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National Antarctic Expedition,
1901-1904

Photographs and Sketches

PLATE I.—THE 'DISCOVERY.'

From a photograph by R. W. SKELTON (Sk. 42, $\frac{1}{2}$ -plate); taken off Cape Adare, Jan. 9, 1902. In the distance are the foot-hills of the Admiralty Range of Mountains, at the head of Robertson Bay.

The "Discovery"

PLATE I.—THE 'DISCOVERY.'

Fig. 1. Photograph by R. W. SKELTON (Sk. 42, 1/2-plate); taken off Cape Adare, 1895. In the distance are the foot-hills of the Admiralty Range at the head of Robertson Bay.

From Victoria, B.C.

The "Discovery"

NATIONAL ANTARCTIC EXPEDITION

1901-1904

[Panoramic Views]

ALBUM

OF

PHOTOGRAPHS AND SKETCHES

WITH A

PORTFOLIO OF PANORAMIC VIEWS

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PREFATORY NOTE

DURING the preparation of the results of the physical observations made by the National Antarctic Expedition, the publication of which was undertaken by the Royal Society, it became obvious that over and above the material contained in the various Journals of Observations, a large body of pictorial evidence had been amassed, which, although it possessed great value as illustrative of the scenery and natural history of the Antarctic regions, could only be partially and in a scattered form comprised in the volumes dealing with the Meteorology, Magnetism, Seismology, and other physical portions of the work of the Expedition. To some extent this pictorial material had been made use of in the already published volumes of the Reports of the Expedition, as well as in other works. But the Committee which was charged by the Council of the Royal Society with the supervision of the work, came to the conclusion that in justice to the value and completeness of this section of the labours of the Expedition, and in the interest of future exploration in the same high southern latitudes, it was desirable that at least some portion of the material should be published in a separate volume as a permanent connected record of the aspect of the regions which the 'Discovery' visited. More particularly did such a publication appear to be advisable in regard to the observed position and condition of the snow-fields, glaciers, icebergs, ice-barrier, sea-ice, and other features which are liable to continual and comparatively rapid changes.

The pictorial material consisted of some hundreds of photographic plates and a large series of panoramic and other sketches. A careful selection from it was made of those subjects which appeared most worthy of reproduction, either for their own interest as illustrative of Antarctic conditions, or as records that might be of service to future investigators in the same part of the world. It was also determined that as far as possible the exact point from which each photograph or sketch was taken should be marked on maps or charts, to form part of the volume.

The photographic work of the Expedition was mainly accomplished by Lieutenant-Engineer R. W. Skelton, whose admirable pictures form a large part of the Plates in the present Album, and who, had he been at the time available, would have been asked to undertake the preparation, reproduction, and description of the photographic part of the volume. In addition to his photographs, others have been selected from those taken by Lieut. A. B. Armitage, Lieut. C. R. Royds, Lieut. E. H. Shackleton, Mr E. A. Wilson, Mr L. C. Bernacchi, Mr H. T. Ferrar, and Mr R. Ford.

The various pencil sketches, which convey so vivid and artistic an impression of

Antarctic scenery, are the work of the Junior Surgeon of the Expedition, Mr Edward A. Wilson, M.B. The Committee was fortunately able to obtain his services for the laborious task of arranging the whole of the selected material, fixing on the maps the precise locality of each photograph and sketch, and writing the descriptive letterpress throughout the volume—a task which, in the midst of other pressing work, he has performed with much success. In the preparation of the key maps he received valuable assistance from Lieut. Skelton.

The reproduction of the "Album" was placed in the hands of Messrs Oliver & Boyd, Edinburgh.

The whole of the photographic illustrations, reproduced by half-tone process-blocks, have been carried out by Messrs Hislop & Day, Edinburgh.

The photogravures are the work of the Swan Electric Engraving Company, London; while the pencil drawings have been reproduced by a new lithographic process, under the supervision of its inventor, Mr Donald Cameron-Swan.

The lithographic reproductions of the drawings of Auroræ are by Messrs West, Newman & Co., London.

The pure rag paper used for the half-tone reproductions was specially chosen and made with a view to durability, in preference to so-called "Art-papers," which, though they would undoubtedly have given more brilliant impressions, could not have been regarded as permanent. The photogravures and the pencil sketches also have been printed on pure rag paper which will last.

In issuing this Album the Committee of the Royal Society ventures to hope that in addition to its general interest as a graphic presentation of Antarctic scenery, it will be found to possess much permanent value as a faithful and minute record of the glacial and other conditions of the Antarctic regions during the years 1901-1904.

ARCH. GEIKIE,
Secretary, Royal Society.

22nd June 1908.

INTRODUCTION

It is necessary to explain shortly the purpose and the limitations which have been held in view during the making of this Album of Antarctic pictures. Although it includes nothing which was not produced by members of the Expedition working on the spot, the volume is not a complete collection of their photographic efforts, but is, so far as possible, a representative series of pictures which are likely to have a permanent value in their bearing upon scientific or semi-scientific problems. As records of geographical and topographical facts their use is evident, and the same may be said of the biological series of mammals and birds.

But a greater value attaches to pictures which represent ice-conditions of to-day with sufficient exactness for comparison with similar pictures which may be taken in years to come. It is evident that the recession of ice in the Antarctic region, one of the more interesting facts which have recently come to light, may be watched from one generation to another by such means as are here suggested and supplied.

In arranging the volume, it has seemed best to group the pictures under subject headings, while keeping a sort of chronological sequence from one end to the other, very roughly indicating the ship's movements, and the main events which took place during her stay in M'Murdo Sound.

For the sake of attaining greater completeness in this pictorial representation of high southern latitudes, photographs which have already appeared in other publications have been repeated here, though a large proportion of the illustrations now published appear for the first time.

Since it has been in almost every case impossible to deal satisfactorily with the subject illustrated in half a dozen lines, frequent references have been given to Captain Scott's *Voyage of the 'Discovery,'* to the already published Scientific Reports of the Expedition, to *A Voyage to the Antarctic Regions*, by Sir James Ross, the discoverer of South Victoria Land, and to other works on Antarctic travel.

The Key Maps, it is hoped, will increase the usefulness of the book, for in the majority of cases it will be possible, by reference to them, to see more or less exactly the spot from which a picture was taken and the direction in which the photographer was looking, as well as the angle included by his picture. The same remarks apply to the pencil panoramas.

In the photographic department the Expedition owed most of all to Lieut.-Engr. Skelton, R.N., who was responsible not only for the general photographic outfit of the ship, but for a large majority of the best pictures that were pro-

duced. Indefatigable as he was in taking pictures himself, he was not less so in seeing that all the negatives produced in the ship were duly signed, named, and dated; and, as a result of this care, it has been possible to give to each photograph in the Album full details as to when, where, and by whom it was taken, as well as the size of the plate or film. Hence any negative may be at once turned up in the collection which is deposited in the rooms of the Royal Geographical Society in London.

It adds very greatly to the value of the work that every word has been carefully revised both by Captain Scott and by Lieut. Skelton, to both of whom I owe my best thanks.

That it would have been impossible to avoid errors without help from other members of the Expedition, I need hardly say, nor can I at all easily point out how much I have borrowed and only partially acknowledged from the writings in print or manuscript of Captain Scott, Lieut. Skelton, and Mr Ferrar. The geology is all Mr Ferrar's, the Western Sledge Journey notes are all from Captain Scott and Lieut. Skelton, and there is something from Captain Scott in probably more than half the pages of the book.

The writing is in fact a compilation, while the photographs are almost all by my companions. I feel myself, on that account, at greater liberty to point out to others their worth and excellence.

To Sir Archibald Geikie, Secretary of the Royal Society, who has superintended the work throughout, I shall always feel deeply grateful for his unfailing kindness and ever ready help and consideration.

EDWARD A. WILSON.

June 1908,
WESTAL, CHELTENHAM.

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MAPS

(IN PORTFOLIO)

- MAP A. Chart of South Victoria Land (smaller scale).
 MAP B. Chart of M'Murdo Sound (larger scale).

National Antarctic Expedition,
1901-1904

PLATE II.—THE PACK-ICE OF ROSS SEA.

FIG. 1 (Map A). From a photograph by R. W. SKELTON (Sk. 34, $\frac{1}{2}$ -plate), Jan. 8, 1902; taken immediately after our passage through the belt of pack-ice in Ross Sea, looking back to the North.

FIG. 2 (Map A). From a photograph by R. W. SKELTON (Sk. 33, $\frac{1}{2}$ -plate), Jan. 8, 1902; taken very shortly before the last, and just before reaching the open water to the south of the belt of pack-ice in Ross Sea.

These pictures show what is meant by "Water-sky" and "Ice-blink." In the upper picture the outlook is across a mile or so of open water to a very extensive area of ice-covered sea in the distance. From such a surface of closely packed ice so much light is reflected upwards that the sky appears almost white, and gives what is known as an "Ice-blink." In the lower picture, although still within the ice, one may recognise the open water, which is just appearing on the horizon, by the lack of light reflected in the sky; the sky is dark, a typical "Water-sky."

These indications may be of the greatest use in avoiding large areas of ice, and in making a course for open water even before it actually comes in sight.

Compare also Figures 1 and 2 of Plate III.

FIG. 1.

FIG. 2.

PLATE III.—PACK-ICE.

FIG. 1. From a photograph by L. C. BERNACCHI (Be. 16, $\frac{1}{4}$ -plate), Jan. 17, 1902;
taken in the pack-ice of Wood Bay.

FIG. 2. From a photograph by R. W. SKELTON (Sk. 15, $\frac{1}{2}$ -plate), Nov. 16, 1901,
at 9 A.M., S. lat. 62° , E. long. $139\frac{1}{2}^{\circ}$.

In the upper figure, which represents a fair example of ice-blink in the sky, the pack-ice consists of floes of moderate size and thickness becoming closely packed. The undisturbed edges of these floes show that there has been but little movement amongst them, and they contrast markedly with the broken and jostled edges of loose and water-washed pieces on the outskirts of the ice-belt, such as are shown in Fig. 2, from a photograph which was taken in November at the edge of the open ocean. The sky in the lower picture is a typical water-sky with but little reflected light, and dark when compared with that of Fig. 1.

Compare Figures 1 and 2 of Plate II.

FIG. 1.

FIG. 2.

PLATE IV.—PACK-ICE.

FIG. 1. From a photograph by Mr FORD (Fo. 60, $\frac{1}{4}$ -plate), Nov. 16, 1901, S. lat. 62° , E. long. 139° .

FIG. 2. From a photograph by R. W. SKELTON (Sk. 17, $\frac{1}{2}$ -plate), Nov. 16, 1901, 11 A.M., S. lat. 62° , E. long. 139° ; showing the wake of the ship through loose ice.

A loose and weatherbeaten pack-ice is represented here, which the 'Discovery' met with when she first dipped south to the Antarctic Circle, on her voyage from London to New Zealand. The digression was made for the purpose of obtaining magnetic observations, and the ice which is here shown lay 200 miles to the north of Adélie Land. It soon became so closely packed as to prevent any rapid progress to the South. In character it was uniformly small, broken, and water-logged, with edges upturned like pan-ice from the constant jostling of piece with piece. There was an almost complete absence of icebergs or large floes. Much of it was discoloured yellow and orange-red by the inclusion of *Diatomaceæ* in its substance. See also Figure 2 of Plate III.

FIG. 1.

FIG. 2.

PLATE V.—WATERING SHIP IN THE PACK-ICE.

FIG. 1 (Map A). From a photograph by R. W. SKELTON (S. 98, 5" × 4" plate), Feb. 21, 1904. Watering ship in Wood Bay.

FIG. 2 (Map A). From a photograph by R. W. SKELTON (Sk. 84, $\frac{1}{2}$ -plate), Jan. 31, 1902; taken at the eastern limit of the 'Discovery's' cruise off King Edward VII.'s Land, while watering ship.

Sea-ice, quite recently broken up, is here shown in Fig. 1, with the edges still undisturbed. As such ice drifts into the open sea, the constant collision of each piece with its neighbour produces a lip or low wall around its edge, a condition of floe well seen in Plate XXXI.

In Fig. 2 a floe of a different character is seen; one, namely, which has been subjected to some considerable disturbance and pressure, with blocks and irregularities partly worn away by weather, and in part concealed by snow drift.

In each of these cases, and in every case where the ship's supply of fresh water was procured at sea, the hard snow deposited on the surface of the sea-ice was used. It was found to be sufficiently free from salt, not only for the ship's boilers, but also for washing and drinking purposes. Solid land or glacier ice, wherever procurable, is, however, to be preferred, from motives of economy, since both the time and fuel required for melting it is considerably less.

FIG. 1.

FIG. 2.

PLATE VI.—THE BLACK-BROWED ALBATROSS.

From a photograph by R. W. SKELTON (Sk. 6, $\frac{1}{4}$ -plate), Dec. 28, 1901; taken shortly before reaching the pack-ice on the journey south from New Zealand.

This Albatross, or "Mollymawk" (*Diomedea melanophrys*), was the least timid and the most abundant of all the Albatrosses that followed in our wake.

As we entered the pack-ice they deserted us, but not before we had caught several of them.

Quite unhurt by their capture, they would stalk along the deck with a splay-foot dignity, which was only increased if obstruction was offered to their progress. There was neither fear nor timidity in their movements.

From the length of their wings and the awkwardness of their legs and feet, these birds were quite unable to rise in flight from the deck without assistance.

See *Nat. Hist. Rep.*, vol. ii., Aves, p. 111.

of the ... of ...

ALBATROSSES AND OTHER BIRDS OF THE PACIFIC OCEAN

W. SKELTON (Sk. 6. 1-plate), Dec. 2, 1900
during the pack-ice on the journey south.

The "Mollymawk" (*Diomedea melanophrys*), was the most abundant of all the Albatrosses that followed in the pack-ice they deserted us, but not before we had secured a few.

When taken by their capture, they would stalk along the deck with a wary, alert, was only increased if obstruction was met. There was neither fear nor timidity in their movements.

With the spread of their wings and the awkwardness of their movements they were quite unable to rise in flight from the deck.

From "Hawaii" by J. S. S. S.

A Group of Black-browed Albatrosses.

PLATE VII.—THE KILLER WHALE.

FIG. 1. From a photograph by E. H. SHACKLETON (Sh. 68, $\frac{1}{4}$ -plate), Feb. 8, 1902;
M'Murdo Sound.

FIG. 2. From a photograph by Mr FORD (Fo. 51, $\frac{1}{4}$ -plate), Feb. 8, 1902;
M'Murdo Sound.

The Killer Whale (*Orca gladiator*) is ubiquitous in its distribution, but is particularly abundant in the Antarctic seas. Hunting in herds generally of a dozen or twenty, but sometimes of nearly a hundred together, it is seen commonly along the edge of the floes as the ice breaks up, evidently on the look out for Seals and Penguins.

Its high dorsal "fin," and the yellow saddle-mark on its back, suffice to distinguish it from all other Cetaceans.

See *Nat. Hist. Rep.*, vol. ii., Mamm., pp. 6-8.

FIG. 1.

FIG. 2.

PLATE VIII.—THE CRAB-EATING SEAL.

FIG. 1. An adult Crab-eating Seal (*Lobodon carcinophagus*), from a photograph taken by R. W. SKELTON (Sk. 27, $\frac{1}{2}$ -plate), Jan. 3, 1902.

FIG. 2. The head of the same, from a photograph by R. W. SKELTON (Sk. 26, $\frac{1}{2}$ -plate), Jan. 3, 1902.

In the ice-pack of the open sea three species of Seals are commonly met with, the Sea Leopard, the Ross Seal, and the Crabeater; but of these only the last is at all abundant, and it appears to suffer more than any other from the attacks of the Killer Whales. It has a very peculiar dentition, which answers the purpose of a sieve for straining water from the mouth, leaving mud and the Crustaceans, which form its food, within, to be swallowed.

It has a creamy white coat of hair, with dapple-rings of a brown or buff colour on the shoulders and flanks.

The young one is born in a pure-white woolly coat, which is shed before the animal enters the water, and is replaced by a coat similarly marked to that of the adult, but of a richer brownish chocolate colour.

See *Nat. Hist. Rep.*, vol. ii., Mamm., pp. 31-34.

FIG. 1.

FIG. 2.

PLATE IX.—THE ROSS SEAL.

FIG. 1. From a photograph by R. W. SKELTON (Sk. 31, $\frac{1}{4}$ -plate), Jan. 7, 1902; taken on board the 'Discovery' in the pack-ice of Ross Sea.

FIG. 2. From a photograph by R. W. SKELTON (Sk. 29, $\frac{1}{4}$ -plate), Jan. 7, 1902; taken on board the 'Discovery' in the pack-ice of Ross Sea.

This, the least abundant of the five species of Seals which have been taken in the Antarctic, was discovered in 1842 by Sir James Ross. It lives mainly upon Cephalopods, and in dealing with them finds little or no use for the post-canine teeth, which are consequently ill-developed and variable in number, often quite loose, and occasionally absent altogether. Not so the canines and incisors, which have developed into needle-pointed recurved hooks of obvious usefulness.

The Seal is grey or brownish-grey above, lighter beneath, and streaked indistinctly with still paler lines upon the neck and sides.

Nothing is known of its breeding habits, and it has seldom been seen except in the open ice-pack. When full grown, it may have a length of 11 feet.

See *Nat. Hist. Rep.*, vol. ii., Mamm., pp. 41-50.

FIG. 1.

FIG. 2.

PLATE X.—THE SEA ELEPHANT AND THE SEA LEOPARD.

FIG. 1. A young Sea Elephant (*Macrorhinus leoninus*); from a photograph by R. W. SKELTON (Sk. 21, $\frac{1}{2}$ -plate), taken at the Macquarie Islands, Nov. 22, 1901.

FIG. 2. The head of an adult female Sea Leopard (*Stenorhynchus leptonyx*); from a photograph by R. W. SKELTON (Sk. 31, $\frac{1}{2}$ -plate), taken in the pack-ice of Ross Sea, Jan. 7, 1902.

The Sea Leopard, as may be guessed from its powerful teeth, is a seal which preys upon comparatively large animals. Emperor Penguins as well as Adélie Penguins have been found in its stomach, besides fish, and occasionally pieces of the young of other seals.

It attains the length of 12 feet, and has then a girth of about 6 feet. Its coat, which is of short straight hair, is iron-grey above, but beneath is lighter and marked with bold splashes of black, especially in the neighbourhood of the flippers, flanks, and shoulders. It frequents the coast as well as the open ice-pack, and is known also in Australia, New Zealand, and all the sub-Antarctic Ocean islands.

Only once was the Sea Elephant seen within the Antarctic Circle, and it must be considered a rare and occasional visitor. The specimen was a young male, about half grown, 10 feet in length, and with a girth of 8 feet under the fore flippers. In colour a uniform greyish yellow, rather darker above than beneath. This seal, the males of which grow to a length of 20 feet, was at one time abundant in the sub-Antarctic Ocean islands—Macquarie and Kerguelen, for example—but was almost exterminated. During our visit to the Macquaries we saw young males and females only, and none more than 7 or 8 feet long. Fig. 1 represents the sub-Antarctic vegetation of the Macquarie Islands. In the Antarctic there is no vegetation save a few insignificant little mosses and lichens.

FIG. 1.

FIG. 2.

PLATE XI.—THE ADÉLIE PENGUIN.

FIG. 1. Adélie Penguins (*Pygoscelis adeliæ*), on the run; from a photograph by R. W. SKELTON (S. 8, 5" × 4" plate), Feb. 1904; M'Murdo Sound.

FIG. 2. Adélie Penguins; from a photograph by R. W. SKELTON (S. 7, 5" × 4" plate), Feb. 1904; M'Murdo Sound.

Captain Scott has thus written of these Penguins in the pack-ice:—"The squawk of the Penguin was constantly heard in the ice-pack, at first afar, and often long before the birds were seen; curiosity drew them to the ship, and suddenly their small figures appeared on a floe at some distance, only to scurry across and leap into the water on the near side, when with what seemed extraordinary rapidity they bobbed up again, shooting on to the surface of some floe quite close to the ship. Here they paused and gazed at us with open-eyed astonishment, occasionally uttering a prolonged call, apparently to attract any of their fellows that might be in the neighbourhood. As the ship forced her way onward, these merry little companions would again and again leap into the water, journeying from floe to floe in their effort to find out what it all meant."

See Scott, *Voyage of the 'Discovery,'* vol. i., p. 122; also, *Nat. Hist. Rep.,* vol. ii., Aves, pp. 36-58.

FIG. 1.

FIG. 2.

PLATE XII.—CAPE ADARE.

FIG. 1 (Map A). From photographs by L. C. BERNACCHI (Be. 22 and 22a, $\frac{1}{4}$ -plates); taken from the ship, looking to the S.-W., Jan. 9, 1902.

FIG. 2 (Map A). From a photograph by R. W. SKELTON (Sk. 37, $\frac{1}{2}$ -plate); showing the headland from the N.-E., Jan. 9, 1902.

Sir James Ross, who first discovered this land in 1841, thus describes it in his *Voyage to the Antarctic Regions*, vol. i., p. 184:—

“Its northern point was called Cape Adare. . . . It is a remarkable projection of high, dark, probably volcanic, cliffs, and forms a strong contrast to the rest of the snow-covered coast. Some rocks that were observed to lie several miles to the north and west of Cape Adare, showing their black summits conspicuously amongst the white foam of the breakers, were named Dunraven rocks.”

Compare Plates CXXIX., CXXX.

FIG. 1.

FIG. 2.

PLATE XIII.—CAPE ADARE.

FIG. 1. From a photograph taken by E. H. SHACKLETON (Sh. 36, $\frac{1}{4}$ -plate); looking N.-W. from the moraine flats at Cape Adare, Jan. 9, 1902.

FIG. 2. From a photograph by R. W. SKELTON (Sk. 41, $\frac{1}{2}$ -plate); looking N. from the moraine flats at Cape Adare, Jan. 9, 1902.

The extensive "beach" at Cape Adare is a mass of re-sorted moraines. Its average height is somewhat less than 20 feet above the sea, and it consists of parallel series of ridge-and-furrow with amplitude of about four feet. The ridges, which are occupied by a large rookery of Adélie Penguins during summer, flatten northward; and the depressions, which contain stagnant water, sometimes join up and form large digitating ponds.

See Ferrar, *Nat. Hist. Rep.*, vol. i., p. 80.

On this "beach," in the middle of the Penguin "rookery," is the wooden hut which was built and inhabited by the members of the "Southern Cross" Expedition, sent out under Mr Borchgrevink by Sir George Newnes in 1898. It is visible in the centre of Fig. 2, just above the shore line.

FIG. 1.

FIG. 2.

PLATE XIV.—ADÉLIE PENGUINS AT CAPE ADARE.

From a photograph by R. W. SKELTON (Sk. 52, $\frac{1}{2}$ -plate), Jan. 9, 1902; looking in a southerly direction towards the head of Robertson Bay.

The Penguin "rookeries" are undoubtedly a great feature, not of Cape Adare only but of the whole Antarctic coast-line. The particular species here illustrated is known as the Adélie Penguin (*Pygoscelis adeliae*), and was so named because it was first discovered off the Adélie Land coast; but it is equally abundant, if not more so, off the coast of South Victoria Land, the South Shetlands, and Louis Philippe Land. "Rookeries" were met with in the 'Discovery's' cruise at the following places: Cape Adare, Possession Islands, Coulman Island, Wood Bay, Cape Jones, Cape Royds, Cape Bird, and Cape Crozier. So pungent is the smell of these nesting grounds, that on one occasion it carried and was recognised at a distance of thirty miles over Ross Island and the Great Ice Barrier.

Adelie Penguins at Cape Adare

PLATE XV.—CAPE ADARE.

FIG. 1 (Map A). From a photograph by Mr FORD (Fo. 215, $\frac{1}{4}$ -plate), taking Cape Adare from the N.-W., Jan. 9, 1902.

FIG. 2 (Map A). From a photograph by R. W. SKELTON (Sk. 39, $\frac{1}{2}$ -plate), taking Cape Adare from the N., Jan. 9, 1902.

“The peninsula of Cape Adare consists mainly of nearly horizontal sheets of basaltic lava laid one above the other to form a flat-topped promontory, which gradually increases in height from N.-W. to S.-E. Dykes occasionally cut across these sheets. The successive sheets are thinner and more numerous at the N.-W. extremity, but they become thicker, and are slightly inclined upwards two miles or so towards the S.-E.

“This approximately horizontal structure appears to be characteristic of the steep coast-line between Cape Adare and Cape Jones, a distance of about one hundred and fifty miles. This part of the coast is a cliff varying between 1000 and 2000 feet in height.”

See Ferrar, *Nat. Hist. Rep.*, vol. i., p. 17.

FIG. 1.

FIG. 2.

PLATE XVI.—THE ADÉLIE PENGUIN.

FIG. 1. From a photograph by L. C. BERNACCHI (Be. 44, $\frac{1}{4}$ -plate), Jan. 9, 1902; taken at the Cape Adare "rookery."

FIG. 2. From a photograph by R. W. SKELTON (Sk. 53, $\frac{1}{2}$ -plate), Jan. 9, 1902; taken at Cape Adare.

Young Adélie Penguins are clothed during the first four weeks of their existence after hatching in a complete covering of sooty-black down.

As they increase in size, so they become more ravenous for food, and this leads them to expose themselves to the attacks of Skua Gulls, which hover round, and to these they often fall an easy prey.

The old birds have, therefore, realised that some safety can be assured by grouping the chicks together as in Fig. 2. Round the group they station guards, whilst others go to sea for "shrimps." On their return, so worried are they by the hungry chickens that they feed them promiscuously simply to be rid of them, and then take a turn at nursing while the former nurses go to sea.

A month after hatching, the young birds begin to shed their down and appear in the first year's plumage of bluish-black feathers, with white front and throat, instead of the black throat of the adult, which appears only in the second year. Soon after this change the young bird is coaxed or driven by hunger to enter water for the first time, there to catch the Crustaceans which are to support its life.

See *Nat. Hist. Rep.*, vol. ii., Aves, p. 51.

FIG. 1.

FIG. 2.

PLATE XVII.—THE ADÉLIE PENGUIN.

FIG. 1. From a photograph by R. W. SKELTON (Sk. 49, $\frac{1}{2}$ -plate), Jan. 9, 1902 ; taken at Cape Adare.

FIG. 2. From a photograph by E. H. SHACKLETON (Sh. 37, $\frac{1}{4}$ -plate), Jan. 9, 1902 ; showing a Penguin pathway up the mountain side at Cape Adare.

It is not difficult to realise the interest and amusement which these busy colonies afford in such a waste of barren land and ice-covered sea as the Antarctic. The incessant movement and clamouring cries of the birds are almost bewildering, and their energy in chasing and scolding is equally unceasing and aggressive.

The birds can be seen in Fig. 2 making their way laboriously up a steep gully on the mountain side. Taken as it is from above, the photograph fails to represent the steepness of the climb thus voluntarily imposed upon themselves by these birds. Yet hundreds, for some unexplained reason, nest above the rugged cliffs rather than on the crowded flats below, where there is an abundance of room, notwithstanding the enormous numbers.

The columns of hard snow which form a quaint feature of this pathway are left standing accidentally between the intersecting tracks that began upon drifted snow but have long since worn down to the rock.

FIG. 1.

FIG. 2.

PLATE XVIII.—THE ADÉLIE PENGUIN.

FIG. 1. A young Penguin clamouring for food; from a photograph by Mr FORD (Fo. 35, $\frac{1}{4}$ -plate), Cape Adare, Jan. 9, 1902.

FIG. 2. Adélie Penguins changing place upon the nest, the cock and hen taking turns at incubation; from a photograph by C. R. ROYDS (R. 184, 5" $\times$ 4" film), Cape Crozier, Nov. 12, 1902.

The nest of the Adélie Penguin is a mere heap of pebbles (see Fig. 1). The parent birds produce two eggs, and when these are hatched by their combined exertions (see Fig. 2), the chickens are fed in the nest until hunger drives them to worry passers-by, in addition to their own parents, for food. In this chase they often wander far, and thoroughly exhaust themselves, and often too they fall victims to the marauding Skua Gulls. But the mere fact that they thus depend for food upon their own exertions, tends to sort out the weaklings, which not only become exhausted by their efforts to get fed, but are half-starved in failing to do so. Under the law of the "survival of the fittest" they are soon eliminated by such a very literal race for life.

See *Nat. Hist. Rep.*, vol. ii., Aves, p. 48.

FIG. 1.

FIG. 2.

PLATE XIX.—MOUNT SABINE.

FIG. 1 (Map A). From a photograph by R. W. SKELTON (S. 121, 5" × 4" plate); looking S. from Cape Adare to Mount Sabine, at the head of Robertson Bay, Jan. 9, 1902.

FIG. 2 (Map A). From a telephotograph by R. W. SKELTON (Sk. 44, $\frac{1}{2}$ -plate); looking S. from Cape Adare to Mount Sabine, at the head of Robertson Bay, Jan. 9, 1902.

Mount Sabine, the highest peak of the Admiralty Range, was discovered in 1841 by Sir James Clark Ross, who thus writes in his *Voyage to the Antarctic Regions* (vol. i., pp. 183, 185):—

"It was a beautifully clear evening, and we had a most enchanting view of the two magnificent ranges of mountains, whose lofty peaks, perfectly covered with eternal snow, rose to elevations varying from seven to ten thousand feet above the level of the ocean. The glaciers that filled their intervening valleys, and which descended from near the mountain summits, projected in many places several miles into the sea, and terminated in lofty perpendicular cliffs."

"The highest mountain of this range I named after Lieutenant-Colonel Sabine, of the Royal Artillery, Foreign Secretary of the Royal Society, one of the best and earliest friends of my youth, and to whom this compliment was more especially due, as having been the first proposer and one of the most active and zealous promoters of the expedition."

Compare Plate CXXX.

FIG. 1.

FIG. 2.

PLATE XX.—THE MOUNTAINS OF ADMIRALTY RANGE.

FIG. 1 (Map A). From photographs by Mr FORD (Fo. 217 and 219, $\frac{1}{4}$ -plates); looking S. from Cape Adare towards the head of Robertson Bay, Jan. 9, 1902.

FIG. 2 (Map A). From a telephotograph by R. W. SKELTON (Sk. 45, $\frac{1}{2}$ -plate); looking S. from Cape Adare to Mount Minto and Mount Adam, Jan. 9, 1902.

“The range of mountains extending to the N.-W. was called Admiralty Range, of which the higher and more conspicuous were distinguished by the names of the Lords Commissioners of the Admiralty under whose orders I was serving. Mount Minto, Mount Adam, and Mount Parker were named after the Right Honourable Earl Minto, the First Lord; Vice-Admiral Sir Charles Adam, K.C.B., . . . and Vice-Admiral Sir William Parker, Bart., G.C.B., . . . the two Senior Naval Lords.”—*Voyage to the Antarctic Regions*, by Sir James Clark Ross, R.N., vol. i., p. 185 (1847).

Compare Plate CXXX.

FIG. 1.

FIG. 2.

PLATE XXI.—POSSESSION ISLANDS.

FIG. 1 (Map A). From a photograph by R. W. SKELTON (S. 111, 5" × 4" plate); approaching the group from the S., Feb. 24, 1904.

FIG. 2 (Map A). From a photograph taken by R. W. SKELTON (S. 112, 5" × 4" plate); looking back to the S., after passing the group, Feb. 24, 1904.

The Possession Islands were discovered by Sir James Ross in 1841, when a landing was also made. Since then they have been visited by several other expeditions. The group consists of two larger and five smaller islands, which lie about five miles from the coast of South Victoria Land.

Consisting largely of columnar basalt and tuff, they have weathered into arches and pillars, which give the group a very picturesque appearance.

For details of their discovery, see Ross, *Voyage to the Antarctic Regions*, vol. i., p. 188.

See also, Scott, *Voyage of the 'Discovery,'* vol. ii., p. 376; and Ferrar, *Nat. Hist. Rep.*, vol. i., p. 4.

FIG. 1.

FIG. 2.

PLATE XXII.—COULMAN ISLAND.

From photographs by R. W. SKELTON (Sk. 58b and 58c, $\frac{1}{2}$ -plates), Jan. 15, 1902, taken from the N.-E. (Map A.)

The various points of interest about the piedmont-glaciers* of Coulman Island are described under Plates XXIII. to XXVI., where will also be found references to Mr Ferrar's report upon the same, and to Captain Scott's work. Attention may be drawn here to the extent of the ice-cap of the island, a feature which is lost in the pictures taken close inshore. This ice-cap is considerable, and even more so when viewed from the S. and W. (see Ross, *Voyage to the Antarctic Regions*, vol. i., p. 199), where it comes far lower, and is apparently considerably deeper. Compared with the ice-cap of the Balleny Islands, however (see Plate CXXVIII.), it may be taken as a proof that in S. lat. 67° , *i.e.*, at the Balleny Islands, the deposition of snow is greatly in excess of that in S. lat. $73^{\circ} 30'$, *i.e.*, at Coulman Island.

* "Piedmont-glaciers are formed by ice crowding on to a coastal plain at the foot of a mountain range. In South Victoria Land three types are distinguished: (a) normal piedmonts-on-land; (b) piedmonts-aground; (c) piedmonts-afloat."—Ferrar, *Nat. Hist. Rep.*, vol. i., p. 63.

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PLATE XXIII.—CAPE WADWORTH, COULMAN ISLAND.

FIG. 1 (Map A). From a photograph by L. C. BERNACCHI (Be. 52, $\frac{1}{4}$ -plate), Jan. 15, 1902; looking eastward.

FIG. 2 (Map A). From a photograph by L. C. BERNACCHI (Be. 50, $\frac{1}{4}$ -plate), Jan. 15, 1902; looking S.-W.

FIG. 3 (Map A). From a photograph by R. W. SKELTON (S. 56, 5" x 4" plate), Jan. 15, 1902; looking S.-W.

These three photographs illustrate the same subject, Cape Wadworth, with its piedmont-glacier, taken from opposite directions.

In the case of Fig. 1, it is worth while making a comparison between this and another photograph taken also by Mr Bernacchi two years before, and published in his book, *To the South Polar Regions*, p. 237. Two other photographs of this corner are given on page 241, and if only to indicate the want of change in the aspect of the glacier ice, they are interesting to compare with our own.

With the object of providing future expeditions with material for comparison, the ice-tongues of Coulman Island have been given more than a fair share of space in this collection. It may be hoped that more pictures of the same details will be forthcoming for comparison with these in the future.

FIG. 1.

FIG. 2.

FIG. 3.

PLATE XXIV.—COULMAN ISLAND.

FIG. 1 (Map A). From a photograph by E. H. SHACKLETON (Sh. 41, $\frac{1}{4}$ -plate), Jan. 15, 1902; showing part of the summit of Cape Wadworth.

FIG. 2 (Map A). From a photograph by E. H. SHACKLETON (Sh. 40, $\frac{1}{4}$ -plate), Jan. 15, 1902; showing the N.-W. side of the island.

FIG. 3 (Map A). From a photograph by R. W. SKELTON (S. 106, 5" $\times$ 4" plate), Feb. 23, 1904; taken from eastward of the island; shows part of its north-eastern shores.

"Piedmonts-aground are well represented along the sides of Coulman Island, which has bare cliff-sides and a flat snow-covered top. It is surrounded by a comparatively low ice-wall, produced by a *talus* of snow, which drifts off the top of the cliff, and accumulates along the cliff-sides to form a nearly continuous belt. . . . Such fringes as that of Coulman Island are sometimes as much as 15 miles long, but are rarely more than 2 miles broad. The snow encircles the rock-cliff up to heights of 200 to 400 feet above sea-level, and the seaward edge is not often more than 70 feet above water."—Ferrar, *Nat. Hist. Rep.*, vol. i., p. 66.

FIG. 1.

FIG. 2.

FIG. 3.

PLATE XXV.—THE PIEDMONT-GLACIERS OF CAPE WADWORTH.

From a photograph by R. W. SKELTON (Sk. 57, $\frac{1}{2}$ -plate), Jan. 15, 1902; looking to the E. (Map A.)

Whether the air had been cleared by a blizzard which had just spent itself, or whether some unrecognised conditions were the cause of it, there is no doubt that, while a landing was being made on this cape to deposit a record, an exceptionally brilliant series of photographs was taken. It has been thought well to perpetuate all these together, giving one or two piedmonts in what may appear to be unnecessary detail, for the sake of comparing them with similar pictures that may be taken in the future by other expeditions.

View of the ship's hull from the water

Glacier, Tongue of Cape Mudge, 'C'oodman, Island

PLATE XXVI.—CAPE WADWORTH, COULMAN ISLAND.

FIG. 1 (Map A). From a photograph by C. R. ROYDS (R. 87, 5" × 4" film),
Jan. 15, 1902.

FIG. 2 (Map A). From a photograph by C. R. ROYDS (R. 86, 5" × 4" film),
Jan. 15, 1902.

FIG. 3 (Map A). From a photograph by C. R. ROYDS (R. 88, 5" × 4" film),
Jan. 15, 1902.

All three Figures represent the detail of rock and ice around the small landing-place on Cape Wadworth, at the northern extremity of Coulman Island.

A record was again deposited here on the rocks, where a landing had once before been made by members of the "Southern Cross" Expedition, in 1899.

For an account of the discovery of this island on Jan. 17, 1841, by Sir James Ross, when still at a distance from it of more than a hundred miles, I may refer the reader to his *Voyage to the Antarctic Regions*, vol. i., p. 199 (1847).

FIG. 1.

FIG. 2.

FIG. 3.

PLATE XXVII.—CAPE ANNE OF COULMAN ISLAND, AND
CAPE JONES.

FIG. 1 (Map A). From a photograph by L. C. BERNACCHI (Be. 146, $\frac{1}{4}$ -plate), Feb. 23, 1904; looking S. towards Cape Anne, along the eastern side of Coulman Island.

FIG. 2 (Map A). From a photograph by R. W. SKELTON (Sk. 59, $\frac{1}{2}$ -plate), Jan. 15, 1902; looking N.-E. to Cape Jones from an inlet in the piedmont of Lady Newnes Bay.

Of Cape Anne, Sir James Ross writes in 1841:—"This land having been thus discovered on the birthday of a lady to whom I was then attached, and whom I have now the happiness of calling my wife, I gave her name to the extreme southern point—Cape Anne."—*Voyage to the Antarctic Regions*, vol. i., p. 199 (1847).

Cape Jones, named also by Sir James Ross after Captain William Jones, R.N., forms part of the base of one of the many volcanic cones which occur along this line of fault. In this case the cone rises to 3000 feet, and is completely snow-covered. In the inlet here figured the sea-ice is still intact, and upon it lie many Weddell Seals basking in the sun. On the left is the land-ice and on the right the ice of the piedmont-glacier. See also Plate XXVIII.

FIG. 1.

FIG. 2.

PLATE XXVIII.—LADY NEWNES BAY.

FIG. 1 (Map A). From a photograph by R. W. SKELTON (Sk. 60, $\frac{1}{2}$ -plate), Jan. 15, 1902; taken looking N.-E. to Cape Jones from the head of an inlet in the piedmont of Lady Newnes Bay.

FIG. 2. From a photograph taken by R. W. SKELTON (Sk. 62, $\frac{1}{2}$ -plate), Jan. 15, 1902; showing the edge of the land-ice which formed the western shore of the inlet in the Lady Newnes piedmont-glacier.

In Fig. 1 is shown a busy midnight scene. The 'Discovery' tied up to the fast sea-ice edge was at the same time supplied with ice for water, and with seal carcasses for food. Lady Newnes Bay is occupied by a piedmont-glacier, and in an inlet of the glacier these two pictures were taken, as well as Fig. 2 of Plate XXVII.

That the ice-cliff of Fig. 2 is the face of grounded land-ice is indisputably proved by the presence of the tide crack at its foot, shown well in this particular photograph. Compare also Plates LXXXI., LXXXII., and LXXXIII.

Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 8, 19, 67; and Scott, *Voyage of the 'Discovery'*, vol. i., p. 147.

FIG. 1.

FIG. 2.

PLATE XXIX.—CAPE CONSTANCE AND CAPE JONES.

FIG. 1 (Map A). From a photograph by C. R. ROYDS (R. 89, 5" × 4" film), Jan. 15, 1902; looking S.-W.

FIG. 2 (Map A). From photographs by L. C. BERNACCHI (Be. 20 and 20a, $\frac{1}{4}$ -plates), Jan. 15, 1902; looking S.-W.

FIG. 3 (Map A). Cape Constance from the W.; from a photograph by R. W. SKELTON (Sk. 58, $\frac{1}{2}$ -plate), Jan. 15, 1902.

These pictures illustrate the coast-line of the mainland to the W. of Coulman Island. The strip of foothills, of which these capes and the volcanic cone form a part, is here nearly twenty miles broad. "From the N. they can be seen to be decreasing slightly in height westwards toward the base of the Admiralty Range, and thus appear to mark off a longitudinal valley running parallel to the coast."—Ferrar, *Nat. Hist. Rep.*, vol. i., p. 18.

FIG. 1.

FIG. 2.

FIG. 3.

PLATE XXX.—THE SHORES OF WOOD BAY.

FIG. 1 (Map A). Mount Melbourne; from a photograph by R. W. SKELTON (S. 106, 5" × 4" plate), Feb. 21, 1902.

FIG. 2 (Map A). From a photograph by R. W. SKELTON (S. 103, 5" × 4" plate), Feb. 21, 1902.

Wood Bay, bounded by Mount Melbourne and Cape Washington to the S., and to the N. by Mount Monteagle and Cape Sibbald, is as fine a specimen of glacier scenery as may be found along this grand but ice-ridden and inhospitable coast.

Mount Melbourne is a volcano, but quiescent; though the fleecy clouds which so persistently hung upon the summit while it was in sight to us suggested that there were still vents open from which steam could issue. The excessively dirty ice-cliff shown in Fig. 2 may be taken probably as an indication of wind; the ice, covered with blown grit for countless ages, is now a fraction of its former depth. Such concentrations of old ice are abundant in South Victoria Land, where the rate of disintegration by evaporation and summer melting far exceeds the rate of deposition.

See also Plates XLVII. and CXXXI.

FIG. 1.

FIG. 2.

PLATE XXXI.—MOUNT MELBOURNE.

From a photograph by L. C. BERNACCHI (Be. 53, $\frac{1}{4}$ -plate), Jan. 18, 1902; looking westward. (Map A.)

Mount Melbourne is a volcanic cone of 8337 feet, presumably quiescent.

The sea-ice is here shown in the earlier stages of disintegration. The ridges which form a lip to the floes have been produced by constant collision, while the water-logged condition of those near at hand shows the effect of the wash and spray upon the ice which is exposed to the waves outside.

See also Plate IV. for the lip formation round pack-ice floes.

Handwritten text, possibly a signature or date, written vertically along the right edge of the dark rectangular object.

Mount Melbourne, Victoria, Australia

Mount Melbourne

PLATE XXXII.—THE SHORES OF WOOD BAY.

FIG. 1 (Map A). From a photograph by R. W. SKELTON (S. 102, 5" × 4" plate),
Feb. 21, 1904.

FIG. 2 (Map A). From a photograph by L. C. BERNACCHI (Be. 152, $\frac{1}{4}$ -plate),
Feb. 21, 1904.

FIG. 3 (Map A). From a photograph by R. W. SKELTON (S. 101, 5" × 4" plate),
Feb. 21, 1904.

In these pictures are represented parts of the coast-line between Cape Washington and Wood Bay, showing the manner in which the slopes of Mount Melbourne terminate seaward.

Bare foothills there are none, but ice-cliffs are abundant, broken here and there by massive crags of dark volcanic rocks. Bosses and buttresses, such as those shown in Figs. 1 and 3, stand out from the ice-bound coast and afford an insecure foothold here and there, with a gravel beach, for Seals and rookeries of Penguins. Compare Plate CXXXI.

Scott, *Voyage of the 'Discovery,'* vol. i., pp. 151, 156; vol. ii., pp. 157, 371.

Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 65, 81, 93.

FIG. 1.

FIG. 2.

FIG. 3.

PLATE XXXIII.—THE COAST OF SOUTH VICTORIA LAND.

- FIG. 1. From a photograph by L. C. BERNACCHI (Be. 144, $\frac{1}{4}$ -plate), Feb. 19, 1904; shows part of the coast-line of Wood Bay, a water-worn piedmont face extending from the foot of Mount Melbourne. The pack-ice is of a similar character to that which is illustrated and described in Fig. 1, Plate V.
- FIG. 2 (Map A). From a photograph by R. W. SKELTON (Sk. 69, $\frac{1}{2}$ -plate), Jan. 1902; looking westward to the coast of South Victoria Land, S. of Cape Washington, where a tabular range of mountains affords a very characteristic feature, and has been named Mount Nansen. See Plate CXXXIII.
- FIG. 3 (Map A). From a photograph by L. C. BERNACCHI (Be. 27, $\frac{1}{4}$ -plate), Jan. 1902; looking westward to the coast of South Victoria Land, a little N. of M'Murdo Sound. It illustrates part of the Prince Albert Range of mountains, so named by Sir James Ross.

Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 21, 65.

FIG. 1.

FIG. 2.

FIG. 3.

PLATE XXXIV.—CAPE WASHINGTON.

FIG. 1 (Map A). From a photograph by L. C. BERNACCHI (Be. 54, $\frac{1}{4}$ -plate), Jan. 18, 1902; looking to the N.

FIG. 2 (Map A). From a photograph by R. W. SKELTON (Sk. 67, $\frac{1}{2}$ -plate), Jan. 18, 1902; looking to the S.-S.-W.

This headland, in its general direction, no less than in its appearance and in the relation which it bears to Mount Melbourne, has a striking resemblance to Minna Bluff and Mount Discovery, farther south. In either case there is a volcanic cone with a long headland of volcanic rock tailing from it to the W. and S.-W., to terminate in a sudden bend to the S.

See Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 20, 22; also, Scott, *Voyage of the 'Discovery,'* vol. i., p. 151.

FIG. 1.

FIG. 2.

PLATE XXXV.—GRANITE HARBOUR.

From a photograph by L. C. BERNACCHI (Be. 29, $\frac{1}{4}$ -plate), Jan. 20, 1902.
(Map A.)

Granite Harbour, on the western side of M'Murdo Sound, was at one time very nearly chosen for our winter quarters. Captain Scott writes later as follows:—

“In fact, altogether there was a promise of snugness and security about this spot which we met nowhere else. It is only in looking back on our experiences that I can see how much we should have missed had we succumbed to the allurements of this tempting spot. Surrounded as we should have been by steep and lofty hills . . . our meteorological observations would have been comparatively valueless; but the greatest drawback would have been that we should have been completely cut off from travelling over the sea-ice beyond the mouth of our harbour. There can be no doubt that the sea-ice was constantly broken up along this coast in the winter of 1902 . . . and . . . it is possible we should never have reached even as far south as the spot at which we eventually wintered. It is when one remembers how naturally a decision to return to this place might have been made, that one sees how easily the results of the expedition might have been missed.”—Scott, *Voyage of the 'Discovery,'* vol. i., p. 159.

In Granite Harbour.

PLATE XXXVI.—GRANITE HARBOUR.

FIG. 1 (Map A). From a photograph by Mr FORD (Fo. 42, $\frac{1}{4}$ -plate), Jan. 20, 1902; taken from the ship at the farthest point to which the ice allowed an entry; shows the southern shores.

FIG. 2 (Map A). From a photograph by R. W. SKELTON (Sk. 70, $\frac{1}{2}$ -plate), Jan. 20, 1902; looking W. from the ship in M'Murdo Sound, to the entrance of Granite Harbour.

FIG. 3 (Map A). From a photograph by C. R. ROYDS (R. 91, 5" $\times$ 4" film), Jan. 20, 1902; taken looking N.-W. from the ship as she forced an entry into Granite Harbour; shows the northern confines.

Bounded on the N. by rocky cliffs, mainly granite capped by dolerite, and small glaciers (Fig. 3), and on the S. by screes and slopes (Fig. 1), Granite Harbour has the look of an exceptionally well-sheltered inlet. As we entered it, the ice was in the act of breaking up, and exhibited the curious regularity of fracture which can be seen in Figs. 1 and 3. At the head of the inlet is a glacier of small size, which reaches the water's edge, but this is completely hidden from sight at the entrance by a sudden bend in the direction of the sheltered fiord.

See Scott, *Voyage of the 'Discovery,'* vol. i., p. 157; Ferrar, *Nat. Hist. Rep.,* vol. i., pp. 32, 33.

FIG. 1.

FIG. 2.

FIG. 3.

PLATE XXXVII.—MOUNT EREBUS FROM THE N.-N.-W.

From a photograph by L. C. BERNACCHI (Be. 32, $\frac{1}{4}$ -plate), Jan. 22, 1902;
taken at a distance of over 40 miles. (Map B.)

This view better than any other shows the remnant of a former very extensive crater, almost half-way down the north-eastern slope. Within it the cone which now makes the upper third of the mountain's height has since been formed, with a crater whose edges are apparent as wide shoulders near the summit. The present small apical cone has grown up within the last, and now issues puffs of steam either intermittently or in continuous column; but greater activity than this was rarely seen, and never an overflow of lava.

Two or three times the canopy of "smoke" was lit up in the winter by a red glow from beneath, but only for a few seconds at a time.

See also Plates CXXXV. and CXXXVI.

Mount Erebus

PLATE XXXVIII.—MOUNT EREBUS.

FIG. 1 (Map B). From a photograph taken by Mr FORD (Fo. 201, $\frac{1}{4}$ -plate); looking N.-E. from the frozen surface of M'Murdo Sound, Dec. 1903.

FIG. 2 (Map B). From a photograph by R. W. SKELTON (Sk. 212, $\frac{1}{2}$ -plate); taken from the W.

FIG. 3 (Map B). From a photograph by R. W. SKELTON (Sk. 63, $\frac{1}{4}$ -plate), March 9, 1902; taken looking to the N.-N.-W. from the Barrier surface on the S. side of Ross Island.

At a height of 12,922 feet the pennant of "smoke" from the crater of Mount Erebus, which appears in Fig. 3, formed a valuable meteorological asset as a wind-vane for the upper air-currents.

Half-way down the right-hand slope, *i.e.* the eastern slope, also in Fig. 3, may be seen part of an old crater lip, the same which is most clearly visible in the photogravure Plate XXXVII., but appearing on the left side, since that picture is taken from the N., and this one, Fig. 3, is from the S.

Fig. 1 shows Mount Erebus from the S.-W., with some very typical storm clouds.

Compare Plates CXXXVII.—CXL.

FIG. 1.

FIG. 2.

FIG. 3.

PLATE XXXIX.—THE DELBRIDGE ISLANDS.

FIG. 1 (Map B). South end of Razorback Island; from a photograph by Mr FORD (Fo. 199, $\frac{1}{4}$ -plate), Dec. 1903.

FIG. 2 (Map B). Tent Island; from a photograph by Mr FORD (Fo. 198, $\frac{1}{4}$ -plate), Dec. 1903.

FIG. 3 (Map B). Razorback Island; from a photograph by R. W. SKELTON (Sk. 207, $\frac{1}{2}$ -plate), Nov. 4, 1902.

Four small islands, named after the second engineer on board the 'Discovery,' lie about twelve miles to the N. of Winter-quarters Bay, and about four miles to the S.-W. of Mount Erebus. Off Tent Island, which is given in Fig. 2, a very large number of Weddell Seals produce their young every spring, and it was here that a large camp was formed while attempts were made to saw a channel in the ice for the liberation of the ship in 1904.

The gravel areas upon the summit of these rocky islets are occupied in the summer months by scores of nesting Skua Gulls. The rock is entirely volcanic, and the four islets are probably remnants of a once continuous land-mass, forming part of Ross Island.

Ferrar, *Nat. Hist. Rep.*, vol. i., p. 16.

FIG. 1.

FIG. 2.

FIG. 3.

PLATE XL.—MOUNT EREBUS FROM THE S.-W.

From photographs by R. W. SKELTON (Sk. 213-215 inclusive, $\frac{1}{2}$ -plates), Nov. 4, 1902 ;
looking N.-E. from Tent Island. (Map B.)

The actual summit of Mount Erebus is in this picture clouded, but the heavy ice-cloak of the western slopes is well shown. Along the coast can be seen here and there outcrops of volcanic rock in high and steep cliffs, over the edge of which the ice-sheet breaks in cascades and avalanches.

Two of the Delbridge Islands are also visible standing up through the sea-ice. To the left of the centre is "Little Razorback Island," and "Razorback Island" covers the left end of the rocky cliffs on the extreme right of the picture. "Inaccessible Island," the third of this group of islets, is not visible in this picture, but lies to the left of the "Skuary," the rocky headland on the extreme left.

See also Plate CXXXVII.

PLATE XLI.—MOUNT EREBUS.

FIG. 1 (Map B). From a photograph by R. W. SKELTON (Sk. 62, $\frac{1}{4}$ -plate), March 9, 1902; showing Mount Erebus from the S. side of Ross Island.

FIG. 2 (Map B). From a photograph by L. C. BERNACCHI (Be. 37, $\frac{1}{4}$ -plate), March 1, 1902; showing Mount Erebus from Harbour Heights, looking to N.-N.-E.

FIG. 3 (Map B). From a photograph by E. H. SHACKLETON (Sh. 174, $\frac{1}{4}$ -plate), Oct. 1902; gives a somewhat similar view of Mount Erebus, taken from the top of Crater Hill, just above Winter-quarters Bay; Castle Rock appears in the middle distance.

Note in Fig. 1 that a puff of white vapour is making its way from the crater. Note also in Figs. 2 and 3 how the wide and symmetrical shoulders of the older crater enclose the more recent cone which has been formed within it.

The glacier-covering of this mountain on the S. and S.-W. sides is so complete that hardly anywhere can bare rock be seen.

In Fig. 2 a small low rocky islet, which is known as Tortoise Rock, from its shape, occupies almost the mathematical centre of the picture.

Compare Plates CXXXVIII.—CXL.

FIG. 1.

FIG. 2.

FIG. 3.

PLATE XLII.—MOUNT EREBUS FROM THE S.-S.-W.

From a photograph by R. W. SKELTON (Sk. 279, $\frac{1}{2}$ -plate), Oct. 6, 1903; looking N.-N.-E. from the sea-ice off Harbour Heights. (Map B.)

From this point the mountain appears with a very regular outline, and shows the small cone and crater which is at present active, situated within the former crater, whose wider shoulders stand out on either side. No suggestion of the still more extensive crater lip, visible on the N.-E. slope, is to be seen from here. Many old overflows of lava can be seen as rocky ridges running down the side from the lips of the uppermost craters.

The picture gives a very good idea of the sea-ice surface of M'Murdo Sound throughout the two years of the 'Discovery's' stay there.

Handwritten text, possibly a signature or date, located to the right of the dark rectangular object.

PLACE ALL-ROUND EARTH FROM THE S.W.

There is a description in E. W. Knight's book 273, 4 plates, 184, of 1892, entitled
"The E. W. Knight's notes on the Great Ditch" (May 18)

There is a point the mountain appears with a very regular course, and shows
the small ones and ridges which it is present with, situated within the former
ones, which is what might be seen on either side. The suggestion of the wall
and the mountain, which is visible on the E. W. slope, is so far away from here.
The mountain, if seen at the end of the ridge, runs down the slope
the mountain appears to be.

The ground is a very good one of the sea and is rather of the same nature
throughout the sea, which is the "Dunrobin" and then.

Mount Erebus.

PLATE XLIII.—MOUNT TERROR.

FIG. 1 (Map B). From a photograph taken by E. H. SHACKLETON (Sh. 46, $\frac{1}{4}$ -plate), Jan. 22, 1902; looking due S. from the open sea.

FIG. 2 (Map B). From a photograph by C. R. Royds (R. 176, 5" $\times$ 4" film), Nov. 2, 1902; looking S.-W. from the surface of the frozen sea.

FIG. 3 (Map B). From a photograph by R. W. SKELTON (Sk. 76, $\frac{1}{2}$ -plate), Jan. 23, 1902; looking S.-E. towards Mount Terror, from the open sea, and showing the N.-W. face of the mountain.

The highest distant point in each of these three pictures represents the crater summit of Mount Terror, a quiescent volcano, 10,775 feet above the level of the sea. Figs. 1 and 2 show how bare of ice are its eastern and north-eastern faces when compared with the N.-W. face in Fig. 3, and the whole of the S. and W. as seen in Plate XLIV. This deficiency of snow and ice on the eastern side is due probably to the prevailing southerly winds which sweep with terrific force round the lower eastern side of the island. Fig. 1 shows the slope, rising directly from the shore, upon which is established a most populous "rookery" of Adélie Penguins. In the centre of this "rookery" is fixed a record post, to which cylinders are attached by passing explorers, giving information as to their movements, and advice to facilitate relief in the event of accident. (See Plate XLV., Fig. 2.)

For details of the geology of Ross Island, of which Mount Terror forms a part, see Ferrar, *Nat. Hist. Rep.*, vol. i., p. 8 *et seq.*

See also, Scott, *Voyage of the 'Discovery,'* vol. i., p. 166 *et seq.*

FIG. 1.

FIG. 2.

FIG. 3.

PLATE XLIV.—MOUNT TERROR FROM THE SOUTH-EAST.

From photographs by R. W. SKELTON (Sk. 194-197 inclusive, $\frac{1}{2}$ -plates), Oct. 20, 1902; looking north-westward from the surface of the Barrier ice. (Map B.)

Mount Terror, like Mount Erebus, is completely glacier-covered on its southern side, yet not so deeply but that innumerable ice-falls and ice-cascades appear at various points, suggesting rocky cliffs and precipitous irregularities beneath. It is a comparatively frequent occurrence for avalanches to fall over these cliffs with a muffled roar and a cloud of snow-powder closely resembling an explosion.

But on the north-eastern slopes the whole appearance alters, and much dark rock appears from top to bottom, since the force of the southerly gales makes the settlement of snow impossible. Sastrugi or snow-dunes are formed at this corner of a great depth and extent, hard as ice, and chiselled out to sharp edges like white marble. Something is seen of these in the accompanying photograph, but in places the irregularity is such that travelling with sledges becomes quite impossible.

On the extreme right is a subsidiary crater, the Knoll, which looks down upon the Emperor Penguins' rookery bay, at the junction of the Cape Crozier cliffs and the Barrier ice-cliffs.

The crater at the summit of Mount Terror is 10,755 feet above sea-level. The camp is situated on a continuation of land-ice lying between the slopes of Mount Terror and the pressure ridges of the floating Barrier ice. Probably at this point the pressure ridges allow of tidal movement, and take the place of a more distinct and recognisable tide-crack.

PLATE XLV.—ADÉLIE PENGUINS.

FIG. 1. From a photograph by R. W. SKELTON (Sk. 38, $\frac{1}{4}$ -plate), Jan. 9, 1902; taken off Cape Adare.

FIG. 2 (Map B). From a photograph by C. R. ROYDS (R. 180, 5" × 4" film), Nov. 12, 1902; taken at Cape Crozier. The post with cylinders attached was erected in the centre of this large "rookery" in Jan. 1902, and eventually guided the relief ship 'Morning' to our winter-quarters in M'Murdo Sound.

Both pictures illustrate quaint and characteristic attitudes of the Adélie Penguin. In the upper one a group appears on an ice-floe, hesitating between curiosity at the sight of the ship and a feeling of discretion which does not always lead them to jump into the water, but rather to remain on the alert upon the ice; for, strange as it may seem, their one idea of danger being connected with Killer Whales and Sea-Leopards in the water, the more terrified they become even by men or dogs the less likely are they to leave the ice. In Fig. 2 the upright birds in the centre are "making love," while a bird on the right has evidently attempted to steal pebbles from the nest of her neighbour, who retaliates with picturesque but otherwise inexpressible language.

FIG. 1.

FIG. 2.

PLATE XLVI.—THE CLIFFS OF THE COAST OF ROSS ISLAND.

FIG. 1 (Map B). From photographs by C. R. ROYDS (R. m and R. n, 5" × 4" films); showing the high rock-cliffs of Cape Crozier.

FIG. 2 (Map B). From photographs by R. W. SKELTON (Sk. 57 and 58, $\frac{1}{4}$ -plates); showing one of the few exposed rock surfaces on the S. side of Ross Island.

The pictures contrast the marked difference that exists in this high southern latitude between the glacier-covering of the northern and southern sides of such land as Ross Island. In Fig. 1 the cliffs are almost bare of ice and snow. They lie at the foot of Mount Terror, 10,755 feet high, whose slopes at this point from base to summit present certainly more rock than ice. Fig. 2, on the other hand, represents one of the few and scanty rock exposures to be seen on the whole of the southern side. From base to summit the superimposing mountain is completely clothed with ice. The thickness of the ice-cap which falls in avalanches over these cliffs is about 100 feet. Note the irregularities in the surface of the Barrier at its foot, an exact parallel on a slightly smaller scale of the movement chasms met with farther South. (See Plates CVI. and CVII.)

FIG. 1.

FIG. 2.

PLATE XLVIL.—THE OLD GLACIER ICE OF ROSS ISLAND.

FIG. 1 (Map B). From a photograph by E. A. WILSON (W. 9, $\frac{1}{4}$ -plate), Oct. 20, 1903; looking N. to Ross Sea from the pressure ridges at Cape Crozier.

FIG. 2 (Map B). From a photograph by R. W. SKELTON (S. 17, 5" × 4" plate), Jan. 1904; a cliff of old ice on the S. side of Winter-quarters peninsula.

The ice-cliffs here shown are remnants of an older and far heavier ice-cap than that which exists in the Antarctic at the present time. The "ice-slabs," of which these figures show the section, with compressed and concentrated layers of grit and clear black ice, are now completely severed from their original sources. In the case of Fig. 1, this source must have been high on the slopes of Mount Terror, and in Fig. 2 must have formed an ice-cap completely covering the greater part of Winter-quarters peninsula. The summer disintegration of such old ice has been well described by Mr Skelton :—

"During the hot days of the latter part of December and early in January, an immense amount of melting goes on in the valley. On the glacier surface there is quite a loud "buzzing" sound, caused by the air-bubbles confined in the ice being freed and coming to the surface through water . . . every boulder in the moraines stands in a large pool of water, often 3 or 4 feet deep . . . and in one of many streams I calculated the flow of water to be about 53 tons per minute."—From a Report by R. W. Skelton, quoted by Capt. Scott. (See *Voyage of the 'Discovery,'* vol. ii., p. 142.)

Although this description applies really to the land-ice on the western side of M'Murdo Sound, it is applicable, as the icicles in Fig. 2 show, wherever the sun strikes dirty ice.

See also Plate XXX.

FIG. 1.

FIG. 2.

PLATE XLVIII.—THE CLIFFS OF CAPE CROZIER.

FIG. 1 (Map B). From a photograph taken by R. W. SKELTON (Sk. 183, $\frac{1}{2}$ -plate), Oct. 18, 1902; looking W. from the sea-ice off Cape Crozier.

FIG. 2 (Map B). From a photograph taken by R. W. SKELTON (Sk. 78, $\frac{1}{2}$ -plate), Jan. 23, 1902; looking S.-W. from the open sea off Cape Crozier.

The cliffs of Cape Crozier form the eastern extremity of Ross Island. Rising to a height of 800 feet, they consist largely of columnar basalt "and a yellow trachytic rock occurring in irregular lenticles in the mass of the cliff." (Ferrar, *Nat. Hist. Rep.*, vol. i., p. 10.)

In Fig. 1 may be seen evidences of the recession of the Barrier ice in the neighbourhood of this disturbed corner. The fragments of ice-cliff still attached to the rock, at a height of 40 or 50 feet along the foot of the cliffs, are remnants of the main Barrier sheet which must quite recently have occupied the bay.

FIG. 1.

FIG. 2.

PLATE XLIX.—WHERE LAND AND BARRIER MEET AT
CAPE CROZIER.

FIG. 1 (Map B). From a photograph taken by R. W. SKELTON (Sk. 192, $\frac{1}{2}$ -plate), Oct. 18, 1902; looking N.-W. from the pressure ridges at Cape Crozier; Ross Sea is just visible in the distance.

FIG. 2 (Map B). From a photograph taken by R. W. SKELTON (Sk. 79, $\frac{1}{2}$ -plate), Jan. 23, 1902; looking S. from the open sea, to the point of impact between land and Barrier.

We have here the same spot viewed from N. and S., and in each may be seen the mass of Barrier ice crumbling to pieces as it forces a way by the Crozier cliffs and floats to sea. Were it but possible to have a series of such photographs as these, taken by successive expeditions, and taken at the same spot with intervals of years, surely facts of great interest would be brought to view.

Compare, for example, the photographs which are accidentally comparable, Fig. 2 on this page and a similar photograph in Mr Bernacchi's book, *To the South Polar Regions*, p. 257, taken in 1899. The field of ice which appears then to have swept down from the slopes of Mount Terror to form an unbroken ice-slope to the sea, is now cut short to expose new rock-cliffs capped by cliffs of freshly fractured ice; the promontory is gone, leaving open what is possibly a new bay, for the one and only Emperor Penguin rookery yet known.

Ross's Barrier is advancing northward at the rate of nearly a third of a mile a year, but the sea-face is more rapidly receding, as we know by comparing observed positions of our own with those taken in 1840 by Sir James Ross. Instead of being now some 18 miles or more farther N. than it was in Ross's time, the sea-face of the Barrier is actually some 10 to 15 miles farther to the S.

FIG. 1.

FIG. 2.

PLATE L.—THE WESTERN END OF THE GREAT ICE
BARRIER FACE.

FIG. 1 (Map B). From a photograph taken by R. W. SKELTON (Sk. 190, $\frac{1}{2}$ -plate), Oct. 18, 1902; looking southward along the line of ice disturbance.

FIG. 2 (Map B). From a photograph taken by R. W. SKELTON (Sk. 189, $\frac{1}{2}$ -plate), Oct. 18, 1902; looking eastward from the sea-ice off Cape Crozier.

Both pictures are taken from the corner of Cape Crozier; but while Fig. 1 shows the basalt cliffs of Ross Island on the right and the ice-hummocks of the Barrier on the left, Fig. 2 shows the transition from the area of pressure hummocks on the right, to a comparatively stable and uniform ice-sheet on the left. The top of this ice-sheet is about forty feet above the level of the frozen sea, which forms the foreground of the picture.

The excessively dirty condition of the ice was due to the fact that Emperor Penguins had frequented the bay in hundreds throughout the winter months; and though none appear in the picture, there were still large numbers there in October, with their young, taking shelter under the cliffs inshore (see Plates LII.—LVIII.). The ice-cliff of Fig. 2 is the actual first mile at the W. end of the 500 miles of ice-cliff known as Ross's "Great Ice Barrier."

See Ross, *Voyage to the Antarctic Regions*, vol. i., p. 218; also, Scott, *Voyage of the 'Discovery,'* vol. i., p. 170.

FIG. 1.

FIG. 2.

PLATE LI.—THE PRESSURE RIDGES AT CAPE CROZIER.

FIG. 1. From a photograph taken by C. R. ROYDS (R. 154, 5" × 4" film), Oct. 18, 1902; looking eastward from the land-ice of the eastern extremity of Cape Crozier, Ross Island.

FIG. 2 (Map B). From a photograph taken by R. W. SKELTON (Sk. 191, $\frac{1}{2}$ -plate), Oct. 18, 1902; looking S.-E. from the land-ice of the eastern extremity of Cape Crozier, Ross Island.

There are five great pressure ridges in the Barrier ice at Cape Crozier. In each of the Figures here shown, the foremost ridge is that which abuts on the fast land-ice, and the contrast between the moving ice and the stationary is evident. In Fig. 1, for example, the camera was placed well back upon the land-ice, while the figure which appears in the centre of the picture stands on the edge of the stationary land-ice, looking down into a trough 20 feet deep, from the bottom of which rises the first tumbled pressure ridge of the moving ice-sheet, to a height of 40 or 50 feet.

In Fig. 2 the same contrast can be seen, while beyond the pressure ridges the level surface of the Great Ice Barrier stretches away indefinitely to the S. and E. Compare also Plate LII., which gives a bird's-eye view of these vast disturbances, and some idea of their extent. They have been traced for more than fifty miles, gradually increasing in magnitude from S. to N., but the climax of disturbance is at Cape Crozier.

FIG. 1.

FIG. 2.

PLATE LII.—THE PRESSURE RIDGES AT CAPE CROZIER.

From photographs by R. W. SKELTON (Sk. 180-182 inclusive, $\frac{1}{2}$ -plates), Oct. 18, 1902; looking E.-S.-E. from the Knoll (1000 feet), over the Great Ice Barrier. (Map B.)

The Knoll is the farther hill in Fig. 1, Plate XLIX. It is also to be seen on the extreme right of Plate XLIV. Standing on its summit, one may look over the apparently boundless snow-plain of the Great Ice Barrier to the S. and S.-E.; and in this picture all that lies to the right of the white ice-cliff is Barrier, and the white ice-cliff is its northern edge. The sea was frozen over in October when this set of photographs was taken. All that lies to the left of the white ice-cliff therefore is sea-ice, and on it are to be seen cracks running across the bay, and a small army of Emperor Penguins busy with their young. This is at present the only Emperor Penguin "rookery" known (see Plate LIII. for an account of its discovery). On the right of the picture can be seen the rock cliffs of Ross Island, against which the Barrier breaks, and the tumult of cracks and pressure hummocks thus caused are indistinctly seen beyond (see also Plates XLIX. to LIV.).

PLATE LIIL.—THE EMPEROR PENGUIN ROOKERY.

From a photograph by R. W. SKELTON (Sk. 184, $\frac{1}{2}$ -plate), Oct. 18, 1902; looking S. from the sea-ice.

This, the only rookery of its kind at present known, was discovered by Lieut.-Engineer Skelton, R.N., at Cape Crozier in October 1902. His report runs as follows:—

“Arriving at the edge of the Barrier, we looked directly down on what we at once realised was an Emperor Penguin rookery, as several dead young ones could be seen. The rookery is on sea-ice in a bay formed by high rocky cliffs on the West, and a sort of indentation in the face of the Barrier, or in what may be called the ridge-ice, on the East. The ice formed early in the winter in this bay is evidently held in during the whole of the winter, but a very short way out across the entrance the ice is continually going out. The number of adult birds using the rookery I should place at about four hundred. We counted two hundred and fifty in the rookery at one time, and others were constantly coming and going to the open water, engaged in fishing. The number of chicks alive was about thirty, and about eighty dead.”

On the right is the land and the land-ice of the eastern extremity of Ross Island. The tumbled mass on the left is the result of the movement of the great ice-sheet along the land.

Notwithstanding its bulk, five gigantic pressure ridges are upheaved in lines running at first parallel with the shore, but continuing for fifty miles to the S., before they disappear; while at the point of actual contact a chaos of huge ice-blocks is forced by an irresistible pressure northwards along the shore to pass the rocky headland.

1871

Photo. by Arthur S. Peckham, 1912

The Emperor Penguins at Cape Crozier.

PLATE LIV.—EMPEROR PENGUINS AT CAPE CROZIER.

FIG. 1. From a photograph by E. A. WILSON (W. 6, $\frac{1}{4}$ -plate), Oct. 19, 1903; taken from beneath the Cape Crozier cliffs, looking eastward along the sea-face of the Great Ice Barrier.

FIG. 2. From a photograph by C. R. ROYDS (R. x, 5" × 4" film), Oct. 18, 1902; looking S. from the sea-ice towards the point where the Barrier ice-sheet crushes itself upon the land.

From the upper picture an idea may be obtained of the nesting colony of a thousand Emperor Penguins which occupied the sea-ice of the bay between Cape Crozier and the Barrier ice-cliffs. Colour is required to give an adequate idea of the beauty of these birds. The head is jet black, and the back bluish grey. The breast is a beautiful lemon yellow, pale below but deepening to a rich golden-yellow patch on each side of the neck. A vivid streak of red and lilac on the lower bill contrasts with the jet-black head, and on all the feathers there is a gloss like satin sheen.

They stand upright to sleep, with their heads tucked in, so to speak, beneath the wings, though the tip of the bill is the only part that gets there. Occasionally they sleep also prone upon the breast. When bolt upright, they stand nearly four feet high, and turn the scale at 80 and even 90 lbs.

See *Nat. Hist. Rep.*, vol. ii., Aves, pp. 1-31.

FIG. 1.

FIG. 2.

PLATE LV.—EMPEROR PENGUINS.

FIG. 1. From a photograph by C. R. ROYDS (R. x, 5" × 4" film), Oct. 18, 1902; taken on the sea-ice at Cape Crozier.

FIG. 2. From a photograph by R. W. SKELTON (Sk. 186, $\frac{1}{2}$ -plate), Oct. 18, 1902; taken on the sea-ice at Cape Crozier, looking toward the disturbed area of pressure ridges.

Both pictures were taken at the Emperor Penguin rookery. The birds are standing upon sea-ice, and the groups are part of the breeding colony. One egg only is laid, and apparently only one bird in ten or twelve succeeds in laying, so that the greater majority are unemployed. They are not, however, altogether idle, for it appears that they all take turns at "sitting," handing over the egg or the chick to another nurse when hunger becomes pressing. As they live on fish it is necessary for them to enter the water, and this they do by means of natural cracks and Seals' blow-holes, which are hardly ever absent in the neighbourhood of Cape Crozier.

A short while before our visit in 1903 there evidently had been a fall of ice from the overhanging ice-cliffs while the birds were incubating their eggs. This so scared the "sitters" that many of them dropped their eggs and fled, and these were almost immediately frozen. To this accident we owe it that we became the possessors of about a dozen eggs, the first that had been found, except the single weathered "Drayton" egg, which was brought home by the Dumont D'Urville Expedition in 1840.

See *Nat. Hist. Rep.*, vol. i., Aves, p. 28.

FIG. 1.

FIG. 2.

PLATE LVI.—THE EMPEROR PENGUIN AND ITS YOUNG.

From a photograph by R. W. SKELTON (Sk. 187, $\frac{1}{2}$ -plate), Oct. 18, 1902; taken on the sea-ice off Cape Crozier.

The extraordinary method of carrying the young, common to the King and Emperor Penguins, is here well shown. The young bird instead of squatting on the ice, is supported on the *dorsum* of the parent's feet. In this position it is off the ice, and is further protected from the cold by a loose fold of thickly feathered skin which falls over it and can completely cover it from view.

There is no "pouch," such as has often been described, but does not really exist, in the case of the King Penguin. The methods employed by both King and Emperor are precisely the same; the former with a view to keeping its egg or chicken from wet mud, and the latter with a view to keeping the egg or chicken from the ice.

See *Nat. Hist. Rep.*, vol. ii., Aves, pp. 1-31.

Mr. [Name] and [Name]

An Emperor Penguin & its chick

PLATE LVII.—EGGS AND YOUNG OF THE EMPEROR PENGUIN.

FIG. 1. From a photograph by L. C. BERNACCHI (Be. 257, $\frac{1}{2}$ -plate), Sept. 22, 1903; shows a group of frozen Emperor Penguin chickens and eggs, in the attitudes in which they were found dead at the "rookery."

FIGS. 2 and 3. From photographs by R. W. SKELTON (Sk. 225 and 226, $\frac{1}{2}$ -plates), Oct. 1903; are of two young Emperor Penguins which were kept alive for some months in the ship.

FIG. 4. From a photograph by R. W. SKELTON (Sk. 220, $\frac{1}{2}$ -plate); represents, from left to right, the eggs of the Emperor Penguin (*Aptenodytes forsteri*), of the King Penguin (*Aptenodytes patagonica*), and of the Adélie Penguin (*Pygoscelis adeliae*). The weight of an Emperor Penguin's egg is 1 lb., and its length about five inches.

After counting the dead Emperor Penguin chickens, and the deserted and frozen eggs which were lying on the sea-ice at Cape Crozier, it was calculated, by comparing this number with the number of the living, that no less than 77 *per cent.* of the young birds die before they shed their downy plumage. There is no doubt that most of the deaths result from anxiety on the part of the unemployed adults to nurse, an anxiety which leads constantly to scimmages for the possession of a chick, whereby the chick is often damaged. If a living chick cannot be obtained, a dead one will often be taken as a substitute for the time, and as they are hard frozen, almost all the dead chickens show the effect of this *post mortem* nursing in a loss of limbs, or at least of downy covering.

See *Nat. Hist. Rep.*, vol. ii., Aves, pp. 5 *et seq.*

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

PLATE LVIII.—EMPEROR PENGUIN AND ITS YOUNG.

From a photograph by E. A. WILSON (W. 12, $\frac{1}{4}$ -plate), Oct. 19, 1903; taken on sea-ice at Cape Crozier.

In this instance the chicken has reached an age when its size interferes with the complete fulfilment of nature's wishes. The chicken is, therefore, compelled to be satisfied in a manner like the Ostrich, by hiding its head where it could wish to hide the remainder of its body. It is, perhaps, not at first obvious in this picture that the black projecting end of the chicken is its tail.

PLATE LIX.—EMPEROR PENGUINS.

FIG. 1. From a photograph by R. W. SKELTON (S. 88, 5" × 4" plate), Mar. 1904 ; a group of freshly moulted Emperor Penguins taken in M'Murdo Sound.

FIG. 2. From a photograph by R. W. SKELTON (Sk. 63, $\frac{1}{2}$ -plate), Jan. 15, 1902 ; a group of moulting Emperor Penguins taken in Lady Newnes Bay.

When the Emperor Penguin is about to shed its feathers it increases in apparent size for two reasons. First, because the feathers themselves, instead of lying close to the skin, are loose and ready to fall off ; and second, because the fat under the skin in which the new plumage is imbedded increases to the extent of an inch or more in thickness. This not only supplies nourishment to the growing feathers, but to the bird itself, which will not, on any account, enter the water during the three weeks of the moult, either to catch fish or even to avoid its enemies. The bird prefers to collect in parties on some fast and undisturbed ice, there to wait in patience until the trying business is completed.

See *Nat. Hist. Rep.*, vol. ii., Aves, pp. 19, 20.

FIG. 1.

FIG. 2.

PLATE LX.—THE EMPEROR PENGUIN AND ITS YOUNG.

From a photograph by R. W. SKELTON (Sk. 187, $\frac{1}{2}$ -plate), Oct. 18, 1902; taken on sea-ice off Cape Crozier.

The portrait given here is a companion picture to that shown in Plate LVI. Both were taken by Lieut.-Engineer Skelton, who, on a sledge journey with Lieut. Royds, was the first to discover the Emperor Penguin's breeding ground and young at Cape Crozier; up to the present time this is still the only "rookery" known of this very remarkable species of Penguin. The first egg (excepting always the "Drayton" egg, whose history is given in the *Nat. Hist. Rep.*, vol. ii., Aves, p. 28) was found shortly after, at the same spot, by Lance-Corporal Blissett, R.M.L.I., who formed one of a sledge party to Cape Crozier, also under Lieut. Royds, in Nov. 1902.

PLATE LXI.—EMPEROR PENGUINS.

FIG. 1. From a photograph by C. R. ROYDS (R. x, 5" × 4" film), Oct. 18, 1902; an adult Emperor Penguin, with the commencement of the Great Barrier ice-cliffs in the distance.

FIG. 2. From a photograph by C. R. ROYDS (R. x, 5" × 4" film), Oct. 18, 1902; group of adult Emperor Penguins tobogganing on sea-ice, with the Great Barrier ice-cliff in the distance.

The Emperor Penguin moves either in a very slow and stately manner by walking bolt upright, or more rapidly, if with less dignity, by dropping on to its belly and propelling itself forward with feet and wings, as though it were a feather-shod toboggan. In this manner it can move easily at the rate of a man running at full speed, on snow.

In the water, on the other hand, swimming powerfully with its wings, it moves as fast as any fish, a necessity both for procuring food and for avoiding Sea-Leopards and Killer Whales, which prey upon it.

FIG. 1.

FIG. 2.

PLATE LXII.—A HIGH ICE-CLIFF.

From a photograph by L. C. BERNACCHI (Be. 64a, $\frac{1}{4}$ -plate), Feb. 2, 1902.
(Map A.)

This, the highest ice-wall that we met with, had an estimated height of 280 feet above the water. It appeared as we returned on our way to the west along King Edward's Land. Most of the bergs by which we were surrounded here were grounded, and the ice-cliff along which we sailed formed the edge of a snow-plain rising southward very gradually to about a thousand feet, as an ice-cap to King Edward's Land.

See also Plate LXIV., in which Fig. 1 represents the same ice-cliff, from a different point of view.

The Cliff face of the head of the River

PLATE LXII.—A HIGH ICE-CLIFF.

From a photograph by L. C. BERNARDI (Box 64a, 1/2-plate), Feb. 2, 1900
(Map A.)

The highest ice-wall that we met with, had an estimated height of 280 feet above the water. It appeared as a continuous wall of ice, and was of the same height. Most of the time by which we were surrounded by ice was continuous, and the ice wall along the shore was not far from the edge of a large ice mass, and was probably no more than a continuation of the ice wall of Edward's Land.

See also Plate LXIV., in which Fig. 1 represents the same ice-cliff, from a different point of view.

Photo. C. A. Smith & Co. New York N. Y.

The Cliff face of the Coast, I. de. Horn

PLATE LXIII.—THE GREAT ICE BARRIER.

FIG. 1 (Map A). From a photograph by L. C. BERNACCHI (Be. 56, $\frac{1}{4}$ -plate), Jan. 24, 1902.

FIG. 2. From a photograph by Mr FORD (Fo. 37, $\frac{1}{4}$ -plate), Jan. 1902.

FIG. 3 (Map A). From a photograph by E. H. SHACKLETON (Sh. 50, $\frac{1}{4}$ -plate), Jan. 27, 1902.

FIG. 4. From a photograph by Mr FORD (Fo. 39, $\frac{1}{4}$ -plate), Jan. 1902.

These four pictures represent various portions of the sea-cliff or ice-face of Ross's Great Ice Barrier. As an almost uninterrupted ice-cliff, this seaward edge extends for some 500 miles, between Ross Island on the W. and King Edward's Land on the E. At one point dropping to 10 feet in height, it rises at another to 240 feet, and maintains an average of some 200 feet in all. Yet nowhere between 170° E. and 160° W. can the surface of the ice-plain to the S. be seen to rise. It forms one vast sheet of floating ice, technically known as a "piedmont-a-float," the disappearing remnant of an ice-sheet incredibly more vast and deep than that which now partially covers the South Polar area.

Ferrar, *Nat. Hist. Rep.*, vol. i., p. 67; also, Scott, *Voyage of the 'Discovery,'* vol. i., pp. 170 *et seq.*

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

PLATE LXIV.—THE GREAT ICE BARRIER.

FIG. 1 (Map A). From a photograph by E. H. SHACKLETON (Sh. 13, $\frac{1}{4}$ -plate), Feb. 2, 1902.

FIG. 2 (Map A). From a photograph by R. W. SKELTON (Sk. 89, $\frac{1}{2}$ -plate), Feb. 4, 1902.

Two extremes of the Great Barrier ice-cliff are here contrasted: in Fig. 1, the highest portion that was observed, far to the eastern end, measuring 280 feet in height from the water; and in Fig. 2, almost the lowest, measuring about 18 feet, and even to water-level close by, in Balloon Inlet. Had it been possible to photograph the 'Discovery' close in under the highest ice-cliff, the truck of her mainmast, being 97 feet above the water and 112 feet above the keel, would have equalled a third only of the whole cliff's height.

Three times the height of the vessel in Fig. 2, gives some idea of the magnitude of the cliff in Fig. 1.

The Great Barrier sheet moves northward at the rate of 45 yards per month; but, notwithstanding this, the sea-face is now on an average 10 to 15 miles farther S. than it was some sixty years ago, showing how still more rapid is its recession by breaking up, than is its advance by propulsion from the S.

Scott, *Voyage of the 'Discovery,'* vol. ii., pp. 300, 415, 416, 422, 428; Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 68, 82, 84.

FIG. 1.

FIG. 2.

PLATE LXV.—THE GREAT ICE BARRIER.

FIG. 1 (Map A). From a photograph by E. H. SHACKLETON (Sh. 48, $\frac{1}{4}$ -plate), Jan. 26, 1902; looking S. from the ship to the sea-face of Ross's Great Ice Barrier.

FIG. 2 (Map A). From a photograph by R. W. SKELTON (Sk. 88, $\frac{1}{2}$ -plate), Feb. 3, 1902; taken in Balloon Bight, where the 'Discovery' was tied to a low part of the Barrier during the ascent of the balloon.

The upper picture represents the most typical characteristics of the sea-face of Ross's Great Ice Barrier, showing a clean fractured surface, very little worn by weather or by water, opaque white in colour, with pure cobalt-blue light in the cracks and fissures, and a line of sea-green ice along the foot at the water-level. In height gradually changing from 40 or 60 feet to 100 and 200 and even to 280 feet from the level of the sea.

At the Balloon Bight, Fig. 2, the sea-face was so low that with the ship alongside one could step from the rail to the Barrier surface. This, however, was exceptional.

The black horizontal line crossing Fig. 2 is perhaps not easy to recognise as one of the ship's hawsers, by which she was tied up with an ice-anchor. This inlet is further discussed with Plate LXVI.

FIG. 1.

FIG. 2.

PLATE LXVI.—THE BALLOON INLET OF THE GREAT ICE
BARRIER.

FIG. 1 (Map A). From a photograph by E. H. SHACKLETON (Sh. 64, $\frac{1}{4}$ -plate), Feb. 4, 1902; taken from the balloon at a height of 400 feet; showing the 'Discovery' tied up to the Barrier side in the inlet, and the shadow of the balloon itself upon the Barrier surface.

FIG. 2 (Map A). From a photograph by E. H. SHACKLETON (Sh. 65, $\frac{1}{4}$ -plate), Feb. 4, 1902; taken from the balloon, looking down upon the surface of the Barrier, where some of the ship's company are seen looking upward.

The interest of this inlet of the Barrier lies in the fact that in 1841 Sir James Ross found a similar inlet at a corresponding position, but 30 miles farther to the N. and E., where now is open sea. We know also from other observations that the present Barrier face stands roughly ten or fifteen miles farther to the S. than it did in the days of Ross; but that this inlet should have retained its character and position is remarkable. It is probable (see Scott, *Voyage of the 'Discovery,'* vol. ii., p. 422) that it does so on account of a line of weakness which, as a "tide-crack," indicates the separation line between the floating ice of the Great Barrier, and the fast grounded ice and coast-line of King Edward VII.'s Land. The continuation of this line of weakness to the southward, or in any direction, if indeed such a continuation is eventually proved to exist, must then be considered the eastern boundary of Ross's Barrier and the western coast-line of King Edward's Land.

FIG. 1.

FIG. 2.

PLATE LXVII.—KING EDWARD'S LAND.

FIG. 1 (Map A). From a photograph by C. R. ROYDS (R. 170, 5" × 4"), Feb. 2, 1902; taken looking S.-E. over the ice-cap of King Edward's Land.

FIG. 2 (Map A). From a photograph by R. W. SKELTON (Sk. 85, $\frac{1}{2}$ -plate), Feb. 2, 1902; taken looking S.-E. over the ice-cap of King Edward's Land.

The rising surface of the ice-sheet, visible in these photographs as a grey line above the cliff, is in reality land-ice, and forms part of the ice-cap of King Edward's Land.

A tilted berg floats off the Barrier cliff in the centre of the lower picture, while to the right is a lower terraced berg whose level of submergence has altered from time to time. It was unfortunate that the condition of the weather made it impossible to photograph that part of King Edward's Land which not only exhibited ice-clad mountains, but here and there a piece of exposed rock cliff, visible through the ice-cap. (See Plate CXLI.)

Scott, *Voyage of the 'Discovery,'* vol. i., p. 180; Ferrar, *Nat. Hist. Rep.*, vol. i., p. 24.

FIG. 1.

FIG. 2.

PLATE LXVIII.—ANTARCTIC ICEBERGS.

FIG. 1 (Map A). From a photograph by L. C. BERNACCHI (Be. 150, $\frac{1}{4}$ -plate), Jan. 9, 1902; off Cape Adare.

FIG. 2 (Map A). From a photograph by R. W. SKELTON (S. 109, 5" $\times$ 4" plate), Feb. 26, 1904; N. of Smith Inlet.

The characteristics of an Antarctic iceberg are a flat top, perpendicular sides, and a length and breadth excessive in comparison with its height. Such a berg has been recorded with a length of 50 miles, and floating 400 feet above the water-level; but the generality are of far more modest measurements. They originate as pieces broken from the free edge of the great Barrier ice-sheets. (See also Plates LXIX. to LXXIV., representing various forms of berg and phases of disintegration.)

Scott, *Voyage of the 'Discovery,'* vol. ii., p. 408; Ferrar, *Nat. Hist. Rep.*, vol. i., p. 73.

FIG. 1.

FIG. 2.

PLATE LXIX.—ICEBERG AND ICE-ISLAND.

FIG. 1 (Map A). An ice-island off King Edward's Land; from a photograph by R. W. SKELTON (Sk. 81, $\frac{1}{2}$ -plate), Feb. 1, 1902.

FIG. 2 (Map A). An iceberg off Cape Adare; from a photograph by L. C. BERNACCHI (Be. 45, $\frac{1}{4}$ -plate), Jan. 9, 1902.

A considerable number of ice-islands, as opposed to icebergs, were observed off King Edward's Land. Varying in extent from half a mile to a mile or more across, they had all the same low, perpendicular sides, and a surface gradually rising to a rounded summit 200 or 300 feet above the sea, quite distinct from the flat top of an iceberg. Soundings taken round them proved them to be aground, and it is evident that no great length of time had elapsed since they formed a continuous part of the main ice-sheet, from which they are now separated by a channel of open water. They are, in fact, detached remnants of that ice-sheet, persisting only because they are bottomed upon shoals; and their disappearance, now that they are isolated, can be but a matter of a few years.

Scott, *Voyage of the 'Discovery,'* vol. i., p. 180.

FIG. 1.

FIG. 2.

PLATE LXX.—ANTARCTIC ICEBERGS.

FIG. 1 (Map A). From a photograph by R. W. SKELTON (Sk. 45, $\frac{1}{4}$ -plate), Feb. 1, 1902; showing an overturned and muddy iceberg off King Edward's Land. Note the boat, with men collecting specimens, at the foot of the iceberg.

FIG. 2. From a photograph by R. W. SKELTON (S. 108, 5" $\times$ 4" plate), Feb. 1904; showing another overturned iceberg.

Some streaks of brown and yellow mud in the overturned iceberg (Fig. 1) were the first indication that we had left the clean, floating ice of Ross's Great Ice Barrier, and were approaching a region where land-ice, or at least grounded ice, might be expected.

The surface of the Barrier was at this point obviously changing, and instead of being flat away to the S. for an indefinite distance as heretofore, it now gradually rose to form low, snow-covered eminences and long, rolling, ice-covered hills. The surface now came into view, and appeared grey above the white ice-cliff (see Fig. 1, Plate LXVII.), and this we now know was really the commencement of King Edward's Land.

FIG. 1.

FIG. 2.

PLATE LXXI.—A TILTED ICEBERG.

From photographs by R. W. SKELTON (Sk. 57 and 58, $\frac{1}{4}$ -plates), Jan. 1902.
(Map A.)

This berg, which was seen off the Great Ice Barrier, had a height of 150 feet and was tilted through an angle of about 45° . The flattened summit now plainly visible from below was at one time part of the horizontal surface of some great ice-sheet or "piedmont-afloat."

Ross's Great Ice Barrier has in the last sixty years lost a strip at the edge, 400 miles in length at least, and averaging 33 miles in width; an extent that is of 13,200 square miles of ice with a thickness of over a thousand feet, sufficient to account for a good many icebergs during these sixty years.

S. Island, 1889

From a distance 800 yards 1/2 ft.

A Tilted Iceberg.

PLATE LXXII.—ANTARCTIC ICEBERGS.

FIG. 1. From a photograph by R. W. SKELTON (S. 107, 5" × 4" plate), Feb. 1904 ; taken on the homeward voyage off South Victoria Land.

FIG. 2 (Map A). From a photograph by R. W. SKELTON (Sk. 46, $\frac{1}{2}$ -plate); taken outside Robertson Bay, Jan. 9, 1902.

In Figure 1 is exemplified a tabular iceberg of some considerable size, with water-worn caves. How typical this form is, may be judged by the second picture, in which eight or ten bergs are seen in the distance, all of a similar shape and size, and quite characteristic of the whole Antarctic region.

FIG. 1.

FIG. 2.

PLATE LXXIII.—ANTARCTIC ICEBERGS.

FIG. 1. From a photograph by L. C. BERNACCHI (Be. 55, $\frac{1}{4}$ -plate), Jan. 23, 1902; taken off Cape Crozier.

FIG. 2 (Map A). From a photograph by L. C. BERNACCHI (Be. 64, $\frac{1}{4}$ -plate), Feb. 2, 1902; taken off King Edward's Land.

FIG. 3 (Map A). From a photograph by E. H. SHACKLETON (Sh. 128, $\frac{1}{4}$ -plate), Feb. 2, 1902; taken off King Edward's Land.

In Figure 2 is exemplified the ordinary unweathered tabular iceberg with freshly fractured cliffs and a level top. Figure 1 represents a smaller example of the same type, with stratification lines, showing how the whole is made up of successive deposits of snow. In Figure 3 a more worn and weathered berg is shown, with many inequalities obscured by snow-drift.

FIG. 1.

FIG. 2.

FIG. 3.

PLATE LXXIV.—ANTARCTIC ICEBERGS.

FIG. 1. From a photograph by R. W. SKELTON (S. 110, 5" × 4" plate), Feb. 1904; taken on the voyage home, off the coast of South Victoria Land; a water-worn iceberg.

FIG. 2 (Map B). From a photograph by R. W. SKELTON (Sk. 210, $\frac{1}{2}$ -plate), Nov. 5, 1902; taken in M'Murdo Sound; a weather-worn iceberg.

These two figures contrast two different types of disintegrating iceberg. Fig. 1 shows typical water-worn caves in a tabular berg, and it will easily be understood that an undermining process such as this will be far more rapid than any process which attacks it from above, as, for example, in Figure 2, where the berg, frozen into sea-ice, remains for years exposed only to wind and the sculpturing action of snow-drift above sea-level. Except where there is grit or dirt in the ice, the sun's melting effect is practically negligible, even in the height of summer, though evaporation is active.

FIG. 1.

FIG. 2.

PLATE LXXV.—THE 'DISCOVERY'S' WINTER-QUARTERS.

From photographs by R. W. SKELTON (Sk. 115-119 inclusive, $\frac{1}{2}$ -plates), April 17, 1902; taken looking N. from the sea-ice off Hut Point. (Map B.)

In this photographic panorama, which gives a complete view of Winter-quarters Bay, Harbour Heights appear on the left above a dark rocky headland. Beneath is Arrival Bay, and in the foreground Hut Point, snow-covered, and carrying a flagstaff, since replaced by a large oak cross erected to the memory of seaman Vince, whose life was lost about a mile from this spot. To the right are the shore huts, and just over the ship, Crater Hill. To the right again, the Gap, dividing a long flat ridge from Observation Hill and Cape Armitage.

Compare Plates LXXVI., LXXVII., and CXXXVII.

ater Hill.

PLATE LXXVI.—THE 'DISCOVERY'S' WINTER-QUARTERS

FIG. 1. From a photograph by R. W. SKELTON (Sk. 142, $\frac{1}{2}$ -plate); showing the snow-drifts which accumulated round the stern of the ship in her winter-quarters.

FIG. 2. From a photograph by R. W. SKELTON (Sk. 102, $\frac{1}{2}$ -plate); showing the general disposition of the ship and the huts in winter-quarters. The picture is taken looking almost S. from Hut Point.

In the foreground of Fig. 2 are two small asbestos huts, piled up with snow, to keep the instruments for magnetic work within at a reasonably uniform temperature.

Half covering the ship is the large wooden living hut; and beyond the ship "the Gap," between the ridge of Crater Hill and Observation Hill, which rises to the right.

Several terraces of old moraine are visible on the left, below Crater Hill, indications of the greater extent of the ice at some previous period.

In Fig. 1 the noticeable feature in the snow-drifts round the ship is the clean-cut moat or trough between the wall of the drift and the weather-side of the ship. This trough is kept free of snow by the fury of the wind.

FIG. 1.

FIG. 2.

PLATE LXXVII.—THE 'DISCOVERY'S' WINTER-QUARTERS.

From photographs by R. W. SKELTON (S. 63 and 64, 5" × 4" plates), Jan. 1904 ;
taken looking S. from Harbour Heights. (Map B.)

In the far distance appears White Island on the left, then Black Island, and Mount Discovery on the right.

To the left of the ship a narrow white streak, the tide-crack, outlines the coast ; and between it and the ship appears the meteorological screen as a double dot.

The summer pools of open water are visible, where shallows run out from Cape Armitage on the left and Hut Point on the right ; it was with the hope of extending this water-hole at Hut Point into a canal to liberate the ship, that efforts were made by exploding guncotton beneath the ice. The picture was taken at the moment of exploding one of these charges, at the end of the water-hole on the right, where the column of ice and water is seen rising into the air.

Compare Plates LXXV. and LXXVI.

White Island.

Thaw-pool off Cape Armitage.

Black Island.

Hut Point and Thaw-pool.

Mount Discovery.

PLATE LXXVIII.—WINTER-QUARTERS.

FIG. 1 (Map B). From a photograph by E. H. SHACKLETON (Sh. 183, $\frac{1}{4}$ -plate); looking N.-E. from off Cape Armitage.

FIG. 2. From a photograph by R. W. SKELTON (Sk. 104, $\frac{1}{4}$ -plate); taken in the early spring, September, before the removal of the ship's winter awning.

Figure 1 gives a very fair idea of the brilliance of moonlight in the Antarctic winter. Such photographs may readily be taken with sufficient exposure, and the results are often excellent. This picture represents the thermometer screen which was placed $1\frac{1}{2}$ miles to the S. of the ship, as near the open Barrier as was feasible. The readings taken daily by Dr Koettlitz were almost constantly 10° to 15° F. lower than those taken at the screen in Winter-quarters Bay.

In this picture from left to right appear Observation Hill, Crater Hill, and Mount Erebus in the distance.

Figure 2 gives a view of the extent of snow-drift about the ship. The picture is taken looking to the S.-W. from close inshore.

FIG. 1.

FIG. 2.

PLATE LXXIX.—WINTER-QUARTERS BAY.

From a photograph by L. C. BERNACCHI (Be. 39, $\frac{1}{4}$ -plate), Mar. 1, 1902; showing the ice breaking up on our arrival.

The release of our ship by the break-up of the two-year-old ice which had held her in this bay for so long, was a happy contradiction of Captain Cook's surmise, that a ship once frozen into such a bay would never be released. The fate that he predicted was indeed very nearly the fate that met the ship's boats, which silently and with extraordinary rapidity disappeared from sight beneath the snow and water-logged themselves in rotten ice.

The greatest thickness of sea-ice alone where snow was not deposited, reached 8 feet $5\frac{3}{4}$ inches; but compacted snow-drifts to 20 and 30 feet were also formed about the ship.

The picture represents the ice breaking up in Winter-quarters Bay on our arrival in 1902, allowing the ship to take up the position in which she eventually was held for two years.

PLATE LXXIX.—WILSON'S QUARTERMASTER.

From a photograph by L. C. BEHN, U. S. A., 1899, taken at the time of the ice breaking up on our arrival.

The photograph was taken at the time of the ice breaking up on our arrival at the station. The photograph was taken at the time of the ice breaking up on our arrival at the station. The photograph was taken at the time of the ice breaking up on our arrival at the station. The photograph was taken at the time of the ice breaking up on our arrival at the station.

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The "Discovery" Winter quarters

PLATE LXXX.—THE ICE OF WINTER-QUARTERS BAY.

FIG. 1. From a photograph by R. W. SKELTON (S. 65, 5" × 4" plate), Feb. 14, 1904, 10 P.M.; looking N.-W. from Hut Point towards the approaching relief ships, 'Morning' and 'Terra Nova.'

FIG. 2. From a photograph by R. W. SKELTON (S. 73, 5" × 4" plate), Feb. 14, 1904; looking S. from the shore of Winter-quarters Bay, showing the 'Discovery' still fast in the ice and the two relief ships tied up to its edge.

The tilt of the 'Discovery' in Fig. 2 shows how the stern of the ship was gripped by the ice through the presence of side-strengthening pieces on the after end of the keel. The stern was in this way depressed with the ice-floe, and it was not until after the last charge of guncotton had been fired beneath the ice just ahead of the ship that it lifted as much as 2 or 3 feet, and the ship floated once more on an even keel.

During the summer months, both at Cape Armitage and at Hut Point, the sea-ice gradually melted from below, owing to currents of water, and a large area opened up each year in January at either cape, to form a water-hole. This is illustrated in the foreground of Fig. 1, which shows the water-hole just below Hut Point. Compare Plate LXXVII., where both water-holes are seen.

See also, Scott, *Voyage of the 'Discovery'*, vol. ii., pp. 458, 459; and Ferrar, *Nat. Hist. Rep.*, vol. i., p. 59.

FIG. 1.

FIG. 2.

PLATE LXXXI.—THE SHORE-ICE AT HUT POINT.

FIG. 1. From a photograph by R. W. SKELTON (S. 38, 5" × 4" plate), Feb. 1, 1904.

FIG. 2. From a photograph by R. W. SKELTON (Sk. 112, $\frac{1}{2}$ -plate), April 17, 1902.

The shore-ice of South Victoria Land ends, as a rule, sharply with a perpendicular ice-wall seawards; a wall which varies from 3 to 300 feet in height.

Two types of shore-ice fringe may be distinguished—

1. Fringe due to frozen sea-spray.
2. Fringe of glacier-ice adherent to the land.

At Hut Point both fringes were exemplified from time to time; the second is pictured in these two photographs, which were taken when the sea was, and had long been, frozen over. The broken pieces which have fallen on to the sea-ice are detached by the constant movement that occurs along the tide-crack.

Acting on the corniced fringe, which outgrows its stability afresh with every snowstorm, this movement is incessantly at work to keep a sharp line of division between the land-ice and the floating sea-ice.

See Ferrar, *Nat. Hist. Rep.*, vol. i., p. 61; and compare Plates XXVIII., LXXXII., and LXXXIII.

FIG. 1.

FIG. 2.

PLATE LXXXII.—TIDE-CRACKS AND SHORE-ICE.

FIG. 1. From a photograph by E. H. SHACKLETON (Sh. 148, $\frac{1}{4}$ -plate), Sept. 9, 1902.

FIG. 2. From a photograph by C. R. ROYDS (R. 118, 5" $\times$ 4" film), Feb. 1902; showing Hut Point as it appeared soon after our arrival, and before the sea became frozen over.

In Fig. 1 the small crack known as the "tide-crack" is seen along the lower edge of the shore ice-cliff, dividing it from the sea-ice. It is a rare thing to find this crack obliterated by a snow-drift, or even temporarily masked, so long as the thickness of the floating ice is not excessive. The whole angle between the land-ice cliff and the sea-ice may be filled with a sloping snow-drift 200 or more feet high; but even so, the crack will be found somewhere along the slope of the drift, very small perhaps, but still visible, and possibly very high up instead of at the level of the sea-ice. Only when the slope of snow-drift extends for miles from land upon a true Barrier ice-sheet is it hard to find where the line of movement lies, and impossible often to find a crack; as, for example, at certain places along the S. side of Erebus Island. The water running from the ice-face in Fig. 2 is not an indication of melting in the land-ice, but merely the drip from the wash of a wave which has recently swept along it. (See Plates XXVIII. and LXXXI.)

FIG. 1.

FIG. 2.

PLATE LXXXIII.—SHORE ICE-CLIFFS.

FIG. 1 (Map B). From a photograph by E. H. SHACKLETON (Sh. 202, $\frac{1}{4}$ -plate), Mar. 1902; looking E. from the sea-ice of M'Murdo Sound towards the western shore of Winter-quarters Peninsula.

FIG. 2 (Map B). From a photograph by E. H. SHACKLETON (Sh. 175, $\frac{1}{4}$ -plate), Oct. 1902; looking E. to Castle Rock from the sea-ice of M'Murdo Sound.

FIG. 3 (Map A). From a photograph by E. H. SHACKLETON (Sh. 43, $\frac{1}{4}$ -plate), Jan. 15, 1902; showing the ice-cliff of Lady Newnes piedmont-glacier, and a "rookery" of Weddell Seals on sea-ice in the inlet.

In each of these three pictures is represented a high ice-cliff forming the edge of the land-ice where it abruptly terminates in the sea. At the foot of these cliffs in every case is to be found a tide-crack, separating the land-ice from the floating sea-ice. This is well shown in Fig. 2 of Plate XXVIII. and in Fig. 1 of Plate LXXXII. The height of these cliffs may reach between 200 and 300 feet, or they may be as low as 3 feet; it appears to vary with the depth of the water beneath them, as with cliffs of rock.

FIG. 1.

FIG. 2.

FIG. 3.

PLATE LXXXIV.—M'CORMICK'S SKUA GULL.

FIG. 1. From a photograph by Mr FORD (Fo. 158, $\frac{1}{4}$ -plate), Dec. 1902; M'Cormick's Skuas (*Megalestris maccormicki*), bathing in a freshwater pool, near 'Discovery's' winter-quarters.

FIG. 2. From a photograph by Mr FORD (Fo. 151, $\frac{1}{4}$ -plate); M'Cormick's Skua; Dec. 1902.

Freshwater pools occur in sheltered valleys at the height of summer, as the result of the absorption of the sun's radiant heat by dark rock, which melts the snow and ice adjacent to it. In this way, so long as the sun is not obscured by clouds, there may be open water-pools when the temperature of the air is many degrees below freezing point.

The Skuas were fond of bathing at these pools; but so accustomed were they to satisfy their thirst with snow instead of water, that even here fan-shaped grooves were scooped in the snow by their bills, and were to be found all round the edges of the pool.

M'Cormick's Skua is migratory, following the Penguins southward to their breeding haunts in spring, and nesting in close neighbourhood with them. They lay two eggs in a depression of the morainic gravel; but of the two chicks which are hatched by each pair of birds, not more than one survives the first week or so, the other invariably disappearing.

Their food consists of Penguins' eggs and chicks, fish and crustaceans, as well as the eggs and chicks of their own kind, and in fact anything they can get.

See *Nat. Hist. Rep.*, vol. ii., Aves, pp. 64-76.

FIG. 1.

FIG. 2

PLATE LXXXV.—THE WEDDELL SEAL.

FIG. 1. From a photograph by R. W. SKELTON (S. 35, 5" × 4" plate); Weddell Seal taken in M'Murdo Sound; Feb. 1904.

FIG. 2. From a photograph by R. W. SKELTON (Sk. 221, $\frac{1}{2}$ -plate); Weddell Seal, taken as it rises to breathe at its blowhole in the ice; Nov. 1902.

The Weddell Seal (*Leptonychotes weddelli*) is the most abundant of all the Antarctic Seals. It reaches a length of about ten feet in the adult. It is a coast frequenter, and non-migratory, remaining as far S. as any known animal during the winter. It feeds on fish, which it obtains by entering the water through holes in the ice, and these holes are kept open for breathing, and egress or ingress throughout the year.

During the summer months far more of their time is spent basking in the sun upon the ice than in winter; but from the frequency of their visits to the blowholes in the winter, the ice, being constantly broken through, never freezes over very firmly, notwithstanding the cold.

The short hair, though useless as a fur, is handsomely marked with black and silver grey.

FIG. 1.

FIG. 2.

PLATE LXXXVI.—THE WEDDELL SEAL AND ITS YOUNG.

FIG. 1. From a photograph by Mr FORD (Fo. 102, $\frac{1}{4}$ -plate); taken in M'Murdo Sound, Oct. 26, 1902.

FIG. 2. From a photograph by R. W. SKELTON (Sk. 267, $\frac{1}{2}$ -plate); taken in M'Murdo Sound, Oct. 8, 1903.

The Weddell Seal owes much of its safety to retiring habits. It lives entirely along the coast, and produces its young as far as possible from open water. At Pram Point, for example, where these two photographs were taken, the colony of Seals was some 15 or 20 miles from the nearest open water, yet the sea, though frozen over, was full of fish, and was easily entered by cracks and blowholes. A large number of young Weddells was produced amongst these pressure-ridges each year, about the third week in October.

See *Nat. Hist. Rep.*, vol. ii., Mammals, p. 18.

FIG. 1.

FIG. 2.

PLATE LXXXVII.—YOUNG WEDDELL SEALS.

FIG. 1. A young Weddell Seal, just born. From a photograph by R. W. SKELTON (Sk. 208, $\frac{1}{2}$ -plate), Nov. 4, 1902; taken in M'Murdo Sound.

FIG. 2. Young Weddell Seal, about three weeks old. From a photograph by R. W. SKELTON (Sk. 223, $\frac{1}{2}$ -plate), Nov. 26, 1902; taken in M'Murdo Sound.

The woolly coat in which the infant Weddell Seal is born has but indistinct markings of a darker and a lighter shade on a buff-grey ground. During the first month of its life the seal lies out upon the ice, and lives on the mother's milk. It has a cry like the "baah" of a sheep, and is far more suspicious of the approach of man than its parents, and much more timid.

In Fig. 2 the woolly coat is shown in the process of moulting. This begins in the third week and is completed by the end of the fourth week, when the animal first enters the water to feed itself.

FIG. 1.

FIG. 2.

PLATE LXXXVIII.—THE WEDDELL SEAL.

FIG. 1. A young Weddell Seal in its first year. From a photograph by Mr FORD (Fo. 96, $\frac{1}{4}$ -plate); taken in M'Murdo Sound, Oct. 19, 1902.

FIG. 2. An adult female. From a photograph by R. W. SKELTON (Sk. 224, $\frac{1}{4}$ -plate); taken in M'Murdo Sound, Nov. 27, 1902.

After the woolly hair in which it is born is shed, during the latter half of the first month of its life, the young Weddell Seal at once assumes the handsomely marked skin of the adult, with shades of black, silver-grey, and white, in rich contrast and in very variable proportions.

Its method of progression upon ice is slow and clumsy. It consists of a succession of efforts to hitch forward the hinder half of the body and to shoot forward the head and shoulders. The result is a gait somewhat resembling that of a looper caterpillar. The limbs are not used for progression either on ice or in water, but are employed chiefly for scratching various parts of the irritable body, while the animal lies upon the ice, and for directing the animal's course when it enters the water.

FIG. 1.

FIG. 2.

PLATE LXXXIX.—CLOUD EFFECTS IN THE ANTARCTIC
REGION.

FIG. 1. From a photograph by Mr R. FORD; showing the ship after a heavy blizzard, when the drifts around her were so excessive that even the guide-posts were nearly buried.

FIG. 2. From a photograph by Mr R. FORD; showing typical fracto-stratus clouds.

It would be absurd in half a page to try to give an account of the beauty of the cloud effects which are to be seen in the Antarctic regions. But the shortest word about the magnificence of the colour may serve to correct a very widespread and mistaken notion as to the monotonous whiteness, greyness, and general want of colour in the far South. It is, as a matter of fact, a most grand and beautiful part of our globe, where for weeks on end in spring and in autumn, gold and fiery orange, purple and pale blue and green, crimson and rosy tints, all seem to vie with one another in their efforts to ring new changes of colour on an altogether glorious canvas of light and shade.

FIG. 1.

FIG. 2.

PLATE XC.—VARIOUS FORMS OF NEW SEA-ICE.

- FIG. 1. From a photograph by E. H. SHACKLETON (Sh. 55, $\frac{1}{4}$ -plate); taken after a fall of snow at sea, Jan. 31, 1902.
- FIG. 2 (Map B). From a photograph by L. C. BERNACCHI (Be. 78, $\frac{1}{4}$ -plate); taken off Danger Slope, Mar. 14, 1902; showing the "lane" formation of new sea-ice formed in a slight breeze, and after a fall of snow.
- FIG. 3. From a photograph by E. H. SHACKLETON (Sh. 112, $\frac{1}{4}$ -plate); taken in M'Murdo Sound, Apr. 29, 1902; showing the efflorescence of salt crystals and ice-flowers on new sea-ice.
- FIG. 4. From a photograph by R. W. SKELTON (Sk. 146, $\frac{1}{2}$ -plate); showing crystals which Mr Hodgson describes as forming in sea-water on his fishing lines, in gradually diminishing quantity from the surface downwards, to a depth of about seventeen fathoms where the line was clear. (Ferrar, *Nat. Hist. Rep.*, vol. i., p. 55.)

Ice-flowers which result from the freezing of the sea, as in Fig. 3, are always extremely salt. They crystallise in rosettes from the concentrated brine which is left upon the surface of newly formed sea-ice, when frozen in still weather. If, on the other hand, the sea is chilled sufficiently by a fall of snow or a blizzard, small roughly hexagonal pans of ice with upturned edges are formed in millions, and the appearance of the ice is then as in Fig. 1, or from a distance as in Fig. 2.

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

PLATE XCI.—SNOW-DUNES.

FIG. 1 (Map B). From a photograph by L. C. BERNACCHI (Be. 126, $\frac{1}{4}$ -plate), Oct. 22, 1902; taken looking S. on the hills about the 'Discovery's' winter-quarters. Crater Hill forms the background.

FIG. 2 (Map B). From a photograph taken simultaneously by E. H. SHACKLETON (Sh. 172, $\frac{1}{4}$ -plate); looking N. over the same patch of snow-dunes; the sea-ice of M'Murdo Sound forms the background, beyond the rocky tops of Harbour Heights; Oct. 22, 1902.

These two pictures, giving views from opposite sides of the same snow-dunes or "sastrugi," were taken 400 feet above sea-level. The snow thus modelled is hard like ice, and merely chips when struck with an iron shovel. It is, however, still opaque and white, not blue or translucent.

Ferrar, *Nat. Hist. Rep.*, vol. i., p. 84.

FIG. 1.

FIG. 2.

PLATE XCII.—SNOW SURFACES.

FIG. 1. From a photograph by E. H. SHACKLETON (Sh. 170, $\frac{1}{4}$ plate), Oct. 1902.

FIG. 2. From a photograph by E. H. SHACKLETON (Sh. 171, $\frac{1}{4}$ plate), Oct. 1902.

The innumerable changes in the appearance of hard snow surfaces, two of which are represented here, and other two on Plate XCI., are due to changes in the direction of the wind acting on the snow-dunes or "sastrugi," which were originally laid down in elongated domes and crescent hollows. With a change in the wind's direction, "the silting snow helps the wind and behaves like a sand-blast, cutting away both the soft and the hard layers."

Ferrar, *Nat. Hist. Rep.*, vol. i., p. 84.

FIG. 21.

FIG. 2.

PLATE XCIII.—ICE-SLABS.

FIG. 1 (Map B). From a photograph by A. B. ARMITAGE (A. 16, $\frac{1}{2}$ -plate), Dec. 10, 1903; looking westward to the Royal Society Range from the western shores of M'Murdo Sound. (See Plate XCIV., giving a near view of the glacier-face which can be seen in the mid-distance of this figure.)

FIG. 2 (Map B). From a photograph by A. B. ARMITAGE (A. 15, $\frac{1}{2}$ -plate), Dec. 9, 1903; looking westward to the Royal Society Range from the western shores of M'Murdo Sound.

Ice-slabs are to be found occupying all the valleys amongst the foot-hills on the eastern side of the Royal Society Range. They are the remnants of glaciers which once drained the main snow valley, and continued their course to the coast. They are now cut off from their original source and terminate in ice-cliffs some miles from the actual coast, leaving about them, as they gradually dwindle, a valley strewn with morainic rock-débris and boulders.

Ferrar, *Nat. Hist. Rep.*, vol. i., p. 73.

FIG. 1.

FIG. 2.

PLATE XCIV.—THE FRONT OF A GLACIER.

From a photograph by A. B. ARMITAGE (A. 17, $\frac{1}{2}$ -plate), Dec. 10, 1903; being a near view of the face of the glacier which appears in Fig. 1, Plate XCIII. (Map B.)

The ice-face here represented forms the front of one of the valley glaciers flowing eastward to within a mile of the western shore of Discovery Gulf.

It has a surface deeply scored by thaw streams, which in places reach the ice-cliff edge and form cascades of icicles in falling over.

The glacier rests upon a bed, some twenty feet in thickness, of fine silt or mud and gravel, which, as the picture shows, is soon worn into tent-shaped ridges when exposed, by the melting of ice-fragments fallen from the face.

It is typically a disappearing glacier, as can be seen by the wide moraines deposited and left far beyond its present reach.

1871. 10. 10. 10. 10.

From Glacier Engineering Co.

A Glacier Front.

PLATE XCV.—KOETTLITZ GLACIER.

From photographs by A. B. ARMITAGE (A. 10-12 inclusive, $\frac{1}{2}$ -plates), Dec. 7, 1903; taken from the southern extremity of the Royal Society Range foot-hills, at a height of 2450 feet above sea-level, and including an angle from S.-E. through S. to S.-W. (Map B.)

There is abundant evidence in this panorama of the recession of glaciers in these latitudes. On the right of the picture, for instance, is a valley basin strewn with moraine which was at one time buried under many hundreds of feet of ice. But now all that remains in the basin is the deposited moraine, while three ice-slabs, fast disappearing year by year in summer streams, fail even to reach the valley which once they overfilled.

The panorama shows Koettlitz Glacier, flowing from the inland ice upon the right to pass between the southern extremity of the Royal Society Range on the north, and Mount Morning, Mount Discovery, and Brown Island on the south.

PLATE XCVI.—KÖETTLITZ GLACIER.

FIG. 1 (Map B). From a photograph by A. B. ARMITAGE (A. 13, $\frac{1}{2}$ -plate), Dec. 7, 1903; taken amongst the foot-hills at the southern end of Royal Society Range.

FIG. 2 (Map B). From a photograph by A. B. ARMITAGE (A. 14, $\frac{1}{2}$ -plate), Dec. 7, 1903; taken looking S.-W. towards Kœttlitz Glacier from the foot-hills of the Royal Society Range.

Flowing eastward presumably from the inland ice, Kœttlitz Glacier reaches the sea-level between the southern end of the foot-hills of Royal Society Range to the north, and Mount Morning and Mount Discovery to the south. It has a width here of about eight miles, and continues from this point as a floating sheet of old and increasingly weathered ice for a distance of 20 miles to the north along the west side of M'Murdo Sound.

Fig. 2 gives an idea of the extent of the weathering and disintegration of the ice where the glacier snout first takes the water. Plates XCVII. to C. represent the more advanced stages of weathering in the same ice-sheet farther north.

In Fig. 1 is seen a small ice-tongue breaking away to the right from the parent glacier, but now cut off from it by a ridge of rock, leaving it merely as an "ice-slab." (See also Plate XCV.)

FIG. 1.

FIG. 2.

PLATE XCVII.—DISINTEGRATING GLACIER-ICE.

FIG. 1 (Map B). From a photograph by R. W. SKELTON (Sk. 231, $\frac{1}{2}$ -plate), Feb. 8, 1902; showing a much weathered portion of the Pinnacled Ice of M'Murdo Sound.

FIG. 2 (Map B). From a photograph by A. B. ARMITAGE (A. 7, $\frac{1}{2}$ -plate), Dec. 2, 1903; looking E. along the right lateral moraine of Blue Glacier across M'Murdo Sound.

In both pictures glacier-ice is to be seen rapidly disappearing under the influence of summer sunshine in the presence of much morainic débris. In the pinnacled ice, grit and gravel are so far concentrated into heaps upon the surface of solid ice that rivers of water are to be found running in all directions and burrowing deep courses in its substance.

In the lateral moraine (Fig. 2) a perfect torrent of water rushes down on a bed of hard green ice between the moraine heaps on the right and the summer-wasted ice-cliff of the glacier on the left.

The season is but short. In December and in January, with a clear sun, running water may be heard wherever bare rock and ice occur together, but never otherwise.

FIG. 1.

FIG. 2.

N

PLATE XCVIII.—THE PINNACLED ICE OF M'MURDO SOUND.

FIG. 1 (Map B). From a photograph by L. C. BERNACCHI (Be. 73, $\frac{1}{4}$ -plate), Feb. 8, 1902; taken on the old weathered glacier tongue known as the "Pinnacled Ice" of M'Murdo Sound.

FIG. 2 (Map B). From a photograph by R. W. SKELTON (Sk. 93, $\frac{1}{2}$ -plate), Feb. 8, 1902; showing the Pinnacled Ice of M'Murdo Sound, and Dailey Islands in the distance.

At the head of M'Murdo Sound, on the western side, there is an immense quantity of morainic material on stagnant but floating glacier-ice. The moraines occur in long trains of cones which often rise 50 feet above the level of the ice. Some of the ice is apparently an overflow from Ross's Barrier Sheet; some in Discovery Gulf, carrying much rock and organic débris, is discharged by Kcettlitz Glacier, and runs northward for 20 miles or more.

In lying thus exposed to the sun of countless summers, the morainic material has eaten into the disintegrating ice, leaving it in the fantastic shapes from which it has received its name. See also Plates XCVI., XCVII., XCIX., and C.

FIG. 1.

FIG. 2.

PLATE XCIX.—THE PINNACLED ICE OF M·MURDO SOUND.

From a photograph by R. W. SKELTON (Sk. 232, $\frac{1}{2}$ -plate), Feb. 8, 1902; looking W. across the Pinnacled Ice to the Dailey Islands. (Map B.)

The tongue of Kœttlitz Glacier running some twenty miles with a north-westerly direction in M·Murdo Sound, is covered with blown sand and gravel, and an abundance of morainic débris, which by absorbing the sun's radiant heat has eaten deeply into the surface-ice.

Fantastic pinnacles, and mushroom-shaped tables, deep river-beds of ice and colonnades, with grottos of blue-green ice screened off by glittering icicles, all thrown confusedly together with sand-heaps, rocks and boulders, give the weird and fanciful impression which is here produced.

Mount Hood, Oregon, 1891

STUDY OF THE POLAR REGIONS OF THE NORTH OCEAN
FROM 1899 TO 1902. (2, 1/2-plate), Feb. 8, 1902; looking
westward from the mouth of the Lena River, Siberia. (Map B.)

The view of the Lena River, looking westward from the mouth of the river, shows the wide expanse of the river and the surrounding ice fields. The river is seen as a dark, winding line through the white ice. The ice fields are vast and featureless, stretching to the horizon. The sky is a pale, uniform color, suggesting a clear or overcast day. The overall scene is one of extreme isolation and cold.

... and mushroom-shaped tables, deep river-beds
screened off by glittering icicles. The
rocks and boulders, give the v

The Pinnacled Ice of McMurdo Sound.

PLATE C.—THE PINNACLED ICE OF M'MURDO SOUND.

FIG. 1 (Map B). From a photograph by L. C. BERNACCHI (Be. 75, $\frac{1}{4}$ -plate); taken on the floating Pinnacled Ice of M'Murdo Sound, Feb. 8, 1902.

FIG. 2 (Map B). From a photograph by L. C. BERNACCHI (Be. 71, $\frac{1}{4}$ -plate), of the same, Feb. 8, 1902.

These pictures represent phases of extreme weathering on the surface of old and dirty glacier-ice. The ice-sheet is afloat, but almost stagnant; it has its origin at this point mainly in Kœttlitz Glacier, and runs thence northward in M'Murdo Sound for some twenty miles. Owing to the great quantity of morainic débris which it carries on its surface, there is a considerable amount of thaw during the height of summer, *i.e.* in December and January.

The dry beds of thaw-water streams which have undercut the ice in every direction are here represented. The black heaps consist of sand and gravel, and this material, when distributed in a thin layer, quickly melts out the ice beneath. Where, however, it is more abundantly deposited, it affords a permanent protection to the ice upon which it lies.

See also Plates XCVI. to XCIX.; and for further details, see Scott, *Voyage of the 'Discovery,'* vol. i., p. 209; and Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 15, 80, 90.

FIG. 1.

FIG. 2.

PLATE CI.—MORaine CONES ON FLOATING GLACIER-ICE.

FIG. 1 (Map B) From a photograph by L. C. BERNACCHI (Be. 102, $\frac{1}{4}$ -plate), Sept. 29, 1902; looking S.-W. to Mount Discovery and Brown Island, across a long row of moraine-cones or talus-heaps in the middle distance.

FIG. 2 (Map B). From a photograph by R. W. SKELTON (Sk. 234, $\frac{1}{2}$ -plate), Dec. 2, 1902; showing one of the heaps of morainic débris.

Mount Discovery, in the distance of Fig. 1, is a quiescent volcanic cone. To the right of it is Brown Island. The whole middle distance is taken up by the old and weathered glacier-ice, apparently an overflow which has been forced along Minna Bluff from the Great Ice Barrier. It bears on its surface an enormous amount of morainic material, often in the shape of a long series of moraine-cones or talus-heaps, whence its fantastic weathering.

Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 14, 20, 81; compare also Figs. 1 and 2, Plate CII.

FIG. 1.

FIG. 2.

PLATE CII.—MORAINHEAPS ON FLOATING GLACIER-ICE.

Fig. 1 (Map B). From a photograph by R. W. SKELTON (Sk. 236, $\frac{1}{2}$ -plate), Dec. 1902; taken off the west coast of M'Murdo Sound.

FIG. 2 (Map B). From a photograph by R. W. SKELTON (Sk. 235, $\frac{1}{2}$ -plate), Dec. 1902; taken at the same place.

At the head of M'Murdo Sound and on its western side, there is an immense quantity of morainic material on floating but almost stationary glacier-ice. The moraines occur in long trains of cones, which often rise 50 feet above the level of the ice, and sometimes even to 150 and 200 feet. Some of the ice is apparently an overflow from Ross's Barrier; some in Discovery Gulf is discharged, with much rock and débris on its surface, from Kœttlitz Glacier.

It is often difficult in these masses to say what part of the material is rock débris and what is ice. During summer, the fine material is constantly being separated from the coarser, by water from the melting ice.

In some cases the cloak of débris is too thick to allow of any melting underneath, and the ice is then preserved indefinitely.

Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 14, 20, 81; see also Figs. 1 and 2, Plate CL, which illustrate parts of the same.

FIG. 1.

FIG. 2.

PLATE CIII.—GLACIER TABLES.

FIG. 1. From a photograph taken by C. R. ROYDS (R. 140, 5" × 4" film); on the old ice near Black Island, M'Murdo Sound, Sept. 15, 1902.

FIG. 2 (Map B). From a photograph taken by L. C. BERNACCHI (Be. 104, $\frac{1}{4}$ -plate); on the old ice near Black Island, M'Murdo Sound, Sept. 28, 1902.

These glacier tables are not uncommon amongst the fantastic shapes assumed by old and weathering glacier-ice. The "mushroom" shape results from the absence of included grit and gravel in the upper ice-slab, while the ice upon which it rests, having much, is rapidly disintegrated. They are rarely more than a few feet in height.

The two here represented were found on the sheet of old ice at the head of M'Murdo Sound. For an account of the composite origin of this sheet, partly from the Great Barrier and partly from Kœttlitz Glacier, see Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 15, 80, 90; and for further illustrations of its very irregular surface, see Plates XCIX. to CI.

See also, Scott, *Voyage of the 'Discovery,'* vol. i., p. 209.

FIG. 1.

FIG. 2.

PLATE CIV.—THE PRAM POINT PRESSURE RIDGES.

FIG. 1 (Map B). From a photograph by E. H. SHACKLETON (Sh. 167, $\frac{1}{4}$ -plate); taken amongst the pressure hummocks of the Pram Point Ridges, Oct. 1902.

FIG. 2 (Map B.) From a photograph by R. W. SKELTON (S. 14, 5" $\times$ 4" plate), Feb. 1904; looking N.-E. from the heights above Pram Point, over the pressure ridges, to Mount Terror.

The series of ice-waves shown in Fig. 2 lying parallel with the coast are caused in the old sea-ice by some partial pressure transmitted from the Barrier movement, into the channel between Ross and White Islands.

The point at which these waves are truncated by a horizontal fissure marks the limit of open water in 1902. When the sea was again frozen over, similar pressure hummocks began to appear as waves in the ice, and continued to increase, until, in two years' time, large sheets were standing upright as in Fig. 1. In 1904 the ice again broke up: its thickness was then 8 feet, the result of two years' growth.

See *Nat. Hist. Rep.*, vol. i., pp. 59, 82; also, Scott, *Voyage of the 'Discovery'*, vol. i., pp. 384, 394.

FIG. 1.

FIG. 2.

PLATE CV.—MOUNT EREBUS FROM THE S.-S.-W.

FIG. 1 (Map B). From a photograph taken by Mr R. FORD (Fo. 147, $\frac{1}{4}$ -plate), in the summer months, Dec. 1902 ; looking N.-E. from Pram Point.

FIG. 2 (Map B). From a photograph taken by R. W. SKELTON (Sk. 264, $\frac{1}{2}$ -plate), Oct. 7, 1903 ; looking N.-E. from Pram Point.

Both give a similar view of Mount Erebus taken from the area of ice-disturbance near Pram Point, about three miles from our winter-quarters. Castle Rock appears on the left, a black crag of palagonite tuff (Ferrar, *Nat. Hist. Rep.*, vol. i., p. 12) ; while on the right are seen the ice-hummocks of the Pram Point pressure ridges (Ferrar, *op. cit.*, pp. 59, 82), which were a favourite resort for Weddell Seals in the breeding season, and served to shelter the new-born young.

In the lower picture are seen a number of moraine terraces on the left, which occur in many places along the coast of South Victoria Land, and afford ample evidence of a far more extensive and far heavier ice-covering in the past than exists at the present time.

Note the small puff of condensed vapour which appears at the summit of Mount Erebus in Fig. 1.

FIG. 1.

FIG. 2.

PLATE CVI.—MOVEMENT CHASM ON THE GREAT ICE BARRIER.

FIG. 1 (Map A). From a photograph by E. H. SHACKLETON (Sh. 180, $\frac{1}{4}$ -plate), Dec. 15, 1902; looking N. along the chasm.

FIG. 2 (Map A). From a photograph by E. H. SHACKLETON (Sh. 180, $\frac{1}{4}$ -plate), Dec. 15, 1902; looking S. along the chasm.

The great scar, which these two figures represent, is one of many which result from the meeting of two moving sheets of ice, the one coming down from the Inland Ice-cap by way of Barne Inlet, the other, the main Ice Barrier, coming from the south.

This particular scar or chasm was about three-quarters of a mile across, and from the edge upon which we stood, had a depth of 80 or 100 feet, with a bottom filled by broken ice and snow-drifts.

Such rents are probably far more extensive and abundant at the openings now named Skelton, Mulock, Barne, and Shackleton Inlets, than at any intervening point along the coast.

See Scott, *Voyage of the 'Discovery,'* vol. ii., pp. 82 and 419.

FIG. 1.

FIG. 2.

PLATE CVII.—MOVEMENT CHASM ON THE GREAT
ICE BARRIER.

From a photograph by E. H. SHACKLETON (Sh. 182, $\frac{1}{4}$ -plate), Dec. 15, 1902; looking S. along the chasm. (Map A.)

This deep scar results from the movement of the Great Barrier ice-sheet northwards along the coast. The floating Barrier-ice not only meets, but eventually absorbs the land-ice flowing eastward down Barne Inlet into it. Figs. 1 and 2, Plate CVI., illustrate the same feature. The chasm allows, and masks, the movement due to tidal action, and so may be considered in part a tide-crack, or line of constant rupture between the ice of the Floating Barrier and that which is firmly attached to land along the shore.

Scott, *Voyage of the 'Discovery,'* vol. ii., pp. 82, 419.

The Chasm between land and Barrier.

PLATE CVIII.—ON THE GREAT ICE BARRIER.

FIG. 1 (Map A). From a photograph by E. H. SHACKLETON (Sh. 193, $\frac{1}{4}$ -plate), Jan. 24, 1903; taken on the surface of the Great Ice Barrier.

FIG. 2 (Map A). From a photograph taken by E. H. SHACKLETON (Sh. 181, $\frac{1}{4}$ -plate), Dec. 17, 1902; off Cape Selborne, on the Great Ice Barrier.

Both pictures, taken on the Southern Sledge Journey, represent difficulties of surface. Fig. 1 shows a very soft deep deposit of fog-crystals, beautiful to look at individually as dainty hexagonal feathery stars, but most trying to deal with when they clog the sledge-runners and allow the feet to sink deeply at every step. These crystals fall in the foggy small hours of the morning, when the sun is low in the south, and for many days in succession the accumulation continues to deepen, making it impossible to travel fast.

In Fig. 2 is shown a crevasse off Cape Selborne, in S. lat. $80^{\circ} 30'$, which we passed with dogs and sledges on a "blind" white sunless day, when neither light nor shade can be distinguished at one's feet. Without seeing it or suspecting it, we had crossed and camped within a few yards of this crevasse, and only on the following morning saw how narrowly our sledge tracks had escaped it. Away from the proximity of land such faults are overbridged, and though the scars are visible, they are safe.

See Scott, *Voyage of the 'Discovery,'* vol. ii., p. 50.

FIG. 1.

FIG. 2.

PLATE CIX.—ON THE GREAT ICE BARRIER.

FIG. 1 (Map A). From a photograph by E. H. SHACKLETON (Sh. 189, $\frac{1}{4}$ -plate), Dec. 30, 1902; taken looking W. to Cape Wilson from the farthest camp, $82^{\circ} 16' 33''$ S. lat.

FIG. 2 (Map A). From photographs by E. H. SHACKLETON (Sh. 187 and 188, $\frac{1}{4}$ -plates), Dec. 28, 1902; taken looking W. towards Shackleton Inlet from the farthest camp.

FIG. 3 (Map A). From a photograph by E. H. SHACKLETON (Sh. 186, $\frac{1}{4}$ -plate), Dec. 31, 1902; looking W. to the line of Buttress Rocks, on the coast of the mainland.

In these three photographs can be very indistinctly seen the southernmost land at present known. On the extreme left, in Fig. 2, is Mount Longstaff (10,350 feet) and Cape Goldie. Between this and the tent comes Mount Markham (15,100 feet at the central peak); Shackleton Inlet lies between Cape Lyttleton on the left and Cape Wilson on the right.

The photographs were taken at the last camp of the outward journey, in $82^{\circ} 16' 33''$ S. lat., on Dec. 30, 1902, when we turned homeward.

See Scott, *Voyage of the 'Discovery,'* vol. ii., p. 79. See also, Plates CLI. and CLII. for sketches of the same piece of coast-line.

FIG. 1.

FIG. 2.

FIG. 3.

PLATE CX.—THE BUTTRESS ROCKS IN THE FAR SOUTH.

From a photograph by E. H. SHACKLETON (Sh. 190, $\frac{1}{4}$ -plate), Dec. 31, 1902; looking W. from the Barrier in S. lat. $82^{\circ} 10'$. (Map A.)

The movement chasm by which our attempt to reach the land was foiled is just visible on the right of the picture, its irregularities being all below the level of the Barrier surface. It was less than a mile in breadth, and from 40 to 50 feet in depth, with perpendicular ice-walls on the landward side, and at the bottom was a chaos of broken ice-blocks, snow-drifts, and pools of ice. After struggling three hours for a crossing, we had to give up the attempt.

The knife-edge sculpturing of these outstanding rocky buttresses is sufficient to indicate a marked recession of the ice along the coast, notwithstanding that it lies in 82° S. lat. There must have been a time when the Inland Ice-cap overflowed these rocks, and joined with an even level the surface of a far higher and deeper Barrier than the remnant which exists to-day.

THE BUTTRESS ROCKS IN THE FAR SOUTH

(Sh. 190, 4-plate), Dec. 31, 1902;

Barrier in S. lat. 82° 10'. (Map A.)

The moment chasm by which our attempt to reach the land was foiled
the right of the picture, its irregularities being all below the level
surface. It was less than a mile in breadth, and from 40 to 50
feet deep, with jagged, broken, and uneven sides, and a floor of ice
and pools of ice.

The knife-edge sculpturing of the standing rocky buttresses is suffi-
cient to mark a recession of the coast, notwithstanding that
it is in S. lat. There must have been a time when the Inland Ice-cap cov-
ered these rocks, and joined with the even level the surface of a far higher
Barrier than the remnant which exists to-day.

Where land and Barrier meet

PLATE CXI.—MINNA BLUFF AND ITS NEIGHBOURHOOD.

FIG. 1 (Map A). From photographs by E. H. SHACKLETON (Sh. 191 and 185, $\frac{1}{4}$ -plates), Jan. 24, 1903; looking N. from the Barrier surface.

FIG. 2 (Map B). From a photograph by E. H. SHACKLETON (Sh. 91, $\frac{1}{4}$ -plate), Feb. 21, 1902; taken off the coast of White Island.

Minna Bluff is a long and narrow promontory which projects S.-E. from the foot of Mount Discovery. Measuring 35 miles in length, it is rarely more than 5 miles across, and has a height of 2000 feet. It is volcanic in origin, and from its position offers an obstruction to the movement northwards of the Barrier ice. Round its end, and between it and White Island, is a good deal of disturbed ice and morainic material. This, however, must not be taken to account for the fractured ice-mounds shown in Fig. 2.

Near the north end of White Island were a number of such mounds with star-shaped fractures on the top. In connection with them were collections of perfect crystals of sodium sulphate (Glauber's salt), lying upon the ice. Similar masses of this salt were found also in other spots, either upon glacier-ice or forming part of old moraines. In this case the ice upon which they were found formed part of the Great Ice Barrier, and they were caused probably by the freezing of salt-saturated thaw-water which had collected beneath the ice from the neighbouring slopes of White Island.

See Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 11, 91.

FIG. 1.

FIG. 2.

PLATE CXII.—THE FERRAR GLACIER.

FIG. 1 (Map B). From a photograph by R. W. SKELTON (Sk. 99, $\frac{1}{4}$ -plate), Jan. 1903; showing the medial moraine of Ferrar Glacier, taken looking E.-N.-E. from a point abreast of Cathedral Rocks. In the distance is seen the gap, "New Harbour," by which the glacier enters M'Murdo Sound. Mount Erebus should be visible a little to the right of the centre of the picture, 70 miles away.

FIG. 2 (Map B). From photographs by R. W. SKELTON (Sk. 96 and 97, $\frac{1}{4}$ -plates), Jan. 1903; looking down Ferrar Glacier towards E.-S.-E. from a point midway between Solitary Rocks and Finger Mountain Ice-fall. Mount Erebus was sometimes visible on the extreme left of the picture, directly over the outlet of the Northern Arm.

From left to right are, Northern Arm of glacier, the dark Solitary Rocks, the snow-covered Royal Society Range with Mounts Hooker and Lister, and Knob Head Mountain.

FIG. 3 (Map B). From a photograph by R. W. SKELTON (Sk. 283, $\frac{1}{2}$ -plate), Oct. 15, 1903; looking up Ferrar Glacier from the sea-ice of New Harbour. Knob Head Mountain can be seen (at a distance of 35 miles), where the glacier is turning a corner from the right, round the Kukri Hills. On the left, really the southern side of the glacier, are the "Northern Foot-hills" and the Cathedral Rocks.

Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 69, 78, etc.

FIG. 1.

FIG. 2.

FIG. 3.

PLATE CXIII.—THE RIGHT BANK OF FERRAR GLACIER.

From photographs by R. W. SKELTON (Sk. 294-299 inclusive, $\frac{1}{2}$ -plates), Dec. 8, 1903; taking in an angle of 180° from W. through S. to E. (Map B.)

From left to right, the left bearing due E. and the right due W. while the centre bears S., are to be made out the following points:—Just above the sledges some dark rocks, known as the Solitary Rocks, and to their right the arm of Ferrar Glacier, known as East Fork, up which the sledge party made its way from sea-level in M'Murdo Sound. To the left of the Solitary Rocks, another small arm of the glacier known as the North Fork, which does not reach the sea. East Fork and North Fork are divided by the Kukri Hills. In the far distance, and above the East Fork, is to be seen the Royal Society Range; and covering it to the right, but much nearer, in succession from left to right, come Knob Head Mountain, New Mountain, Beacon Heights, Pyramid Mountain, and Finger Mountain at the end of the chain. Still to the right of this is seen Finger Mountain Ice-fall and the passage to the Inland-ice bearing due W., 7500 feet above the level of the sea.

See Scott, *Voyage of the 'Discovery,'* vol. ii., p. 226; also, Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 69, 78, etc.

PLATE CXIV.—TRIBUTARY GLACIERS.

FIG. 1 (Map B). From a photograph by R. W. SKELTON (Sk. 304, $\frac{1}{2}$ -plate), Dec. 9, 1903; on the right bank of Ferrar Glacier, showing the descent to its northern arm, and Obelisk Mountain.

FIG. 2 (Map B). From a photograph by R. W. SKELTON (Sk. 312, $\frac{1}{2}$ -plate), Dec. 12, 1903; on the left bank of Ferrar Glacier.

“On the North Fork of Ferrar Glacier three small glaciers drain from one firnfield, and end about one thousand feet above the ice of the main valley. Two are known as Cliff-glaciers, since the ice breaks off at the edge of a cliff and falls in avalanches, to be lost in the main ice-flow beneath. The third has lately been a cliff-glacier, but its present loss by ablation exceeds the supply, and it now ends some distance from the edge of the cliff, and therefore is of Alpine type.”

Fig. 2 shows the eastern foot of New Harbour Height, with a Hanging-glacier on the north side of the East Fork of Ferrar Glacier.

Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 71, 72; Scott, *Voyage of the ‘Discovery,’* vol. ii., pp. 288, 293.

FIG. 1.

FIG. 2.

PLATE CXV.—TRIBUTARY GLACIERS.

FIG. 1 (Map B). From a photograph by R. W. SKELTON (Sk. 311, $\frac{1}{2}$ -plate), Dec. 12, 1903; on the right bank of Ferrar Glacier, near the coast.

FIG. 2 (Map B). From a photograph by R. W. SKELTON (Sk. 309, $\frac{1}{2}$ -plate), Dec. 10, 1903; on the left bank of Ferrar Glacier, above Sentinel Peak. Ferrar, *Nat. Hist. Rep.*, vol. i, p. 37.

The following classification of the land-ice of South Victoria Land has been taken from Mr Ferrar's *Report on the Field Geology of the Expedition*, pp. 63, 64.

1. *Ice-sheet* or *Inland-ice* applies to a mass of ice which covers a continental area of land.
2. *Local Ice-cap*, the ice covering partially or wholly a limited land mass.
3. *Piedmont-glaciers* are formed by ice crowding on to a coastal plain at the foot of a mountain range.
4. *Glaciers of Greenland type*, or *Ice-streams*, drain an ice-sheet and end in the sea.
5. *Glaciers of Norwegian type* flow from a large firnfield down well-defined valleys (fjords).
6. *Glaciers of Alpine type*, *Valley-glaciers*, drain small intermontane basins and never reach the sea.
7. *Cliff-glaciers* are broken glaciers of the above types.
8. *Hanging-glaciers* are collections of snow and ice in corries.
9. *Ice-slabs* are glacier remnants, resulting from ice-recession.

FIG. 1.

FIG. 2.

PLATE CXVI.—ROYAL SOCIETY RANGE AND FERRAR GLACIER,
FROM THE TOP OF BLUE GLACIER.

FIG. 1 (Map B). From photographs by R. W. SKELTON, Dec. 9, 1902 (Sk. 246 and 247, $\frac{1}{2}$ -plates); taken looking westward over the lower reaches of Ferrar Glacier, from the top of Descent Pass. Descent Pass formed a practicable though difficult passage from the summit of Blue Glacier and the névé at the foot of the northern end of Royal Society Range, to the surface of Ferrar Glacier. On the left are the Cathedral Rocks, and on the right the Kukri Hills; between them is the South Arm of Ferrar Glacier.

FIG. 2 (Map B). From photographs by R. W. SKELTON (Sk. 239-242 inclusive, $\frac{1}{2}$ -plates), Dec. 8, 1902.

In this panorama, which was taken from a point 3000 feet above sea-level, is a view of the Royal Society Range with its snow covered peaks, including from left (*i.e.* south) to right (*i.e.* north), Mount Huggins (12,870 feet), Mount Rücker (11,260 feet), Mount Hooker, and Mount Lister (12,995 feet). The camp is placed in the névé valley at the foot of the north end of this range, and at the summit of Blue Glacier.

See Ferrar, *Nat. Hist. Rep.*, vol. i, p. 23.

thern Foot-hills, and Lower Kukri Hills beyond.

PLATE CXVII.—ROYAL SOCIETY RANGE AND FERRAR GLACIER,
FROM THE BLUE GLACIER.

FIG. 1. From a photograph by R. W. SKELTON (Sk. 244, $\frac{1}{2}$ -plate), taken on Dec. 9, 1902; looking S.-W. from the top of Descent Pass over the névé at the northern end of Royal Society Range. If this range is followed to the right, it is found to end in the Cathedral Rocks, as seen in Fig. 1, Plate CXVI.

FIG. 2 (Map B). From photographs by R. W. SKELTON (Sk. 69 and 70, $\frac{1}{4}$ -plates); taken on Dec. 11, 1902; looking over Ferrar Glacier from the névé at the summit of Blue Glacier. On the left is a snow slope, almost entirely covering the Cathedral Rocks, which are the northern limit of the Royal Society Range. Between the Cathedral Rocks and the south side of the Kukri Hills, on the right, is Ferrar Glacier, coming down from the Inland-ice. The summit of Descent Pass, from which the picture is taken, is 5000 feet above sea-level, and 2500 feet above the level of Ferrar Glacier at its foot.

FIG. 3 (Map B). From a photograph by R. W. SKELTON (Sk. 228, $\frac{1}{2}$ -plate), Dec. 4, 1902; shows the Royal Society Range, taken from about half-way up the Blue Glacier, looking S.-W. The two peaks are Mount Hooker and Mount Lister.

FIG. 1.

FIG. 2.

FIG. 3.

PLATE CXVIII.—RIGHT BANK OF FERRAR GLACIER.

FIG. 1 (Map B). From photographs by R. W. SKELTON (Sk. 77-79 inclusive, $\frac{1}{4}$ -plates), Dec. 24, 1902, at noon; looking to the S. up the glacier valley. The picture shows the right bank of Ferrar Glacier just beyond, and inland to the Royal Society Range. On the right, and just above the camp, is Knob Head Mountain.

FIG. 2 (Map B). From photographs by R. W. SKELTON (Sk. 285 and 286, $\frac{1}{2}$ -plates), taken on Oct. 17, 1903; looking E.-N.-E. down Ferrar Glacier towards the mouth of the valley. On the right are the Cathedral Rocks, on the left "High Peak," and a medial moraine.

See Scott, *Voyage of the 'Discovery,'* vol. ii., p. 136.

PLATE CXIX.—THE CATHEDRAL ROCKS.

From photographs by R. W. SKELTON (Sk. 75 and 76, $\frac{1}{4}$ -plates), Dec. 22, 1902;
looking S.-E. from Ferrar Glacier. (Map B.)

Taken from the surface of Ferrar Glacier, this picture shows a small tributary ice-flow coming from the direction of the Camel's Hump, which is seen as a rocky point in the distance. The Cathedral Rocks on the left, with dolerite cliffs standing back from an edge of granite, rise to 6000 feet above sea-level, and form about ten miles of the right bank of Ferrar Glacier.

Ferrar, *Nat. Hist. Rep.*, vol. i., p. 30; Scott, *Voyage of the 'Discovery,'* vol. ii., p. 224.

Mount Fuji, Japan

The Cathedral Rocks of Royal Society Range.

PLATE CXX.—THE SOLITARY ROCKS, FROM THE BASIN OF
FERRAR GLACIER.

From photographs by R. W. SKELTON (Sk. 305-308 inclusive, $\frac{1}{2}$ -plates), Dec. 10, 1903; looking W.-N.-W. up Ferrar Glacier from Knob Head Moraine. (Map B.)

The right half of this picture shows the Solitary Rocks, and an opening leading down to the North Fork of Ferrar Glacier. To the left is the route taken by the sledge party under Captain Scott, and this runs up to the W. under Finger Mountain, which is recognisable by the cairn-like projection on the top. The point at which the picture was taken is about 3000 feet above the level of the sea, the height of the Solitary Rocks being 5259 feet. An upthrust of morainic material produced by the impact of two streams of ice can be seen crossing the glacier from the foot of Knob Head Mountain. The dirt-bands bend up and appear at the surface 70 feet above their previous level.

See Ferrar, *Nat. Hist. Rep.*, vol. i., p. 76; and Scott, *Voyage of the 'Discovery'*, vol. ii., p. 228.

PLATE CXXI.—BETWEEN LAND AND GLACIER ICE.

From a photograph by R. W. SKELTON (Sk. 301, $\frac{1}{2}$ -plate), Dec. 1903. (Map B.)

At the foot of Knob Head Mountain, in the ice-wall which forms the edge of the glacier, a good deal of englacial rock-débris can be seen; boulders up to four feet across, ice-scratched and sub-angular, are mixed with numerous small stones and some sand.

At the spot here shown, two streams of ice meet, and at their junction the englacial matter is forced up 70 feet, and appears as a medial moraine upon the surface.

See Ferrar, *Nat. Hist. Rep.*, vol. i., p. 76.

Side of the Glacier

PLATE CXXI.—BETWEEN Knob H and Knob I.

Photograph by R. W. SKILL.

At the foot of Knob H a good deal of moraine material is visible, ice-scratched and covered with stone sand.

In the spot here shown the moraine material is found in the form of a small, rounded, irregular mass.

See Ferris, *ibid.* p. 10.

Reuben S. Sargent & Co.

At the Side of the Glacier.

PLATE CXXII.—THE SIDE OF THE GLACIER.

From a photograph taken by R. W. SKELTON (Sk. 302, $\frac{1}{2}$ -plate), Dec. 9, 1903; taken in the lateral moraine of Ferrar Glacier, abreast of Knob Head Mountain, at the meeting of ice-streams from the W. and N.-W. arms. (Map B.)

The sheer ice-walls which bound the glaciers of South Victoria Land show the ice receding as usual from the banks. The intervening channels often contain frozen ponds, which in some cases are more than a mile in length.

The structure of the ice in such a cliff as this has remarkable variations. The uppermost 40 feet is normal vesicular glacier-ice, free from rock débris. Below this are several dirt-bands, and amongst them other bands, up to 10 feet thick, of perfectly clean ice, as clear as rock crystal. As this does not show the granular structure of glacier-ice, Mr Ferrar believes that it may be due to intrusive thaw-water.

See Ferrar, *Nat. Hist. Rep.*, vol. i., p. 82; and, Scott, *Voyage of the 'Discovery,'* vol. ii., p. 237. Compare also this picture with Plate XLVII., and note the description given there of the melting effected during the summer months. The description applies particularly to the ice of these great glaciers on the western side of M'Murdo Sound.

Note also the figure at the foot of the cliff, by which a better idea of its height may be obtained.

PLATE CXXIII.—KNOB HEAD MOUNTAIN.

FIG. 1 (Map B). From a photograph by R. W. SKELTON (Sk. 310, $\frac{1}{2}$ -plate), Dec. 12, 1903; showing an ice-cascade in the Ferrar Glacier, between Cathedral Rocks and Knob Head Mountain. The latter is seen just above and beyond the ice-fall. From the level surface above the fall to the surface on which the sledge rests is about six hundred feet.

For the description of a descent with a loaded sledge down such a fall in thick weather, the reader should refer to Captain Scott's account in the *Voyage of the 'Discovery,'* vol. ii., p. 279; see also, Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 69, 83.

FIG. 2 (Map B). From a photograph by R. W. SKELTON (Sk. 300, $\frac{1}{2}$ -plate), Dec. 9, 1903; showing the lower rocks of columnar dolerite *in situ*, with débris of the lateral moraine at the foot of Knob Head Mountain. The photograph was taken in the lateral moraine, and shows the vertical side of the glacier beyond. The large boulder on the sky-line is of granite. See Ferrar, *Nat. Hist. Rep.*, vol. i., p. 51.

FIG. 1.

FIG. 2.

PLATE CXXIV.—BOULDERS ON FERRAR GLACIER.

FIG. 1 (Map B). From a photograph by R. W. SKELTON (Sk. 80, $\frac{1}{4}$ -plate), Dec. 25, 1902; looking westward from amongst the ice-borne boulders of Knob Head moraine on Ferrar Glacier. In the background are the Terra-cotta Mountains, with Terra-cotta Peak on the right, composed mainly of sandstone and abundantly riddled by dykes of dolerite. The height of this camp above sea-level was 3250 feet; that of the Terra-cotta Mountains about 8000 feet. See Ferrar, *Nat. Hist. Rep.*, vol. i., p. 47; and, Scott, *Voyage of the 'Discovery,'* vol. ii., p. 138.

FIG. 2. From a photograph by H. T. FERRAR (F. 2, $\frac{1}{4}$ -film); taken on Dec. 9, 1902, near Descent Pass. The boulder is of granite and has been hollowed to a shell by the combined action of wind and weather. The cavity faces the S. or weather side, and is therefore not open to the sun. Incrustations of calcium carbonate are connected with the disintegration. See Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 87, 88.

FIG. 1.

FIG. 2.

PLATE CXXV.—FINGER MOUNTAIN.

From photographs by R. W. SKELTON (Sk. 85 and 86, $\frac{1}{4}$ -plates); facing about S. from the surface of Ferrar Glacier; Feb. 2, 1902. (Map B.)

“A wedge of sandstone here separates two sheets of dolerite, one of which caps the hill, while the other separates the wedge from the major portion of the sandstone below it, but without disturbing the general horizontality of the bedding. The whole sequence occupies a cliff of 500 feet. One bed of sandstone after another is cut out by the dolerite, as it transgresses them upwards to the south of Finger Mountain.” See Ferrar, *Nat. Hist. Rep.*, vol. i., p. 44; Scott, *Voyage of the ‘Discovery,’* vol. ii., p. 240.

1891

ATE CXXV.—FINGER MOUNTAIN.

Photographs by R. W. SKELTON (Sk. 5 and 86, 1-plates); facing about
the surface of Ferrar Glacier; Feb. 2, 1902. (Map B.)

A bed of sandstone here separates two sheets of
... it, but without disturbing the general horizontality of the
... sequence occupies ... of 500 feet. One bed of ...
... out by the dolerite ...
"Mountain." See Ferrar
... vol. ii., p. 240.

Mount Shasta, California, U.S.A.

In Royal Society, Range.

PLATE CXXVI.—FINGER MOUNTAIN AND DEPÔT NUNATAK.

- FIG. 1 (Map B). From a photograph by R. W. SKELTON (Sk. 82, $\frac{1}{4}$ -plate), Jan. 1903; looking westward up Ferrar Glacier; shows Finger Mountain on the left, Finger Mountain Falls in the centre, and the left bank of the glacier on the right.
- FIG. 2 (Map B). From a photograph by R. W. SKELTON (Sk. 98, $\frac{1}{4}$ -plate), Jan. 1903; showing the cliffs of Finger Mountain, with a dolerite-sill in the Beacon Sandstone of Royal Society Range. It was near this point that Mr Ferrar discovered unmistakeable fossil plant remains as "thin, black, irregular bands in a pure white sandstone," but owing to decay of the plants and to changes produced by a neighbouring sheet of dolerite, their characteristics are indeterminate. See Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 44, 48, 50; Scott, *Voyage of the 'Discovery,'* vol. ii., pp. 240, 242, 287.
- FIG. 3 (Map B). From a photograph by R. W. SKELTON (Sk. 94, $\frac{1}{4}$ -plate), Jan. 1903; showing Depôt Nunatak, a mass of columnar dolerite at the edge of the inland-ice which begins its descent eastward here as Ferrar Glacier, passing by the northern end of Royal Society Range to reach sea-level in M'Murdo Sound.
- FIG. 4 (Map B). From a photograph by R. W. SKELTON (Sk. 95, $\frac{1}{4}$ -plate), Jan. 1903; shows the dolerite cliff of Depôt Nunatak, which rises to a height of nearly 500 feet from the glacier surface, itself at this point 6000 feet above the sea. Ferrar, *Nat. Hist. Rep.*, vol. i., p. 49; Scott, *Voyage of the 'Discovery,'* vol. ii., pp. 140, 288.

FIG. 1.

FIG. 2.

FIG. 4.

FIG. 3.

PLATE CXXVII.—THE UPPER REACHES OF FERRAR GLACIER.

FIG. 1 (Map B). From photographs by R. W. SKELTON (Sk. 90-92 inclusive, $\frac{1}{4}$ plates); looking back to the eastward from the Inland-ice of South Victoria Land.

The disappearance of the mountain tops, except those of the Royal Society Range, was complete about 10 miles farther to the W., as Captain Scott and his party made their way farther in upon the Inland-ice. Eventually even the highest peaks were lost, and a level plain of wind-swept ice, at a height of nearly 8000 feet above the sea, lay before them without a single break.

In this picture are seen from left (north) to right (south), the Inland Forts, the Northern Arm of the glacier over which Mount Erebus could be seen on a clear day; then Finger Mountain, and beyond it, in the far distance, Mount Lister and Mount Hooker of the Royal Society Range. Next shows just the top of Dépôt Nunatak, beyond which are some dark mountains, where Mr Ferrar obtained his fossil plants. The panorama ends to the right with mountains to the west of Royal Society Range. See Scott, *Voyage of the 'Discovery,'* vol. ii., p. 240.

FIG. 2 (Map B). From photographs by R. W. SKELTON (Sk. 292 and 293, $\frac{1}{2}$ -plates), Dec. 7, 1903; looking N. from the upper and main valley of Ferrar Glacier, 4500 feet above sea-level.

At this group of hills, named Inland Forts, Mr Ferrar examined nearly 1500 feet of the Beacon sandstone. They are capped by dolerite and separated by *cols*, through which the ice once forced its way northward into the adjoining drainage system. For details regarding the fossil organic remains which were discovered, see Ferrar, *Nat. Hist. Rep.*, vol. i., pp. 42, 48; also, Scott, *Voyage of the 'Discovery,'* vol. ii., p. 453.

PLATE CXXVIII.—THE BALLENY ISLANDS.

FIG. 1 (Map A). From a photograph by R. W. SKELTON (S. 142, 5" × 4" plate), Mar. 2, 1904; showing part of Sturge Island from the N.-E.

FIG. 2 (Map A). From a photograph by R. W. SKELTON (S. 123, 5" × 4" plate), Mar. 2, 1904; showing part of Sturge Island from the N.

FIG. 3 (Map A). From a photograph by R. W. SKELTON (S. 126, 5" × 4" plate), Mar. 2, 1904; showing Buckle Island from the S.

The group consists of five islands which lie about the latitude of the Antarctic Circle to the northward of Cape North. Buckle Island is said to bear an active volcano at its northern end, which was invisible to us, as we passed in unfavourable weather. Sturge Island, on the other hand, was more plainly viewed, and gave the accompanying photograph of the glacier tongues, which closely resemble those of Coulman Island.

See Ferrar, *Nat. Hist. Rep.*, vol. i., p. 3. See also, Bernacchi, *To the South Polar Regions*, pp. 46, 49, 54, where two sketches are given. Also, for other photographs of these islands, Captain Scott's *Voyage of the 'Discovery'*, vol. ii., p. 390; and for the resolution of the two groups named respectively Balleny and Russell, into one group of five islands, see Scott, *op. cit.*, vol. ii., p. 387 *et seq.*

FIG. 1.

FIG. 2.

FIG. 3.

Descriptive Letterpress
OF
Panoramic Sketches
(PLATES CXXIX.-CLII.)

By E. A. WILSON, M.B.

PANORAMIC SKETCHES

Drawn by E. A. Wilson, M.B.

PLATE CXXIX.—THE COAST-LINE OF SOUTH VICTORIA LAND FROM CAPE ADARE TO CAPE M'CORMICK.

From a sketch made on board ship, Jan. 10, 1902; representing the north-eastern precipitous face of the promontory which ends in Cape Adare, and forms the north-eastern boundary of Robertson Bay. (Map A.)

To the right, the sketch ends with Cape Adare. In the centre, the rocky promontory is so low that the peaks of Admiralty Range appear in succession as one sails eastward, even close inshore. To the left, at Cape Downshire, the cliffs become more lofty and more precipitous, while the coast-line turns to run due S. On the extreme left of the sketch is Cape M'Cormick, off which the Possession Islands may be seen. (See Plate XXI. for photographs of the Possession Islands taken two years later.)

There was too much pack-ice and too great an abundance of icebergs, large and small, to allow, at this time, of a closer approach to the coast or to the Possession Islands. The ice drifts to the N.-W., and the heavier and larger bergs become stranded for a while upon a line of shoals which extend in a north-westerly direction from Cape Adare. When sufficiently reduced in size by the action of the waves, by melting and disintegration under water, and by the action of the wind and weather, these bergs are once more floated off and continue again to drift to the N. and W.

PLATE CXXX.—THE ADMIRALTY RANGE.

From a sketch made on board ship in passing; Jan. 11, 1902, about 4 A.M.
(Map A.)

On the right of the sketch, which is taken looking W., is a foreshortened repetition of Plate CXXIX., to Cape Adare in the distance. Mount Sabine, "rather less than ten thousand feet in height, and about thirty miles from the coast,"

is the highest peak of the Admiralty Range. To the left of it appear Mounts Herschel, Peacock, and Lloyd in succession southward, while to the N. and right of it are Mounts Whewell, Robinson, Minto, and Adam. (See also Plates XIX. and XX., showing these mountains from the N.)

The sketch was made too far from land to show the Possession Islands with any detail, but these may be seen in Plate XXI.

PLATE CXXXI.—MOUNT MELBOURNE AND WOOD BAY.

From a sketch made on board ship in passing; Jan. 17, 1902. (Map A.)

On the right a long bank of low cloud covers all but the top of the highest peak, Mount Monteaule, and the foot-hills. Wood Bay runs deeply in behind Cape Sibbald, whose cliffs are bold and perpendicular, and rise several hundreds of feet straight up from the sea. The bay was still full of pack-ice in January 1902, and it was not until February in 1904 that an entrance to the bay was made, and the photographs taken, which appear in Plates XXX. and XXXII.

A landing had been effected here previously by members of the "Southern Cross" Expedition, and it is probable that at some future time the spot will be used as a base for work in connection with the South Magnetic Pole, which is believed to exert its maximum vertical force at no great distance inland from this point.

Mount Melbourne (8337 feet above sea-level) is a quiescent volcanic cone with a very wide base and snow-covered slopes reaching down to the sea. To the south-east the slopes continue to form a prominent and rocky headland, known as Cape Washington.

PLATE CXXXII.—MOUNT MELBOURNE AND THE COAST-LINE SOUTHWARD.

From a sketch made on board ship in passing; Jan. 18, 1902, 1.30 P.M. (Map A.)

At this part of the coast-line which came into view while crossing Terra Nova Bay, the most striking feature is the tabular range of mountains inland, the highest point of which, 8788 feet above sea-level, has been named Mount Nansen. It shows well-marked horizontal structure and steep scarp slopes, and forms part of the Continental Range which stretches N. and S. along the coast for at least 800 miles. This range of mountains is apparently the eastern edge of a vast plateau, having a fairly uniform height of about 8000 feet, at any rate between 77° S. and 78° S. lat., where Captain Scott made his long journey westward in 1903 over the Inland Ice-cap.

Mount Baxter to the N. and Mount Larsen to the S. are both prominent points of the Nansen tabular range of mountains. In this sketch, taken close in-shore, they are partly covered by the low foot-hills of the coast-line. (See also Plate CXXXIII.)

Mount New Zealand and Mount Queensland lie almost at the back of Mount Melbourne, which appears on the extreme right of the sketch.

PLATE CXXXIII.—MOUNT NANSEN.

From a sketch made on board ship in passing ; Jan. 19, 1902. (Map A.)

The highest point of this range, named after Dr Fridtjof Nansen, has a height above sea-level of 8788 feet, *i.e.*, more than 400 feet greater than that of Mount Melbourne.

For geological details of the range, so far as they may be surmised without actual exploration, the reader may be referred to Mr Ferrar's report on the geology of the expedition.—*Nat. Hist. Rep.*, vol. i., pp. 21, 39, 54.

It must suffice here to say that so far from Dr M'Cormick's view being the the correct one, namely, that the whole range was volcanic, there is evidence throughout of horizontal structure in the rock masses, while the peaks, which are gradually pyramidal in outline, have their shoulders truncated sharply at the shore—a structure which could not be produced by the eruption of rocks from local centres.

The "Nunatak" of rock which stands out of the ice like a black beehive on the left of this sketch forms a very noticeable and peculiar landmark.

PLATE CXXXIV.—THE ROYAL SOCIETY RANGE AND THE VIEW S. AND W. FROM WINTER-QUARTERS BAY.

From a sketch made looking S. and W. from Winter-quarters Bay ; March 1902.
(Map B.)

The extreme left, Minna Bluff, bears a little E. of S. from Winter-quarters Bay. To the left of this might have been added the White Island.

The highest point of Black Island is 3534 feet ; Mount Discovery, a quiescent volcanic cone, is 9085 ; the highest point of Brown Island is 2812 feet ; and beyond it, Mount Morning is 5779 feet above sea-level. In no case, during our stay in M'Murdo Sound, did open water ever reach the foot of the pieces of land just named ; all of them rise out of a frozen sheet of old ice, an inseparable communion of glacier-ice, barrier-ice, and old sea-ice here floating and there obviously aground, here absolutely clean, and there, on the other hand, so full of morainic

débris as to make it impossible to say whether one stood on more of ice or more of solid heaps of rock fragments.

At the southern extremity of the Royal Society Range, Kœttlitz Glacier flows down from the Inland Ice partly to the S., but mainly into M'Murdo Sound.

Of the Royal Society Range itself, the following are the most prominent peaks in order from left to right: Mount Cocks, forming the southern extremity of the range and part of the northern boundary of Skelton Inlet, and separated by the Kœttlitz Glacier from Mount Kempe; Mount Huggins, with a height of 12,870 feet; Mount Rücker, 12,850 feet; Mount Hooker, about the same; and Mount Lister, 12,995 feet. Together, they form a magnificent series of peaks in this range of mountains, the precipitous edge of the great continental plateau known as South Victoria Land.

PLATE CXXXV.—MOUNT EREBUS FROM THE N.-N.-W.

From a sketch made on board ship in passing; Jan. 20, 1902, evening. (Map B.)

Clouds cover the whole of the lower slopes of the mountain, and a fairly heavy pack-ice occupies the sea along the coast of Ross Island; but rising above the clouds, to a height of 12,922 feet, the crater summit of Mount Erebus is clear, with a pennant of "smoke" or vapour.

From this side there are visible the remains of no less than three craters. The peak half-way down the left of the mountain really forms part of the lip of an old and evidently very extensive crater. The broad upper shoulders are the lip of a second, and within these the present small open crater has been formed from which puffs of vapour emerge in quick succession.

See also Plate XXXVII., taken from about the same bearing, and at about the same time.

PLATE CXXXVI.—MOUNT EREBUS AND MOUNT TERROR FROM THE W.-N.-W.

From a sketch made on board ship in passing; Jan. 21, 1902, 10 A.M. (Map B.)

In this view of Ross Island the existence of Cape Bird as a distinct low rounded mountain is more evident.

The clouds on Mount Terror in the background, which were very often present, suggested occasional activity quite as much as did the cloud of condensed vapour at the summit of Mount Erebus. In the latter case, however, the appearance was constant, while in the former it was occasional and intermittent.

On this bearing there is visible a small central crater at the summit of Mount Erebus, with lips tilted to the N.-W. This appearance was not seen from any other point.

Ross Island gives a footing for at least three Adélie Penguin rookeries in the summer months; of these the largest is at Cape Crozier, the second is on Cape Bird, and the third, a small one, on Cape Royds.

PLATE CXXXVII.—ROSS ISLAND FROM THE S.-W.

From a sketch made on board ship in M'Murdo Sound; Feb. 8, 1902, 5 P.M.
(Map B.)

At the foot of Mount Erebus are seen two of the Dellbridge Islands, and to the right of them a conspicuous cliff and projecting rock on the coast known as "The Jetty."

Mount Terror is here shown without any sign of cloud or vapour.

From this point to Cape Armitage on the right is a broad-side view of the long and narrow promontory, at the southern end of which was "Winter-quarters Bay."

Castle Rock, 1310 feet above sea-level, the plug or core of a volcanic cone since gone, is the most conspicuous landmark on this tongue of land, and to the right of it are the slopes upon which our companion Vince met with his fatal accident.

The summit of Crater Hill, 1000 feet above sea-level, was used as a station for temperature observations throughout the winter months.

PLATE CXXXVIII.—MOUNT EREBUS AND MOUNT TERROR FROM TURTLE ROCK.

From a sketch made looking N.-E. from Turtle Rock; Sept. 10, 1903.
(Map B.)

Turtle Rock lies about half a mile off the west coast of Winter-quarters Peninsula, and four and a half miles from Hut Point.

Surrounded by a tide-crack, and with ingress to and egress from the water made easy by movement in the ice around it, the island was a favourite haunt of Weddell Seals, which frequented it especially in the early summer when about to give birth to their young.

Small and insignificant though the island was, it nevertheless had always an interest on account of the variety of crystalline volcanic rocks which it supplied, many of them of considerable beauty.

See Ferrar, *Nat. Hist. Rep.*, vol. i., p. 14.

PLATE CXXXIX.—ROSS ISLAND FROM THE S.

From a sketch made looking northward from the northern extremity of White Island; Feb. 21, 1902. (Map B.)

The whole of Ross Island on this, the south side, is almost completely buried in snow and ice.

From Mount Erebus to the left is the narrow promontory known to us as Winter-quarters Peninsula. At the left end of it, and behind Observation Hill, is Winter-quarters Bay.

On the extreme right, along the sky-line downwards from the summit of Mount Terror, a number of rocky projections are kept clear of snow by the fury of the southerly winds which sweep round this side of the island and become concentrated at Cape Crozier. It has been noticed more than once that when a heavy blizzard is blowing at each extremity of this island, there is a flat calm in the bay between Winter-quarters Peninsula and Cape Mackay.

In the many journeys that have been made across this "fair weather bay," no foul weather has ever been experienced, nor has the snow surface ever shown a sign of more than a gentle breeze. (See Plate CXL.)

PLATE CXL.—ROSS ISLAND FROM THE TOP OF CRATER HILL.

From a sketch made looking to the N. from the top of Crater Hill on Winter-quarters Peninsula; November 1902. (Map B.)

This sketch shows on the right the "fair weather bay" mentioned in connection with Plate CXXXIX., lying between Cape Mackay in the distance and the peninsula from which the sketch was made.

Castle Rock as usual forms a prominent feature under Mount Erebus, whose western slopes run down to Cape Royds at sea-level on the left. Here also may be seen the four rocky islets known as Dellbridge Islands, projecting from the frozen surface of M'Murdo Sound.

PLATE CXLI.—KING EDWARD VII.'S LAND.

From a sketch made on board ship; Jan. 31, 1902. (Map A.)

Captain Scott writes as follows concerning the discovery of this land:—

"We could now see the coast-line clearly for many miles. On the left was the low barrier formation . . . which I now note as 'ten to twelve feet high and sloping up for a short distance, when it runs horizontally for ten or eleven miles to the base of a range of well-defined hills.' To the right and left of two groups of hills which lay opposite to us, a thin stratus cloud partially hid the outline of continuously high snow-covered ridges, and the same thin veil hung in the broad valley between the groups; but the sharp peaks of the groups were clearly outlined against the sky, and with a sextant and the distance given by four-point bearing, we were able to calculate the altitude as between 2000 and 3000 feet. . . . Behind the broader valley which separated the hill groups, the outline of farther ranges was strongly indicated, and convinced us that the high land extended far back beyond the coastal hills, and that our new-found land was not a group of islets, but a country of considerable altitude and extent."—Scott, *Voyage of the 'Discovery,'* vol. i., pp. 190, 191.

PLATE CXLII.—WHITE ISLAND, WITH MOUNT EREBUS AND MOUNT TERROR, FROM THE S.

From a sketch made on the Southern Sledge Journey; Jan. 31, 1903, 10 P.M.
(Map B.)

This sketch takes in the whole western aspect of White Island, and shows how its snow-slopes gradually merge to the S. with the surface of the Barrier. It forms a very disturbing element in the progress of the Barrier Ice-sheet northward, and at both the northern and southern extremities is the cause of extensive waves or pressure-ridges full of crevasses, which make it necessary in travelling with sledges to give the island a wide berth.

The general direction of the movement of the Barrier Ice-sheet is a little to the east of north, and the rate at which it is moving is approximately 540 yards in twelve months.

See Scott, *Voyage of the 'Discovery,'* vol. ii., p. 416 *et seq.*

PLATE CXLIII.—MINNA BLUFF AND THE COAST-LINE SOUTH, FROM MOUNT DISCOVERY.

From a sketch made on the Southern Sledge Journey; Jan. 25, 1903, 3 to 6 P.M.
(Map A.)

In this sketch is included the coast-line from the extremity of Minna Bluff on the right to Barne Inlet on the left.

Minna Bluff has been already described (see Plate CXI., fig. 1) as a promontory running out to the S.-E. from Mount Discovery. Mount Discovery has a height above sea-level of 9085 feet, while Mount Morning has a height of 5779 feet. Behind the latter, on this bearing, the peaks of the Royal Society Range are hidden, except Mount Huggins, Mount Cocks, and Mount Kempe.

Skelton Inlet here forms a break in the continuity of the coast-line, and to the south of it come in succession, Mount Harmsworth, 9644 feet; Mount Speyer, 8913 feet; and Mount Dawson Lambton, 8675 feet.

Mulock Inlet, between Cape Teale and Cape Lankester, forms another break, and a new range commences with Mount Keltie, 8910 feet. This range continues with Mount Chalmers, 7865 feet; Mount Longhurst and Mount Hughes, 7690 feet and 25 miles inland; Mount Mill and Mount Reeves, 5885 feet; and the Darwin Mountains, 6200 feet; the last lying more than 30 miles inland from the coast. Still farther southward are the Goorkha Craters and a glacier, and then a mountain chain which runs inland to the S.-W., forming the northern boundary of Barne Inlet. It has numerous peaks, which, however, appear only in miniature at the extreme left end of this sketch, but are represented in greater detail and at shorter range in Plates CXLV. and CXLVI.

PLATE CXLIV.—MINNA BLUFF.

From a sketch made on the Southern Sledge Journey; Jan. 27, 1903, 10 P.M.
(Map A.)

The highest point in this drawing of Minna Bluff has a height above sea-level of 3590 feet. The sharp point just below and before it has a height of 1521 feet.

The sketch is made looking due N., and shows some of the immense snow-drifts which collect in the southern angle of this long wall of rock.

At its extremity the ice is in an exceedingly disturbed condition for many miles, owing to its movement northward past the rocky headland.

PLATE CXLV.—THE COAST-LINE NORTH OF BARNE INLET.

From a sketch made on the Southern Sledge Journey; Jan. 20, 1903, 6 P.M.
(Map A.)

In this drawing the same coast-line is included which has already been figured in Plate CXLII., but from another bearing.

The mouth of the glacier emerging by the Goorkha Craters is here visible, while to the left of it is the range of mountains which forms the northern boundary of Barne Inlet. In this range are the following named peaks, Mount M'Lintock the highest, 10,530 feet above sea-level; Mount Henderson, 8120 feet; and Mount Aldrich, 8050 feet. (See also Plate CXLVI.)

Barne Inlet is some 12 miles across at its mouth between Cape Kerr on the N. and Cape Selborne on the S., and as in the case of the other inlets, namely Skelton, Mulock, and Shackleton Inlets, forms the passage by which an immense flow of glacier ice passes into and merges with the Barrier from the continental Inland Ice-cap.

PLATE CXLVI.—BARNE INLET AND MOUNT M'LINTOCK.

From a sketch made on the Southern Sledge Journey; Jan. 13, 1902. (Map A.)

Between Cape Selborne and the mountain range beyond is the wide opening known as Barne Inlet.

The sketch gives detail of the M'Lintock range of mountains, which is absent in Plate CXLV., though the latter represents the same mountains from another bearing.

Where the inland ice, flowing from this inlet, meets the Barrier ice, there is an immense disturbance which becomes visible in waves and lines of rupture running many miles outward from the coast. The chasms which thus appear have already been described and pictured (see Plates CVI., CVII., and CVIII., fig. 2).

PLATE CXLVII.—THE "PYRAMID AND TABLE MOUNTAIN" RANGE.

From a sketch made on the Southern Sledge Journey; Jan. 8, 1903, 3 P.M.
(Map A.)

In this sketch part of the land-mass which lies between Barne Inlet to the N. and Shackleton Inlet to the S. is shown.

It is repeated to some extent in Plate CXLVIII., which, while giving in greater completeness the whole length of coast-line between these two inlets, is unfortunate in that the more important mountain ranges at the back are covered to some extent by the less important foot-hills of the coast-line.

Mount Albert Markham, which we knew for many months as "Table Mountain," and "Pyramid Mountain" just to the north of it, retained their characteristic forms from almost every bearing, and were most valuable land-marks during this stage of our journey outward as well as homeward.

PLATE CXLVIII.—THE "PYRAMID AND TABLE MOUNTAIN" RANGE.

From a sketch made on the Southern Sledge Journey; Dec. 17, 1902, noon.
(Map A.)

On the extreme left is Christmas Mountain, which is the southernmost peak of any considerable size in the land-mass between the Barne and Shackleton Inlets.

On almost the extreme right of the drawing is Cape Selborne, the northernmost limit of the same land-mass.

Over the rounded and snow-covered eminence of Cape Selborne the M'Lintock range appears on the far side of Barne Inlet.

Between Cape Selborne and Christmas Mountain the following peaks, in succession from N. to S., have been named, and their heights above sea-level estimated: Mount Hamilton, 7400 feet; Mount Egerton, 7660 feet; Durnford Bluff, 7020 feet; Mount Field, 9390 feet; Mount Wharton, 8849 feet; Mount Albert Markham, 10,460 feet; Mount Nares; Mount Lindley, 7270 feet; Mount Hoskins; and Christmas Height, 6200 feet.

Behind and beyond this range no sign of other peaks is visible. It may be taken, therefore, for granted that they form at this point the western edge of the continental plateau.

PLATE CXLIX.—CHRISTMAS MOUNTAIN AND LAND TO THE S.

From a sketch made on the Southern Sledge Journey; Dec. 22, 1902, 6 P.M.
(Map A.)

To the left is Mount Longstaff appearing in the far S., about lat. 83°.

Christmas Mountain, so named because our Christmas camp on December 25

was pitched abreast of it, forms the most conspicuous landmark of the southern portion of this land-mass.

It will be seen that the whole coast-line from 77° S. lat. to 83° S. lat. can be conveniently considered as composed of five land-masses separated from one another by four inlets. The northernmost of these with the Royal Society Range is best known to us as being nearest to our winter-quarters. The second land-mass lies between Skelton and Mulock Inlets, the third between Mulock and Barne Inlets, the fourth between Barne and Shackleton Inlets, and the fifth between Shackleton Inlet and the unknown South. The last-mentioned appears on the extreme left of this panorama.

PLATE CL.—THE RED CLIFFS.

From a sketch made on the Southern Sledge Journey; Jan. 3, 1903, noon.
(Map A.)

"On this day we were abreast of the highest cliffs we had seen, and my angles, roughly computed, gave a height of 1800 feet between their base and the white snow-line on top, and they were so impressive even in the distance that I cannot believe them to have been much under. In many places the rock-face must have been sheer to this great height, for where it fell away a white splash showed where the snow had found lodgment.

In colour they were a rich, deep red, though a little farther to the S. this rock was confusingly bedded with a darker, almost black one; this alternation of black and red occurred along the whole coast south of our position at this time, always in the same irregular fashion, but always with a definite line between the red and the black."—Scott, *Voyage of the 'Discovery,'* vol. ii., p. 71.

PLATE CLI.—VIEW TO THE S. FROM CHRISTMAS CAMP.

From a sketch made on the Southern Sledge Journey; Dec. 26, 1902, 9 A.M.
(Map A.)

Rather more of the southernmost land-mass appears in the present sketch than in Plate CXLIX.

Mount Longstaff, 10,350 feet high, and Mount Christchurch, 4700 feet, show peaks which are lost again a few miles farther S., behind the snow-cap of Cape Lyttelton.

To the right of the sketch is Christmas Mountain, and a little to the left of it the high Red Cliffs shown in Plate CL.

PLATE CLII.—MOUNT MARKHAM AND THE VIEW TO THE S.
FROM 82° 16' 33" S. lat.

From a sketch made at the farthest point reached to the southward on the Southern
Sledge Journey; Dec. 28, 1902, 9 P.M. (Map A.)

Mount Markham lies fully 40 miles back from the coast. With its three main peaks, 15,100 feet, 12,300 feet, and 11,050 feet high, clad in snow from top to bottom, yet so generally precipitous that none of the outlines are lost or even blunted, this mountain is a very magnificent sight.

The drawing was made at the last outward camp. On the extreme left, and situated in 83° S. lat., is Cape Goldie, running out from the Longstaff Mountains. Shackleton Inlet, with its flow of ice into the barrier mass running out between Cape Lyttelton and Cape Wilson, divides the Mount Markham land-mass to the S. from the land-mass of the "Pyramid and Table Mountain Range" to the N. And as at the more northern ice-flow from Barne Inlet, so here, an immense disturbance is created where this great ice-river mingles with the ice of the Great Barrier, a disturbance which is evident in waves and radiating rents and cracks extending for a score of miles around the point of junction.

Meteorological Plates

From Drawings (with Descriptions) by E. A. Wilson, M.B.

PLATE CLIII.—FOG-BOW.

From a water-colour sketch, representing a camp on the Great Ice Barrier and a Fog-bow, in the small hours of a summer morning.

Fog, or a white frozen mist, was a common, almost a constant, occurrence for a short while after midnight, during fine still sunny weather on the Barrier. A Fog-bow, such as is here represented, was then sometimes to be seen, if one stood looking in a north-westerly direction, *i.e.*, with back turned to the sun, in the early hours of the morning. It was always small, of white light, not prismatic, and brightest at the ends of the two limbs, which came below the level at which one would have placed the horizon, had not the fog obscured it. A good example was observed on Dec. 17, 1902, near 81° S. lat., and another on Nov. 15, 1902, farther N., both on the Barrier, during the Southern Sledge Journey.

PLATE CLIII. HARBOR.

Our sketch representing a camp on the Great Ice Barrier
in the small hours of a summer morning.

A white frozen mist, was a common almost a constant, occurrence to
be seen after midnight, during fine still summer weather on the Barrier. A F
is here represented, was then something to be seen, if on
a westerly direction, for each back turned to the sun.
It was always shed of white light, not prisma
ls of the two limbs, when came below the level at w
the horizon, had not the ice obscured it. A good exa
at Dec. 17, 1902, near 81° S. and another on Nov. 15, 190
on the Barrier, during the Sledge Journey.

Tog-bow - on the Great Ice Barrier

E. A. C.

PLATE CLIV.—EARTH SHADOWS.

From a pencil sketch made during the 'Discovery's' stay in M'Murdo Sound.
Aug. 1903.

The sketch represents a remarkable shadow which appeared on a thin altostratus of cloud in the southern sky for several mornings in succession, at the time when the sun was just appearing or disappearing in the N. While the sun in the N. apparently moved from E. to W., three beams of shadow, radiating from a point in the horizon, followed one another in the S., moving from W. to E.

The sketch represents the moment when these three shadows happened to be arranged symmetrically.

The most probable explanation is that they are really divergent, though, from their immense length, apparently convergent, shadows, thrown on the sky by Mounts Erebus and Terror, which lay behind the observer, between his back and the sun.

PLATE CLIV.—EARTH SHADOWS.

Sketch made during the 'Discovery's' stay in McMurdo Sound.

This sketch represents a remarkable shadow which appeared on a thin airmass in the southern sky for several mornings in succession, at the time when the sun was just appearing or disappearing to the N. While the sun was above the horizon, followed one another in the S., moving from W. to E.

This sketch represents the moment when these three shadows happened to be geometrically.

The most probable explanation is that they are really divergent, but at such an immense length, apparently convergent shadows, thrown on the snow-covered ice of McMurdo Sound and Terror, which lay behind the observer, between the horizon and the observer.

recovered, and the new expedition 1891

Earth Shadows

PLATE CLV.—FRACTO-CIRRO-STRATUS.

From a pencil drawing made in M'Murdo Sound, looking across to the S.-W. from Winter-quarters Bay.

The high broken cirrus here shown is characteristic of the Antarctic region, and is often accompanied by very magnificent colour effects during spring and autumn, when the sun moves low on the horizon for hours together.

Cirrus and Cirro-stratus Clouds, looking to S.W.

PLATE CLVI.—MOUNT EREBUS AS CLOUD-PRODUCER.

From a pencil sketch, representing the "smoke" or condensed steam emitted from the crater at the summit of Mount Erebus.

The appearance of distinct columns rising from separate vents was unusual, and became possible only when a dead calm prevailed, 12,922 feet above sea-level. The collection of the condensed steam at a still higher level to form a cloud-mass was less unusual.

Compare Plates CLVII. and CLVIII.

Mount Erebus as Cloud-Producer

PLATE CLVII.—THE “SMOKE” OF MOUNT EREBUS AS A
WIND-VANE.

From a pencil sketch, representing the condensed steam of Mount Erebus, emitted, as it almost always was, in a series of rounded puffs, to be carried away by the upper currents of air in the form of a long pennant.

At this height, 12,922 feet, it was of great value as a wind-vane, enabling us to record the direction of upper currents of air, which often differ from those observed at sea-level, and amongst the highest clouds.

10. 1890

"Smoke" of Mount Erebus as a Wind Vane

PLATE CLVIII.—“SMOKE” OF MOUNT EREBUS AS A
WIND-VANE.

From a pencil sketch, showing the summit of Mount Erebus from M'Murdo Sound.

In this sketch the “smoke” of Mount Erebus is seen to be giving very exact information as to the level at which a calm changes into a breeze. The height of the lower limit of the moving air can easily be estimated by the height of the summit itself, in this case it is about 14,000 feet above sea-level.

"Smoke" of Mount Erebus Showing Upper Current of Air

Illustrations of Auroræ

From Drawings by E. A. Wilson, M.B.

These Plates represent various types of Auroral display seen in M'Murdo Sound during the winter months of 1902 and 1903. The original Sketches from which some of the Plates have been drawn were made on the spot by the Officers who were taking the two-hourly Meteorological Observations during the display. The following descriptions are also by Dr Wilson.

PLATE CLIX.—AURORAL STREAMERS.

From observations and sketches made on April 9, 1902, at 2.25 A.M., mean time ;
looking to the N. and N.-E. from Winter-quarters Bay.

STATE OF NEW YORK

IN SENATE,
January 10, 1906.

West, Newman lith

Auroral Streamers, April 9th, 1902. 2h 25m AM, M.T.

PLATE CLX.—AUROREAL ARC AND CURTAIN.

From sketches and observations made on July 5, 1902, at 0 hr. 30 min. A.M.; looking eastward over Crater Hill and Observation Hill from Winter-quarters Bay.

The colour of almost all the auroral displays which were observed in M'Murdo Sound was a pale golden-straw tint. Very occasionally there were observed also traces of rose and greenish light.

PLATE CLX. *Continued from Plate CLXV.*

The following are the names of the persons who have been
admitted to the Society since the last meeting, viz. the
1st of January 1854.

Mr. J. H. [Name] of [Place] was admitted on the 1st of
January 1854. [Name] of [Place] was admitted on the 1st of
January 1854.

Auroral Arc & Curtain above, glare in E. July 5th 1902. 0^h 30^m A.M.

PLATE CLXI.—AURORAL CURTAINS.

From sketches and observations made on July 5, 1902, between 1 hr. A.M. and 2 hr. A.M. ; looking to the N. from Winter-quarters Bay, M'Murdo Sound.

The colour in this case was a pale straw-yellow, and the movement which accompanied the display was very striking. Unhappily it is an impossible thing even to suggest in picture, for as the curtain appears to fold in one direction, it is waved out of sight in another, while the varying intensity of the vertical beams of light which compose it, now brilliant, now vanishing altogether, now stealthily appearing or disappearing imperceptibly, gives the onlooker a strange feeling of expectation and bewilderment, to which is added the conviction that the whole is very beautiful, but quite impossible to represent on paper.

Auroral Curtain, July 5th 1902. 1^h A.M. to 2^h A.M. seen in N.

West Newman lith

PLATE CLXII.—MULTIPLE AURORAL ARCS.

From sketches and observations made on Aug. 29, 1902, 2 hr. A.M. ; looking N.-E. from Winter-quarters Bay.

A very frequent feature in the auroral displays seen in M'Murdo Sound was a brilliant pale yellow glow of light in the gaps between the hills. The vertical rays which soon arose from this would then arrange themselves to form an arc, which gradually rising from the horizon, was followed by another, and another.

The uppermost of these might then begin to break and wave and fold into a curtain, gradually rising to the zenith, where it occasionally culminated in a corona of radiating beams or folding streamers.

THE HISTORY OF THE UNITED STATES

OF THE UNITED STATES OF AMERICA
FROM 1776 TO 1876

THE HISTORY OF THE UNITED STATES
OF AMERICA
FROM 1776 TO 1876

THE HISTORY OF THE UNITED STATES
OF AMERICA
FROM 1776 TO 1876

Double Auroral Arc. Vertical rays, in Upper Arc. August 29th 1902. 2nd A.M.

PLATE CLXIII.—AURORAL CORONA.

From sketches and observations made on April 8, 1903, at 2 hr. A.M.; looking to the zenith, M'Murdo Sound.

The sketch is intended to give an idea of the culmination of moving arcs and curtains and beams of light in the zenith, where occasionally the appearance of radiation from a centre, or of revolution, slow and changeful, about an axis, is given to the onlooker. Such evanescent figures, almost impossible to describe in words, are even more difficult to suggest with any approach to truth, in pictures; they are spoken of as "coronæ."

CINCH-ACHORAI

Observations made on April 8, 1900
McMurdo Sound.

It is intended to give
a description of light in the
course of revolution
of the planet.

West, Newman lith.

Corona, April 8th 1903. 2^h A.M.

PLATE CLXIV.—AURORAL CORONA.

From sketches and observations made in Winter-quarters Bay on May 31, 1903,
4 hr. P.M.; looking to the zenith.

The form of corona here shown was the production of a rising series of arcs which followed one another upward from the horizon, slowly changing, folding, evanescent first here, then there, till overhead, though for a few moments only, the form of a crown appeared, and passed rapidly, but with a strange appearance of deliberation, out of sight.

Corona, May 31st 1903. 4^h P.M.

West/Newton 1118

PLATE CLXV.—A LOW AURORAL ARC.

From sketches and observations made on June 3, 1903, at noon; in Winter-quarters Bay, M'Murdo Sound, looking to the N.

In this sketch is shown the birth of an auroral arc. When first it appeared on the horizon as a glow of pale straw-coloured light, or as a row of upright beams, there may have been no trace of light in the whole heaven other than the stars; and yet as one watched, imperceptibly the curtains rose, one arc above another, glowing here and fading there, but always up and upwards with lengthening beams, and increasing brightness. The brightness, however, was seldom great in the displays which appeared to us in M'Murdo Sound.

Low Auroral Arc showing above Hills, June 3rd 1903, noon.

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National Antarctic Expedition,
1901-1904

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