

THE "NORVEGIA" ANTARCTIC EXPEDITION OF 1929-1930

by

REAR ADMIRAL A. T. LONG, DIRECTOR.

The *Norvegia* Antarctic Expedition of 1929-1930 was under the leadership of the well-known explorer and aviator Hjalmar RIISER-LARSEN, the author of the fore-mentioned article. It was sponsored by Consul Lars CHRISTENSEN, a leader in the whaling industry who, in 1924, had initiated a seasonal programme of antarctic explorations, but this season's programme was more extensive than in former years.

Aerial reconnaissance was to be an essential part of the expedition, which carried two air-planes, and Commander Lürzow-HOLM, a well-known pilot of the Norwegian Naval Air Service, was a member of the party. The total personnel of the Expedition was eighteen.

The *Norvegia* which had been laid up for the winter at South Georgia went first to Bouvet Island to establish a shelter and provision depot for shipwrecked mariners and then met the *Thorshammer* and took on her air-planes and others stores.

On November 8 the *Norvegia* started on her own expedition and headed again for Bouvet Island, which was sighted on November 11th.

"We were eager to find smooth water to take off the seaplane for the purpose of mapping the island. And in this we were eminently successful, for innumerable huge icebergs of the plateau type stranded on the west coast of the island enclosed the most perfect seadrome one could wish. During our stay here several flights were made and a series of oblique pictures of the coast line taken, the low clouds not permitting us to get high enough for vertical pictures."

The *Norvegia* left Bouvet Island on November 14th and set her course to Enderby Land, encountering a number of gales. Soundings were taken with a BEHM Echo Sounder.

COURSE SET TO ENDERBY LAND.

"As everyone knows, Enderby Land was discovered by that very able British seaman, Captain BISCOE, in 1831. Later expeditions that tried to get there failed. To accomplish our programme we had to reach Enderby Land early in the season, but at that time a direct approach would be impossible. Penetration of heavy pack for several hundreds of miles was out of the question. I had already learned in the Arctic not to work against the ice but with it.

"I had in mind VON NEUMAYER's theory (1) of a warm current setting towards Enderby Land, the southward bending of the isotherms here, and the fact that no icebergs are found towards Kerguelen. In the vicinity of Enderby Land the ice drifts in a westerly direction. Should we approach it from the western side we should have to work against wind and ice, and if caught in the ice should drift in the wrong direction.

(1) Die Erforschung des Süd-Polar-Gebietes, Zeitschr. Gesell. für Erdkunde zu Berlin, Vol. 7, 1872, pp. 120-170, with map on a scale of 1/40,000,000. On some subsequent observations and views, see references in Krümmel: Handbuch der Ozeanographie, Vol. 2, 1911, p. 680.

Furthermore, with the prevailing easterly winds the leads and openings in the ice have a north-south trend. Pushing into the ice southeastwards would mean working through heavy pack with little advantage of the leads, whereas cutting into ice to the east of 53° E. would enable us to take full advantage of the leads. Then again there was the record of the German Deep Sea Expedition on the *Valdivia*, which as early as December 16 (1898) found a huge bay in the pack ice at about 53° E. with open water as far south as $64^{\circ}14'$ (1). We decided to follow the edge of the ice eastwards searching for this "Valdivia Bay", as we called it.

AIR RECONNAISSANCE SHOWS LAND TO THE SOUTH.

"A southerly breeze brought bright and clear weather on the morning of December 7. Shortly before 11 o'clock Commander Lützw-HOLM and I were in the air with the seaplane to reconnoitre ice-conditions to the eastward. As we approached the altitude of 3,000 feet I saw two black spots far away to the south. They might be the shadow side of icebergs, but they might also be nunataks. At 4,000 feet I was sure that the black spots were mountains. I wrote down the message "Land to the south", and handed it to Commander Lützw-HOLM. He had seen it himself too and pointed in the same direction. We flew towards it some forty miles; but, as there was a stiff wind against us and the distance to the land was too great to enable us to get there and back again with safety, we returned to search southwestwards, where I believed the ice would be opened up by the Neumayer Current. Before turning we took a good view of the land. It stretched out to the west and east of the cliffs first seen. Far to the east what seemed to be a mountain range protruded through the ice, and several nunataks were observed far inland where the inland ice gradually sloped to the south; others were observed to the west. We passed the ship and flew for an hour southwestward. As I expected, great openings were seen in the ice in this direction; but quite heavy pack drifted between them and the bay in which our ship lay. After having taken several bearings we returned.

"On this flight we experienced how immensely difficult it is to find a ship in the ice. What you look down upon is not a huge white plain: the ice is broken, some cakes drift loosely, some are closely packed, the picture indeed, in black and white and in colours from the diatoms, is the most irregular that could be dreamt of. Moreover, if one is away any length of time ice conditions may have completely altered before one gets back, on which account it is advisable to leave the ship for long flights only when weather conditions indicate that no fog or snow is likely to occur before the return.

"On December 22 in $65^{\circ}10'$ S. and $49^{\circ}30'$ E. we got into the air heavily loaded with equipment, including emergency wireless gear. The skipper had orders to keep the ship due north of a couple of big icebergs of conspicuous appearance and instructions not only for the rest of this season but until March 1931, in case we did not return to the ship.

"Weather conditions were good though not of the best. We had a southerly wind which would keep the weather clear, but to the west were great openings in the ice and hazy air. We flew some ninety nautical miles on to the coast. Under way I mapped the ice, marking on it the icebergs seen. When we had passed them I turned round and made a quick silhouette drawing of them, so that I should know them again on our return flight if we met with bad visibility.

"Along the coast big tabular bergs were stranded, some far out, some close to the shore. Inside this line of bergs the ice was quite unbroken and seemed to be rather smooth, but my experience of ice in the Arctic deterred me from the risk of landing. We rounded a cape which I believed to be BISCOE'S Cape Ann; we passed a little island. With our heavily laden seaplane we could not climb the steep ascent of the inland ice. We therefore turned to the south, in which direction we saw open water and there landed after another 25-minutes' flight.

"Lützw-HOLM brought the machine up against unbroken ice without hummocks whose snow-covered surface was only half a foot above the level of the sea. He opened up his engine, and the machine climbed onto the ice. We sledged under engine power a distance towards the shore, at first thinking this would be a convenient mode of ice travel, but the surface proved less smooth than it had looked. So after heading the machine for the opening we stopped the engine. We were quite close to the inland ice

§(1) Wissenschaftliche Ergebnisse der Deutschen Tiefsee-expedition, 1898-1899, Vol. 1, Atlas, Pl. 39.

where the bergs had broken off and floated away. The wall, about sixty feet high, nowhere in the vicinity offered a foothold. Close-by were two snow-covered skerries; in the distance were exposed rocks, and hoping to reach them for specimens we set out on skis. We were each attended by an inquisitive little Adélie penguin. At first they followed us, but when we slackened speed after an hour's hard going they passed us and took the lead, sledging on their stomachs, propelling with their feet and flappers; and whenever we stopped they stopped too.

"Shortly after we landed I saw a small cloud forming over the inland ice, a very bad sign. It meant that the wind was turning, moist air coming, with fog certain to follow. A heavy bank was already forming on the western horizon. During the march I kept my eyes on the gradually growing cloud over the inland ice. After we had gone for more than two hours I decided to return. I recollected what SCHACKLETON said to the Geographical Society of Oslo when he returned from his expedition to 88° S.: "We could have got to the Pole, but then there would have been no one to tell you the tale to-night." We could have reached the rocks and got our specimens, but the matter of bringing them home would have been problematical. We hastened back to the skerries (66°33' S., 50°40' E.) and there solemnly hoisted the flag presented to us by Their Majesties the King and the Queen of Norway. Then we returned to the machine, warmed it up, and started for the ship.

"On December 30 we met the *Thorshammer* coming eastward, but we were not able to coal until January 4. Two days later we were able to start again for Enderby Land. We followed the ice eastward, our route, considerably to the south of our westward track, showing how far the ice had receded in the last fortnight. On January 8 we came to the northeast corner of the great bay now worked by the current far to the west. On the south side of the ice a stiff southeast gale was blowing with high sea, against which we had to seek shelter until the 11th when we crossed over the open sea to the coast ice, which we met on the 13th. Following this eastward on the next day we met the *Discovery*, and I went on board to pay my respects to Sir Douglas MAWSON and the Nestor of Antarctic Skippers, Captain JOHN KING DAVIS.

"On January 15 we were stopped by the ice, which now allowed us to get close to land. To the east we saw parts of Enderby Land, to the south new mountainous land. The great ice barrier that had barred BISCOE's view southward no longer exists: 99 years had wrought this change.

QUEEN MAUD LAND.

"On January 15 we got into the air again; but, as little shelter could be found from the swells, we had to leave behind the radio and much other equipment. We flew southward mapping a considerable stretch of new land which ran into a big bay, Ice Bay, and thence continued westward. We named it Queen Maud Land. The lead on which we landed on December 22 had disappeared. It was all ice and not very good to fly over because of its broken character. I should much prefer to have to land on Arctic ice; that is bad enough but it offers some chance.

"On our return from this flight we brought the ship to 44° E. from where we made another flight, this one very short as bad weather was indicated from the west — stiff westerly breezes giving us a drift of as much as 35° at the altitude of 3,000 feet and very hazy weather in that direction. We mapped the land from where work had been suspended before westward to 43° E., where it disappeared in the haze in a westerly direction. All along were so many nunataks that it was out of the question for me to map them. I was glad enough to content myself with the coast line as given by the wall of the inland ice.

"The next morning an easterly gale compelled us to seek shelter in the ice, where we immediately became fast in a bad position, with heavy ice cakes ramming our sides and a big berg bearing down on a direct course for us. The berg appeared at seven o'clock in the evening and at 4.30 the next morning passed close to us. In the meantime we had managed to get the ship turned round, though for a long time it looked as if we should have to leave her.

GUNNERUS BANK.

"After the gale had subsided we proceeded west to fulfil our programme, which called for oceanographical stations along the edge of the ice as far as Coats Land on the eastern border of Weddell Sea. Weddell Sea, it is well known, is bad even in the middle

of the summer and still worse in the season. Our ship was not built to stand winter pressure of the ice, and we had the fate of the *Endurance* in mind.

"On February 1 we discovered a bank in latitude 68° S., soundings giving only about 1800 feet between 32°11' and 32°38' E. We named it "Gunnerus Bank" after Johan Ernst GUNNERUS, bishop of Trondhjem and naturalist, who in 1770 was the first to describe the pelagic shrimp. An appearance of land was seen sixty to eighty nautical miles south-southeast of the bank.

"I shortly pass over the next three weeks of our voyage. The ice conditions encountered were quite different from those on the eastern side of the bank. The Neumayer Current seems to die away at the bank, or more probably it is deflected northwards, as we found the water to the east and the northeast of the bank crowded with small icebergs, a kind of Sargasso Sea as it were.

"Finally on February 16 we rounded the northwest corner of the ice and headed into Weddell Sea. A sounding in 68°30' S. and 11°46' W. gave a depth of 4.935 metres, which corresponds very well with the *Scotia's* soundings of 2.660 fathoms (4.865 m.) in 68°32' S. and 12°49' W. and 2.487 fathoms (4.549 m.) in 68°32' S. and 10°52' W. In this area Ross reported 4.000 fathoms no bottom but the *Scotia* found evidence here of a strong undercurrent, to whose existence is attributed the fact that the bottom is swept free of diatoms, which are very abundant in the upper layers. (1)

"Routine observations at our station of that day showed that the water layer of 0° C. temperature was deeper than farther east. The temperature of the water at the surface had risen to -0.67° from -1.07°. Bird life was meagre.

"We continued southward with very little ice around us and took up another station in the morning of February 17 at 70°42' S. and 13°0' W. The water temperature had now sunk to -1.07°. Soundings gave us 2.550 metres, the bottom seemed to be rising rapidly, and we were obviously on the right course. At about three p.m. we sighted a long row of icebergs trending east by north to west by south, so thickly strewn that we were certain they were aground. Our course was set towards them, and soundings were started. The bottom rose quickly: in 71°13' S. and 13°11' W. we got 314 metres. The water here was very cold, the temperature being -1.92° at the depth of 150 metres. Here trawling yielded a good haul.

"We sailed among the icebergs sounding 222 metres where they were aground. In 71°26' S. and 12°8' W. we were inside the row of bergs and were here stopped by heavy pack. As it now was dark we had to wait for the coming dawn, which we hoped would bring good flying weather. We were now close to Ross's farthest south in 1843. I presume, however, that his dead reckoning was in error — a not unusual circumstance in those days, or he would have made the sensational discovery of this shallow water. He must have been farther to the west.

CROWN PRINCESS MARTHA LAND.

"From the crow's nest during a short spell of better visibility I noticed in the sky to the east a peculiar light that is to be seen above inland ice. The morning of February 18 the skipper reported ice sky to the east, and this I confirmed and furthermore saw the actual inland ice itself. We headed for it. Soon it was seen rising eastwards and disappearing into low clouds. The pack offered us no difficulty whatsoever; and at noon we stopped our ship in a bay about 500 feet away from the wall of the inland ice, where we sounded 160 metres.

"We had to work quickly for the season was far advanced. In spite of the threatening weather conditions we got into the air with our seaplane and followed the land southward and then to the southwest. Clouds and fog compelled us to fly lower and lower until it was all fog about us and we had to return. Conditions were a little better at the ship; we could here rise to about 350 metres, which also was the altitude of the inland ice. We proceeded east of the *Norvegia's* position, following the coast line. Farther east the ice was level, at places indicating floating barrier ice. As the visibility to the south did not allow us to see far enough to determine where the rise commenced, we could only sketch the edge of the barrier. The wind, which had been southwest when we started, now changed to north of west. We therefore returned and passed

(1) See the reports on the *Scottish National Antarctic Expedition* in "Scottish Geogr. Mag.," Vol. 21, 1905, especially pp. 28, 37, 405, 414.

through a snow squall just before reaching the *Norvegia*, where we landed after a flight of two hours. Half an hour later all was fog.

"We went several miles into the bay and got a sounding of 608 metres, indicating somewhat deeper water on the landward side of the bank. Here we stopped for the night, but had to be on our guard as we might easily be trapped by the ice. The next morning (February 19) the bay was nearly filled up with pack.

"Because of the abundance of seals we named the place Seal Bay. Inside was smooth, broken bay ice with no sign of hummocks in the inner part. I think it might afford winter quarters for a ship but it has one rather serious drawback. It is a question as to whether the ice will open up from one season to the next. Personally I would not take up quarters here unless I had provisions for at least two years.

"We passed outside the row of bergs and proceeded westward to $71^{\circ}26'$ S. and $14^{\circ}58'$ W., where we were stopped by the pack, which here took a northerly direction. We had now come to the western limit of our area.

"A southeast wind brought clear weather on February 20, and Lützw-HOLM and I got into the air again. A layer of clouds at 1,000 feet gave us some difficulty. Below the clouds we could not see far, for the undersides hung like draperies. We passed through the cloud zone climbing to 5,000 feet and on to the southeast. The clouds disappearing southwards, we now saw the coast line from Coats Land to the south and southeast of us and a little later also to the east, giving us connection between Coats Land and the land discovered two days before.

"No nunataks were observed protruding through the ice, neither here nor farther east, this land which we named Crown Princess Martha Land having the same character as the neighbouring lands — Coats Land, Caird Coast, and Luitpold Land.

"We steamed along the coast to the eastward, mapping it from the ship, until we met the pack, which took a more northerly direction the farther east we went. As I feared, the pack north of us had drifted a considerable distance to the west during the gale, compelling us to work back westward again in order to get out. It was now February 23, a rather late date to be in Weddell Sea. The temperature of the water was at freezing point, and the air temperature also was getting low. Any moment we might expect pancake ice to start forming when the wind slackened. During the strong blow the salinity of the surface water most likely had risen on account of the evaporation. As soon as the wind slackened this condition would change. As the little more that could be achieved stood in no reasonable relation to the grave risks we were running by staying here longer, I decided to finish our work as quickly as possible. We therefore headed northward.

"The *Norvegia* met the *Thorshammer* at the rendez-vous (about $66^{\circ}50'$ S., 12° E.) and after bunkering from and transferring planes and other equipment to her, proceeded to Cape Town where she arrived on March 27, 1930.

"Summing up the chief results of the expedition, 370 nautical miles of coast were mapped in the eastern area between the meridians of 43° and 55° , and in the western area more than 200 nautical miles of new coast line from $8^{\circ}30'$ W. to Coats Land.

"The *Norvegia* cruised 7,600 miles, partly in waters never navigated before. Oceanographical stations with vertical net hauls were taken on a section as far south as possible between the meridians of 53° E. and 15° W., the results of which will be dealt with by the Geophysical Institute of Bergen and the Biological Institute of the University of Oslo.

"The seasonal variation of the pack under the influence of currents and winds was observed, and the speed and direction of the drift of the pack and movements of the icebergs were measured. Meteorological observations were taken. Finally new whaling grounds were found — also a matter of importance."

The chart of the tracks of both expeditions shows clearly the area covered and that their valuable explorations did not overlap but joined up at Enderby Land.

