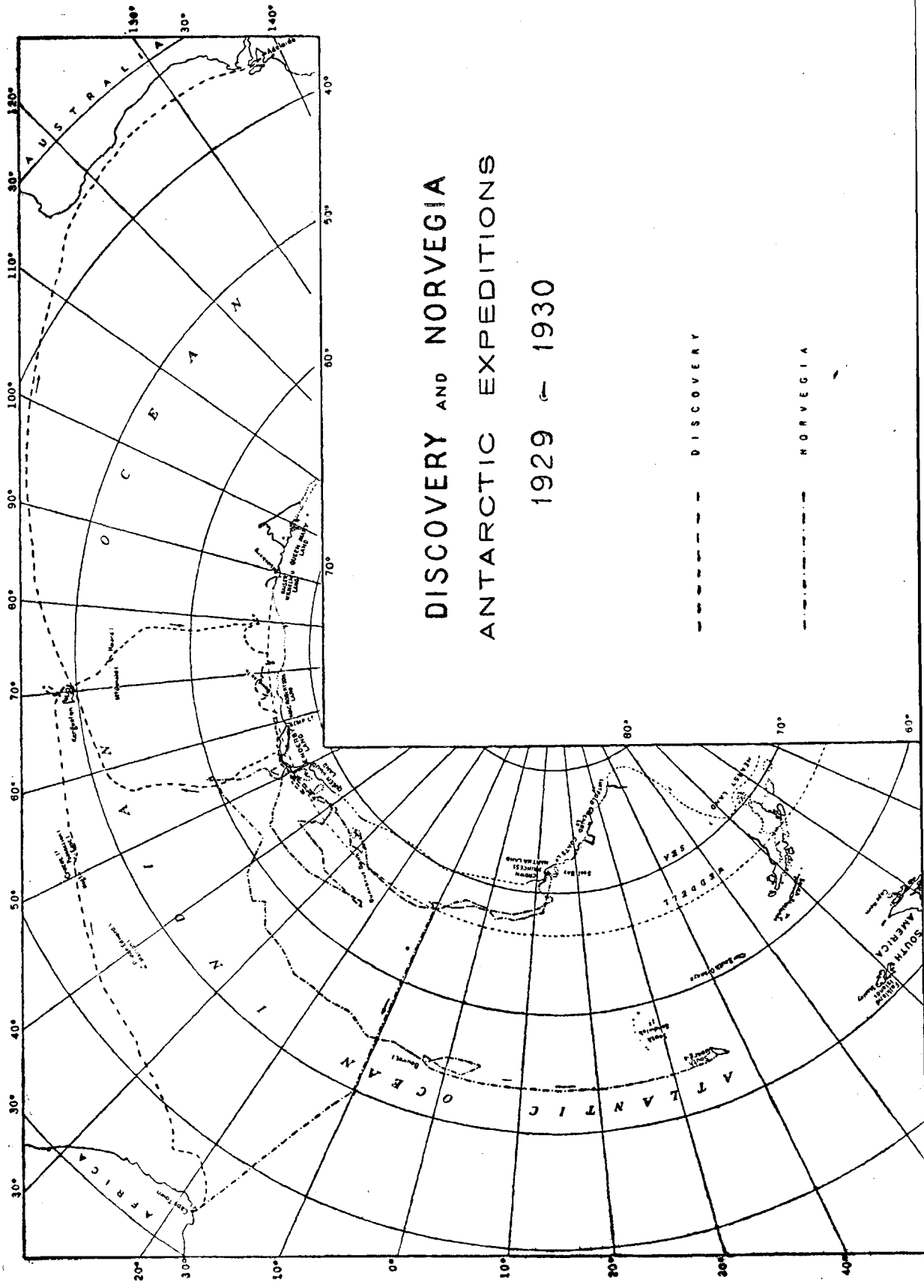


DISCOVERY AND NORVEGIA ANTARCTIC EXPEDITIONS 1929 - 1930



THE ANTARCTIC CRUISE OF THE "DISCOVERY", 1929-1930

by

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The "*Geographical Review*" of October, 1930, published by the *American Geographical Society* of New-York, contains two very interesting articles on recent expeditions in the Antarctic, one: *The Antarctic Cruise of the "Discovery"*, 1929-1930, by Sir Douglas MAWSON and the other: *The "Norvegia" Expedition*, 1929-1930, by Hjalmar RIISER-LARSEN.

The cruise of the *Discovery* received the title of "British-Australian-New Zealand Antarctic Research Expedition" from the three sponsoring countries. Sir Douglas MAWSON was in charge of the Expedition and was assisted by a staff of scientists; the ship was also provided with an air-plane and two air-pilots.

The *Discovery* left Capetown on October 19, 1929, and proceeded to Possession Island of the Crozet group where two days were spent, after which she sailed for Kerguelen Island (Land of Desolation). Nine days were spent there in coaling ship at an abandoned whaling station where a depot of coal had been landed for the Expedition.

"On account of the prevailing winds and fogs the weather side of Kerguelen, which includes the west and the south coasts, is comparatively little known. The east-facing coast, on the other hand, has been the locus of sealing activities for a hundred and fifty years.

"Kerguelen is an extraordinarily interesting island, but wretched weather conditions and rugged topography preclude its economic development and it remains a Land of Desolation.

"On November 24 a course was set for Heard Island, which lies in latitude 53° S. Every care had to be taken with navigation, for the vessel was laden with coal, even piled high upon the decks.

"The high volcanic cone that constitutes the central feature of Heard Island hove in sight at dawn on the 26th. It was exceptionally clear weather, and a view was witnessed seldom revealed in that region of mist and snow. Even as it was, cloud hid a portion of the mountain so that it cannot be said with certainty whether there is still active emission of vapor from the crater. The report that such was the case in 1910 may be correct, but it may be that what was witnessed at that time was actually condensation cloud fraying out in wreaths from the 7,000-foot summit.

"Anchor was cast in Corinthian Bay, open to the north and sheltered from the south, a poor place for a vessel to lie in but apparently the best offering for a craft of our size. A party of the scientific staff proceeded ashore by motor boat.

"At great hazard the last of the shore party were reembarked on December 3, and in a strong gale the *Discovery* managed to creep out into the safety of the high sea. A course was set somewhat east of south with the intention of reaching the pack ice in the neighbourhood of the eightieth meridian; at the same time we hoped to define the farther extension of the Kerguelen-Heard Islands rise.

"The *Gauss* Expedition had shown the existence of colder bottom water in the eastern division than in the western division of the South Indian Ocean. The inference was that a rise exists in the ocean floor between Heard Island and Gaussberg. The actuality of such a rise was suggested by a 1260 fathom (2304 m.) sounding recorded by the *Challenger* in a position roughly intermediate between these positions. It was not surprising, therefore, to find day after day as we progressed that considerably shallower water existed along this course than recorded by previous expeditions in the ocean to the east and to the west. Excitement, however, waxed daily when not only was the rise

discovered to be much more marked than heretofore had been suggested, but that the water became shallower as the ship progressed southward. Eventually at 6 p.m. on December 7, in latitude $59^{\circ}10'$ S. and longitude $77^{\circ}45'$ E., the bottom was found to approach within 350 fathoms of the surface. Thereafter the depth increased, but the ridge may continue eastward of our course, from this time on nearly due south. We left the ridge with reluctance and with the intention, unfortunately not realized, of renewing the investigation on our return."

The ship continued south and on December 7 sighted ice-bergs; and:

"On December 9th, in latitude $61^{\circ}36'$ S. and longitude $77^{\circ}59'$ E., the sea was found to be studded with bergs and fragments of very old bay ice. Here the depth was 1.783 fathoms (3.261 m.)."

On the 12th and 13th December progress was difficult and with snow and a moderately cold blizzard wind blowing, the vessel became firmly embedded in the ice. On the 15th the vessel was able to work her way to Westward and on the 17th to the Southward and Westward.

On December 31, 1929:

"Conditions being favourable, the airplane was swung over the side of the ship on its floats, and an ascent was made by CAMPBELL and DOUGLAS. To the south nothing was to be seen but continuous solid ice until a height of 2,500 feet had been reached. Then there loomed up a dark line of water beyond the hummocky floe. At 5,000 feet the strip of open water, separated from the ship by a belt some forty to forty-five miles wide of practically unbroken ice, appeared to be about ten miles wide and led beyond to undulating ice-covered land. Embedded in it were numerous large ice-bergs, and away to the southwest were the projecting black tips of what were apparently several small islands. These islands of course accounted for the hold-up of the old pack, which was prevented from drifting past them to the west with the current. They were named *Douglas Islands*.

"After remaining aloft for an hour or more the plane descended to report. It was then late in the day, and so it was decided to steam slowly west along the edge of the fast ice with the expectation of making a further ascent on the morrow. Unfortunately, however, a wind arose, and several days were spent in weathering a gale and dodging massive ice rafts.

"Whilst waiting for the wind to abate, land ice slopes were miraged up on the southern horizon during the evening hours. On the 5th, as the weather was favourable for flying, the opportunity was taken to examine the new land from the air. With CAMPBELL as pilot, I ascended to 4,000 feet in about 61° E., then flew a few miles east and west and towards the land, which presented a magnificent spectacle from the air. East, west and south high ice-covered land extended to the horizon. Peaks were observed to break through the general surface at intervals, but in the main it is an ice plateau that rises steadily to the south. The coast line was distant from the ship not more than thirty miles. First came a belt of some fifteen miles of pack ice, then a few miles of free water, and finally six to ten miles of hummocky floe frozen solidly to the land. Seventy or eighty miles to the west we could see dark peaks looming through the distant haze.

"One of the most pleasing observations was the discovery that to the west of us lay comparatively open sea. Evidently we had arrived at the western limit of the great pack belt through which the *Discovery* had pushed her way for a month past.

"It was decided to move the vessel slowly to the west during the evening hours with the expectation of next day reaching the actual coast in that direction. The weather was then beautifully calm; but soon after midnight there was a sudden change, and a violent wind from the east arose. All the following day we were hove to in what Captain DAVIS and I agreed was, while it lasted, the most severe summer hurricane we had experienced in Antarctic seas. The instrument recorded a wind velocity of over seventy miles an hour. Fortunately, the most violent phase abated after a day of great anxiety, but the gale and thick weather still continued for some days. It was not until January 11 that the ship could be headed back towards the newly discovered coast. It was found, however, that the recent hurricane had set the pack from the east down upon

this section of coast, so we had to turn the vessel to the west with the intention of following the coast line in that direction.

KEMP LAND.

"At noon on January 12 we were off an ice-cliff coast in latitude $66^{\circ}3'$ S. and longitude $57^{\circ}43'$ E. The peaked ice slopes of the land lay only a few miles to the south. A sounding gave 146 fathoms (267 m.). Throughout that day the ship had been following the well-defined edge of the pack and occasionally passing through lines of grounded bergs. The distribution of the banks upon which these bergs were grounded suggests that they represent submerged moraines.

"KEMP had come in sight of land in this vicinity in the year 1833, but the exact position of his landfall has been in doubt because he had with him only two chronometers neither of which pursued an even rate.

PROCLAMATION ISLAND.

"On the morning of January 13 the *Discovery* arrived at a striking feature of the coast which we subsequently named *Proclamation Island*. A peaked, black, rocky island, reaching a height of 800 feet (244 m.), stands on the coast margin, evidently joined to the mainland by a thick ice shelf during much of the year, but separated in summer by a water channel several hundred yards in width. There are many other tiny islets in the neighbourhood, and rocky prominences also project from under the land-ice sheet. The islets give shelter for vessels against moving pack ice and create the best approach to an accessible harbour anywhere noted along these coasts.

"The neighbourhood was examined by some of the scientific staff whilst a party ascended to the top of the peaked island. On this most unusual feature of the coast so far seen we raised the *Union Jack*. From this elevation a better view was obtained of the mainland. A number of rocky peaks were seen to rise above the ice plateau. A bold peak to the southwest of Proclamation Island corresponded closely in position with that named Mt. Codrington by BISCOE. We ascertained its height to be about 4,870 feet (1,485 m.). Evidence that glacial conditions are waning thereabouts was noted in the fact that this island rock mass is everywhere grooved and polished by former ice and has, dumped upon it even to the summit, a veneer of erratics obviously transported from the mainland to the south.

"The ship continued west along the coast line separated from the hundred-foot high ice cliffs by only two or three miles of loose pack ice. The undulating ice surface penetrated by sharp, rocky peaks rose to the interior seemingly to an altitude of some 2,000 or 3,000 feet. A well defined continental shelf extends out to sea for fifteen to twenty-five miles, then the sea floor plunges to the ocean depths.

"Considerable areas of the continental shelf range from one hundred to one hundred and fifty fathoms in depth. At intervals lines of grounded bergs recur, usually in from one hundred to one hundred and thirty fathoms of water.

THE SCOTT MOUNTAINS.

"A conspicuous black rocky mountain in latitude $66^{\circ}13'$ S. and longitude $51^{\circ}25'$ E. we named *Mt. Biscoe*. It rises steeply from the sea front to a height of 1,600 feet. Most of the northerly face is encrusted with guano, for countless flocks of Antarctic petrels and other sea birds resort there during the nesting season. Farther south and west the pack belt widens, apparently held up by grounded bergs and ice tongues extending from the land. Thus edged away from the coast, our view of the land became limited to the higher portions only. A fine range of rocky mountains extending from the coast to the east roughly along the 67th parallel we named the *Scott Mountains*, to commemorate the great contribution to Antarctic exploration made by Captain Robert Falcon SCOTT. What appeared to be the furthest inland extension of this range visible from the ship is a high and very notable peak which we have named *Mt. Riiser-Larsen*, the estimated height of which is 6,100 feet (1,860 m.).

MEETING WITH THE "NORVEGIA".

"During the evening of January 14 whilst we were steaming west along the edge of the pack ice in about longitude 47° E. and latitude $66^{\circ}22'$ S., just out of sight of land, the Norwegian exploring vessel *Norvegia* hove in sight coming towards us from the west. The celebrated explorer and aviator, Captain RIISER-LARSEN, was on board. He honou-

red the *Discovery* by paying us a visit. An hour was spent exchanging views and roughly outlining our respective programmes. We explained that the region for the investigation of which our expedition had been equipped lay east of the fortieth meridian of east longitude. A farthest west marine station was conducted about the forty-fifth meridian. We then turned back to the east on January 15, leaving the more westerly field of operations to the Norwegians. On January 16 we passed the *Norvegia* some ten miles distant heading to the west."

On January 22, 1930, the *Discovery* started on the return voyage, via Kerguelen Island to Adelaide, Australia, where she arrived on April 1, 1930.

ENDERBY, KEMP AND MACROBERTSON LANDS.

"The newly discovered and newly examined territory we have mapped in three divisions. That extending between the 45th and the 55th meridians is defined as *Enderby Land*, for this was the sphere of BISCOE's operations in 1831: that between the 55th and 60th meridians is indicated as *Kemp Land*, for KEMP sighted land in this interval in the year 1833. KEMP's landfall was not so reliable in longitude as BISCOE's. If we accept one of his chronometers, the land he saw would be in the eastern half of this interval. If it should prove that his other chronometer was the correct one, then his landfall would be nearer the 55th meridian.

"We are certain, however, that no previous explorer saw land to the east of the 60th meridian; consequently the new land that we have charted in that direction has been named *MacRobertson Land*, to commemorate the outstanding help afforded to the expedition's finances by Mr. Macpherson ROBERTSON of Melbourne. All is high, ice-covered land rather similar in topographic character to the well-known Queen Mary Land, but with an ice plateau studded far more freely with nunataks. In the neighbourhood of Proclamation Island, as viewed from the airplane at an elevation of 5,000 feet, upward of 100 peaks are visible rising through the general ice flood. Along the seacoast, however, exposures of rock are few, the land ice terminating, with rare exceptions, in a vertical ice wall from sixty to a hundred and fifty feet in height.

"The rocks, where examined *in situ*, and all erratics dredged from the sea floor in these coastal waters are uniformly continental in type. Granites, diorites, gabbros, schists, and metamorphosed quartzites and slates are the varieties thus met. There is exhibited a great similarity in general character between these rocks and our former collections in Queen Mary Land. These facts, taken in conjunction with an analysis of the numerous soundings effected off these shores and in the region still further east leading on to Queen Mary Land, are all strongly in favour of the unity of this newly examined territory with the accepted continental mass of Antarctica lying between these longitudes and the Ross Sea. Unless, and until, disproved by future explorations, the Antarctic Continent may be regarded as extending west from the Ross Sea at least as far as the 45th degree of east longitude.

"In addition to contributions to geography in the Antarctic zone, corrections and extensions have been made to the charts of the Crozet, Kerguelen and Heard Islands.

"By the inclusion in the expedition equipment of an echo-sounding machine, a valuable series of deep-sea soundings have been obtained. These amount in all to about 750 soundings and include a series made in waters off the Antarctic coast, extending through 35 degrees of longitude. Exhaustive hydrological data have been secured. Besides observations of the temperature and the chemical nature of the surface waters taken at regular intervals throughout the day, more than 20 vertical stations have been occupied in the pack ice zone and northward from Enderby Land, as well as between Kerguelen and Antarctica, and Kerguelen and Australia.

"Considerable information relating to upper air movements was obtained by release of pilot balloons on all suitable occasions. In all, 34 of these balloons were released, recording the direction of motion of the air up to an extreme height of 53,200 feet.

"Observations with the pyroheliometer showed that, with the sun at the same height in the sky in the two places, the Antarctic air let through 50 per cent more heat than that of the Australian Bight. No doubt the presence of dust particles in the Australian air partly accounted for this difference. Experiments with a "jet dust counter" revealed no trace of dust in the Antarctic air.

"Examination of the plankton content of the seas traversed was one of the most carefully and systematically conducted parts of the work. Observations were quantitative as well as qualitative. Nets were operated at a large number of stations, which gave

information as to the kinds and numbers of organisms occurring in the waters between depths of 1,000 and 750 metres, 570 and 500, 500 and 250, 250 and 100, 100 and 50, and 50 to the surface. Other nets were towed obliquely from a depth of 100 metres to the surface behind the ship for a known distance at a known speed, so that an average cross section of the life of the more superficial waters was thus obtained. For larger organisms a net with much greater diameter and a wider mesh was used. These were operated at depths of over a mile below the surface. For obtaining examples of the living bottom forms, trawls were employed. Some of the hauls on the Antarctic continental shelf were extraordinarily rich".

In this connection an interesting preliminary chart of the harbours and anchorages of South Georgia has been issued by the British Admiralty on 22 September 1930. This chart is based on the work of the *Discovery* in 1928-29. Chart N^o 3589.

