

1917.

NEW ZEALAND.

“AURORA” ANTARCTIC RELIEF EXPEDITION

(REPORT OF THE PROCEEDINGS OF THE), BY CAPTAIN JOHN KING DAVIS.

Presented to both Houses of Parliament by Command of His Excellency.

“AURORA” RELIEF EXPEDITION, 1916–17.

“AURORA,” auxiliary barquentine. Tonnage, 580 gross, 386 net. Built 1876, by Stephens, of Dundee. Length, 165 ft.; breadth, 30 ft. 6 in.; depth, 18 ft. 9 in. Loaded draught, carries approximately 600 tons, dead-weight. Engines, steam, compound; nominal horse-power, 98.

Crew List.—Master, John King Davis; chief officer, C. F. de la Motte; second officer, A. le Gros; third officer, W. Aylward; staff officer, M. H. Moyes, R.A.N.; surgeon, F. G. Middleton; purser, A. H. Ninnis; wireless operator, T. M. Ryan; chief engineer, F. C. Gillies; second engineer, A. Dakin; boatswain, J. Paton; chief steward, A. Webster; second steward, B. P. Robertson; cook, H. Voegeli; donkeyman, M. Hannan; A.B.s, W. Peacock, W. Kavanagh, E. McDonald, A. Mackinnon, — MacNeill, C. Brock, J. Rafferty, E. Murphy, T. Smith.

REPORT.

SECTION—PORT CHALMERS TO ANTARCTIC CIRCLE.

The “Aurora” completed loading on the evening of 19th December, 1916, and at 6.55 a.m. on 20th December left Port Chalmers wharf and proceeded to an anchorage. The vessel carried a crew of twenty-four hands, was provisioned for eighteen months, and had on board 524 tons of coal. Her draft was 18 ft. 9 in. aft and 17 ft. 5 in. forward.

At 9 a.m. the tug “Plucky” arrived alongside and Sir E. Shackleton was embarked. The Minister of Marine, New Zealand (Hon. Dr. McNab), handed me final instructions, and at 9.20 a.m. the “Aurora” proceeded to sea.

We were provided with an efficient wireless installation of ordinary ships’ type—a 2½ kw. set, motor generator; the aerial, “L” type, Navy pattern, 85 ft. high and 85 ft. long. Power was provided by a shunt-wound 9.2 kw. dynamo, direct-coupled to a steam-engine. This generating-set was also in daily use for ship’s lighting and charging of storage batteries.

On 21st December antarctic clothing was issued to the officers and crew.

A southerly course was followed from Port Chalmers in moderate weather until 24th December, when the high north-westerly seas made it necessary to bear away to the south-east, and on this course we continued until the evening of 27th December. Wind and sea then moderated, and it was possible to haul more to the southward. On this day the first ice was sighted—two tabular bergs, each about ¼ mile long and 100 ft. in height—in lat. 60° 50′ S., long. 179° 10′ W.

Nothing of importance occurred until 29th December, when we arrived in lat. 64° 55′ S., long. 176° 40′ W., the latitude in which pack ice has usually been encountered by previous expeditions. Here a considerable swell and remarkable absence of ice were noticeable, and indicated, apparently, that the Ross Sea was more or less open this season.

Wireless communication was maintained until the aerial was blown down during a gale on 26th December. At this time we were 700 miles from the receiving-station, Awarua. On 29th December, when approximately 1,200 miles from the receiving-station, the wireless officer “read in,” but was not able to make himself heard by them in reply, the period of twenty-four hours daylight having been reached.

On 30th December the Antarctic Circle was crossed, after a fair passage across the westerly wind belt. During the passage constant high sea caused the vessel to labour and strain considerably. The repairs may therefore be considered to have been efficiently carried out as, although deeply laden, she made very little water.

The food, stores, clothing, and equipment supplied to the Relief Expedition have proved suitable and of excellent quality, and in this connection I should mention the debt that the Expedition is under to Mr. J. J. Kinsey, of the New Zealand Committee.

REPORT II.

SECTION—ANTARCTIC TO CAPE ROYDS.

30th December, 1916.—At 8 p.m. we encountered a quantity of drift ice, with appearance of "blink" to the southward. The experience of previous expeditions with regard to the pack ice of the Ross Sea teaches one that a passage round the pack is quicker than a passage through it. The longer a vessel can retain her freedom of action the shorter period she is likely to occupy in crossing the pack belt. Acting upon this we have been steaming to S.W. (true) during the twenty-four hours, with the main pack apparently to the eastward all day.

1st January, 1917.—The New Year found us steering through loose ice, skirting the pack in a westerly direction and making boards to the southward, where the sky showed clearer water. At midnight on this day we reached the edge of the main pack, lat. $70^{\circ} 20'$ S., long. $178^{\circ} 46'$ E. Very strong blink to the south extending to east-west. As the strong blink of this pack appeared to indicate that this was the main body, I now decided to go west, as nothing could be gained by going a few miles south and then getting stuck. During the following day we continued on a westerly and south-westerly course, blink becoming less marked and conditions looking more promising as we proceeded.

2nd January, 1917. At 8 p.m. on this day we may be said to have entered the pack: position, lat. $70^{\circ} 20'$ S., long. $175^{\circ} 20'$ E. We steered south-west into big leads till 4 p.m., when pack became close, but having got as far as possible.

3rd January, 1917.—During the day some progress was made to the southward through leads, and part of it was occupied in watering ship from a large floe. Ice becoming closer at 6 p.m. we stopped. The following three days it blew a blizzard, with thick snow, during which time the vessel drifted in loose pack, or steamed in open leads, in smooth water.

6th January, 1917.—Mount Sabine was sighted, bearing S.W. (true) at 100 miles distance.

7th January, 1917.—At 10 p.m., the wind having moderated, we forced our way to the S.E. through long lanes, afterwards getting into a long lead extending to S. (true). The recent gale had torn large channels in the pack, and it was by making use of these in a southerly direction that, at 4 p.m., we entered the open Ross Sea, the passage through the pack having occupied five days, of which three were spent sheltering from the weather. The belt of pack where crossed extended for a distance of 104 miles in a north-and-south direction. Continuing south into the Ross Sea along the western coast of Victoria Land we encountered fields of ice, which we in most cases avoided by steering to the eastward.

9th January, 1917.—At noon Mounts Erebus and Terror, the former 13,350 ft. high, were sighted at a distance of 130 miles; and at 9 p.m. Beaufort Island was sighted.

10th January, 1917.—At 5.35 a.m. Beaufort Island was passed at a distance of 6 miles, and we proceeded round Cape Bird into McMurdo Sound. No pack ice was encountered at all, but at 10.20 a.m. we were off Cape Royds and met the fast sea ice, which extended south from this point across the sound. Cape Evans was visible 7 miles to southward, but there was no sign of life there. We now came alongside the ice-edge at Cape Royds, and I despatched a party, under Sir E. Shackleton, to the hut of the 1907 expedition to look for some record. This party returned on board, having found a record stating that the Ross Sea party were housed at Cape Evans. Just before their arrival on board a party of six men, with dogs and sledge, was sighted approaching the vessel from the direction of Cape Evans. At 1 p.m. this party arrived on board, and we learned that of the ten members of the Expedition left here when the "Aurora" broke away on 6th May, 1915, seven had survived, viz.: A. Stevens, E. Joyce, H. E. Wild, J. L. Cope, R. W. Richards, A. K. Jack, I. O. Gaze. These seven men were all well, though they showed traces of the ordeal through which they had passed.

I regret to report that the Rev. A. P. Spencer-Smith died of scurvy on the Barrier, 20 miles S., 60 E., from Hut Point, on 9th March, 1916; and that Captain Mackintosh and V. G. Hayward perished on 8th May, 1916, in a blizzard, whilst attempting to cross the sea ice from Hut Point to Cape Evans. An inquiry was held into the circumstances concerning the loss of Captain Mackintosh and Mr. Hayward, and attached hereto is a detailed statement gathered from evidence furnished by the surviving members of the party, who further report that they had, on the first opportunity, searched the locality of the track followed without finding any traces of the missing men.

11th January, 1917.—This day was spent in carrying out some repairs to the main engines, which were completed at 10 p.m. I considered that a remote possibility existed of Captain Mackintosh and Hayward having drifted across to the western shore of the sound, and therefore now took the opportunity, when the weather was clear and fine, of proceeding to Butter Point, where the only food depot known to these men existed. We got under way at 10.30 p.m.

12th January, 1917.—At 12.15 a.m. the ship reached a point $5\frac{1}{2}$ miles east of Butter Point before being stopped by the fast ice. A party left the ship, under Sir E. Shackleton, to make an examination of the vicinity. On returning he reported that after crossing $5\frac{1}{2}$ miles of rubble and water-logged ice they came within 30 yards of the piedmont ice, but owing to the cliffs being too high and moving slushy ice intervening they could not land; further, at the point cut by the cross-bearings of the depot the land ice had broken away, but was visible in the form of two large bergs grounded to the north of Mount Barne. There was no sign of the depot or of any one having visited the vicinity.

At 8.30 a.m. the ship returned to the fast ice off Cape Barne, Cape Evans now bearing E. by S. (true), distant 5 miles.

13th January, 1917.—A party under Sir E. Shackleton was despatched from the ship with the object of searching the area north of Glacier Tongue, including Razorback Island, for traces

of the two missing men, this being the only locality that has not been searched. The vessel then proceeded to Cape Royds, where some fresh water was obtained from a berg, and a visit paid to the 1907 hut for the purpose of leaving the following record:—

“S.s. ‘Aurora,’ McMurdo Sound, 11th January, 1917.

“The Government Relief Expedition under my command arrived here all well on 10th January, and relieved the surviving members of the Shackleton Expedition—namely, A. Stevens, E. Joyce, J. L. Cope, H. E. Wild, R. W. Richards, I. O. Gaze, and A. K. Jack—who were found all well. We learned on arrival that Rev. A. P. Spencer-Smith died of scurvy on the Barrier on 9th March, 1916. Captain Mackintosh and V. G. Hayward perished on 8th May, 1916, in a blizzard while attempting to cross the sea ice from Hut Point to Cape Evans. The ‘Aurora’ will leave McMurdo Sound during this week for Wellington, proceeding northwards past and in sight of Cape Adare, if ice conditions permit.—JOHN KING DAVIS, Commanding Relief Expedition.”

16th January, 1917.—At 10 a.m. the ship arrived at the fast ice about $1\frac{1}{2}$ miles south of Cape Evans and embarked the search-party, which consisted of Sir E. Shackleton, Joyce, Wild, and Jack. The following report as to the work of this party was received:—

“DEAR SIR,—

“McMurdo Sound, 16th January, 1917.

“Please receive the following report on search for the bodies of Lieutenant Mackintosh and Mr. V. G. Hayward:—

“Saturday, 13th.—Arrived Cape Evans hut 1.30 p.m. Joyce and I left at 3 p.m. for the Razorbacks. We conducted a search round both islands, returning to the hut 7 p.m.; search fruitless.

“Sunday, 14th.—Started with Joyce at 10 a.m. to search the north side of Glacier Tongue, but the surface drift, with wind from S.E., decided me not to continue, as the ice was moving rapidly at the end of Cape Evans, and the pool between the hut and Inaccessible Island growing larger. The wind increased in the afternoon.

“Monday, 15th.—Blowing south-east blizzard, with drift half up the islands. I considered unsafe to sledge that day, especially as ice was breaking away from south side of Cape Evans into the pool. Spent day putting hut in order.

“Tuesday, 16th.—Got up at 3 a.m. Weather fine, calm. Started 4.20 with Joyce to the south at greatest possible speed; reached Glacier Tongue about $1\frac{1}{2}$ miles from seaward end. Wherever there were not precipitous cliffs there was an even snow slope to the top. We arrived about 7 a.m. From the top we searched with glasses; there was nothing to be seen but blue ice, crevassed, showing no protuberances. We came down and, half running, half walking, worked about 3 miles towards the root of the glacier; but I could see there was not the slightest chance of finding any remains owing to the enormous snow-drifts wherever the cliffs were accessible; also, the base of the steep cliffs had drifts 10 ft. to 15 ft. high. I arrived back at the hut at 9.40, and left almost immediately for the ship.

“I consider that all places likely to hold the bodies of Lieutenant Mackintosh and Mr. Hayward have now been searched, and now there is no doubt to my mind that they met their deaths on the breaking of the thin ice when the blizzard arose on 8th May, 1916.

“I am, &c.,

“E. H. SHACKLETON.

“Captain J. K. Davis, Commander Ross Sea Relief Expedition, s.v. ‘Aurora.’

“P.S.—Messrs. Jack and Wild were busily employed throughout in squaring up the hut and erecting the cross to the memory of the three men who lost their lives in the service of the Expedition.—E. H. S.”

We remained alongside the ice at Cape Evans throughout this day, waiting for a change of wind to open up the ice we were surrounded with towards the northward.

17th January, 1917.—At noon to-day, the ice having set out of the sound to the north, we proceeded in that direction with a view to examining the ice-conditions. We stood northward toward the Nordenskiöld Barrier, when heavy pack obliged us to turn back south at 4 a.m. on 18th January.

We now followed the edge of the pack as far as Beaufort Island, and during the evening of 19th January, the weather having cleared, we stood over to the western coast towards Dunlop Island, following it up till midnight, when we arrived at Granite Harbour, being at this time distant 2 miles from Cape Roberts. The weather was remarkably clear, objects being visible at a great distance. No mark or depot of any kind was seen.

I now decided that we could accomplish nothing further by remaining here, and therefore gave orders for our departure. A course was set to the eastward with the object of getting out of the pack which surrounded us, and proceeding to Wellington. We continued northward till 22nd January against fresh northerly winds. At noon on this day we reached the main pack again, about 60 miles from Cape Adare. A very marked blink extended all round the northern horizon, the winds from that direction having evidently closed the pack. I considered that it would be advisable not to try and force our way round Cape Adare, and decided to return to the southward through the open water. It appeared to me that it would be at least a week before we could hope for better conditions.

25th January.—On this day we were off Beaufort Island again, and proceeded up the sound toward Cape Royds. Five miles north of this, however, we arrived at the edge of the pack, which

now filled the whole southern end of the sound. We now steamed slowly back to the northward again, and continued in that direction until 28th January. A north-westerly gale on this occasion allowed us to approach Cape Adare closely, and on 29th January we proceeded northwards, passing between the pack and the land into open water, crossing the Antarctic Circle on 31st January.

We continued northward until 4th February, when the following message was despatched by wireless, in code arranged previously, to the Navy Office, Melbourne, and to the Minister of Marine, New Zealand:—

“The ‘Aurora’ arrived at Cape Evans, all well, on 10th January, and relieved the seven surviving members of the Shackleton Expedition—namely, Stevens, Joyce, Cope, Wild, Richards, Gate, Jack—who were found all well. I regret to report that during the second year of the Expedition Rev. A. P. Spencer-Smith died of scurvy on the Barrier on 9th March, 1916. Captain Mackintosh and V. G. Hayward perished on 8th May, 1916, being overtaken by a blizzard which broke up the sea ice over which they were attempting to cross from Hut Point to Cape Evans. The ‘Aurora’ left McMurdo Sound on 19th January, and should arrive Wellington about 10th February. Next-of-kin: Smith—Mother, 51 Palace Street, Westminster, London; Mackintosh—wife, ‘The Lindens,’ Bedford, England; Hayward—mother, ‘Ecklinville,’ Connaught Road, Harlesden, London. Will you communicate with them, and notify me when this has been done.—DAVIS.”

On 6th February we were overtaken by a fresh south-westerly gale, which continued for the next forty-eight hours, the vessel making an average speed of 9 knots under steam and sail.

In concluding this report I desire to bring to your notice the excellent conduct of the ship’s company, fore and aft; all have worked loyally and cheerfully to carry out the object of the Expedition. Mr. C. F. de la Motte, the chief officer, I would specially mention. It would be hard to overrate the value of his experience and sound common-sense on a voyage of this kind. Mr. Gillies, the chief engineer, and his staff have kept the “Aurora” going throughout. To Sir Ernest Shackleton, who was given charge of such shore operations as were necessary, my thanks are due for his cordial and ready assistance at all times. Instructor Moyes, R.A.N., although sledging operations proved unnecessary, has, in conjunction with the second officer, relieved me of all routine navigating duties. He has also acted as meteorologist and draughtsman. Mr. A. H. Ninnis has assisted me in the preparation of this report.

The “Aurora” arrived at Wellington, all well, at 7 p.m. this evening, 9th February, 1917, and berthed at the Wool Wharf.

JOHN KING DAVIS,
Commanding Relief Expedition

THE CIRCUMSTANCES CONCERNING THE LOSS OF CAPTAIN MACKINTOSH AND V. G. HAYWARD ON 8TH MAY, 1916.

In March, 1916, the southern party of the Expedition, consisting of Captain Mackintosh, Joyce, Wild, Richards, and Hayward, returns to the Discovery Hut at Hut Point after depot-laying, and were housed there.

Cape Evans, the winter quarters of the Expedition, is separated from Hut Point by a distance of 15 miles across McMurdo Bay, the passage between the two places being only practicable when the sea is frozen, and should occupy about five hours. The time of freezing depends on the season, strength of the gales, &c., but it is usually midwinter—viz., June—before it is really safe to travel over the bay. The weather conditions at this time of the year may be predicted with some certainty—constant blizzards which are accompanied by thick drift, varied by short intervals of calm, clear weather, when the temperature falls, and the sea ice, which has been broken up by the gales, re-forms. A short period of twilight prevails at this time of the year for about five hours on either side of noon in clear weather.

On 8th May, 1916, Captain Mackintosh and Mr. Hayward, after a short period of fine weather, decided to attempt to reach Cape Evans. The sea ice over which the route to Cape Evans lay had been forming for only four days, and is reported to have been about 4 in. thick—strong enough to travel on, but too sticky for a loaded sledge and party. The remaining three members of the party had doubts as to the wisdom of this journey, and expressed them. Captain Mackintosh then announced that if bad weather did come on they would return to Hut Point, and started at 1 p.m. in calm weather, with a temperature of 21° F., and without any equipment. He was watched by the remainder of the party till nearly 2 miles to the north, heading for Cape Evans.

At 3 p.m., a blizzard coming on, anxiety was felt by the party at Hut Point for the safety of these two men, and on the first practicable day, 10th May, they followed the tracks of Captain Mackintosh and his companion to the north for a distance of about 2 miles. Here the ice that they had been travelling over ended abruptly, sound ice only existing to the north. Further search for this party was impossible, and the party at Cape Evans was naturally in ignorance of the attempted crossing.

The wind-velocity at Cape Evans at 3 p.m. is recorded as 19 miles per hour, reaching 44 miles per hour at 7 p.m., wind from S.E., the temperature having risen to -15° F., and also that the majority of the ice in the sound went out during this blow, “frost-smoke” afterwards being observed to the south, indicating the existence there of a large body of open water.

Captain Mackintosh and Mr. Hayward never arrived at Cape Evans, nor has any trace of them been discovered since. As they had only been on the journey some two hours at the time this blizzard overtook them, it would appear most likely that they had not had time to get near to

the Delbridge Islands, or any landmark, to observe and make for in any form of thick weather. The thinness of the ice would suggest speedy breaking up and scattering in the wind as it drifted away, also rapid breaking up of the detached floes. This would lessen the chance of their being carried more than a very short distance before they lost all support: certainly 4 in. of ice could not stand the smallest swell should they have been driven out into the sound.

It is impossible during the winter to exist with no equipment whatever for more than the briefest period, and the only food carried by Captain Mackintosh and his companion was a little chocolate and some seal-meat. Especially would it be so in the case of these two, for their remaining companions at Hut Point assert it was only a week or two before this attempted journey that they were sufficiently recovered from scurvy to be able to walk without trouble, so their vitality cannot have been very high nor capable of standing long exposure.

Bad weather delayed the departure of the remaining members from Hut Point for Cape Evans until 15th July, when they reached Winter Quarters and learned that Captain Mackintosh and Hayward had not reached their destination.

The following report from Mr. E. Joyce deals with the steps taken to discover any traces of the remains of Captain Mackintosh and Mr. Hayward:—

“ ‘Aurora,’ McMurdo Sound, 17th January, 1917.

“ *Report of Searches made for the Bodies of Captain Mackintosh and Mr. Hayward, or for any Traces of the above Two Men.*

“ I beg to report that the following steps were taken to try and discover the bodies of Captain Mackintosh and Mr. Hayward.

“ After our party's return to the hut at Cape Evans, 15th July, 1916, it was learned that Captain Mackintosh and Mr. Hayward had not arrived; and, being aware of the conditions under which they were last seen, all the members of the wintering party were absolutely convinced that these two men were totally lost and dead—that they could not have lived for more than a few hours at the outside in the blizzard that they had encountered, they being entirely unprovided with equipment of any sort.

“ There was the barest chance that after the return of the sun some trace of their bodies might be found, so during the spring—that is, August and September, 1916, and in the summer, December and January, 1916–17—the following searches were carried out:—

“ (1.) Wild and I thoroughly searched Inaccessible Island at the end of August, 1916.

“ (2.) Various parties in September searched along the shore to the vicinity of Turk's Head.

“ (3.) In company with Messrs. Wild and Gaze I started from Hut Point, 31st December, 1916, at 8 a.m., and a course was steered inshore as close as possible to the cliffs in order to search for any possible means of ascent. At a distance of $\frac{1}{2}$ mile from Hut Point we passed a snow slope which I had already ascended in June, 1916; $3\frac{1}{2}$ miles farther on was another snow slope, which ended in Blue Ice Glacier slope, which we found impossible to climb, snow slope being formed by heavy winter snowfall. These were the only two places accessible. Distance on this day, 10 miles 1,710 yards covered. On 1st January search was continued round the south side of Glacier Tongue from the base towards the seaward end. There was much heavy pressure; it was impossible to reach the summit owing to the wide crack. Distance covered, 4 miles 100 yards. On 2nd January thick weather caused party to lay up. On 3rd glacier was further examined and several slopes formed by snow led to top of glacier, but crevasses between slope and the tongue prevented crossing. The party then proceeded round the Tongue to Tent Island, which was also searched, a complete tour of the island being made. It was decided to make for Cape Evans, as thick weather was approaching. We arrived at 8 p.m. Distance, 8 miles 490 yards.

“ I remain, &c.,

“ ERNEST E. JOYCE.

“ To Sir Ernest Shackleton, C.V.O., Commander I.T.A.E.”

“ To Captain Davis, Commander Ross Sea Relief Expedition, s.y. ‘Aurora.’—From E. H. SHACKLETON.”

After careful consideration of the reports furnished by survivors of the Expedition, taken with the evidence furnished by the meteorological log kept at Cape Evans for this date, the only possible conclusion is that these two men perished owing to the breaking-up of the ice over which they were travelling during the blizzard that commenced after they had left Hut Point, 8th May, 1916.

JOHN KING DAVIS,

Commanding Relief Expedition.

COPY OF REPORT OF SIR E. SHACKLETON.

DEAR SIR,—

Off Fast Ice, Cape Royds, 11th January, 1917.

After carefully examining all the statements submitted *re* the disaster to Captain Mackintosh and Hayward, I am forced to a definite conclusion—that is, that both men lost their lives on the afternoon of 8th May, 1916, through venturing on thin ice and being caught in a blizzard which drove the ice out of the sound. As neither man had any equipment, I consider it impossible for them to have survived more than a few hours, and now eight months have elapsed without news. I agree with you that a search should be made for their bodies in two directions—the area north of Glacier Tongue, and at the depot of Butter Point. As Joyce and party have searched the south side of the Tongue, nothing more can be done.

I am, yours faithfully,

Captain J. K. Davis, Commander, “Aurora,” Ross Sea.

E. H. SHACKLETON.

EXTRACT FROM METEOROLOGICAL LOG, CAPE EVANS, 8TH TO 10TH MAY, 1916.

Date.		Temperature, Fahr. (uncorrected).	Wind.		Cloud, Snow, and Drift.	Remarks.
Day.	Hour.		Direction.	Velocity, M. p. h.		
8th	3 a.m.	-19.7	E.	4	1	Mist along horizon generally. Much as at 7 p.m., but no aurora.
	7 a.m.	-19.9	..	0	2	Mist generally on horizon. Calm.
	11 a.m.	-21.0	..	0	0	Cloudless, clear, still. Ice well set.
	3 p.m.	-14.5	S.E.	19	8	Ni. mainly; few detached Ci.—Str. to north. N.E. and N.W. Rapidly clouding from S.W.; blizzard approaching. During sledging storms from S.W. quarter also occurred. Sudden rise in wind and temperature about 1 p.m. and fall in hydrograph.
	7 p.m.	-15.0	S.E.	44	10	Ni. sheet. Blizzard. Ice creeping out now about 5 yards off shore.
	11 p.m.	-14.0	S.E.	5	5	Probably Str. and mist (?) around horizon. Fine ice crystals falling; wind backing. Ice well off shore and young ice forming inshore. Nature and amount of cloud uncertain, and general mist. Only zenith stars visible, and these dimly.
9th	3 a.m.	-18.1	S.E.	26	?	Ice in bay gone out, N. Temperature and humidity falling.
	7 a.m.	-19.7	S.E.	36	?	Ci.—Str. (?) probably. Very dense high frost-smoke on water. Humidity and temperature oscillating.
	11 a.m.	-17.8	N.E.	4	4	Str. sheet from N.E. to S. extending well up to zenith. Ice along shore S. of Glacier Tongue gone out. Frost-smoke over water still prominent. A Str. except to W. and N.W. Light fall of ice crystals.
	3 p.m.	-16.0	..	9	9	..
	7 p.m.	-19.0	N.E.	11	6	Sheet Str. (?) especially to W., S., and E. Erebus practically obscured; stars clear. Bay freezing over.
	11 p.m.	-19.1	E.	2	6	Cloud as at 7 p.m. Calm. Few very fine snow crystals on instruments in screen since 7 p.m.
10th	3 a.m.	-19.0	..	0	0	Probably misty to W. Fine.
	7 a.m.	-20.4	..	0	0	Cloudless. Good high plume on Erebus.
	11 a.m.	-19.1	..	0	0	Cloudless. Fine high plume.
	3 p.m.	-13.8	S.E.	26	0	Cloudless, fine, bright; stiff wind. Strong mirage on N.W. horizon.
	7 p.m.	-14.1	E.	25	0	Cloudless; misty along W. horizon over sound, otherwise clear.
	11 p.m.	-16.0	N.W.	5	0	Cloudless, bright, and clear.

MEDICAL REPORT.—DECEMBER, 1916, TO FEBRUARY, 1917.

The health of the relief party on the whole has been excellent. There were only a few cuts which needed suturing, while there were some minor abrasions and burns which healed successfully, though tardily, in the higher latitudes. There were one or two instances of colds in the higher latitudes. On the return journey the main troubles were from the teeth.

The health of the relieved party, considering the trying conditions under which they had lived for the previous two years, was very good. Mr. Stevens was suffering from an axillary abscess, which had been under Dr. Cope's treatment some weeks before the arrival of the "Aurora." It was not long before the abscess subsided.

Dr. Cope reported that Mr. Richards was recovering from strain contracted while sledging early in 1916. On examination his heart was normal, and his general condition was very good. The whole of the relieved party were more or less sunburnt.

F. G. MIDDLETON,
Surgeon to the s.y. "Aurora."

7th February, 1917.

METEOROLOGICAL REPORT.

SIR,—

I beg to submit the following meteorological report:—

Meteorological readings were taken by the watchkeeper every four hours during the voyage, 20th December, 1916, to 9th February, 1917.

Highest thermometer reading, 59.2 F.—8th February, 1917: lat. 44° 20' S., long. 174° 40' E.

Lowest thermometer reading, 12.2 F.—15th January, 1917: McMurdo Sound.

Lowest barometer reading, 28.42"—30th January, 1917: lat. 68° 50' S., long. 170° 56' E.

Highest barometer reading, 30.39"—21st December, 1916: lat. 42° 25' S., long. 171° 05' E.

The winds encountered throughout the voyage were to a large extent those which might be expected in those latitudes—namely, westerly in the Southern Ocean, northerly near Cape Adare, southerly in the Ross Sea.

A remarkable frequency of northerly winds was experienced in the Ross Sea, and on each of the four occasions that we traversed it a well-marked area of low pressure was observed between Ross Island and Cape Adare.

MORTON H. MOYES,
Senior Naval Instructor, R.A.N.

The Commanding Officer, "Aurora" Relief Expedition.

SUMMARY OF ICE MET ON OUTWARD VOYAGE.

	Latitude.	Longitude.	Date.
First bergs	60° 50' S.	179° 10' W.	December 27, 1916.
Pieces of floe	64° 10' S.	176° 40' W.	December 29, 1916.
Considerable quantities of loose ice	66° 30' S.	175° 40' W.	December 30, 1916.
Broken lines of pack	67° 10' S.	175° 00' W.	December 30, 1916.
Large pieces of pack, but fairly open	from 68° 31' S.	from 175° 30' W.	December 30, 1916.
	to 70° 13' S.	to 179° 31' W.	December 31, 1916.
Met main pack	70° 13' S.	179° 31' W.	January 1, 1917.

Steamed along edge of main pack till 70° 20' S., 175° 20' E, then worked way through, mainly on S.W. and S.S.E. courses.

On 6th January weather moderated; made way through channels to 72° 04' S., 173° 09' E., when open water was reached on 7th January at 4 p.m. Southing through pack, 104 miles. Met tongues of loose pack off coast of South Victoria Land as far as 76° 24' S., 172° 10' E. Pack also visible towards the land.

SUMMARY OF ICE MET ON HOMEWARD VOYAGE.

18th January.—From Ross Island: Open sea southward to Cape Barne. Dense pack northwards from Cape Bird past Beaufort Island, closing in to the land near Nordenskiöld Ice Tongue.

20th January.—75° 02' S., 171° 22' E. Loose lines of pack.

21st January.—73° 08' S., 172° 42' E. Line of pack to west, extending N. and S.

22nd January.—71° 38' S., 173° 44' E. Dense pack ahead—viz., marked blink to northward. Proceeded south again.

25th January.—Ross Island. McMurdo Sound full of pack.

25th–27th January.—Proceeding north observed many bergs.

28th January.—71° 00' S., 171° 40' E. Scattered lines of pack seen.

29th January.—70° 50' S., 171° 30' E. Off Cape Adare. Close pack E. to W. through N. Made way through it. Good-water sky to northward.

30th January.—68° 40' S., 170° 56' E. Dense pack to W., with lines across ship's course.

Pack became thicker, and continued to 67° 08' S. 66° 10' S.: Scattered ice.

Sighted numerous bergs during next few days, the last one being in 63° 31' S., 171° 50' E.

WIRELESS REPORT OF "AURORA," 20TH DECEMBER, 1916, TO 10TH JANUARY, 1917.

On 20th December, the date of our departure from Port Chalmers, traffic was exchanged O.K. with Awarua, N.Z., but after that date and up till the 25th it was almost impossible to make my signals heard at the Bluff station, despite the fact that his incoming signals at that same time were reaching me at maximum strength (5).

On 26th December, as delayed traffic was still on hand, I decided to connect up a new lead to "earth," and as a result succeeded in disposing of all messages which had accumulated for the past two or three days without the slightest trouble.

On 27th December aerial was carried away in a gale, and owing to the weather conditions it was impossible to re-erect same before 28th December, on which date two unsuccessful attempts were made—at 11.40 p.m. and 12 p.m. respectively (ship's time)—to re-establish communication with the Bluff.

On 29th December a further effort was made to get in touch with the land without success. Noting on this occasion that the hot-wire ammeter was reading lower than usual, I examined the "lead in" wires on the top of the wireless-house, and discovered that the "earth switch" had fallen into place—probably through the continuous rolling of the ship—and had practically earthed the aerial. To prevent a recurrence of this trouble I lashed back the switch of the lightning-arrester to the "off" position. As this discovery was not made until 12.45 a.m. on 30th December all efforts on the previous night were obviously useless.

On 31st December, at 10.52 p.m., Awarua was heard sending the "war warning" (nil) to ABMV on the 2,500-metre wave-length. Heard nothing further until 2nd January, when very weak signals from Awarua were picked up.

On 1st January the ship's dynamo failed, and it was found on examination that the armature was short-circuiting in several places, thus necessitating the unwinding of the whole of the outer binding-wire and a considerable portion of the armature winding in order to permit these faulty portions to be reinsulated. As there was a considerable amount of soldering to be done it was not until 6th January that the dynamo was once again in good working-order.

As no signals had been heard since 2nd January it was deemed inadvisable to attempt to transmit from this station, but the times arranged for listening-in were always strictly observed.

The three-step amplifier has been in use solely as an amplifier for the crystal detector, and has given satisfaction. The ultra-audion detector proves most unreliable, owing to the critical adjustment required for the graphite potentiometer, which it was impossible to maintain owing to the severe vibrating and rolling of the vessel, and for this reason it was seldom used.

T. M. RYAN,
Wireless Operator, "Aurora."

To Captain Davis, Commander "Aurora" Relief Expedition.

WIRELESS REPORT (RETURN VOYAGE), 10TH JANUARY TO 9TH FEBRUARY, 1917.

No signals whatever were heard on the return trip until the night of 26th January, when a station making Vs was heard at 9.25 p.m. All efforts to obtain a reply from this station failed.

On 29th, 30th, and 31st Bluff was heard, signal's strength 3; but it was not until the night of 4th February that it was possible to exchange signals with this station. From that time onward traffic was exchanged O.K. until our arrival in Wellington on the night of 9th February, 1917. The remarks of the Audion amplifier in my first report on the trip down are also applicable to the return voyage.

In conclusion, I wish to state that the times arranged for listening-in and sending have always been strictly observed, even though at times it was obviously impossible to exchange signals.

T. M. RYAN,
Wireless Operator, "Aurora."

To Captain Davis, Commander "Aurora" Relief Expedition.

FINAL REPORT.

SIR,—

Wellington, 21st February, 1917.

In continuation of my report despatched on 10th February: The discharge of Government stores was commenced on 10th February, the butter being sent into cool storage, and the remaining stores and equipment being placed in a store allotted by the Minister of Marine. By Wednesday, 14th February, this was completed.

The crew were paid off on the morning of 15th February, ceasing on 14th February, except in the case of three officers who were considered necessary to place the ship in a condition ready to be handed over and to complete lists of stores, &c.

On arrival in Wellington all negatives were taken charge of and handed to the Secretary of Marine, in accordance with the instructions issued by the Minister of Marine before sailing.

The chief engineer reported on the coal-supply and state of batteries, &c., in the following reports:—

"1. Coal Account.

	Tons owt.
" On board on joining vessel	30 0
" Received 6th December, Port Chalmers	30 0
" Received 14th-19th December, Port Chalmers	467 0
" Total	527 0
" Port consumption, Port Chalmers	7 0
	520 0
" Steaming	279 13
" Remaining at end of voyage	240 7
" Owing to ship	70 0
	170 7
" Remaining, Government account	170 7

"2. Engine-room Department, s.y. 'Aurora.'

"The following work has been done on board the above vessel: Main engines cleaned down, boiler opened up and cleaned, bottom doors put on, and boiler left empty; air-pump opened up and examined, lifts of feed-pump valves adjusted.

"The batteries are fully charged, and require further charges at least once a week at 70 volts 15 to 20 amps.

"The engines and boiler are ready for use as required, and are in first-class condition.

F. J. GILLIES,
"Chief Engineer."

On 15th February Messrs. Moyes, Gillies, Le Gros, Ryan, the cook Voegeli, and one A.B. sailed for Australia in the "Moeraki." Passages were arranged for each to his home port, and pay allowance calculated to the date of arrival there. Dr. Middleton was assumed to have sailed on this date also, as being the first available steamer, but will actually return on 22nd February, with the rest of the party, in the "Riverina." Other members of the crew were given passes to the port of signing articles, Dunedin or Port Chalmers.

On Saturday, 18th February, the vessel was handed over to Sir Ernest Shackleton, who acknowledged receipt in the following terms:—

Wellington, 16th February, 1917.

"I hereby acknowledge that the s.s. "Aurora" has this day been handed over to me by the Marine Department in good order and condition, and that 170 $\frac{7}{10}$ tons of coal remaining on board belong to the Government, and is to be held in the ship so that her purchasers may take it over at its value. Failing their doing so, or failing a sale of the ship within a reasonable time, I undertake to allow the Government of New Zealand to take the 170 $\frac{7}{10}$ tons out of the ship at a future date.

E. H. SHACKLETON.

"Witness—George Allport."

On 17th February the following letter was received :—

“ Office of the Minister of Marine,
“ Wellington, 17th February, 1917.

“ DEAR CAPTAIN DAVIS,—
“ I am commissioned by the Government of New Zealand to return you their warmest thanks for the manner in which you have conducted the Relief Expedition of the ‘ Aurora,’ despatched jointly by the Governments of Great Britain, Australia, and New Zealand to the Ross Sea. The whole conduct of the Expedition has been most satisfactory to this Government, and is due, we know, to your skilful seamanship, untiring energy, and competent handling of what might have been a difficult position.
“ I would be glad if you would convey to your officers and to the members of the crew of the ‘ Aurora ’ the Government’s high appreciation of their services, and also the Government’s hearty congratulations on having brought the Expedition to such a successful issue.
“ Wishing you a pleasant stay in New Zealand and a safe return to your native country,
“ I am, &c.,
“ W. H. HERRIES,
“ Acting Minister of Marine.

“ Captain J. K. Davis, Wellington.”

To this letter the following reply was made :—

“ Aurora Relief Expedition, 1916–17,
“ Wellington, 20th February, 1917.

“ SIR,—
“ I should be grateful if you would convey to the Government of New Zealand my thanks for their appreciation of the work of the ‘ Aurora ’ Relief Expedition conveyed to me in your letter of 17th February.
“ The officers and men of the Relief Expedition join me in expressing gratitude to the various Departments of the New Zealand Government for the assistance given to us throughout the period of our service.
“ I have, &c.,
“ J. K. DAVIS,
“ Commanding Relief Expedition.

“ Hon. W. H. Herries, Acting Minister of Marine, Wellington.”

21st February, 1917.—A complete list of all the stores supplied to the Relief Expedition and returned to store was handed to the Secretary of Marine to-day.

Authority was given by the Minister of Marine to present Mr. C. P. de la Motte with a watch, and Instructor M. H. Moyes, R.A.N., with a camera, the property of the Relief Expedition.

The District Naval Officer at Sydney has been asked to supply railway passes to officers and men being returned to Melbourne. These will be chargeable to the Expedition vote.

The electric generating set supplied to the “ Aurora ” will be shipped to Melbourne by the “ Roscommon.” This vessel will leave here about 24th February.

All equipment supplied by the Naval Store Officer is being returned to Williamstown.

A letter was written to the District Naval Officer, Port Melbourne, advising him that the officers lent to the Relief Expedition were returning to Australia.

Before discharging the crew such work was carried on on the “ Aurora ” as was deemed necessary—unbending sails, cleaning boiler, &c., and generally squaring up—the vessel being handed over in first-class order.

“ AURORA ” RELIEF EXPEDITION
JOHN K. DAVIS, Commander.

Hon. Acting Minister of Marine, Wellington, N.Z.

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