely cling to anything. They did not dare cut too sharply for fear of piercing the canvas covering and letting more water into the boat. No man could stand this ice chopping more than four minutes; it was bitter pun-

ishment. But it had to be done to keep the boat from getting top-heavy, or sinking under the weight of ice. Two oars were thrown overboard to relieve the boat of weight, and two sleeping bags, reindeer bags.

"Why anybody should look upon such a wretched bit of sodden wetness, hair and chill, as a home I really don't know," said Worsley, "but the fact remains that we all did, and I can remember even now the sad expression of two of the men as they watched their sleeping bags floating away. They looked as if they had lost the last thing on earth that mattered."

Men become elemental under such conditions. The mere means of living is far more precious than gold and jewels, and a sleeping bag, wet and shedding its fur, was a palace. Of course, they did not sacrifice much, for there were always three men on duty, and there were four bags left, but each bag was a personal possession.

The fur from the bags was a nuisance. They fished it out of the soup and milk, and it was everywhere in the boat. It got into the pump, into their eyes and mouths, until they began to feel that each wet hair was a crawling, detestable thing.

Their feet also troubled them; their hands and knees were so chafed from crawling around over the ballast—remember, this was only a twenty-two-foot boat—that they bled continually. One night Worsley could not straighten out after his spell at the tiller. They had to lift him below, straighten his body and rub some semblance of life into it before he could be tucked into his sleeping bag. They were in the midst of a cold, wet, gray hell, and they had to go on.

Then came an almost disastrous moment. Shackleton was at the tiller. There was a heavy cross sea, with snow squalls, a miserable day. Shackleton saw what he thought was a line of clear sky, as he said:

"I called to the other men that the sky was clearing, and

then a moment later I realized that what I had seen was not a rift in the clouds but the white crest of an enormous wave. During twenty-six years' experience of the ocean in all its moods I had not encountered a wave so gigantic. It was a mighty upheaval of the ocean, a thing quite apart from the big white-capped seas that had been our tireless enemies for many days. I shouted 'For God's sake, hold on! It's got us.' Then came a moment of suspense that seemed drawn out into hours. White surged the foam of the breaking sea around us. We felt our boat lifted and flung forward like a cork in breaking surf. We were in a seething chaos of tortured water; but somehow the boat lived through it, half full of water, sagging to the dead weight and shuddering under the blow. We bailed with the energy of men fighting for life, flinging the water over the side with every receptacle that came to our hands, and after ten minutes of uncertainty we felt the boat renew her life beneath us. She floated again and ceased to lurch drunkenly as though dazed by the attack of the sea."

One of the men seemed to lose his strength after this. Another was in a bad way, although cheerful. Shackleton, himself, was suffering terribly from sciatica, a fact that he does not mention in his book. It got better as he went on, fortunately. Then they broached their last water cask and found that it had salt in it, not enough to make it undrinkable, but enough to increase their thirst. Worsley had the tough job of trying to get a sight by kneeling on a thwart while a man held him on each side so that he would not go overboard with his sextant. There was constant mist, the horizon was not good, and the sun was a vague blur through the fog above. But by taking about ten sights and averaging them, he managed to get a fairly accurate position.

And so they finally sighted South Georgia and headed for King Haakon Sound, but the seas breaking on reefs and approaching darkness kept Shackleton from running for the

land. They decided to wait until morning, and that night a terrific gale hit them and drove them toward the coast. They were so thirsty from the salt water that they could hardly swallow their food, their lips were split, the spray from the waves shot from the side of the boat high into the air, and the wind howled like an airplane zooming. The shocks of hitting the seas opened the planks in the bow of the boat so that the water gushed through. They bore down on a tiny island, driven remorselessly, and it was a question whether they would hit it, or round it into calmer water.

"She'll do it," said Worsley.

"Of course she will," Shackleton replied. "She's damned well got to."

The next day Shackleton told Worsley that they must get ashore, that two of the men were weakening from lack of water, and that he didn't want to take the chance of going to sea again in the boat. So he proposed to find a landing and go over the island to the whaling station on the other side. No human being had ever been in the interior of South Georgia. What was behind those glaciers and ice-covered mountains was unknown. But Shackleton was determined to try that route rather than take the chance of having his boat foundered or crushed against the rocks, which would mean that the men back on Elephant Island would die.

They got into King Haakon's Sound, managed to pull their boat up with difficulty, and found a cave. Some baby albatrosses in their nests provided them with food, and they were so hungry they ate the bones. Near by was a stream of water that tasted like nectar. Leaves and some sort of moss made a bed on the stones. For the first time in two weeks they could relax and sleep and they did.

Somebody had to be left with the boat, as the seas that roared in picked it up and threw it against the rocks. One night they all turned out and held the boat, and Shackleton, with a formal bow, said, "I do hope that you are all enjoy-

ing my little party." Shackleton had nightmares about the huge wave he had seen. They killed a sea elephant and the liver was the best present they could have had. The rudder, which had been torn from the boat when they made their first landing, miraculously came back to where the boat had been beached. They went up to the head of the sound, where they spent three days under the upturned boat, days when the wind howled, when snow and sleet beat over them, where they shivered in the most violent storms that are known in the world. But the need to get away and find help for the men on Elephant Island was imperative. They had a grim reminder of what storms could do in a great pile of driftwood at the upper end of the sound, half an acre of wreckage from ships.

"In places it was piled eight feet high or more, and there were ships' masts and timbers, a great mainyard, bits of figureheads, teak stanchions with brass caps, cabin doors, binnacle stands, broken oars and harness casks. These had been swept before the westerly gales a thousand miles from Cape Horn, or farther, until the wild South Ocean had, by some freak of its eddies, thrown them up here to rot." It was like those relics of an ancient Spanish ship that Smith had found years before in the Shetlands.

"Some day, Skipper," said Shackleton, "you and I will come back here and dig for treasure. Or, who knows, we may have to take our last sleep here with those who used these things."

The weather was continually bad. The mountains were swathed in mist, the wind blew, and the cloud rack overhead made prospecting for a place through the passes an almost impossible task. Shackleton became gloomy, and said, "I'll never make another expedition." But then early on May 19, 1916, the weather cleared, the moon shone, and Shackleton, Crean, and Worsley started across the island. When they

reached the other side, they found that they had had the only favorable weather in many weeks.

That cross-island trip has nothing to do with the sea, but it was an effort that, in its way, was as great as the boat journey. Three men were not fit to travel and were left behind. Those who went carried three days' food each, a primus stove, an adze to cut steps in the ice, compasses, a chronometer, and ninety feet of rope. They had brass screws in the soles of their shoes to help them climb on ice.

Their first slope was littered with big boulders and they saw one bounding down the mountain with great speed. They suddenly found themselves on the edge of a giant pit in the snow, a hundred feet deep, which Worsley thought must have been caused by a meteor. He was behind, steering the group by his compass. They found themselves in blind passes, made their way almost down to the sea and had to turn back, and once found themselves on the brink of a "gigantic chasm," 200 feet deep, 200 feet broad, and 2,000 feet long, ripped out by the howling gales. They pushed back and looked at each other and wondered what would happen if a gale came up—it would blow them into that crevasse. Then they roped themselves together.

Finally they reached the ridge, a ridge so steep that they could sit on it and let their legs dangle over on each side. They did not know in what direction to move. The fog had crept up over the country they had been through and had blotted it out. They were in an impossible position. If they did not move, they would freeze to death. They started cutting steps in the ice down the side of the mountain. It took them half an hour to go down a hundred yards and Shackleton realized that such slow progress was useless. Let Worsley tell the rest of the story. He is a good storyteller.

"Shackleton then cut out a large step and sat on it. For a few moments he pondered, then he said:

" 'I've got an idea. We must go on, no matter what is be-

low. To try to do it this way is hopeless. We can't cut steps down thousands of feet.'

"He paused, and Crean and I both agreed with him. Then he spoke again.

" 'It's a devil of a risk, but we've got to take it. We'll slide.'

"Slide down what was practically a precipice, in the darkness, to meet—what?

" 'All right,' I said aloud, perhaps not very cheerfully, and Crean echoed my words.

"It seemed to me a most impossible project. The slope was well-nigh precipitous, and a rock in our path—we could never have seen it in the darkness in time to avoid it—would mean certain disaster. Still, it was the only way. We had explored all the passes: to go back was useless: moreover such a proceeding would sign and seal the death warrant not only of ourselves but of the whole of the expedition. To stay on the ridge longer meant certain death by freezing. It was useless therefore to think about personal risk. If we were killed, at least we had done everything in our power to bring help to our shipmates. Shackleton was right. Our chance was a very small one indeed, but it was up to us to take it.

"We each coiled our share of the rope until it made a pad on which we could sit to make our *glissade* from the mountain top. We hurried as much as possible, being anxious to get through the ordeal. Shackleton sat on the large step he had carved, and I sat behind him and clasped him around the neck. Crean did the same with me, so that we were locked together as one man. Then Shackleton kicked off.

"We seemed to shoot off into space. For a moment my hair fairly stood on end. Then quite suddenly I felt a glow, and knew that I was grinning! I was actually enjoying it. It was most exhilarating. We were shooting down the side of an almost precipitous mountain at nearly a mile a minute. I yelled with excitement, and found that Shackleton and Crean

were yelling too. It seemed ridiculously safe. To hell with the rocks!

"The sharp slope eased out slightly toward the level below, and then we knew for certain that we were safe. Little by little our speed slackened, and we finished up at the bottom in a bank of snow. We picked ourselves up and solemnly shook hands all round.

"'It's not good to do that kind of thing too often,' said Shackleton slowly. 'Thanks be that the risk was justified this time.'

"We turned and looked up at the mountain down which we had just sped. I judged that we had travelled down about three thousand feet, and it was difficult to realize that we had reached the bottom in less than three minutes after we had left the top. This of course included the slowing down at the bottom.

"As we dusted the snow off us, I looked ruefully at my trousers, which happened to belong to an old dress suit. They were badly torn in spite of the pad of rope. Shackleton laughed, but when I pointed out to him that his own were in equally bad case his laugh eased up a bit."

When they were so close to the whaling factory on the island that they could hear the whistle in the morning, they found themselves in another predicament. They were on a mountainside that was nearly a precipice. The snow had melted and then frozen again. Shackleton happened to bring a heel down sharply on the ice and broke through the surface crust, so that by banging his heels he could cut a series of steps. The others followed, using the same depressions and enlarging them as they banged also.

As Worsley put it, they went down "walking on their backs." He was afraid to lift his head up lest he fall forward. But it was better than cutting steps, and safer. They came to a narrow defile that ended in a waterfall, and down that they went on the rope, and were soaked in the icy water. They

came to a shed, a part of the whaling factory, having crossed South Georgia in thirty-six hours, and were so wild-looking that two young Norwegian boys who first saw them turned and ran.

The commander of the whaling station, who had entertained them two years before, did not recognize them when they reached his house. When Worsley went back to King Haakon Sound to get the three men left there, they were disappointed because a member of their own party had not come ashore with the Norwegians to rescue them. They had lived with Worsley two years on the ship, the ice, and in the small boat, but did not recognize him after he had had a bath and a shave, and had donned some decent clothes.

Looking back at that trip across the island, with all its hidden dangers and its miraculous success, Worsley wrote, and Shackleton echoed him in his own narrative:

"There was indeed one curious thing about our crossing of South Georgia, a thing that has given me much food for thought, and which I have never been able to explain. Whenever I reviewed the incidents of that march I had the subconscious feeling that there were four of us, instead of three. Moreover, this impression was shared by both Shackleton and Crean."

Even the most avowed agnostic might have had that impression after such a journey. They had crossed the island in the only interval of good weather during the entire winter.

The men at King Haakon Sound were rescued, and Shackleton, with the aid of the Chilean government, and after two abortive attempts, was able to get his men off Elephant Island in one of the few moments when the ice permitted an approach. They were all well—with the exception of one lad whose toes were amputated—after living for four and a half months under two overturned boats, beaten by hurricanes, and pelted with ice from the mountains. So ended the greatest Antarctic adventure of them all.

Shackleton's hair turned silver in those four months.

After the first World War he went south again in the small ship *Quest*, hoping to continue his Antarctic exploration. Worsley and Frank Wild were with him. He died on the *Quest* of a heart attack, grimly humorous to the last, and was buried on South Georgia.

A New Era

WITH the coming of the airplane, it was obvious that a new and more efficient weapon had been forged with which to explore the mysteries of Antarctica. It provided speed, height at which aerial surveys could be made photographically, thereby covering in a day, and more accurately, a territory that might occupy months of exploration on the surface, and a wide range. Strange as it may seem, the greatest discoveries, with two exceptions, have so far been made over water.

It is also true, however, that the airplane, as so far used, has been something of a disappointment because, again with one exception, it has never made a trip in the Antarctic to a point farther than could be reached by men with sledges and dogs.

There are several reasons for this. The weather is uncertain. A plane with a very low landing speed and therefore a low top speed must be used because of the rough surface. Also a method correlating the use of dog teams and airplanes, or even relays of airplanes, to cover great distances, has never been thoroughly worked out. That will come.

The great value of the airplane so far has been in scouting, in finding over a difficult route places that would reward a more careful examination on the surface. In this the airplane is unexcelled, and there is no doubt that in the future planes will be used in such a way that they will unveil every important section of that great land. The first man to use airplanes in the Antarctic was Sir Hubert Wilkins in his flights over Palmer Land. The second, who embarked on a much more

extensive program, was Rear Admiral Richard Evelyn Byrd, who had already flown in Greenland and over the North Pole, as well as across the Atlantic.

Byrd has been criticized for the complexity and size of his expeditions, but I do not think that is a fair criticism. In a mechanical age an explorer who does not use all the instruments that come to his hand is neglecting his opportunities. Byrd has used airplanes, tractors, and dog teams. Both Shackleton and Scott attempted to use tractors of a sort, but they were not a success because machines and engines had not been developed in their day. Byrd's men have done things with tractors that are astonishing, when one considers the crevassed and dangerous ground over which they have traveled. But his greatest accomplishments and his important discoveries have been with the airplane.

As a matter of fact, Byrd's best work in the Antarctic has been entirely overlooked popularly because of his spectacular flight to the South Pole, which disclosed very little geographically. Byrd is a good showman, and his flights over both poles have made him famous. But his eventual claim to fame geographically will rest on other flights, of which few people realized the significance and which have been forgotten except by those deeply interested in such work.

Byrd is a Virginian, a graduate of Annapolis, and very good-looking. His motivating forces have been ambition and vanity, and that is not said in disparagement, for ambition is a worthy impulse, and who of us is free from vanity. But it is those two characteristics that have given him the driving force to get together and send to the Antarctic three tremendous expeditions, two of which he led himself, and one of which he directed for the government. He is imaginative, impulsive, and yet cautious, somewhat secretive and suspicious. He can be generous, and at the same time extremely difficult to deal with. He has both the faults and virtues of most ex-

plorers, but he can get things done under difficulties as well as any man who has gone to the Antarctic.

It is because of these characteristics that he was able to take two expeditions to the Antarctic, each of which probably cost nearly a million dollars. The amount of material he has used makes the equipment of former explorers look small indeed, but that is to be expected if one is to use three airplanes, quantities of oil and gasoline, spare engines and parts, tractors and dogs, as well as the houses, food, and infinite number of things that are necessary to shelter many men. His ships have become larger with each expedition, and he has always used two.

His first expedition was planned primarily for the purpose of reaching the pole. Not having entirely relinquished the idea of the old wooden Norwegian sailing ship, built for the ice, he had the *City of New York* which he had bought in Norway under the name of the *Samson*. Amundsen recommended her. She was a stout sealer and a splendid ship. He had as a consort a rolling bit of metal called the *Eleanor Bolling*.

Byrd not only followed Shackleton's example by having the *Bolling* tow the *City* to the ice pack, but he broke precedent by being towed through the pack itself by a powerful whaler. The *City* left Dunedin, New Zealand, on Dec. 2, 1928, and outside the heads was taken in tow by the *Bolling*. There was one gale on the way down, with heavy seas that at times blotted out the *Bolling* so we (I was on board as correspondent of *The New York Times*) could hardly see the tops of her masts. The *Bolling* was rolling her rail under, but the stout old *City* rode the seas like a duck.

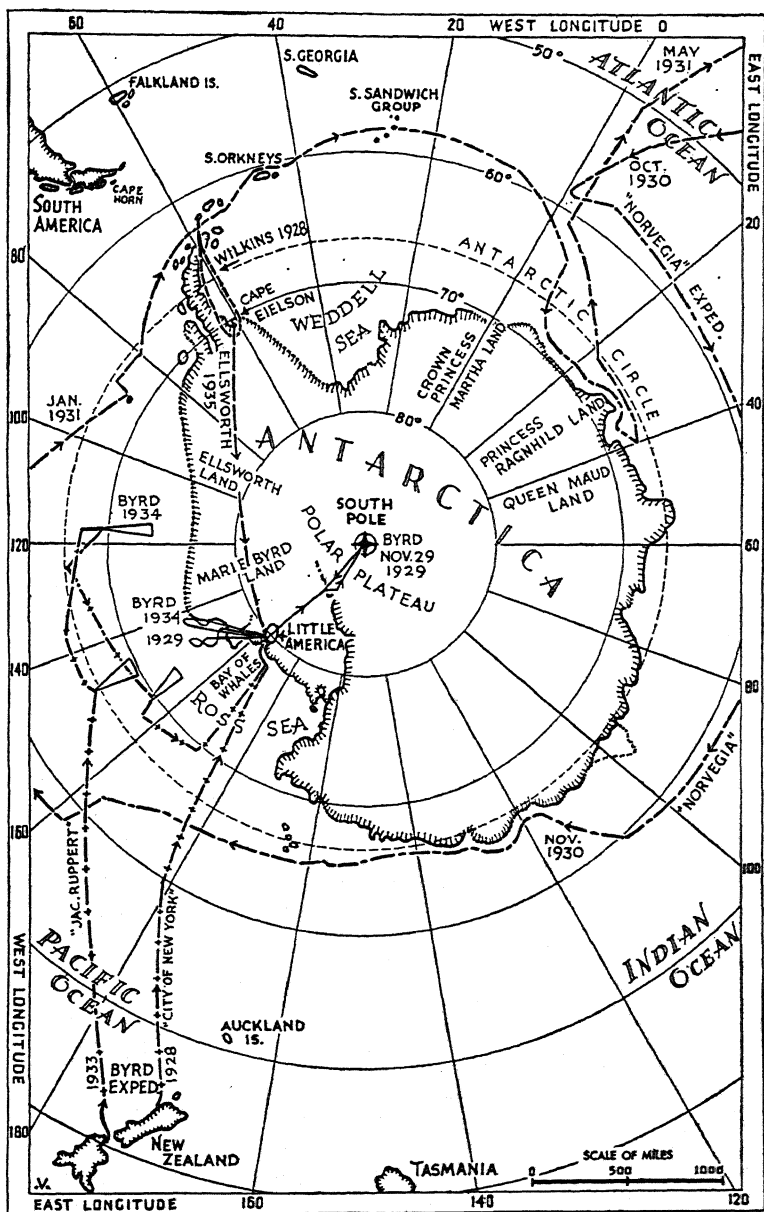
On Dec. 10 she met the *C. A. Larsen* on the edge of the pack, having passed close to the Scott Islands, and lay to in a bay in the ice while coal was shifted from the *Bolling*. The pack was heavy and wide that year, and the solid sealer with her asthmatic engine would not have been able to get through

for some time if she had not been towed through by the *Larsen*, a 17,000-ton whaler.

That tow was something nobody who was aboard the *City* will ever forget. The huge ship dwarfed our little vessel, and as she nosed into the ice with us astern it was like being dragged along by an ocean liner. Not that we went fast. The *City* was difficult to control, forever creeping up on the ship ahead when the *Larsen* slowed down, and then being yanked along with a jerk as the powerful engines of the whaler turned over again. The sensation of being snaked across a wide, open bit of water in the pack at a speed to which the *City* was not accustomed, was all most exciting. No expedition ship ever before traveled that fast in the pack.

But there was a day when the *Larsen* lay still in heavy ice, waiting for it to loosen up a bit, while a strong wind howled through the rigging and drifted snow across the ship, when it was impossible to see very far, and the snowy petrels drifted in and out of the gloom like eerie ghosts of birds. And another day when the *Larsen* had to stop and we heard the sound of hammers on her hull, as the engineers tried to straighten out a plate that had buckled near the engine room. It was heavy pack. Once or twice the *Larsen* was stuck, and then it was a sight to see a small chaser come up from the lane astern, and at full speed ride up on the ice beside the mother ship. The little chaser would roll over, the ice would break under her, and then she would back up and whack it again until she had worked her way clear up to the bow of the *Larsen*.

After a severe pounding that made the ship groan in every timber, open water was reached on Dec. 23, and on Christmas night the barrier was sighted. Strangely enough, I had seen so many pictures of it that it did not arouse any great emotion. Byrd made for the Bay of Whales for several reasons. The most important was that to the east lay a completely unknown territory that he wanted to look at, and secondly



Map 11.—Byrd discovered the east side of the Ross Sea, sought for many years, and Ellsworth flew across the continent.

it is a region far from mountains from which come the terrific gales that make the western side of the Ross Sea so uncomfortable. Not that we didn't have blizzards, but there are probably fewer of them over the flat country around the bay than in most other parts of the continent. It was better suited to flying.

The bay was well filled with ice, and it was not possible to set a base down anywhere near where Amundsen had wintered. But on the east side of the bay an inlet was found, with a smooth slope leading up to a basin between slightly higher levels of barrier. It was obvious later that that basin broke loose at times and moved up and down, as it did on the second expedition, but it looked safe enough. And there the camp was established. It formed an excellent flying field.

While the ships were unloading, Byrd made a flight to the east and immediately made a discovery, showing the reconnoitering value of planes. He found a group of small mountains, which he called the Rockefeller Mountains, and another mountain farther to the east that he called the Matterhorn. A survey of the Alexandra Mountains and of the barrier edge beyond Cape Colbeck completed that year's work.

The first important flight the next year was that to the South Pole, which was started on the afternoon of Thanksgiving Day and which lasted about seventeen and a half hours. Instead of going up the Axel Heiberg Glacier Byrd and his crew went up the Liv Glacier just to the west, as it offered a longer time for the climb to the plateau.

Bernt Balchen, who was the pilot, made it only after 250 pounds of food had been dropped overboard. They reached the "vicinity" of the pole, and then turned back, this time flying down Axel Heiberg to where a fuel depot had been placed on the barrier at the foot of the mountains. The trip in from there was simple.

With this flight off his mind Byrd was able to turn his attention to the east, and he made a flight the track of which,

to say the least, is puzzling. Many attempts had been made to reach the east side of the Ross Sea by ship; Scott and Shackleton had both tried it, only to be checked by heavy, hummocked pack in which lay what Scott called ice islands. It is probable that no ship will ever be able to penetrate very far in that direction until ice conditions are radically improved. It remained for Byrd to learn why this was so.

The flying weather at this time was good, both during the polar flight and for a short time later, and on Dec. 5 Byrd started on his eastern flight. Alton Parker was the pilot this time, with Harold June along as flight engineer, and Captain Ashley McKinley as photographer, the last two having been on the polar flight also.

Byrd flew to the northeast across King Edward VII Land and then out over the ice, which was broken up with large pools of water between floes—not a nice place to land. After a time, on his right, he saw a chain of mountains, split by glaciers, rising high above the shore ice. It was the eastern side of the Ross Sea! The goal for which men had struggled in ships for years lay within easy reach of his airplane.

But instead of heading for the mountains and flying along their front to get good pictures of them, he turned north, out to sea, attracted by some ice islands or peaks that he thought he saw looming in the distance. Of course, an effort to learn what was holding that great mass of ice to the north was worth while, but of far greater importance was the mountain range to the east. It was a geographical discovery of the first order, one as imposing as the discovery by Ross of the mountain range on the coast of Victoria Land to the west.

McKinley got some pictures of it at a distance of about forty miles, and then the planes turned to the east for a short distance, and then to the southwest. As they turned Harold June said he thought he saw the end of the land to the north, with the coast tending to the eastward, which has since been proved to be correct. Byrd turned north again

on a search for some illusive ice islands, and then south back to King Edward Land and home. Ice islands are interesting, but a closer examination and better pictures of that eastern rampart would have been more valuable. On the next expedition a sledging party went almost to the end of that mountain range, thus completing the survey.

It was on his second expedition that Byrd did his most daring work, wiping off the map a great unknown area that had puzzled scientists for years. His finding of that eastern mountain range, known as the Edsel Ford Range, was an explanation of why so much pack gathers in the sea north of the land, ice that had also been impenetrable. Now it was to yield, both to airplanes and to ships.

On this trip Byrd had two good-sized ships, the *Jacob Ruppert*, a large steel vessel, and the famous old Coast Guard ship *Bear*, retired from active service but still plenty strong. He needed the *Ruppert* to carry a large biplane, of a type that was once used in the army as a bomber. It was no longer suitable for that purpose, but it would carry a heavy load and its landing speed was low. The *Ruppert* put out from Wellington, New Zealand, on Dec. 12, 1933, and headed to the southeast. Byrd intended to attack the mystery of what lay beyond the northern point of the Edsel Ford Range from the ocean, going as far east as the ice would permit and using an airplane based on the ship. It had been done by Captain R  ser-Larsen of the Norvegia Expedition in 1929-1930, and by Sir Douglas Mawson, but Byrd used a larger plane, with a crew of four, and equipped with radio.

It was an ambitious and sensible program, and fortunately he was aided by an open ice year. On Dec. 19 the *Ruppert* had passed beyond Cook's farthest south, a point no other vessel had reached except a small Norwegian ship hunting sealing grounds. Certainly no steel ship had ever been near there. The old *Ruppert* butted her way through heavy ice

that grated along her plates to 67 degrees 9 minutes south and 148 degrees west, 148 miles beyond Cook's record. But they could go no farther, and Byrd turned back to where there was a pool of open water. Now it was time to use the plane to vault what a ship could not penetrate.

The plane was dropped overboard on the morning of Dec. 21. The weather was perfect, a clear day with the sun shining. The plane took off and an hour was spent in checking the compasses while the plane circled the ship. Then it headed south on the 150th meridian at an altitude of 2,000 feet, at which height they could see for nearly sixty miles. They flew through a snow squall, and when they came out of it, Byrd could see what he thought was an ice front or barrier, but which turned out to be a great rampart of bergs, with the pack between and beyond them. He turned back at 69 degrees 51 minutes south and 149 degrees 45 minutes west.

It was on this flight that Byrd used for the first time in polar exploration a radio telephone with which to communicate with the ship—a good way to learn if it would be wise to turn back because of changing weather.

The ship again went on to the east and soon entered a region that Byrd called the Devil's Graveyard, a place of white fog and drifting bergs and ice, where danger loomed on one side or the other every few minutes. It was the devil of a place for a steel ship. While they felt their way through this mess, a gale came up at a time when they were surrounded by icebergs half concealed in the mist. Two big bergs reared themselves about 200 yards ahead, one on each bow, and the ship turned to pass to windward of them. And just as she turned, her speed fell off.

Water had gotten into the oil tank, had been pumped into the burner nozzles and put the fire out. To windward of a huge berg in a gale and with almost no steam! They cleared the berg by 200 yards, only to find themselves in a mass of growlers, small pieces of steellike hard ice, which would have

carved through the ship's sides if she had rammed one of them hard.

Fortunately she worked clear of them. On the twenty-seventh the sun came out, and then they realized what they had been through. The sea was covered with bergs. They steamed past one twenty miles long and ten miles wide. In twenty-four hours they sighted 8,000 bergs.

The ship edged its way along heavy pack toward the southeast and drifted in thick weather waiting for a chance to put the plane overboard and again fly to the south seeking land. The weather remained bad, but on Jan. 3 Byrd decided to take a chance and fly. It was probably the most dangerous flight he ever made in his life, and knowing how cautious he usually is about taking off in bad weather, I am astonished that he did it. It was a courageous thing to do.

It is probable that he felt he had gone east as far as he could if he were to reach Little America in time to unload, and that he would never again have the opportunity of darting south in this region. There was no sun, limited visibility, and a low ceiling, with a steady snowfall. The position of the ship was 69 degrees 57 minutes south and 116 degrees 37 minutes west.

When they took off they flew at about 400 feet, just high enough to clear icebergs, and then scud was flying by under the pontoons. Six hundred feet above them was a solid bank of clouds. Five minutes later the ship was lost to sight. Byrd had left word to have a weather report sent to him every fifteen minutes, and the ship was to send up a column of smoke which might act as a guide, if they were lucky enough to see it.

The visibility was never more than ten miles and often less, and the ceiling was never more than a thousand feet. Most of the way they flew at 400 feet. Harold June was the pilot. Not forty miles from the ship they got a wind shift from west to east, which Byrd discovered but could not at

first believe. However, when the plane was dropped to fifty feet, he could determine the drift by ripples on open water. The pack, despite occasional openings, was the heaviest they had seen. About 110 miles south of the *Ruppert* they crossed an enormous solid floe, about twenty miles wide, and in the middle of it were two lonely emperor penguins.

They turned north again at 72 degrees 30 minutes south, when they saw ahead a horizon black with snow squalls, in which they might have been lost. They could see about ten miles beyond the point at which they made the turn. On the run home they nearly rammed an iceberg in the thick weather. Snow squalls were all around them, and mist streamed past the windows, so thick that they had to fly by instruments. Ice clogged the air speed indicator so that it would not work, and ice began to form on the forward edges of the wings.

Bowlin, co-pilot, who was flying at the time, went down to about 100 feet where the air was warmer. Somewhere along their track were three bergs that they had passed on the way out. Barely able to see ahead, Bowlin suddenly sighted a black shadow looming up. He lifted the nose sharply, opened the engines wide, and they barely missed the top of a berg. A fine place for low flying! After that he kept an altitude of 300 feet, and the weather cleared a bit. But two hours after they landed, a thick snowstorm blotted out the whole horizon.

They came to one interesting conclusion because of the winds, during the time they lay north of the pack at their far-eastern position. It had been the experience at Little America that southerly winds from the interior of the cold, dry continent were clearing winds. But southerly winds where they lay brought nothing but snow and mist, and the only logical deduction was that the coast must lie several hundred miles south of their position for the southerly winds to pick up so much moisture.

As the weather continued bad they turned west, and as they proceeded along the edge of the pack they were able to go much farther south than on their eastern trip. The pack had gone out in tremendous quantities. In fact, the ship was able to get within a mile of the farthest south reached by the plane on the first flight. It was an astonishingly quick change.

On Jan. 10 Byrd made his third and last flight from the ship. It had been his original intention to fly the 600 miles to Little America, which would have been an easy flight in good weather. The weather was perfect where the *Ruppert* lay, a light wind, unlimited visibility, and a warm sun.

But it was not so at the Bay of Whales. Lincoln Ellsworth was there with his plane, hoping to fly across the continent, a flight that he later made safely in the opposite direction. He informed Byrd by radio that there was no visibility at Little America, and that it was snowing. To have attempted a flight to such a distance under those conditions would have been ridiculous. So Byrd reluctantly gave up his plan. Ordinarily at that time of year weather conditions at Little America are spotty.

However, Byrd decided to make one last flight to the south. A short time after they took off, the sky became overcast and there was obviously a change coming, so the plane again turned back, having reached 71 degrees 45 minutes south at 152 degrees west. The importance of these three flights can hardly be overemphasized. They proved beyond a doubt that there was no land in this area. This fact was confirmed the next month when two ships, the whaler *Thorshavn* and the Australian exploring ship *Discovery* were able to reach about 72 degrees south, farther than Byrd had gone in his plane.

The ships' accomplishment does not detract at all from Byrd's achievement. The ships, under less favorable conditions, might not have been able to get so far south, and the

only reason they did was because of the tremendous outsurge of the ice. It must have been an unusually open year. Score one more in Captain Weddell's favor. One never can tell what will happen in the Antarctic.

Before the plane landed it went up to 7,000 feet where the sea was scanned for a possible channel for the ship. Byrd did not want to go back to the traditional 178th meridian to pass through the Ross Sea pack, if he could help it. It would be a waste of time and he hoped to find another opening through the pack to the east of that point. He may have recalled that Amundsen went through the pack with little difficulty to the east of the meridian on which Scott spent nearly a month in working his way through the ice in the same year. The pack is unpredictable. At any rate he saw from the plane an irregular lead about thirty miles to the northwest. It was worth trying.

Ellsworth, whose plane had been wrecked in the Bay of Whales when the ice in the bay suddenly broke up and went out, had met tremendously heavy ice at 178, which was another determining factor in Byrd's choice. So they pushed slowly westward looking for an opening to the south, and on the 169th meridian found an open road to Little America. They met no ice at all.

Byrd's other flights belong more properly to another narrative, as they have to do entirely with inland exploration, but one, at least, must be mentioned because of its significance. There had always been differences of opinion between geologists as to whether the Antarctic Continent was divided by a strait, filled with ice, that ran from the east side of the Ross barrier toward the Weddell Sea. On one side were the Edsel Ford Mountains to the north, and on the other the Queen Maud Range to the south.

This mystery was resolved by a unique use of the airplane. A flight to the southeast along the parallel of 81 degrees 10 minutes south was made, the plane coming down close to the

surface at intervals so as to show the elevation by the plane's altimeter. In connection with seismic soundings at the point where the plateau began to rise, the slope indicated plainly that there was land under the ice. It was an extremely clever expedient, and it worked perfectly. Added to the flights made from the ship it rounded out in broad outline two fine geographical discoveries.

But it is these things which are seldom appreciated by the public, and therefore they have gone unnoticed. Admiral Byrd's self-immuration in a hut eighty miles south of Little America during the year made much better popular reading. But long after that is forgotten, his reputation will rest solidly on his discovery of the eastern shore of the Ross Sea, a mystery which had eluded many other men.

What Is It Worth?

IT IS a long way from the visionary Quiros and his dream of a rich, warm southern continent filled with people waiting for spiritual salvation, and from the hardly less amusing vaporings of Alexander Dalrymple, who thought there must be at least fifty million inhabitants of the land, to the partial conquest of the Antarctic by ship, sledge, and airplane. The warm land of imagination gave way to the knowledge of a land defended by icy barriers and ramparts, but the greater its inaccessibility the more it tempted the staunch souls who demanded and obtained some of its secrets.

That search, extending over more than 300 years, is one of the most dramatic in the history of exploration. We have seen how, beginning merely with a philosophical postulate, the Antarctic began to emerge from the mist as men refused to let ice and storm defeat their purpose. How the sketchy outlines of land, a lonely island or two, piqued their curiosity and led them forward to ever greater gains. How they hurled themselves against the growling ice, that warden at the gate, time and again, until they burst through to find that vast frozen and lonely land. Truly has it been called a siege, a siege in which all the ingenuity and courage of men were brought to bear against an implacable and unrelenting foe.

We know fairly well now what sort of a continent lies behind that icy rim that repelled men for so many centuries. Its great domed plateau, its major mountain chains, its tremendous glaciers, are partly outlined. And with every recurring thrust against its portals, or into the interior, more

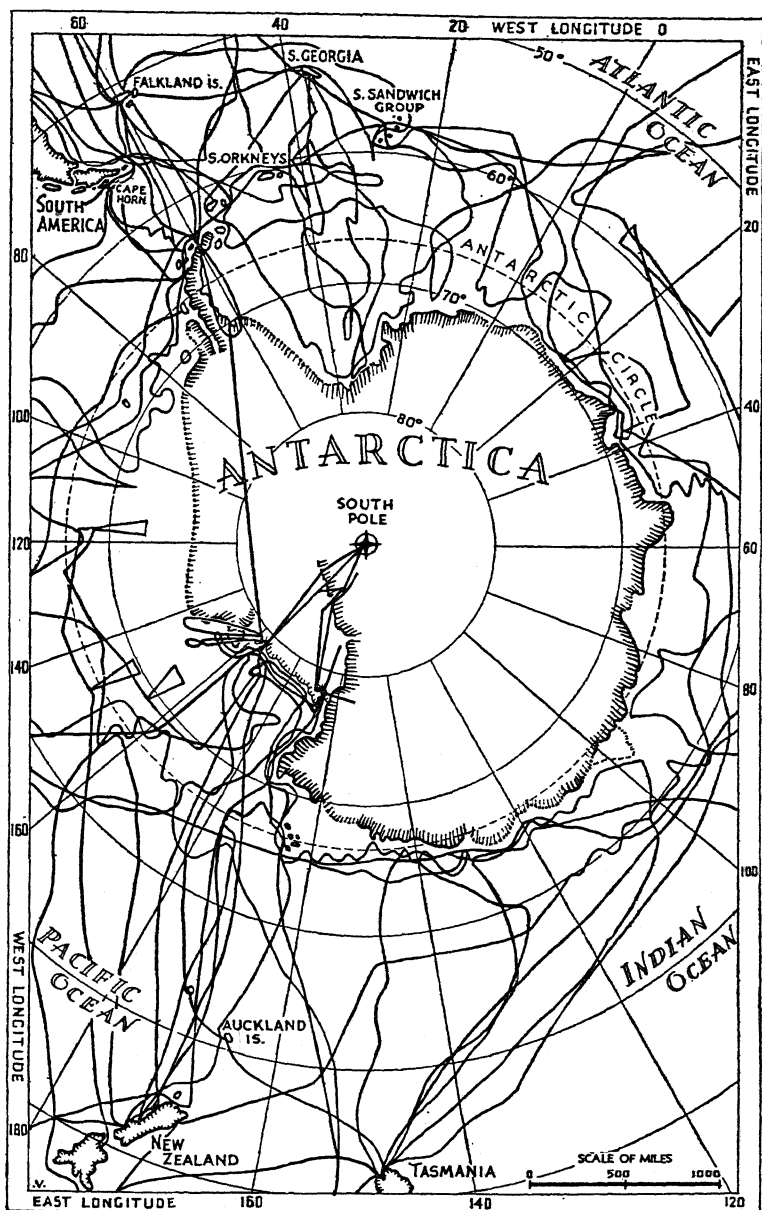
is learned to satisfy the curiosity of those to whom every unknown region on the surface of the earth is a constant challenge.

But the question remains: Of what material value is this great mass of ice-covered land? And the answer is, except for further geographical and geological investigation, and its value as a weather station: Absolutely none!

So long as any part of its surface is unknown, men will go there, drawn by the irresistible instinct to plunge into areas in which other men have not been, as well as to learn more of its strange geological history, which may throw light on the past of the whole globe. That will always be so, until the charts show every valley and glacier and mountain range, until they show how this strange land came into being, and what has happened to it in ages past, since it had a warm climate. That is something worth seeking.

Knowledge of Antarctic weather is also invaluable, and the time will probably come when weather stations will be established there permanently in order that the weather of the southern hemisphere may be more accurately predicted. The Antarctic controls that weather. That inconceivable large mass of ice, breeding storms, sending its cold breath to the north, affects the lives of all those living within a few thousand miles of it. It has been the dream of meteorologists for years to learn more of the vagaries of Antarctic weather.

But why nations should squabble over Antarctic territory is beyond my comprehension. Chile and Argentina have recently put forward claims, so has Germany, so has the United States, unofficially, based on Byrd's explorations. England established her claims long ago, when by Orders in Council she claimed the Falkland Island Dependencies and the Ross Sea Dependency. It is not likely that these claims



Map 12.—The tracks of all the expeditions mentioned in the narrative; a cobweb of attacks on the icy ramparts of the land.

were based on a desire to control any part of the Antarctic land.

The Falkland Island Dependencies were established because at the Falklands England has a naval station that controls the passage around the Horn and the whale fisheries to the south, or pretends to control the latter, and the Ross Sea claim was put forward in an attempt to control the rich whaling grounds of that region. At one time New Zealand levied a tax on every barrel of whale oil brought into the whaler's base at Stewart Island, until the Norwegians refused to pay it.

Coal has been found in the Antarctic, it is true. Shackleton found it on his polar journey and Scott confirmed his finding. Griffith Taylor, geologist with Scott, estimated that the Antarctic contained the greatest coal deposit in the world, as did Laurence Gould, geologist of the first Byrd expedition. But the coal is of inferior quality. It is buried in sandstone in tremendously long seams running north from the Beardmore Glacier. It was found by members of Byrd's second expedition on their geological trip to the east of the Ross Sea.

But so long as 2,600 miles of ocean and pack ice separate the only practicable approach to the interior of the Antarctic from the nearest civilized land, New Zealand, of what conceivable use is the coal? When all the coal in the present habitable world is used up, which will be in the far-distant future, then it might be worth while to send ships through the gales and ice of the Antarctic Ocean to bring back some of this inferior coal. But by that time science will probably have made us independent of coal anyway.

Nothing else of any value has ever been found there. Gould found faint traces of copper, but there is an almost limitless amount of copper available in more comfortable climates. Traces of metals and other valuable raw materials have been found in some of the glacial moraines along the

edge of the continent. But where did they come from? To find their place of origin would mean boring haphazardly through an unknown thickness of ice.

There is nothing valuable in the Antarctic that can be reached, or that could be exploited profitably.

It has been mentioned as an aviation base on great circle flights between points in the southern hemisphere. There are only two or three months of the year when flying is possible in the Antarctic, and anyone who has been there knows the uncertainty of weather conditions. No meteorologist at present can predict the weather in that frozen land for more than twelve hours ahead, and even then he takes a chance. Landing there is always a hazard with a heavy plane because of the rough surface.

It will be only a few years before planes have such a long range that intermediate stops in a flight of 5,000 or 6,000 miles will be unnecessary.

No, the Antarctic is a field for the explorer or the adventurer, not for business or even for military strategy. It is unique in this world, isolated by nature, protected by ice and storm, inviolate except to the feeble thrusts of men who dare greatly to learn what the outside surface looks like, or the tale concealed in its rocks. And yet nations dispute over it. To leave one's name there is an honor dearly won, but for any country to say, "This is my chunk of ice and mountains and blizzard," seems the height of absurdity. Some of the statesmen who claim portions of it should sit through a winter there, and then decide what they would do with the Antarctic if it were given to them.

Its only material wealth lies in the ocean surrounding it—the whales. Its real wealth is in what man can learn from it, the secrets he can wrest from its winds and rocks.

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