

THE POLAR RECORD

NUMBER 6:
JULY 1938

PRINTED IN GREAT BRITAIN FOR
THE SCOTT POLAR RESEARCH INSTITUTE
CAMBRIDGE: AT THE
UNIVERSITY
PRESS

1938

Price One Shilling



(Exchange)

Pages



President *Eschert as missing*
in Bulletin.

J.M.
2.8.33

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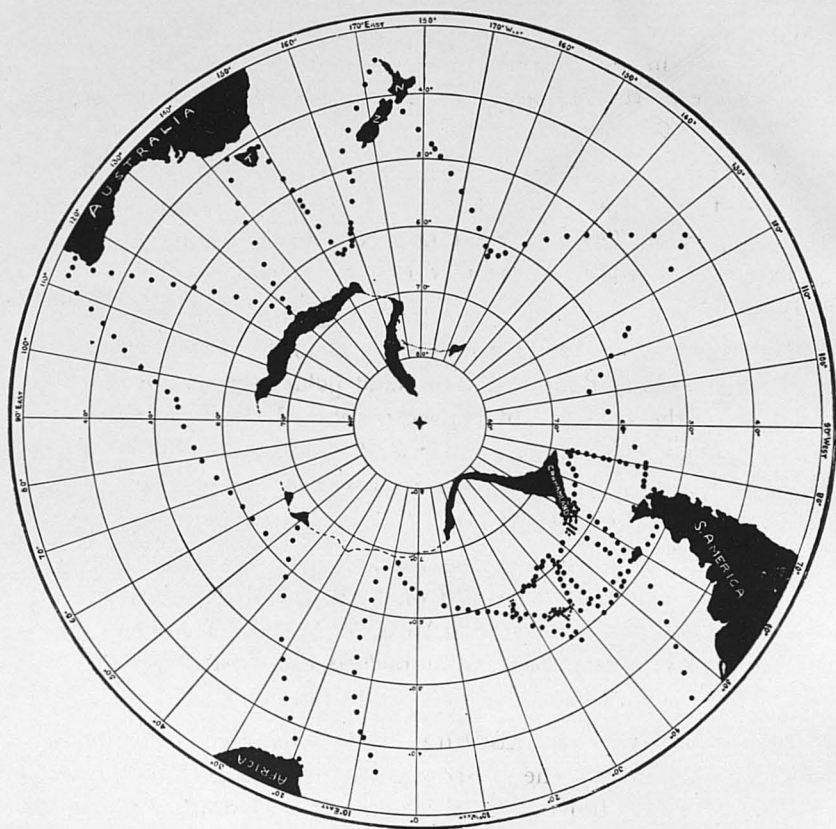


Chart showing the stations of the circum-polar cruises and those comprising the 1932-33 Survey of the Falkland Sector.

(See article, page 128).

FOREWORD

It is not often that the Polar Regions figure prominently in International affairs, but in the last half year two important pronouncements have appeared. The dispute between Norway and Denmark as to their respective claims in East Greenland was settled by the Court of International Justice at the Hague, the decision being given in Denmark's favour.

An Order in Council issued on February 7, announced the transfer of a large part of the Antarctic continent to the authority of the Commonwealth of Australia. The sector extends from 45° E. Long. to 160° E. Long., except that Adélie Land, in which France claims an interest, is specially excluded.

As we go to press, the International Polar Year is about to close, and once more there will be a mass of data about polar meteorology for slow assimilation by the branches of science concerned. Though few of the expeditions are far inside the Arctic circle, it is satisfactory to be able to report that, up to date, there has been no loss of life, such as attended so tragically the Polar Year of 1883.

It is a pleasure to record the recognition of polar service by the Royal Geographical Society, by the award of its Royal Medals this year to Professor Eric von Drygalski and to Mr J. M. Wordie. The members of the *Sibiriakov* Expedition, who accomplished the North-East Passage last year, have been awarded the Order of Lenin.

The annual report of this Institute which is required by Ordinance to be published yearly in the *University Reporter* has now become too long for repetition in full in *The Polar Record*, including as it does a complete list of gifts and subscriptions made during the year.

The cost of printing the *Record* at its present size is causing some concern to the Committee of Management, and it is feared that, unless the Institute receives substantial endowment for this purpose in the near future, the price will have to be raised from 1s. to 2s. 6d. per copy. In the past, the expense has been met largely from the general income available for maintenance of the Institute, but the increasing demands on the Maintenance Fund (it is only £300 a year) make it imperative to render the journal more nearly self-supporting.

THE GINO WATKINS MEMORIAL FUND

As stated in the general press and in these columns, a small committee was at work last winter raising funds for a memorial to the late Henry George Watkins.

Their efforts have met with a success which was surprising considering the general financial stringency of the times, and a capital sum has been raised sufficient to provide an income of about £50 per annum.

A Deed of Trust has been drawn up, of which a copy may be seen at the Polar Research Institute, but its main provisions may be briefly described. The object of the Trust is defined as follows:

- (A) The improvement and diffusion of knowledge of the Polar regions.
- (B) The promotion of the acquisition of special knowledge necessary for the success of Polar Exploration and for the prevention of accidents and loss of life on Polar expeditions and
- (C) With a view to the objects aforesaid the assistance by financial or other means of suitable Polar expeditions. The Trustees have power to invite further gifts and subscriptions to the Fund.

A Committee to administer the Fund has been appointed, consisting of the following:

Professor FRANK DEBENHAM (*Chairman*).
STEPHEN LEWIS COURTAULD (*Trustee*).
HON. FRANCIS JAMES RENNELL RODD (*Trustee*).
Dr TOM GEORGE LONGSTAFF.
Professor KENNETH MASON.
JAMES MANN WORDIE.
JAMES MAURICE SCOTT.
AUGUSTINE COURTAULD (*Secretary*).

This Committee has decided that applications for grants from the Fund must be received by them on, or before, March 1 of each year, and that the first award shall be made in 1934.

The Secretary acknowledged individual subscriptions with thanks as they were received, but the Committee, as a whole, would like to take this opportunity of thanking the donors for their generous support of the appeal, and of expressing its hope that the manner in which the memorial fund is to be administered will be approved by them.

ARCTIC REGIONS

SVALBARD, FRANZ JOSEF LAND, AND RUSSIAN ARCTIC REGIONS

Swedish-Norwegian Expedition to North-East Land, 1931.

This expedition, led by Professor Hans Ahlmann, carried out investigations on the inland ice of North-East Land during the summer of 1931, and an account of its work appeared in *The Polar Record*, No. 3. We are now able, through the courtesy of Professor Ahlmann, to supplement the earlier statement with the following account of his sledge journey across the island, and a brief summary of the results.

The expedition chartered the *Quest*, commanded by Captain Schjelderup and manned by twelve Norwegian sailors, and reached Advent Bay on June 21, 1931; and later, after making a topographical survey on Moffen Island, established a base in Murchison Bay, North-East Land, on June 24. The personnel of the expedition was as follows:

Professor HANS AHLMANN, leader.
Lieut. E. CHRISTELL, in charge of radio station.
BACKA E. ERIKSEN, M.A., meteorologist.
O. KULLING, geologist.
S. MALMBERG, journalist.
H. MOSBY, oceanographer.
Dr L. ROSENBAUM, geologist and topographer.
H. SCHMIDT, hunter, member of Oxford Expedition, 1924.
Dr P. F. SCHOLANDER, botanist, physician.
S. SKJELTEN, hunter, member of *Bratvaag* Expedition, 1930.
O. STAXRUD, engineer and technical adviser.

The glaciological party, consisting of Professor Ahlmann, Staxrud and Schmidt, started on the inland ice journey on July 2, 1931. The ship carried the party as far as the edge of the ice in Wahlenberg Bay, whence, after crossing some three miles of melting winter ice, they were able to reach the ice-cap by way of a small glacier. The equipment and provisions, sufficient to last three men and nine dogs for forty-five days, which together weighed about 840 lb., were carried on two 9 ft. sledges of the Norwegian type, the broad runners sheathed in German-silver. After travelling some 217 miles, first in a southerly, then an easterly, a northerly, and finally a westerly direction, at an average of $13\frac{1}{2}$ miles a day, the party reached Murchison Bay early on July 18. Apart from a delay of two days in camp caused by bad weather, the

journey was concluded without incident. The surface, however, had become increasingly difficult, owing to rapid thaw, and it was impossible to extend the trip any further.

As a result of observations made on the journey a new map of North-East Land has been compiled, on the scale of 1 : 750,000, showing that the island supports three ice-caps, respectively in the south, the east and the west, the two latter being divided by an ice-free strip stretching from Ríjp Fjord to the head of Wahlenberg Bay. Although some fog was encountered during the trip, the party were fortunate enough to meet with good visibility at certain points, and this enabled them to make topographical observations of regions at some distance from the route followed. Detailed survey work was carried out in Palander Bay, on the south side of Wahlenberg Bay, and it was found to conform in general to the sketched-in outline on the map published by Baron De Geer in 1928, other charts having either marked the bay merely as a small creek, or else ignored its existence.

Between Camps II and III on the journey, the route ran parallel to Palander Bay, in a south-easterly direction, and, the visibility being good, the party were able to take angles to the margin of the ice-free belt on the south coast; and between Camps III and IV, although the course had been changed to a north-easterly direction, similar observations were also made. It has thus been possible to include the contours of this ice-free area on the map, both from these measurements, and also from observations made on board the *Quest* during the voyage along the south coast. The boundary of the Eton depression, east of the head of Wahlenberg Bay, was approximately fixed from about the same point.

It is of interest to note that, as a result of the fixing of the position of Great Island by Dr Rosenbaum, and his estimate of its distance from the mainland, Cape Leigh Smith is moved $10\frac{1}{2}$ miles further to the north-west in the corrected map, an amendment to its position having already been made by Commander Worsley, of the British Arctic Expedition, 1925, on board the *Island*. Unfortunately a severe storm was encountered at Camp X, the nearest approach of Professor Ahlmann's party to Cape Leigh Smith, and this forced the party to turn, and make for Murchison Bay, and it also prevented topographical observations in the neighbourhood. Later, good weather made it possible to fix some altitudes in the Ríjp Fjord district. It was found that measurements and observations made by the party between the Ríjp Fjord region, and the West Ice, were in entire agreement with those of the Oxford Ex-

pedition of 1924. The trip was brought to a close at the edge of the inland ice to the west of Murchison Bay.

The detailed results of the expedition are being published in *Geografiske Annaler*, during 1933 and 1934, and will consist of some fourteen separate reports. A general account of the expedition, with maps and illustrations, has already appeared in Swedish, under the title of *Sommar vid Polarhavet*.

Soviet Union Expeditions, 1931 and 1932.

We are now able to publish further news of Russian work in the Arctic, carried out during 1931 and 1932, reports of which were not available when the last number of *The Polar Record* went to press. For this information we are indebted to the Arctic Institute of the U.S.S.R., who have kindly allowed us to make use of the *Bulletin* of the Arctic Institute Nos. 11 and 12 of 1932, and Nos. 1, 2, 3 and 4 of 1933.

During the years 1931-32 a party was at work prospecting an air route between Bering Strait and the mouth of the Lena. The personnel of the expedition was as follows:

- I. A. LANDIN, leader.
- N. K. GAVRILOFF, second-in-command.
- V. A. ARSENEFF, zoologist.
- V. J. AVGUEVITCH, geodesist.
- A. V. IVANOFF, wireless operator.
- M. Kh. KARAEFF, interpreter.
- Captain S. G. KIRILOFF, mechanic.
- A. M. MIRONOFF, mechanic.
- P. G. OUTYNTCHENKO, engineer.
- S. R. PAYLOFF, geologist (commissioned by the Arctic Institute).
- L. V. SIDORENKO, mechanic.
- V. V. SHAVROFF, engineer, hydrographer.

Leaving Vladivostok on June 30, 1931, on board S/S *Lieutenant Schmidt*, the expedition reached its first destination, Cape Inxow, about 20 miles to the north-west of Cape Dezhnev on July 23, and transferred to two small cutters, which had been brought from Japan, for the continuation of the journey. During the first part of the voyage along the Chukots coast the progress of the party was much impeded by ice, but after having been blocked for about twelve days off Cape Severny, the expedition, after passing Cape Shelagski, was able to regain open water, the ice having gradually broken up. Chaunskaya Bay was reached soon afterwards, and a series of soundings made, and the party finally arrived at Ambarchik Bay, at the mouth of the Kolyma, on September 12, 1931, the voyage of some 1350 miles having taken fifty-four days. A

base was established at Sredne Kolymsk, where the winter of 1931-32 was passed.

The results of the first year's work included maps of the coast from Cape Dezhnev to the mouth of the Kolyma, with notes on the geology of the region and observations compiled with a view to aerial navigation. Preliminary plans for an east polar air route were also drawn up, as well as a handbook on the navigation of that part of the Siberian Sea crossed by the expedition.

In the summer of 1932 the expedition obtained the use of *M/S Pioneer*, a 16-ton sailing vessel, fitted with a 35 H.P. engine, and work was continued as soon as it was possible for the ship to put to sea. The expedition was divided into two parties; the advance party left the base in the early spring of 1932, reached the Indigirka river on foot, and returned by way of the coast, carrying out observations between the mouth of the Indigirka and the mouth of the Kolyma, with the help of the motor boat, *Sokol*. The main expedition, starting from Sredne Kolymsk on July 15 picked up the advance party at the mouth of the *Lazeya*, and then made a series of soundings off the coast, these waters having previously been uncharted. Vankin Bay and Sellyakhskaya Bay were afterwards visited, to see if they could be used as harbours, their position between the Lena and Kolyma rivers making this desirable.

In the neighbourhood of Cape Borkhaya the expedition was able to render assistance to the *Lena* and *Estafette*, which had been wrecked during two successive storms, after which, the navigation season being over, the *Pioneer* returned to Yakotsk on the *Lena*.

As forecast in *The Polar Record*, No. 4, an attempt to reach Wrangel Island was made during the summer of 1932, by an expedition on board *S/S Soviet*. It was intended to relieve the personnel, and reprovision the station established at Rogers Bay in 1926. A party on board the schooner *Tchukotka* had tried to reach the island in 1931, but the vessel had been crushed in the ice before reaching its destination.

The 1932 expedition, which was sent out by the Kamschatka Co., Ltd., and which was led by Captain K. A. Dublitsky, included a wintering party of seven men, who were ultimately left on the island; and two scientists, a hydrologist, N. N. Alekseyeff, and a meteorologist, who carried out observations on board the ship. A full supply of provisions, including fuel and medical stores, was carried by the expedition for the use of the colony.

The expedition left Vladivostok on July 17, and the first ice was encountered on August 10, drifting south along the Chukots coast in the neighbourhood of St Lawrence Bay. North of Cape Dezhnev, however, the expedition regained open water, and it was possible to carry out part of the scientific programme, and soundings were taken every eight hours. Pack-ice was met with again on August 12, at a point some 40 miles south-east of Herald Island, and for the next month the expedition was imprisoned in the thick hummocky ice surrounding Wrangel Island. The ice was found to be drifting almost continuously in a south-westerly direction, at a speed of about 0.2-1.0 knots.

As it was clearly impossible to reach the island, although on August 27 the ship had been within 9 miles of her destination, Rogers Bay, further attempts to land were abandoned, especially as the propeller of the ship had been badly damaged in the pack. The seven members of the relief party, and the various stores, were, however, taken to the island by means of the hydroplane belonging to S. V. Obrutchev's expedition to the Chukchis peninsula. During the flight to Rogers Bay, it was observed that Wrangel Island was entirely surrounded by solid ice. Eight Russian settlers were brought back from the colony, and a cargo of furs was also brought away, bringing the total weight on the plane up to about 3300 lb. M. Mineev, the leader of the evacuating party, decided to remain on the island for another year in order to carry out meteorological observations; with him are the seven Russians of the relief expedition, and also a colony of forty Eskimo.

The ship was freed from the ice on September 12, when about 150 miles east of Wrangel Island, only to encounter it again some 25 miles north of Cape Wankarem, and not far from the entrance to Long Strait. By skirting the ice-field in an easterly direction, open water was reached on September 24 off Cape Lütke, and the expedition then returned to Vladivostok.

Traders, as usual, visited the Kara Sea during the summer of 1932, the fleet of twenty-eight steamers leaving Archangel on July 22. The ice-breaker *Lenin*, with two weather experts on board, was responsible for the route followed by the fleet, and led the way through Matochkin Shar, reports on the ice conditions having shown that route to be the easiest way to the mouths of the Ob and Yenisei. Nineteen ships made the passage through Matochkin Shar between August 4-25, the other nine having chosen the route through Yugorski Shar. The return journey

was made by the latter route only, and the last ship reached the Barents Sea on October 8.

As a result of this trading venture 26,523 standards of timber were exported from Igarka in exchange for 1473 tons of imported goods, and 9480 tons of provisions and other commodities for the use of the colonies on the Ob and Yenisei; there were also shipped 3088 standards of timber, from Novy Port, and 148 tons of canned fish in exchange for 3787 tons of technical gear delivered there by 3 of the 28 vessels visiting the region.

The fleet included thirteen British, nine Norwegian, two German, and two Soviet Union ships.

Besides the above activities, organised by the Soviet Government, work of a similar nature was carried out under the auspices of *Kom-severput, Ltd.*, during the open season of 1932, when several vessels made successful trips through the Kara Sea with the object of establishing new hunting stations, or provisioning those already in existence.

Ten new hunting stations were set up in Pyasina Bay, to the east of Dickson Island, including one at Cape Mikhailova and one on Rastorgueva Island; and ten others were placed on the east coast of the Gulf of Yenisei, and in Nydayamskaya and Ob Bays.

Scientific work was carried out by a party on board S/S *Albatross*, which was used by the Oceanographical Institute for fishery investigations, and by a hydrological party, which explored the Pyasina river from Lake Norilsk to its mouth.

In addition, ten new hunting stations were established, in Novaya Zemlya, in 1932, by *Sevmorzverprom* (the *Island Section of the Northern Sea Hunting Trust*), one in Archangel Bay, one in Russian Harbour, and eight on the east coast, the most northerly being that situated on Pakhtusova Island.

An expedition, organised under the auspices of the State Hydrological Institute of the U.S.S.R., carried out observations in the Kara Sea region during the summer of 1932, on board the ice-breaker *Lenin*, which was also responsible for the Kara Sea trading fleet. The following scientists took part:

L. I. ANTONOFF.
Dr A. S. CHECHULIN.
Mrs I. N. KELAREVA.

A hydrological section was made, from Matochkin Shar to White Island and back to Yugorski Shar. Observations of the currents were

carried out in the western portion of Matochkin Shar near White Island, in Yenisei Bay, near the Korsakov Islands; and in Yugorski Shar, where it was proved that the currents from the strait flow into the Kara Sea, thus confirming the results obtained by previous expeditions in the area. Three hundred and thirty surface samples of sea water were taken and analysed.

As recorded in *The Polar Record*, No. 5, a buoy, one of those thrown overboard in the Nordenskiöld Sea during the Yakut Expedition of 1927, was picked up in Norway on April 3, 1932; this throws important light on the speed and direction of the Arctic currents. It is interesting to read, in the *Bulletin*, No. 3, 1933, that another buoy and two bottles set adrift by the same expedition and in the same locality have now also been recovered. They were picked up on July 21, August 13 and August 20, off Norway, off Iceland, and in Lat. $66^{\circ} 45' N.$, Long. $13^{\circ} 35' W.$ respectively.

News has also been received of the recovery of two more buoys, which were thrown into the northern part of the Kara Sea during the *Sedov* Expedition, in 1930. The first, which was set adrift on August 13, 1930, in Lat. $79^{\circ} 20' N.$, Long. $74^{\circ} 41' W.$, was found by Fridtjof Fredriksen on March 24, 1932, in the open sea off the coast of Norway in Lat. $69^{\circ} 20' N.$, Long. $6^{\circ} 15' E.$; and the second, thrown overboard on September 3, 1930, in Lat. $76^{\circ} 58' N.$, Long. $85^{\circ} 20' E.$, was found by Marinius Antonssen on December 3, 1932, near Hillesö Island in the north of Norway in Lat. $69^{\circ} 39' N.$, Long. $17^{\circ} 58' E.$ It is thought probable that these buoys, having floated from the Kara Sea into the Polar Basin, drifted north of Franz Josef Land, and were then carried south in the East Greenland current, finally passing into the Norwegian Sea between Jan Mayen and Iceland.

As part of the scheme of the Soviet Government for the development of her arctic airways, a series of enterprising flights were made in the Kara Sea region, during the summer of 1932, by a party led by A. D. Alexeyeff, using a Dornier-Wal hydroplane.

The party arrived at Dudinka, on the Yenisei, on June 22, and a successful flight was made to Norilsk, three days later, for the main purpose of exporting fur, though a few passengers were also carried. After three trial trips to Volossianka, flights were made from Dudinka to Khatanga on June 28, and from Khatanga to Dudinka on July 1. A series of reconnaissance flights began on July 6, during which the basins

of the rivers Kas, Sym, Duhches, Vorogovka, and Podkamennaya Tunguska were explored, and investigations made in the neighbouring forest areas.

Another branch of the work was the carrying out of an air survey of ice conditions in the Kara Sea, covering the region from Dickson Island to Varnek Bay, Vaigatch Island, made in connection with the opening up of the route for the trading fleet. After various flights in the Dickson Island and Matochkin Shar areas, a visit was made to Igarka, on the Yenisei, whence, after a fortnight's delay, owing to bad weather, the plane proceeded to Cape Chelyuskin. Here, she met the ice-breaker *Rusanov*, and obtained a map of Severnaya Zemlya from the geologist of the Serge Kamenev Expedition. A successful landing was then made at the Serge Kamenev Islands, the furthest point to be reached on the flights, after which the plane returned to Cape Chelyuskin en route for Dickson Island.

On September 11 a reconnaissance flight, in connection with the Siberian Hydrological Expedition, was carried out, with Dr Vorobiev, the leader of the expedition, and Captain Rybin of the expedition's ship *Tzinkul*, as passengers. The flight took place along the following route: Dickson Island, the mouth of the Pyasina, Cape Medvyedeva, Rastorgueva Island, the Kamennuie Islands and Cape of Two Bears, and back to Dickson Island. Finally the plane flew to Sebastopol, by way of Krasnoyarsk, Novosibirsk, Omsk, Sverdlovsk, Sarapul Samara, and Stalingrad.

Work of a similar nature was carried out by an expedition led by S. V. Obrutchev, working further east, in the Chukchis region of Siberia, during the summer of 1932. The personnel of the party included:

V. KOSSUKHIN, pilot.
KRUTSKY, engineer.
K. SALISHCHEV, geodesist.
G. STRAUBE, pilot.

The expedition left Krasnoyarsk on July 16, 1932, in a Dornier-Wal hydroplane, and flew by way of Baikal and the Angara, to the Yablonov Mountains, and then along the course of the Amur to its mouth. From there the route lay along the shores of the Sea of Okhotsk, and then having crossed Kamschatka, followed the coast once more, as far as its destination at the mouth of the Anadyr river. The journey from the

Amur to the Anadyr took six days only, in spite of bad fogs encountered over the sea of Okhotsk.

During the next flight the expedition made a crossing of the Chukchis peninsula as far as Cape Dezhnev, flying west from there along the coast as far as Cape North. Whilst there, news was received that S/S *Soviet*, which had been sent to relieve the personnel of the station on Wrangel Island, had been unable to reach the island, owing to the heavy pack-ice. The plane was therefore sent to its assistance, and, after an unsuccessful attempt on September 3, reached Wrangel Island, after a fine flight, on September 5, leaving the relief party at the station at Rogers Bay, and bringing off the colonists who were left on the island three years previously. The *Soviet* was at this time 50 miles from the island, blocked in the ice.

The plane returned to Cape North on September 6, and four days later flew to Anadyr, crossing the Chukchis peninsula south of Koliuchin Bay. The next flight was to the interior, as far as the southern slopes of the Anadyr ridge, where the party was delayed by a snow-storm from September 25-30, after which the return journey was made to Anadyr, following the same route. On October 1 the plane was slightly damaged by crashing into the Bering Sea, whilst flying low during a storm. After repairs, however, it was found possible to continue the journey on October 13, and the plane arrived, on October 19, at Nagaev Bay on the Sea of Okhotsk, where it was taken on board a ship bound for Vladivostok.

Observations made during flights over the Bering Sea, the Sea of Okhotsk, and in the Kamschatka, Anadyr and Chukchis regions indicated that the existing maps were inaccurate. It was also discovered that the central range of mountains in Kamschatka form a great arc, convex to the north-west.

A decree of the Soviet Government, dated November, 1932, announces that Victoria Island has now been claimed as under the jurisdiction of the *Islands Administration of the Arctic Ocean*.

The island, which is situated in the north-west of the Barents Sea, mid-way between Spitsbergen and Franz Josef Land, was named by Professor Nathorst on the *Antarctic* in 1898. Previously Victoria Island and White Island had appeared together on maps as Gilles Land. It has since been visited by various expeditions, including the British Arctic Expedition on the *Island*, in 1925; the *Sedov* Expedition in 1928, and

the *Bratvaag* Expedition in 1930. The latter expedition, led by Dr Gunnar Horn, carried out the first scientific work on the island. Finally, in 1932, the *Knipovitch* Expedition, led by Professor N. N. Zubov, landed on the island, and formally claimed it as belonging to the U.S.S.R.

In *The Polar Record*, No. 5, brief mention was made of an expedition at work in the region between Dudinka on the Yenisei and the Khatanga river, equipped by the Polar Commission of the Academy of Sciences, and under the leadership of A. I. Tolmatchev. The expedition has now returned, and, as a result of its work, no less than four new meteorological stations have been established. The first three were set up by the party working in the Khatanga district; at Volotchanka, near the source of the Aram and Kheta rivers; at the Khatanga Trading station, and at the Norilsk Mine. The fourth station is at the Noguinsk graphite mine on the river Nijni Tunguska, and about 180 miles from Turukhansk. The equipment of the latter station was handed over to the party working in the Turukhansk region. Two meteorologists were left at each of the first two stations. Work will be continued from Khatanga during the summer of 1933.

The Oceanographical Institute sent out its usual expedition during the summer of 1932, this being the fortieth voyage of the *Persey* for this purpose. The expedition was led by V. Vasnetzov, and nineteen scientists took part. The work was chiefly in connection with the International Polar Year. An oceanographical section was made from North Cape via Bear Island to South Cape (Spitsbergen), crossing the main stream of the North Cape current.

Sections were also made along the 15th meridian and the Foyen Island meridian, for the purpose of making corrections to the charts of the Barents Sea currents. During the course of the expedition seventy-six stations in all were made, and 258 depth soundings carried out, the latter being made every 5 miles along the sections. Meteorological observations were taken every four hours. The expedition covered altogether 4000 miles, and was at work from August 27 to October 14.

As announced in *The Polar Record*, No. 5, an expedition, sent out by the Arctic Institute, under the leadership of G. V. Gorbatsky, a member of the staff, spent the summer of 1932 at work in the region round the mouth of the Petchora. As a result of geological and geomorphological observations, the existence of two glacial epochs, separated by an interglacial period with a boreal transgression, has been proved. A geological

study of the Quaternary deposits in the Petchora valley was made, and it is of interest to learn that no outcrops, other than drift deposits, were discovered during the work. A topographical survey of the lower Petchora region was carried out by N. Shanin, and the Wooden, Kuya and Great Visky rivers were surveyed for the first time. Botanical specimens were collected by V. Sdobnikov, another member of the staff of the Arctic Institute, and investigations made into the questions of reindeer food. As a result of the investigations of the party it has now been decided to erect a permanent station for scientific research in this locality.

An expedition, organised jointly by the Arctic Institute and the Leningrad Geological Prospecting Trust, was at work in Novaya Zemlya during the summer of 1932, continuing the programme of prospecting and geological research drawn up by a similar expedition in 1931. The investigations were carried out by eight separate parties, three working in the northern island, and five in the southern.

A form of transport new to this region was used by parties working in the south island in the district between Nekhvatova Bay on the west, and Savin Bay on the east, when a crossing of the island was made on horseback. During the journey a bituminous substance of the shungite type, found at Cape Sokol in Rogacheva Bay, was examined by one of the parties.

In addition, mineral investigations took place at Pyrite Island, in the Kara Strait region, where pyrite deposits had been discovered by the expedition of 1931: V. Kuklin was in charge of this work. Further investigations of the zinc ore deposits near the river Tarassova on the southern shore of Matochkin Shar, discovered by M. M. Yermolaev of the Arctic Institute in 1931, were made, and work, begun the year before, on correlating the geological structure of the northern and southern coasts of Matochkin Shar was continued.

During a crossing of the northern island from Byeluzhi on the northern coast of Matochkin Shar to Mityushikha Bay in the south-west corner of the island, deposits of asbestos, zinc and copper were found, and the expedition was also fortunate in discovering lead-zinc and fluor spar just north of Matochkin Shar in the neighbourhood of Mityushev Kamen. In the Matochkin Shar region a topographical survey was made, on scale 1 : 50,000, and corrections made to older maps.

In addition to the work described above in detail in this issue, other

expeditions have been carrying out equally interesting journeys and investigations in the Russian sector of the Arctic. Chief amongst these are the Anadyr-Chukotsk Expedition, organised by the Arctic Institute, the Taimyr Hydrological Expedition, and the Bering Sea section of the Pacific Ocean Expedition. We regret that we are unable, through lack of space, to publish full accounts of these undertakings in this number, but hope this omission may be rectified in the next issue.

Soviet Union Expeditions, 1933.

We have to record the stranding of the ice-breaker *Malyguin*, which took place as the result of a storm, on December 29, 1932, in Ice Fjord, Spitsbergen.

The two ice-breakers, *Malyguin* and *Sedov*, left Archangel on December 17, bound for the Soviet mining colony at Green Harbour, on the south side of Ice Fjord, carrying both cargo and passengers. When about 3 miles from Green Harbour, the *Malyguin* ran aground on some rocks during a blizzard, and sustained serious damage. The passengers and cargo were immediately transferred to the *Sedov*, and taken on to their destination. Two other ice-breakers, *Lenin* and *Ruslan*, were ordered to the rescue from Murmansk, arriving on January 8. After two days' work, however, it became clear that owing to the darkness and the frequent delays caused by drifting ice and bad storms, there was little possibility of salvaging the ice-breaker at this time of year. The whole cargo was therefore transferred, and the vessel sunk, to prevent further damage, until salvage operations could be resumed at a more suitable season. An expedition was equipped for this purpose in the early spring of 1933, and arrived at Spitsbergen on March 13. The work was carried through with great dispatch, and by March 24 the *Malyguin* was once more afloat. The vessel was taken in tow by the *Ruslan*, and removed to Barentsburg, for a preliminary examination and repairs. The *Malyguin* was later escorted to Murmansk by the *Krassin* for a thorough re-conditioning.

The following plans for expeditions to take place during the summer of 1933 have been sent to us by the Arctic Institute.

A second navigation of the North-East Passage, following upon the successful voyage of the *Sibiriakov* last year, is part of the programme of an expedition on board the ice-breaker *Tcheluskin*, which will be led by Professor O. J. Schmidt in his capacity of Chief of the newly

established *Department of the Northern Sea Route*. The expedition is to start from Leningrad in June, 1933, and will be escorted for part of the way by the ice-breaker *Krassin*. After calling at Murmansk a course will be set for Wrangel Island, where it is hoped to land a consignment of necessities for the colonists at the station at Rogers Bay.

Professor W. J. Wiese is to lead an expedition, on board *S/S Taimyr*, for the purpose of marine investigations in the waters between Franz Josef Land, Severnaya Zemlya, and the most northerly point of Novaya Zemlya.

Work on a large scale is to be carried out in the Lena Delta, the main objects of the expedition being to make a survey of the delta, particularly of certain branches of the river, with a view to navigation, and to selecting a suitable place for the construction of a harbour.

A hydrological expedition on board *M/V Pioneer*, and led by S. D. Lappo, will be at work in the southern area of the Nordenskiöld Sea.

Expeditions will also be at work at Khatanga Bay, where oil prospecting, hydrographical, and topographical work will be undertaken by a party under N. N. Urvantzev: at Kara Strait, making observations on the currents; and in Novaya Zemlya where two parties will carry out geological and ichthyological work.

Three cargo boats and some river boats are to leave Archangel sometime during the summer, in an attempt to reach the mouth of the Lena, a journey which has never previously been made by vessels of this type. They will be escorted by the ice-breaker *Krassin*.

A new station is to be established at Severnaya Zemlya, at the southwestern extremity of October Revolution Island, as a centre for tin prospecting.

Soviet Polar Year Stations, 1932-33.

Since the commencement of the Polar Year, further new stations have been established by the U.S.S.R., bringing the number of those carrying out the International programme up to ninety-two. Thirteen of these stations are situated on mountains, and, their objects being entirely meteorological, their work does not come strictly within the scope of this journal; while of the others there are too many to allow more than a brief mention being made. We give the following items of news, which have been obtained from various sources.

News from the station at Russian Harbour, Novaya Zemlya, has been received by wireless via the station at Cape Zhelaniya. Crossings of Novaya Zemlya have been made both by dog transport and propeller sledge. Later news, dated April 9, 1933, tells of a journey to Cape Zhelaniya, undertaken during what was apparently very bad weather, so that after the first week the party was forced to abandon the propeller sledges, and to proceed on foot. About 17 miles from Cape Zhelaniya, Dr Wölcken, a former member of the Wegener Greenland Expedition, and who is in charge of seismic sounding operations on the ice-cap, found he could go no further; he was left in his tent and a dog team was detailed later to go and fetch him in. He was supplied with provisions, and was presumably picked up, according to plan, though no further news of the party has reached us since that date.

Reports from the leader B. D. Georgievsky give news of a sledge journey, made by the party stationed at Cape Chelyuskin, across the cape in an easterly direction, but no further details are as yet available. An interesting relic of Amundsen's 1918-20 expedition in the *Maud* was discovered by the party on Cape Chelyuskin, in the shape of the diary of Tessem, a Norwegian member of the expedition, who died at Dickson Island in 1918. His skeleton had already been found by a Russian expedition under Urvantzev in 1922, together with letters explaining that he and a companion had been sent by Amundsen from Cape Chelyuskin to Dickson Island during the winter of 1918. The remains of his companion, Knutsen, were discovered in 1921. Tessem's diary was found, together with some astronomical instruments and food stores, in a small stone hut, 9 ft. square and 6 ft. high, roofed with boards, and lined inside with tarpaulins; remnants of a Norwegian boat were found outside.

An important branch of work at Cape Chelyuskin has been the regular biological observations on bird, cod and whale migration, and on polar bears, ten of these having been seen by the party up to November, 1932. Walrus and seal have also been seen occasionally. A collection of samples of plankton has been made. The other scientific work is proceeding according to plan, and all the party are well.

The station at Sogo Bay, an inlet in Tiksi Bay, at the mouth of the Lena, which was established under the auspices of the Arctic Institute, and of the Yakuts Geophysical Observatory, is also successfully carrying out its programme. The station is furnished with propeller sledges,

transported there by the *Sibiriakov*. Meteorological and aerological observations have been carried out since August 1, 1932.

The party stationed at Bulun, on the Lena, had unfortunately been hindered from carrying out the full programme of terrestrial magnetism, owing to transport difficulties. Meteorological work, however, including pilot balloon ascents, is being carried out, and observations are being made on clouds and on radio-activity.

The Polar Year work in Franz Josef Land is also proceeding according to the programme. A party consisting of J. D. Papanin, leader, E. K. Fedorov, magnetician, and Kunashev, hunter, left the station at Calm Bay, Hooker Island, on November 16, 1932, with the intention of visiting Salisbury Island. No further news of this journey has come through. A special biological laboratory was established at Calm Bay, the work including research into the embryology of seals, whales and polar bears; samples of plankton are being obtained, and, in addition, entomological and ichthyological collections are being made. The latest birds seen on Hooker Island were observed on October 26, 1932.

At Rudolph Island, the most northerly Polar Year station (Lat. $81^{\circ} 47' N.$), special biological observations, in addition to the routine observations connected with the Polar Year, are being carried out by F. Balabin, the leader of the party. These include a daily record of the different species of birds observed in the neighbourhood of the station, and investigations into their food and habits. The last birds left the island on October 21.

Oxford University Arctic Expedition, 1933.

An expedition, sent out by the Oxford University Exploration Club, and organised and led by Mr A. R. Glen, will be at work in Spitsbergen during the summer of 1933. Mr J. H. Martin, who was to have led the expedition, has been prevented from doing so owing to severe frostbite sustained whilst in Arctic Canada in the spring. The injuries are only temporary, however, and he will be in charge of expedition affairs in England. Financial support was received from the Royal Society, the Royal Geographical Society, the University and several Colleges at Oxford, and from the Worts Fund at Cambridge, several Cambridge men being in the party. The expedition has chartered M/V *Isbjørn*, and left Newcastle on June 27, to join their ship at Tromsø.

The party will consist of the following:

A. SLEDGE PARTY.

W. L. S. FLEMING, leader and geologist.
 H. R. de B. GREENWOOD, R.E., surveyor.
 A. K. GREGSON, ass. surveyor, photographer.
 A. S. IRVINE, camp assistant.

B. SLEDGE PARTY.

Unit One: Seismograph.

A. R. GLEN, leader.
 R. A. G. BINNY, R.E., surveyor.
 O. GATTY, seismologist.

Unit Two: Survey.

L. C. SMITH, R.E., surveyor.
 J. H. BENSON, ass. surveyor.
 A. C. GEDDES, ass. surveyor.

BASE PARTY.

J. BROUGH, geologist.
 J. M. EDWARDS, ass. surveyor, geologist.
 J. M. McC. FISHER, assistant.
 C. H. HARTLEY, ornithologist.
 R. H. S. ROBERTSON, geologist.
 F. E. STOTT, marine biologist.

On arrival at Spitsbergen parties A and B will be landed at Treurenburg Bay, at the north end of New Friesland, and will attempt to reach the ice-cap by way of the Treurenburg Glacier, by the route recommended by Captain Staxrud. Party A will carry out a topographical and geological survey in the interior, and eastern portion, of New Friesland. The seismograph unit of B party will work on one or more sections across the ice-cap: the survey unit of B party will meanwhile work in the north and west of the same region with a Wild phototheodolite. Both parties will then make a sledge journey down to Klaas Billen Bay in Ice Fjord, where the whole expedition will be picked up by *M/V Isbjørn* in mid-September.

The Base party have been given permission to use the Scottish Spitsbergen Syndicate Hut in the Ebba Valley, in Ice Fjord. They will carry out a geological and topographical survey of the Dickson Land region, which lies between the areas covered by the surveys of Mr R. M. Jackson in 1932, and Mr Joseph Lid in 1924. Geological investigations of the fossils of the Old Red Sandstone of Dickson Land will also be carried out. A hydrographical station is being maintained in Klaas Billen Bay, and an attempt will be made to link up the marine to the land ecology, and ornithological work is also planned.

All three parties will be provided with short wave wireless transmitters and receivers, each set, together with batteries and accessories, weighing about 25 lb. They will also be equipped with Leitz infra-red photo-

graphic equipment, in the use of which three members have been specially trained by Messrs Leitz.

Norwegian Expedition to Spitsbergen, 1933.

An expedition, planned under the auspices of the Norges Svalbard-og Ishavs-undersøkelser, and led by Mr A. K. Orvin, a member of the staff, will leave Oslo towards the end of June, and will visit Spitsbergen during the summer of 1933, on board M/V *Polarbjørn* of Aalesund. The personnel will include an engineer from the Norwegian Lighthouse Department. The expedition will be landed at Cape Linné, on the south side of the entrance to Ice Fjord, where a radio station and a lighthouse will be established. Lighthouses will also be erected on the west side of the entrance to Green Harbour, and at Advent Point at the entrance to Advent Bay. The ship, having landed the party, will then proceed to Greenland, with the members of the Norwegian East Greenland Expedition.

Polish Polar Year Expedition, Bear Island, 1932-33.

Brief mention was made, in *The Polar Record*, No. 5, of the Polish Polar Year Station on Bear Island. We are now able to publish a more detailed account of the expedition, through the kindness of Dr J. Lugeon, President of the Polish National Polar Year Commission, who has sent us the following information.

The expedition was organised at the Aerological Observatory, Jablonna, and the equipment, comprising 21 tons of gear, packed in 140 boxes and 120 bags, was purchased in Warsaw, Copenhagen and Tromsø.

The party consisted of the following:

- Dr J. LUGEON, leader.
- M. C. CENTKIEWICZ, engineer.
- M. GURTZMAN, engineer.
- M. M. LYSAKOWSKI, meteorologist.
- M. SIEDLECKI, physicist.

The two latter took a course at the Danish Meteorological Institute, under Dr la Cour, in preparation for the expedition.

The party left Poland on July 16, 1932, and reached Tromsø by means of a small coastal steamer. A week was spent installing an atmoradiograph at the Geophysical Observatory. They left for their final destination on August 2, on board M/V *Sverre* (16 tons) and arrived at Tunheim, on the east coast of Bear Island on August 4, where calm weather facilitated the landing of the equipment. A house, originally

part of the mining settlement, was kindly placed at the disposal of the party by the Norwegians. The next four weeks were spent in installing the instruments, in preparation for the regular observations, which were begun at the end of August. These include meteorological, magnetic, radiation, terrestrial magnetism and radio-electric observations; auroral photography is also being carried out.

Having superintended the establishment of the station, Dr Lugeon himself, in company with M. Gurtzman, left Bear Island at the end of August, on board a small (20-ton) trawler. The expedition will return in September, 1933, unless it should be found possible to continue some of the observations for a still longer period.

Finnish Polar Year Stations, 1932-33.

The participation of Finland in the International scheme is confined to activities in her own country, but, as will be seen from the brief report published below, much steady work has been, and is being, done there, and it is expected that Finland will make a large contribution to the total sum of results at the end of the year. We are indebted to Dr Keränen, President of the Finnish National Polar Year Commission, for the following information.

The Magnetic Observatory at Sodankylä, Lat. $67^{\circ} 22' N.$, Long. $39^{\circ} E.$ was founded in 1913, but has lately been greatly enlarged with a view to the Polar Year activities. The staff consists of:

E. TUCKSDORFF, leader and geophysicist.
Mrs A. TUCKSDORFF, assistant.
Miss E. KURTH, assistant.

Observations in magnetism, meteorology, clouds, radiation and atmospheric electricity, which were begun on August 1, 1932, will be continued after the close of the Polar Year. The radiation work is being carried out under the direction of Professor H. Lunelund and Mr C. Holmberg. A net-work of stations for auroral observations, to work in connection with the main observatory, has also been established by Mr Tucksdorff.

Another Polar Year station has been established at Petsamo, Lat. $69^{\circ} 36' N.$, Long. $31^{\circ} 13' E.$, on the north coast of Finland, by the joint efforts of Dr Keränen, and of Dr N. Tommila, who is now in charge of the work. The observations are being carried out under the auspices of the Academy of Science and the Meteorological Central Office. At the

end of the Polar Year this station will also continue to function, but only as a second grade meteorological observatory. Meteorological and aerological observations are being made, and research on the intensity of light is being carried out by means of a Grankeilphotometer.

A magnetic station, furnished with a quick-run magnetograph, was established in November, 1932, at Kajaani, Lat. $64^{\circ} 13' N.$, Long. $27^{\circ} 46' E.$, by Dr La Cour, and Dr J. Keränen. Dr N. Hela is in charge of the work, which it is hoped will be continued for two years.

Aeroplane flights and pilot balloon ascents in connection with the Polar Year are being undertaken at military camps throughout Finland, and besides this, an aerological station was established in September, 1932 at Kemijärvi, Lat. $66^{\circ} 43' N.$, Long. $27^{\circ} 23' E.$, under the auspices of the Aerological Department of the Meteorological Office. The work is in the charge of Dr V. Väisälä.

Norwegian Polar Year Stations, 1932-33.

Further news has been received of the Polar Year work being done in Norway. A magnetic station has been established at Rønvik, about 2 miles from Bodö, and work begun on September 1, 1932. The station is equipped with three quick-run La Cour variometers, whilst ordinary registrations are obtained by means of three ordinary variometers lent by the Halde Observatory. At Bossekop, observations on magnetism and earth currents were begun at the end of September. The records from both Bodö and Bossekop are sent in sealed boxes to Tromsö, where they are developed at the Aurora Observatory. These two stations are inspected and absolute measurements taken about once a month. Polar Year observations are also being made at Dombas and Fredriksstad.

Auroral observations are being carried out on a large scale in Norway under the supervision of Professor Störmer, at the following stations: In the north: at Tromsö, where the special spectrographic investigations are being made; and at Tenness: in the south: at Oslo (double station), Oskarborg; Kongsberg, Tømte, and Lillehammer. Professor Störmer spent the latter part of March at Trondheim taking auroral photographs for determination of altitude and position in space, in co-operation with the station at Løkken Verk. Visual auroral observations are being made both at Løkken Verk, and at Darbu (near Kongsberg). Ships navigating between Norway, Iceland and America are also taking up this work.

TRADING NAVIGATION IN THE KARA SEA

BY PROFESSOR W. WIESE

Vice-Director of the Arctic Institute, Leningrad

As early as the beginning of the sixteenth century the route by sea to the mouth of the River Ob was well known to Russian traders; though in those days they avoided the passage round the Yamal Peninsula by dragging their small vessels over the rivers and lakes of the Peninsula, as far as Ob Bay. In the first half of the seventeenth century, however, trading navigation to Ob Bay was brought to a standstill by an interdict placed on it, in 1619, by an Ukase of the Muscovite Government.

It was not until 250 years later, that the question of the practical use of the northern trade route was brought before the public eye by a well-known Russian promoter in the north, M. K. Sidorov. In 1868 Sidorov made the acquaintance of A. E. Nordenskiöld, who took a great interest in the scheme of the organisation of trading navigation through the Kara Sea, and who sent out two expeditions by sea to the mouth of the river Yenisei (1875-76). During the second expedition, on the steamer *Pröven*, the first merchandise was carried from Europe to the mouth of the Yenisei, and the next year (1877), the Russian sailing vessel *Utrennyaya Zarya* (*Sunrise*) sailed from the mouth of the Yenisei with the first cargo brought back from that district. About this time, Captain J. Wiggins, one of the most energetic pioneers of the Northern Sea Route, began his cruises in the Kara Sea, conducting merchant ships from Europe to the north of the Ob and Yenisei no less than ten times.

Since Nordenskiöld and Wiggins, the Kara Sea has been visited by merchantmen almost every year. The sea route to the Ob and Yenisei was used on a large scale for the first time in 1893, when 1500 tons of rail for the Trans-Siberian railway, then under construction, were carried on six ships from Europe to the mouth of the Yenisei. In 1897, twelve vessels made the passage of the Kara Sea, carrying 4500 tons of cargo to Siberia, and in 1905 the Board of Ways of Communication equipped an expedition of twenty-two vessels, which carried 18,000 tons of freight to the mouth of the Yenisei. It was planned that a powerful ice-breaker *Yermak* should conduct these vessels through the Kara Sea: this plan, however, was not carried out, the ice-breaker having run

aground off Vaigatch Island; the vessels however made a successful navigation of the Kara Sea, unescorted.

Though the trading navigation in the Kara Sea in the last century, and at the beginning of the twentieth century, has undoubtedly proved the possibility of an economic use of the Northern Sea Route to the mouths of the Ob and Yenisei, nevertheless these undertakings were often carried out with considerable hardship and risk, there being as yet no aids to navigation in these waters. Its ice conditions were also unknown, so that the navigator, entering the Kara Sea, had no knowledge of the state and distribution of the pack. All sea traffic, therefore, to the Ob and Yenisei, was in the nature of an exploratory expedition.

The first steps taken to establish regular navigation in the Kara Sea involved the organisation of meteorological radio stations on the neighbouring shores. The first stations were set up in 1914 on Vaigatch Island (Lat. $70^{\circ} 24' N.$, Long. $58^{\circ} 47' E.$), in the Yugorsky Shar (Lat. $69^{\circ} 50' N.$, Long. $60^{\circ} 46' E.$), and in Morrasale (Lat. $69^{\circ} 43' N.$, Long. $66^{\circ} 48' E.$). In 1915 a meteorological radio station was erected on Dickson Island (Lat. $73^{\circ} 31' N.$, Long. $80^{\circ} 23' E.$). Since the Revolution, six new stations have been added: in the port Ust-Yenisei (1920, Lat. $60^{\circ} 40' N.$, Long. $84^{\circ} 22' E.$); in the Novy Port in Ob Bay (1923, Lat. $67^{\circ} 42' N.$, Long. $72^{\circ} 57' E.$); in Matochkin Shar (1923, Lat. $73^{\circ} 16' N.$, Long. $56^{\circ} 24' E.$); on the Serge Kamenev Islands, Severnaya Zemlya (1930, Lat. $79^{\circ} 30' N.$, Long. $91^{\circ} 08' E.$); on Cape Zhelaniya (1931, Lat. $76^{\circ} 56' N.$, Long. $68^{\circ} 35' E.$), and on Cape Chelyuskin (1932, Lat. $77^{\circ} 43' N.$, Long. $104^{\circ} 17' E.$). In the summer of 1933, a meteorological radio station is to be built on White Island (to the north of the Yamal Peninsula). By means of these stations it is possible to judge of the ice conditions in the Kara Sea, some time before the beginning of the navigation season, and by its commencement to have obtained a rough idea of the distribution of the ice.

It is now known that in summer the Kara Sea is never entirely covered with ice, the pack ice gathering in the different portions of the sea, in accordance with the prevailing winds, and leaving considerable areas free, of which trading vessels are able to take advantage. It often happens that the southern straits in the Kara Sea (Yugorsky Shar and Kara Strait) are packed with ice, while the northern passages (Matochkin Shar and round the northern extremity of Novaya Zemlya) are ice-free. Such conditions were the case, for instance, at the beginning of the navigation season of 1932. In 1930, two cargo steamers, returning from

Yenisei to Europe, took the route round the northern extremity of Novaya Zemlya for the first time.

The importance of the meteorological radio stations will be seen from the following figures: of all the vessels taking the northern Sea Route during the period from 1874 to 1931, 5.5 per cent. were unable to complete their journey, owing to ice obstruction, but if we take the period since the establishment of the meteorological stations (1914-31) we do not find a single case where vessels failed to reach their destination on account of the ice.

The next measures taken to ensure successful navigation of the Kara Sea were, firstly, the use of powerful ice-breakers to escort merchantmen, and, secondly, reconnaissance of the distribution of the ice from the air. The ice-breaker *Lenin* conducted merchant ships through the Kara Sea for the first time (not counting the unsuccessful attempt in 1905) in 1921. From 1929 onwards the ice-breakers *Lenin* and *Krassin* have been used regularly for this purpose.

Reconnaissance of the ice in the Kara Sea, from the air, was first carried out in 1924 by means of a small Junker aeroplane. Since 1929 Dornier-Wal hydroplanes have been used, two or three operating there regularly during the navigation period. Mention must also be made of the scientific expeditions which have been at work in the Kara Sea region since 1921. As a result of these expeditions, much light has been thrown on the currents and ice conditions in the Kara Sea, and a great improvement made in the charts of this region.

In fact, thanks to the measures enumerated above, the trade route from Europe to the mouths of the West Siberian rivers is now established, and at the present time it may be considered that the difficulties of its navigation have been practically conquered. The extremely favourable ice conditions obtaining there since about 1920 certainly facilitate the navigation. However there is not the slightest doubt that the technical means in use at the present time to ensure safe passages are sufficiently advanced to permit the commercial voyages on the Kara Sea to be successfully carried through, even under more severe ice conditions.

The gradual development of the trading navigation to the mouths of the Ob and Yenisei may be seen from the table on p. 93.

Trans-shipping operations, until 1928, were carried out in Ob Bay, at Novy Port, and at Port Ust-Yenisei in the Yenisei. The River Ob has a shallow bar, which does not allow sea-going vessels to enter the river. The Yenisei offers, in this respect, more favourable conditions, as sea-

going vessels with a deep draught can easily enter this river, which is navigable for a considerable distance from its mouth.

Since 1928 the trans-shipping operations in the Yenisei have been carried out at Igarka, which is situated in Lat. 67° 25' N., over 300 miles from the mouth of the river. Igarka, where a few years ago there was nothing but tundra and marshy forest, is now a town of 15,000 inhabitants. Port Ust-Yenisei, has, however, by no means lost its importance, as the Norilsk coal deposits, about 90 miles from the town, give it promise of great future prosperity.

The sea route from Europe to the mouths of the West Siberian rivers being now well known, the question of extending its scope further east especially as far as the mouth of the river Lena is a natural sequel.

Year	Export tons	Import tons	Total tons	Cargo Steamers
1921	4,877	8,440	13,317	5
1922	5,837	7,790	13,627	5
1923	24	1,076	1,100	3
1924	4,148	6,523	10,671	3
1925	5,582	7,602	13,184	4
1926	10,070	9,098	19,168	5
1927	11,114	13,314	24,428	6
1928	17,107	12,271	29,378	8
1929	60,060	13,500	73,560	26
1930	125,000	18,000	143,000	40
1931	49,165	14,445	63,610	16
1932	76,480	20,283	96,763	28

The sea and the coast east of the Yenisei being, however, comparatively unknown, the first stage is necessarily the investigation of the prospects of such a development. This work has been undertaken by the Arctic Institute.

In 1930-32, the expeditions sent out by this Institute have explored the northern portion of the Kara Sea, which, in this case, is understood to mean the waters limited in the west by Novaya Zemlya and Franz Josef Land, in the north by the northern boundary of the Continental Shelf, and in the east by Severnaya Zemlya. The Institute has established meteorological stations on the Serge Kamenev Islands, on the west coast of Severnaya Zemlya, and on Cape Chelyuskin, the most northerly point of Asia. In 1932 hydrographical work in the northern portion of the Kara Sea was carried out by an expedition of the Hydrographic Department, on board S/S *Taimyr*, which also investigated the recently discovered Schokalsky Strait, connecting the Kara Sea with the Norden-skiöld (Laptev) Sea. Finally, in 1932, the *Sibiriakov*, chartered by the

Arctic Institute, made the whole North-East Passage in one navigation season, sailing round Severnaya Zemlya for the first time.

The work of investigation in the waters between the Yenisei and the Lena will be continued in 1933 by the Arctic Institute. A new radio station will be erected on Tin Cape (at the western entrance to Schokalsky Strait; a hydrographic and survey expedition on board the *Belukha* will be at work on the coast between the Yenisei and Cape Chelyuskin. A large expedition will also be at work at the mouth of the Lena, with the object of determining the navigability of the different arms in the Delta of the river, and discovering a suitable site for a new harbour. This summer (1933) it is hoped to establish aeroplane bases on Dickson Island, as well as at Cape Chelyuskin, where three planes are to make observations on the state of the ice for the whole year. Finally, in 1933, for the first time, three cargo steamers, conducted by the ice-breaker *Krassin*, will sail from Archangel to the mouth of the Lena.

The route from the Yenisei to the Lena, by reason of its natural conditions, undoubtedly presents many more difficulties for navigation than the area west of the Yenisei. It is hoped, however, that these difficulties, conquered so successfully in the western portion of the Northern Sea Route, may be overcome by the present high standard of science and technique, and that in the course of a few years a still further stretch may be added to the route which is, some day, to reach the Bering Strait.

GREENLAND

Sixth and Seventh Thule Expeditions, 1931 and 1932.

We are indebted to Dr Knud Rasmussen for the information about his two latest expeditions to East Greenland, which is summarised below.

The Sixth Thule Expedition, so-called because the station at Thule defrayed a portion of the expenses incurred, was planned with the object of carrying out survey work, combined with anthropology, archaeology, as well as botany, zoology and magnetic research in the coastal region of East Greenland between Cape Farewell and Angmagssalik. The expedition had the use of M/V *Dagmar* (10 tons), and the personnel included the following:

Dr KNUD RASMUSSEN, leader.
Commander BANGSBØLL, navigator.
ERIK HOLTVED, archaeologist.
SVEND NIELSEN, photographer.
JOHS. OLSEN, in charge of magnetic research.
CHRISTIAN POULSEN, Greenlander, hunter.
TOKKING, engineer.
Lieut. WITTRUP-HANSEN, engineer.
Three Greenlanders, hunters.

The journey to Angmagssalik was made with all possible speed, to take advantage of the favourable weather, this part of the Greenland coast offering little or no shelter in case of storm. A rapid survey of the coast, as regards navigation and harbourage, was made on the way. After a visit to Lindenow Fjord, the expedition headed for Puisortoq, the most dangerous part of the coast, and were fortunate enough to pass it in fine weather, making their first camp just north of the Puisortoq Glacier at Tingmiarmiut. After a visit to Griffenfeldt Island, the expedition arrived at Skjoldungen Island on August 24, and a week was spent at work in the Dronning Maria valley behind it, which is the one oasis on the South-East coast. On leaving there, on August 30, pack ice was met, and the ship had to keep some way out from the land; this obstacle was successfully negotiated, however, and the expedition arrived at Angmagssalik on September 1. After five days spent in shipping stores, a course was once more set for the south, and the expedition arrived at Umivik on the return journey on the morning of September 9. Umivik is the most southerly of the Eskimo settlements grouped round Angmagssalik, and has a population of seventeen. Besides these, there

were forty-seven Eskimo at Inigssalik during the summer of 1931, and thirty-one at Igtuk; making a total of ninety-five persons living south of Sermilik Fjord.

Between Umivik and Skjoldungen the expedition ran into a severe storm with heavy pack ice. The rudder was torn away, and though a jury rudder was rigged, the ship lay at the mercy of the gale for three days, September 11, 12 and 13, the wind rising sometimes to force 11 or 12. On September 12, the jury rudder was broken; fortunately the storm abated, and after a new jury rudder had been rigged the expedition was able to set a course for land, having been driven 125 miles south and 80 miles out to sea during the storm. Skjoldungen Island was reached on September 15, after which, going cautiously, with a patched-up rudder, and avoiding the now frequent storms, the expedition made for the small village of Augpilagtoq, in the fjord behind Cape Farewell, and arrived there on October 2.

Perhaps the most important result of the expedition was the knowledge gained concerning the navigation of this part of the Greenland coast, and particularly the discovery that these waters are navigable from the beginning of July, and are almost free from ice in August and September. Survey work was also done in the inner part of Skjoldunge Fjord, and charts made of good anchorages and harbours along the coast, though, owing to the damage done by the storm, it was impossible to complete the programme of topographical work. Two large fjords were discovered just north of Skjoldunge Fjord. Magnetic observations, for comparison with those made at Rude Skov, Denmark, and Godhavn, were made at eighteen stations during the expedition, eleven of them on the east coast. During the magnetic observations it was found that north of Tingmiarmiut there were considerable variations from the normal deviation, indicating the presence of iron-bearing minerals. Observations on magnetic storms were made. Botanical and zoological work was also done whenever possible.

The Seventh Thule Expedition, in the summer of 1932, was the outcome of the reconnaissance outlined above, and was planned with the object of making a thorough investigation of the coast-line between Cape Farewell and Umivik.

The expedition had the use of S/S *Th. Stauning*, commanded by Captain Peder M. Pedersen; as it was proposed to divide into several parties, seven motor boats were also taken, as well as an aeroplane.

Most of the Eskimo members of the expedition also brought kayaks. The personnel, numbering sixty-two men, included the following:

Dr **KNUD RASMUSSEN**, leader.
R. BØGGVAD, geologist.
 Captain **GABEL-JØRGENSEN**, cartographer.
PAUL HANSEN, biologist.
H. C. JACOBSEN, air photographer.
L. JENSEN, mechanic.
C. JØRGENSEN, mechanic.
 Commander **MADSEN**, geodesist.
 Dr **T. MATHIASSEN**, anthropologist.
 Lieut. **O. NIELSEN**, air photographer.
 Dr **P. NØRLUND**, archaeologist.
KNUD ØSTERGAARD, hunter.
THORKIL PETERSEN, pilot.
 Lieut. **ERIK RASMUSSEN**, pilot.
EMIL RASMUSSEN, hunter.
 Commander **TEGNER**, geodesist.
P. WINTHER, radio engineer.
 Lieut. **WITTRUP-HANSEN**, engineer.

Twenty-five members of the expedition were Greenlanders.

The most important work of the expedition was the aerial survey. During the flights 6275 miles were covered, and about 1000 aerial photographs taken. Flights were made over the entire coast from Pikiutdleq, north of Umivik, to Cape Farewell; concluding, on September 2, with a crossing of the ice-cap from Lindenow Fjord to Julianehaab. Another crossing, from Ivigtut to the Norwegian station, Finnsbu, just north of Skjoldungen, was made earlier in the expedition, to assist in the rescue of the stranded Hutchinson family. The ground survey was carried out, with the help of motor boats, by four parties, each consisting of a topographer and two Greenlanders. Geological investigations and collections showed the coast to consist of granite and gneiss; no useful mineral deposits were found. The archaeological work of the expedition was of particular interest, as this part of the coast had formerly supported a large Eskimo population. Some 200 house ruins were examined, and twenty-one ruins fully excavated. Dr Rasmussen made investigations with a view to the possible re-populating of this region, and came to the conclusion that the means of livelihood were sufficient for an Eskimo, though possibly not for a white, community. Investigations into hunting conditions revealed the fact that there is excellent sealing all along the coast, but no land game. There are no fish in the fjords, or along the coast, with the exception of trout in some of the rivers. Two hunters, Knud Østergaard and Emil Rasmussen, have undertaken to remain at Narsaq, in Lindenow Fjord, in order to study this question more fully.

The expedition returned to Copenhagen on board S/S *Hans Egede* at the close of the navigation season.

Danish Three Year Expedition to East Greenland, 1931-34.

We are indebted to Dr Lauge Koch for the following note on the work of the expedition during the winter of 1932-33, and on the plans for this summer.

During the winter of 1932-33 three main stations, equipped with wireless, have been maintained in East Greenland. The stations and staff are as follows:

Ella Island:

P. V. GLOB, archaeologist.
A. de LEMOS, radio operator.
O. SIMONSEN, topographer.
S. O. STENØR, topographer.
Dr E. WEGMANN, geologist.
Three Greenlanders.

Eskimonaes, Clavering Island:

JOHAN DAVIDSEN, Greenlander.
V. DEVANTIER, topographer.
A. JENSEN, geologist.
T. JOHANSEN, topographer.
HOLGAR MADSEN, zoologist.
AXEL NIELSEN, radio operator.
EIGIL NIELSEN, palaeontologist.

Hochstetter Foreland:

P. HALFDANER, topographer.
A. B. C. MADSEN, topographer.
ALWIN PEDERSEN, zoologist.
ARNE SCHWARCK, archaeologist.

The following is a brief summary of the work to be carried out during the present season.

As in previous years, the two steamships, *Gustav Holm* and *Godthaab*, will be at the disposal of the expedition, together with fourteen motor boats. Two seaplanes will be taken for use on topographical surveys, and the total personnel of the expedition will be 105 men. Unless ice conditions are specially unfavourable, the cartographical, archaeological and botanical investigations in the area between Lat. 72° and 76° N., will all be completed during the summer of 1933.

The triangulation work done during the summer of 1932 will be continued by eleven surveyors, divided into four parties, having the same personnel as before, and working with the help of motor boats. These will be:

- (1) A party led by O. Simonsen in the interior of Franz Josef Fjord.

- (2) A party led by Captain Johansen in the region round Hold-with-Hope.
- (3) A party led by Lt.-Col. L. Bruhn in Tyroler Fjord.
- (4) A party led by Captain Madsen in Bessels Fjord.

Eleven men will take part in the air photography divided into (1) a northern party, with a base on Clavering Island, consisting of two pilots, two mechanics, and two photographers, and (2) a southern party, with its base first on Ella Island, and subsequently in Scoresby Sound, consisting of one pilot, two mechanics and two photographers.

The air photography, as well as the triangulation, in the area between Lat. 72° and 76° N. will, it is hoped, be finished in the summer of 1933, and work will be begun in the region between Lat. 70° and 72° N.; while that already commenced, between Lat. 76° and 78° N., will be continued.

Geology will be studied by seven parties:

- (1) Professor Backlund, with four assistants, will continue his petrographical work round Davy Sound.
- (2) Mining engineer Eklund, with eight assistants, will continue prospecting for minerals on Clavering Island.
- (3) Dr Malmqvist, with one assistant, will continue his petrographical work on Hold-with-Hope.
- (4) Dr Säve-Söderbergh, with four assistants, will carry out palaeontological collecting on Hold-with-Hope.
- (5) Eigil Nielsen, with two assistants, will continue his palaeontological work on Hold-with-Hope.
- (6) Dr Wegmann, with three assistants, will continue tectonic work in King Oscar Fjord.
- (7) Dr Aldinger, with one assistant, will make palaeontological investigations in Scoresby Sound.

Thorv. Sørensen and Dr Seidenfaden will make botanical investigations in the area between Clavering Island and Danmarkshavn, Gelting will continue his botanical work on Clavering Island, while Søren Lund will make a collection of algae in Scoresby Sound.

It is planned that Alwin Pedersen and Holgar Madsen will finish their investigations on the vertebrate life in the region between Clavering Island and Danmarkshavn. Søgaard Andersen has undertaken to winter on Ella Island in order to investigate the invertebrate life in the fresh water lakes, and on the land. Gunnar Thorsen and Ussing will continue

the zoologic-hydrographical research begun in the summer of 1932, using *S/S Godthaab*, which is fitted out as a base, with an echo-sounding apparatus, and other zoological equipment.

Archaeology is under the care of Arne Schwarck and P. V. Glob, who hope to finish their archaeological work by the end of this year's expedition, the former at Hochstetter Foreland and Shannon Island, and the latter in Franz Josef Fjord and King Oscar Fjord.

During the winter of 1933-34, a staff of six men will be in charge of the station at Ella Island, as follows:

SØGAARD ANDERSEN, geologist.
Dr BUTLER, geologist.
E. DRASDRUP, assistant.
A. de LEMOS, radio operator.
Two Greenlanders.

There will also be a wintering party of six men at Eskimonaes, Clavering Island:

EKLUND, geologist.
P. HALFDANER, topographer.
T. JOHANSEN, topographer.
A. NIELSEN, radio operator.
WÄNGSIÖ, geologist.
One Greenlander.

The station at Hochstetter Foreland will probably be occupied only in the spring and autumn.

British Greenland Survey Expedition, 1932-33.

Since the death of their leader, Mr H. G. Watkins, the three remaining members of the expedition have been carrying on the work at Lake Fjord, East Greenland, as far as possible in accordance with the original plans.

After building their house, they spent the autumn in laying in food supplies for the winter. In September salmon were caught at the mouth of the river, and dried for use as dog food. In November Rymill and Chapman hunted seals by kayak, and made several motor boat trips to the Eskimo settlement in the next fjord. A depôt of supplies for the spring journey was laid at the head of the Kangerdlugsuatsiak Fjord, as had been planned.

The winter is described in a dispatch from the party as having been "extremely comfortable." The party felt no anxiety on the score of provisions, as seals were abundant, and, together with birds, bears and foxes, assured an adequate supply of fresh meat. By making holes in

the ice with dynamite, and laying a net underneath, it was also possible to obtain char and salmon, up to 10 lb. in weight, throughout the winter. Fine days in the winter were spent by the party in attending to the fish and seal nets, and also in shark fishing. Blubber tied to stones, dropped through holes in the ice, and then baited, sometimes resulted in twenty sharks being caught in one day, with a hook on a long line. The sharks, about 8 ft. long, were used as dog food.

The weather report for the winter shows a complete absence of heavy gales at Lake Fjord, the strongest gust recorded being 34 m.p.h. Snow fell on forty-three days during December and January, and lay 10 ft. deep; sledging was only possible, therefore, when occasional rain, with warm spells, caused an ice crust to form. The lowest temperature recorded was -13° F. Three dogs, out of fourteen, failed to survive the winter, and the shortage made survey journeys impossible while the deep snow lasted. It is of interest to note that, of the dogs which died, two were the only Alsations in the team, and succumbed obviously to the hard conditions; the other, a huskie, was killed by the other dogs.

In the early spring of 1933 Rymill and Chapman made a journey by sledge across the sea-ice to Angmagssalik to buy dogs and send wireless messages, while Riley remained at the base in charge of the meteorological work. They left Lake Fjord on February 7, but after a few days they were delayed by heavy snow, and forced to make a track for the dogs, so that their progress was necessarily slow. On February 13, whilst camping near Ananak Island, a severe north-east wind, with heavy snow-fall, caused the ice to break up beneath the tents, and the party passed an anxious night, as the blizzard made it impossible to strike camp and move to a less dangerous locality.

Travelling conditions then improved, and it was possible to cover about 20 miles a day, as the blizzard had given the snow a hard and level surface. In spite of frequent delays caused by open water forcing the party to take devious routes over islands and promontories, the Eskimo settlement of Sermiligak was reached on February 16, and two days were spent there, bad weather making it unwise to proceed. The journey was then continued, the 30 miles to Kungmiut being covered in one day, and the party arrived at Angmagssalik on February 20, 1933. Twenty dogs were bought at Angmagssalik, and it was planned to return to Lake Fjord in a few days.

The programme for the summer includes the projected sledge journey to Kangerdlugsuak, which, on the outward journey, will be by way of

the sea-ice, while the return journey will be made over the ice-cap for survey purposes. It is hoped to climb Mount Forel, and other survey journeys will also be undertaken if possible. A visit to Angmagssalik by kayak is planned for July; and the party will return to this country in August.

French Polar Year Station, Scoresby Sound, 1932-33.

Very little news has been received during the winter of the French Polar Year station at Scoresby Sound. We are informed, however, by Dr J.-B. Charcot, that the observations have been proceeding in a satisfactory manner, and that all the party are well. The members of the wintering party asked to spend another year at the station, but their request has been refused, both on the score of finance, and because the observations would lose their principal interest after the cessation of the Polar Year work in August.

An expedition, to bring back the party, will visit Scoresby Sound during the summer, on board the *Pourquoi Pas?*, captained as usual by Captain A. Chatton, and accompanied by the ice-breaker *Pollux* commanded by Captain Mailloux. They will leave France at the beginning of July: at Akureyri, in the north of Iceland, a party of three from Cambridge University, who intend to do ecological work in Scoresby Sound, will be picked up, and the expedition will proceed to East Greenland on July 18.

It is planned to carry out a certain amount of scientific work during the preliminary cruise, and the expedition is accompanied by the following scientists:

Professor CHEVALLIER, geophysicist.
 Professor DEVAUX, geophysicist.
 M. P. DRACH, botanist.
 Dr PARAT, botanist.

Some assistance may also be afforded to Dr Lauge Koch in his proposed work in Scoresby Sound. The expedition will spend about three weeks in the Sound, and will return to France at the end of August.

Cambridge East Greenland Expedition, 1933.

A small expedition from Cambridge University, consisting of:

G. C. L. BERTRAM, St John's,
 D. L. LACK, Magdalene,
 B. B. ROBERTS, Emmanuel,

will visit Scoresby Sound, East Greenland, during the summer of 1933, leaving Akureyri, North Iceland, on July 18. From there they will

travel on board the relief ship of the French Polar Year Expedition, Dr J.-B. Charcot having very kindly invited them to be his guests on board the *Pourquoi Pas?*

The party intends:

(1) To make an ecological survey of an area in East Greenland for comparison with those made in other Arctic regions: West Greenland (1928), Iceland (1932), Bear Island (1921 and 1932), and Spitsbergen (1921-25).

(2) To investigate the effects of low temperatures upon the geographical distribution of animals in the Arctic, by studying the temperature conditions in the different localities, and the animals found there, in order to ascertain the temperature ranges they can withstand. The object of this work is to test the ability of animal life to withstand the conditions of a glaciation, as it is thought that there may be no need to suppose the recolonisation of Arctic lands following glaciation.

(3) To extend to East Greenland the work of Dr T. G. Longstaff in West Greenland upon the distribution of the four common Arctic land birds.

Louise A. Boyd Expedition to East Greenland, 1933.

An expedition, led by Miss Louise A. Boyd, of San Francisco, will visit East Greenland during the summer of 1933, in order to carry out survey and photographic work in the region round Franz Josef Fjord and King Oscar Fjord, in continuation of the work done on her previous expedition to the same locality in 1931. The personnel of the party will be as follows:

Miss LOUISE A. BOYD, leader and photographer, San Francisco.

J. HARLEN BRETZ, physiographer, University of Chicago.

W. B. DREW, botanist, Gray Herbarium, Harvard University.

O. M. MILLER, surveyor, American Geographical Society.

N. E. ODELL, geologist, Cambridge University.

Mrs N. E. ODELL.

WALTER A. WOOD, assistant surveyor, New York.

Five porters.

The expedition will leave Norway at the end of June on board S/S *Veslekari* (200 tons), and should reach the Greenland coast early in July. If conditions permit a call will be made at Jan Mayen either on the outward or return journey. The expedition will be equipped with a Hughes Silent Magneto-Striction Echo Sounder with Recorder, and particular attention will be paid to soundings over the continental shelf off East Greenland, and at the mouths of the fjords. The equipment also includes

two automatic tide gauges, lent by the American Coast and Geodetic Survey.

The survey work in Greenland will consist chiefly of large scale mapping of various small areas, with the help of a Wild phototheodolite. It is hoped, for instance, to explore the valley west of the head of Kjerulf Fjord, and the Hisinger Glacier, and to connect both these areas trigonometrically with the surveys made by the Cambridge Expedition in 1929. From the Hisinger Glacier a traverse will be made to the head of the Rohs Fjord or the Rhedin Fjord. It may also be possible to make a traverse up the Jatte Glacier, and round to the Nordenskiöld Glacier; on this journey an attempt will be made to locate the Mystery Lakes, seen by the Cambridge Expedition in 1929 from Petermann Peak.

The photography, which is in charge of the leader of the party, forms an important part of the programme; besides photographs illustrating the main work of the expedition, special attention will be paid to glacial marginal features, and to plant and animal life. Geological, physiological and botanical observations will also be made in connection with the survey work. The expedition will return to Norway sometime in September.

Dutch Polar Year Station, Angmagssalik, 1932-33.

As stated briefly in *The Polar Record*, No. 5, the Dutch Polar Year Expedition left Copenhagen on board S/S *Gertrud Rask* on July 14, 1932, and arrived at Angmagssalik on August 2. The party consists of:

J. A. de BRUÏNE.
H. P. TH. VAN LOHUIZEN.
K. L. VAN SCHOUWENBURG.

Dr N. Tinbergen and Mrs Tinbergen-Rutten accompanied the expedition as guests in order to carry out biological work.

Absolute magnetic observations were commenced on August 31, and radio observations on September 6, and by the second half of September the full programme was in progress.

Observations on meteorology include visual observations and registrations of pressure, temperature, humidity, direction and force of the wind (using a Dines anemometer), and cloud observations by means of a Stüve nephometer. Aerological observations are being made with both pilot and sounding balloons. During the winter, few pilot balloon ascents were made: trouble was experienced with the hydrogen generator, owing to the impossibility of producing hydrogen in small quantities,

but this difficulty was surmounted and it is hoped that pilot balloon ascents may now be made regularly during the last few months of the Polar Year. Fifteen Patterson meteorographs have been sent up.

Radiation, cosmic radiation, terrestrial magnetism and radio-electricity are receiving full attention, and in connection with the latter, daily measurements of the Kennelly-Heaviside layer are being made. Auroral observations have been carried out on 113 nights up till February 14, 1933, photographs being taken simultaneously with the French station at Scoresby Sound. The photography was unsuccessful at first, owing to developing trouble, but this has now been rectified, and complete sets of photographs obtained. Special attention has been paid to haloes and similar optical phenomena which have been observed in large numbers and in varying forms.

The reports received from the expedition make no mention of the weather conditions, except for a violent storm on January 14 and 15. The barometer fell 39 mm. in 18 hours, the wind reached force 11 and the minimum temperature was -20°C .

The party will leave Angmagssalik on board S/S *Gertrud Rask* in August, 1933.

Norwegian Expedition to East Greenland, 1933.

An expedition, organised by the Norges Svalbard- og Ishavs-undersøkelser, will be at work in the region between Davy Sound and Sabine Island, East Greenland, during the summer of 1933. We are indebted to Dr Adolf Hoel for the following note:

Leaving Oslo about June 24, on board M/V *Polarbjørn* of Aalesund, the expedition will first visit Spitsbergen, in order to land the Norwegian Spitsbergen Expedition at Cape Linné, and will then proceed to East Greenland. The work will be chiefly of a topographical and hydrographical nature, but it is hoped that other scientific work may also be undertaken. The expedition will return to Norway about the beginning of September.

Norwegian Polar Year Stations in Greenland, 1932-33.

The station at Myggbukta has been carrying out the usual Polar Year programme, during the winter of 1932-33.

Four new Polar Year stations have been established by Norway in Greenland, as follows: Jonsbu, Lat. $75^{\circ} 20' \text{N.}$, Long. $20^{\circ} 28' \text{W.}$; Storfjord, Lat. $68^{\circ} 10' \text{N.}$, Long. $31^{\circ} 50' \text{W.}$; Finnsbu, Lat. $63^{\circ} 24' \text{N.}$, Long. $41^{\circ} 17' \text{W.}$; Torgilsbu, Lat. $60^{\circ} 32' \text{N.}$, Long. $43^{\circ} 11' \text{W.}$

Norwegian Expedition to South-East Greenland, 1933.

A small expedition will be sent to visit the Norwegian stations at Storfjord, Finnsbu and Torgilsbu in South-East Greenland. Though not strictly a scientific undertaking, it is hoped that one or two scientists may be of the party.

University of Michigan Expedition to West Greenland, 1932-33.

A Polar Year station has been established on the neck of the Upper Nugssuak Peninsula, Lat. $74^{\circ} 20' N.$, Long. $56^{\circ} 13' W.$, and is being maintained by the Fifth University of Michigan Expedition to Greenland. The party, which began observations on August 1, 1932, consists of:

Dr R. BELKNAP, leader, geologist.
EVANS S. SCHMELING, second-in-command, aerologist.
MAX DEMOREST, assistant aerologist.
KARL V. HANSEN, radio operator.
H. N. GARDNER, photographer, botanist.

Since the establishment of the station the following news has been received. The winter quarters, named Peary Lodge, were completed at the end of August, and since then the work has been continued without any outstanding incident. The period between October 1 and November 8 was spent in setting up stakes to record the movement of the inland-ice, the work being much delayed by snow, high winds, and low visibility. By means of the short wave radio station, the party have successfully remained in communication with the outside world, and have also been in touch with the Swiss, Danish and Canadian Polar Year stations. In December, 1932, the fjord froze over, and made it possible to reach the neighbouring Eskimo settlements by way of the sea-ice. An interesting visitor to Peary Lodge at that time was the Greenlander, Abel Danielsen, who had served at different times with Dr Lauge Koch, Dr Knud Rasmussen and Dr Peter Freuchen.

The latter part of the winter was spent in a series of small reconnaissance trips, particularly with a view to prospecting a route up on to the ice-cap. Several journeys were also made to the Eskimo village of Kraulshavn 30 miles distant. Towards the middle of February a severe blizzard was recorded, the temperature rising 30 degrees in an hour, and 60 degrees in 24 hours. The wind velocity reached 100 m.p.h., lower temperatures following. Later in the month, as a result of storm and warmer weather, the sea-ice went out, thus temporarily cutting off the party. This change in the weather, however, according to dispatches from Dr Belknap, had

a much more serious effect upon the mail sledges which were travelling south at that time from Thule, the most northerly station in Greenland. They were overtaken by the storm when within a day's journey of their destination, and carried north-west, to find themselves eight days later opposite Cape York, having practically returned to the point whence they had started. Fortunately the drivers were able to kill polar bears for food.

Fine weather was experienced in March and April though low temperatures were recorded. On March 11 a party started on a trip to Upernivik, in order to visit the Danish Governor. Forty-five miles were covered the first day, and the night spent at an Eskimo village. On the second day, after another 45 miles, Tassiusak was reached, and the party arrived at Upernivik, a further distance of 75 miles, on the third day.

An improvement in the weather favoured the carrying out of the special Polar Year observations including pilot balloon ascents. On May 8 the party concluded a month's simultaneous observations, self-registering instruments having been installed at a temporary coast station at Kraulshavn in order that a comparison might be made between conditions near the glacier and on the coast. During this month the instruments, including a home-made tide gauge, were read every hour. It was found that the climate in this part of Greenland varies greatly within short distances.

At the beginning of May Mr Demorest made a week's journey for the purpose of collecting geological specimens. At the end of May Dr Belknap and Mr Schmeling commenced a trip northwards by dog sledge on the sea-ice; on reaching Karrussulik, however, the ice was found to be breaking up, and the party decided to return, re-mapping the coast south of Cape Seddon on the way. It was observed that the glaciers on this part of the coast have retreated rapidly during the last few years. On the return journey several days were spent at Devil's Thumb, where there is a settlement, founded in 1928, of eight Eskimo families, attracted there by the hunting. The party attempted the ascent of the central peak of the island (about 2700 ft.), but were forced to return when within 200 ft. of the summit. This was the last trip possible on the sea-ice, which was already breaking up when the party returned to the base.

Several journeys are planned for the summer, and the party also hope to erect a weather station on the ice-cap. Depth soundings of the ice will be made, and studies of glacier movement continued.

German Polar Year Station, Arsuk, South-West Greenland, 1932-33.

We are indebted to the *Archiv für Polarforschung*, Kiel, for the following news of their Polar Year station at Arsuk, South-West Greenland, in Lat. 61° N., Long. 48° W. As noted briefly in *The Polar Record*, No. 5, this station is being maintained by private enterprise. The party originally consisted of:

Dr MAX GROTEWAHL, Archiv für Polarforschung, Kiel,
Dr KERN, Breslau,

but it is understood that three more men have now joined them, leaving Germany on May 6.

Thanks to the kindness of the Danish officials at Ivigtut, the base was established by November 22, 1932, and glaciological and auroral observations were begun on December 1, and meteorological and magnetic work on December 16.

The party has experienced a long, but not very severe, winter; though much wind is reported. The most usual weather conditions were either a cold and dry wind from the north-west (average force 6), or a damp, warm wind from the south to south-east (force 5-9) bringing a sudden rise in temperature. In February, 1933, unusual weather conditions culminated in a severe thunderstorm lasting 1½ days, with wind up to force 12. Since the middle of April, however, the weather had steadily improved, with rising temperatures and light winds.

Particular attention is being paid to auroral observations, and simultaneous measurements of height are being made in conjunction with the Danish station at Julianehaab and the Dutch station at Angmagssalik. As regards ice observations, the party report that the Arsuk Fjord was frozen from the beginning of March to the beginning of May. The pack-ice, drifting with the East Greenland Polar current, reached the Ivigtut district about the middle of March, and in spite of the scarcity of ice on the East Greenland coast during the summer of 1932, seemed no less in amount than that observed in former years. The expedition will return to Germany at the close of the Polar Year.

Dutch Aerological Station, Reykjavik, 1932-33.

This station, which was established by Dr H. G. Cannegieter at Reykjavik, Iceland, by permission of the Icelandic Government, in August, 1932, is officially financed by the Dutch Government. The party consists of:

J. H. van GIESSEN, leader, flight lieutenant.
H. BOSCH, air pilot, troop sergeant.
C. van der LEYDEN, mechanic, sergeant.

Two Fokker planes have been lent by the Military Air Service at Soesterberg, Holland. The expedition is working in close co-operation with the meteorological service at Reykjavik, and reports are being sent to Oslo, whenever possible, for insertion in the European daily weather reports. The programme of work is as follows:

(1) Aeroplane ascents to at least 3000 ft., once daily in winter, twice daily in summer. (2) Pilot balloon ascents, once daily in winter, at least twice daily in summer. (3) Synoptic messages thrice daily. (4) Regular nephoscopic observations and hourly cloud observations on International days of the 1st and 3rd order. (5) Computing of climatological tables for frequency of wind velocity in eight directions, and for visibility and height of low cloud at a selected number of Icelandic stations.

During the winter, gales and heavy snow-storms were experienced at the station. In November some danger was caused to the hangar by a gale, with wind velocity of 31 metres per second. On December 29 one of the planes was seriously damaged in a violent snow-storm which arose during a flight, and necessitated a forced landing. Similar storms also prevented ascents for several days in the middle of January, the landing ground being deep in snow, with large drifts in front of the hangars. After January the weather improved, but a strong gale was recorded on February 12.

The mean temperatures from November to March were -5.4° , -16.8° and -29° C. for the 3000 ft., 9000 ft. and 16,000 ft. levels respectively. A steep vertical gradient in the temperatures from the ground upwards accounts for the perpetual disturbance of the atmosphere in Iceland. In January the air pressure was found to change as much as 16-18 millibars in 4 or 5 hours. Inversions of temperature were seldom noticed.

Aeroplane flights between September and May numbered 226 in 190 days, and 189 pilot balloon ascents were made. Balloon ascents were also carried out during the voyage to Iceland of the Dutch cruiser *Heemskerck* in May, 1933.

Observations will be continued at the station until August 31. Dr Cannegieter will himself spend July and August at the station to carry out research into the stratosphere by means of Moltchanoff radiosondes.

Polar Year Station, Snaefellsjökull, Iceland, 1932-33.

News of the Polar Year station at Snaefellsjökull (4920 ft.) on the west coast of Iceland, has been received from Professor Dr P.-L. Mercanton,

who, with Dr Thorkelsson of Reykjavik, is the joint Director of the undertaking.

The wintering party, consisting of two men:

M. TH. ZINGG, Switzerland, leader, meteorologist,
M. JENSEN, Denmark, radio operator,

arrived at Ólafsvik, on the west coast of Iceland and due north of Snaefellsjökull, on board the coastal steamer *Esja* on August 16, 1932, accompanied by Professor Dr P.-L. Mercanton, and Mr P. La Cour, as engineer. Having made a temporary base at Ólafsvik, the party proceeded to erect the station. The site selected was not at the summit of the mountain, which was out of the question both from the point of view of transport and also of the drawback of constant cloud, but on the eastern side, on a small crater at a height of about 2600 ft., reached by a narrow path, accessible to pony transport. In spite of the extremely bad weather, including snow which fell at the end of August and almost incessant north and north-west winds, delaying the work considerably, the station, consisting of a 13 ft. hut divided into a living room, laboratory and small kitchen, was ready for occupation by September 7, after which Professor Mercanton and Mr La Cour returned to Europe. Observations were started in October.

The party has kept in wireless communication with Europe throughout the winter, and it is learnt that the bad weather has continued almost without interruption since the foundation of the station. Two great storms, one in mid-November, and the other at the end of December, were the cause of some damage to instruments, as well as the snowing up of the station for several days. During the later storm, the wind reached a speed of 60 metres per second. During the winter, observations, especially those connected with the aurora, have also been much hindered by low lying cloud, and continuous snowfall.

With the spring, however, the snow melted rapidly and the weather improved, so that the work is now being carried out successfully. Special observations have been made on the formation of clouds.

The party will remain at the station until the end of the Polar Year.

Austrian Polar Year Station, Jan Mayen, 1932-33.

As reported in *The Polar Record*, No. 5, the Austrian Polar Year Expedition, led by Dr H. Tollner, arrived at Jan Mayen in June, 1932, and was fortunate in finding accommodation, through the good offices of

Professor Hesselberg, at the reserve house of the Norwegian meteorological station. This is situated at Jameson Bay on the south-east coast of the island, about 3 miles from the site of the Austrian station during the First Polar Year, which was on the north-west coast.

Magnetic observations form the chief interest of the party, and data having a direct bearing upon the results of the First Polar Year have already been obtained. After some preliminary difficulty in insulating the magnetic huts, observations were begun in August, 1932. Terrestrial magnetism observations are being carried out with special reference to the influence of volcanic rocks in the neighbourhood of the station. Auroral and meteorological observations are also being made. In addition, it is hoped to make large collections of geological and botanical specimens. The weather has unfortunately very much hindered any outdoor work on the island.

The party will conclude their observations at the end of August, 1933.

ARCTIC CANADA, LABRADOR, AND ALASKA

British Polar Year Station, Fort Rae, 1932-33.

Constant news has been received throughout the winter of the British Polar Year Expedition at Fort Rae, Canada (Lat. $62^{\circ} 50' N.$), as, owing to the air traffic between Fort Resolution and Great Bear Lake, the station has been in regular communication with the outside world.

After the unpleasantly hot weather experienced during August, 1932, the temperature dropped steadily throughout the month of September, and by the end of the first week in October the lake at Fort Rae had begun to freeze. Snow fell on October 1, and from that date until March, 1933, the temperature, except for a few isolated days, had been constantly below freezing point. The chief effect of the more severe conditions was the freezing of various instruments, including clocks and the anemograph, the latter due to the impossibility of keeping the meteorological hut above freezing point. In the first case the difficulty was overcome by removing all oil from the clock, and in the second by re-plastering the walls of the meteorological hut and covering all the crevices with paper and sacking.

A general description of the winter conditions is given in the latest report, dated March, 1933. It appears that the snowfall was light last winter, the average thickness of a fall being usually about 1 ft., with drifts up to 8 or 10 ft. Winds have also been light, force 2, 3 and 4 being

recorded over long periods, with occasional spells of force 6 or 7, with gusts of greater force still. As regards temperature, the leader, Mr J. M. Stagg, says in his report: "In general retrospect the winter has been characterised by a fairly steady cold, unmarked by any spectacular extremes. The mean daily temperature, $\frac{1}{2}$ (max. + min.), for each of the five months November to March was -21° , -25° , -31° , -30° and -20° , all in degrees centigrade. For several days at a time, on three or four occasions, temperatures have hovered round -40° C., but the extreme screen minimum was only -42° C., which was registered on more than one occasion. The general impression to be gathered from the inhabitants of the settlement is that the winter on the whole has been unusually free from spells of higher temperatures (-20° C. to -15° C.) with their customary sequels of more extreme cold down to -50° C."

In connection with these figures of temperature, we apologise for printing in our last issue a statement attributed to Mr Stagg, that 100 degrees of frost might be expected at Fort Rae. Though the statement appeared in the press it was not authoritative.

After the freezing of the Great Slave Lake a telephone cable was laid, connecting Fort Rae with the Old Fort, 17 miles to the south, the site of the former Polar Year station in 1882-83. This work involved clearing a way for the first six miles through the bush, consisting of spruce, birch and willow, and fixing the cable to the tallest trees. The latter part of the route lay over the frozen lake: suitable trees were chosen and felled in the neighbouring bush, and after having been stripped of their branches, were hauled by dog sledge to the positions assigned to them on the lake, and frozen into the ice at intervals of 120 yards. Three men were engaged on the work: one man went ahead laying out the cable, and marking the places on the ice for the poles, and the other two followed cutting holes in the ice, and putting the poles in. The insulators were tied on with the cable already threaded through. The same section was gone over again the next day, the cable being pulled up and tension put on. When the party began laying the cable the temperature was -12° to -15° C., but towards the end of the work it had fallen to -20° C., and the poles froze in so quickly that the party were able to put on the tension immediately, thus saving considerable time. The work of laying the cable took about a fortnight, and on December 1 simultaneous photography of the aurora at both bases was carried out for the first time by means of the telephone; and proved a much more satisfactory method of communication than wireless, which had up till then been used. The telephone has worked well,

any breakages due to winds and other causes having generally been mended in time for the simultaneous observations to be carried out when necessary.

During the winter auroral observations were the chief interest of the party and have entailed almost continual occupation of the Old Fort. Fine displays in August, September and October were followed by a period of cloudy weather in November and December. In February, however, a period of good auroral activity coincided with moonless and comparatively cloudless nights, and the resulting photographs brought the total of exposures at each station up to 4500 simultaneous pairs. Since February the weather has again been somewhat disappointing. Auroral noises have been heard through the medium of the telephone.

Meteorographs have been sent up regularly, though, owing to the difficult nature of the surrounding country, very little hope was at first entertained of any being recovered. In a report recently received from the party, however, it is announced that two meteorographs have been brought in, in good condition, and bearing what appear to be good records. These were recovered by Indians, the first near Gros Cap at the entrance to the main lake from the north-west arm, the second in the Barren Lands to the north-east of Fort Rae. Both meteorographs seem to have penetrated well into the stratosphere, attaining a height of about 9 miles, with the tropopause showing at about 5 miles.

Other observations have also been proceeding successfully. Since the middle of July, 1932, about 280 pilot balloons have been sent up, the average height of the ascents being probably 8000–10,000 ft. In spite of the trouble with the instruments at the first onset of cold weather, all the meteorological records are complete up to date. Full magnetic observations have also been made.

A note on the equipment of the party may be of interest. Since the beginning of the winter, local forms of dress as regards footwear and hand protection have been adopted. The party find their Burberry suits entirely satisfactory, but the helmets have been found impracticable owing to the sedentary nature of the work, and have been superseded by fur helmets, worn over balaclavas. Long moose mitts, lined with duffe, are worn over gloves, either of silk or wool; while for footwear either moccasins over several pairs of socks are worn, or else the *mukluk* (moose-hide moccasin feet with long canvas uppers) for deep snow. As regards food, the station is well supplied: fresh moose or caribou meat is

obtainable, and a large supply of vegetables was laid in before the winter freeze up.

All the members of the party are well, and except for an outbreak of fire in the living hut in November, life at the station has been without serious incident. The party expect to return to England in October.

Krüger Search Expeditions, 1931-32.

A search for Dr H. K. E. Krüger and Mr R. A. Bjare, who disappeared during the summer of 1930, was made during the winter of 1931-32 by the detachment of the Royal Canadian Mounted Police stationed at Bache, Ellesmere Island. It was hoped that news of the results of this search party might have been brought back by the supply vessel *Ungava* after the Eastern Arctic Patrol during the summer of 1932, but the ship was unable to reach Bache owing to adverse ice conditions. No information was therefore received until May 1933, when a wireless message from the station at Bache was picked up at Godhavn, giving the following news.

During the winter of 1931-32 a party of Eskimo, led by Corporal Stallworthy, who is in charge of the detachment at Bache, and Constable Hamilton, made patrols to the west and north and finally discovered a record left at Peary's Cairn at the north-east point of Axel Heiberg Island, signed by Krüger, Bjare and Akoioa. They had visited Lands Lok, and intended to proceed to Meighen Island, having apparently decided not to go further north on the polar ice. As far as could be ascertained, however, neither Isachsen Island nor Meighen Island had been visited by the Krüger party, and there was no trace of them on the west coast of Axel Heiberg Island or Cornwall Island, at Baumann Fjord or on the east coast of Ellesmere Island. During these journeys, the patrol under Corporal Stallworthy encountered bad ice conditions, lost 29 dogs, and were handicapped by a scarcity of game.

The Royal Canadian Mounted Police detachment is to be moved south from Bache Peninsula to Craig Harbour during the summer of 1933, and any further reports will be brought back by the supply ship at the end of the summer.

Admiralty Surveys in Labrador.

An expedition, on board H.M.S. *Challenger* (1140 tons), with a complement of eleven officers, and seventy-three men, under the command of Commander A. G. N. Wyatt, R.N., has begun a detailed hydrographic survey of the Labrador coast between Indian Harbour and Cape Chidley.

The following account of the work is published by permission of the Admiralty.

The survey was commenced in July, 1932, these waters being ice-free from mid-July to mid-November. A triangulation was made in the vicinity of Nain; but later the ship had the misfortune to strike an uncharted rock, and received such damage that operations had to be discontinued for the remainder of the year.

It is proposed to continue the work of the expedition from July, 1933, but the number of years necessary to complete the survey cannot at present be forecast. The ship will leave the Labrador Coast at the close of the navigable season, but a party, consisting of three officers:

Lieut.-Commander BAKER,
Surgeon-Lieut. BINGHAM,
Lieut. DEANE,

and five men, will winter at Nain with the object of undertaking triangulation and coast-line work, using dog transport, during the early spring. All reports go to show that during this period the snow is hard, travelling easy, and the weather generally favourable. It is believed also that many of the uncharted rocks can be identified and fixed when ice-covered during the winter.

U.S. Navy Aleutian Islands Survey Expedition, 1933.

Particulars have been received, through the courtesy of the American Geographical Society, of a hydrographic and geodetic survey of the Aleutian Islands, to be carried out by the United States Navy, on a large scale, commencing in 1933.

The expedition will consist of U.S.S. *Argonne*, commanded by Commander C. R. Hyatt, U.S.N.; two small tugs, *Gannett* and *Swallow*, which will be used as floating bases for two aeroplanes; and U.S.S. *Vega*, as supply ship. Two destroyers, equipped with sounding apparatus, may also take part. The complete personnel has not yet been selected, but Commander H. A. Batt, U.S.N., will act as second-in-command, and Lieut. J. P. W. Vest will pilot one of the planes. The expedition will work in co-operation with the Department of Commerce and the Coast and Geodetic Survey.

The Aleutian Islands, which extend for about 1500 miles from Alaska into the Pacific, the most westerly island being situated in Long. 173° E., have long been of potential strategic importance, but have never been fully utilised, owing to the lack of charting and ignorance of weather

conditions. The smaller islands are uninhabited, except for occasional visits from natives in the fishing season, but there are small settlements at Dutch Harbour, at Unalaska, and on other of the larger islands.

The detailed survey to be undertaken by the proposed expedition includes a complete charting of the whole group out to the 1000 fathom line, aerial photography and determination of heights from the planes by means of altimeters. The severe storms in the Pacific are believed to originate in the Aleutian Islands. It is hoped, therefore, to establish a meteorological station on either Adak Island or Kanaga Island, both of which are situated about midway in the group. The station will be equipped with a gasoline driven radio set, and will send out weather reports to ships navigating in these waters.

Danish-American Archaeological Expedition to Alaska, 1933.

An expedition, consisting of Mr K. Birket Smith, Miss Frederica de Laguna, of the University Museum of Philadelphia, and several students from either Philadelphia or Seattle, will carry out archaeological investigations in the Cook Inlet region of Alaska, during the summer of 1933. The work, which will be concluded in August, is being financed by the Rask-Ørsted Fund, and the Julius Skrike Foundation.

The party will start work at the beginning of May at Prince William Sound, and will concentrate chiefly on excavations at Kachemak Bay, Cook Inlet, where Miss de Laguna has paid several visits during the past few years, discovering sites suitable for investigation. The main object of the work is to obtain material bearing on the theory that the Aleuts and the Eskimo of the Pacific coast of Alaska are not Eskimo by extraction, but only through environment; both linguistically and physically this population differs considerably from other Eskimo communities, and has affinities both to the Tlingits and Kamschatkan natives.

Hubbard Alaskan Expedition, 1933.

The seventh expedition to be led by the Rev. Bernard J. Hubbard will be at work this summer of 1933 on volcanological, archaeological and geological investigations in the Alaska Peninsula. The party, which will leave Seattle on May 16, and return some time in August, consists of:

REV. BERNARD J. HUBBARD, leader, geologist.
Professor R. CHISHOLM.
EDGAR LEVIN, geologist.

They will work their passage to Alaska on board S/S *Delwood*, and meet

the fourth member of the expedition, George Petersen, Alaskan trapper and guide, on arrival at their destination.

The main object of the expedition is to study volcanic formations in the crater of Mount Veniaminof on the Alaskan Peninsula (approx. Lat. 56° N., Long. 159° W.). The crater is filled with a glacier 25 sq. miles in area, with an active cone in the centre. A study will also be made of the diminution in eruptive activity of Mount Shishaldin on Unimak Island (Lat. 55° N., Long. 164° W.), which was climbed by the same party in May 1932, only a few months after it had been in active eruption. The expedition will also carry out excavations on various sites of stone age native villages in the Aleutian Islands, which were discovered and marked on former visits.

Canadian Polar Year Stations, 1932-33.

The following news, which has reached us through the courtesy of the Director of the Canadian Meteorological Service, carries on the account of the work of these stations.

At Cape Hope's Advance (Lat. $61^{\circ} 5' N.$, Long. $69^{\circ} 33' W.$) observations have been carried out successfully during the winter. The meteorological observations, which were started on August 1, 1932, have been made continuously, and 244 balloons have been sent up between that date and March 3, 1933, the maximum flight being of 76 minutes duration. Many of these flights indicated that, while the wind is fairly strong at ground level, it does not persist, and that higher up the winds are quite light. The aurora has been observed and photographed as frequently as possible.

At Chesterfield Inlet (Lat. $63^{\circ} 45' N.$, Long. $91^{\circ} 50' W.$) the magnetic installation was completed by September 1, and since then records have been obtained on 3 sets of La Cour self-recording instruments. The earth current equipment, lent by the Carnegie Institution, has also been giving good results. It has been found, however, that the earth currents are much greater than was anticipated, and there was some difficulty at first in reducing the sensitiveness sufficiently to be able to record them. An examination of the magnetic and earth current traces has shown quite close agreement, particularly between the declination and the earth current; and on several occasions bright aurora coincided with increased magnetic and earth current activity. A continuous watch has been kept on the aurora during the winter and observations made every half hour.

A second auroral station was established about 20 miles from the main station, and is operated by one-way radio communication. By this means 1000 pairs of simultaneous photographs have been taken, from which the height of the aurora can be obtained. The MacLennan night spectroscope has been in constant use, and it has been found possible to obtain the spectrum of the aurora, even while the sky is completely overcast; in the latter case an exposure of about 2 hours is necessary. In spite of the exceptionally stormy weather during the greater part of the year, kite flights have been made on several occasions, and pilot balloon flights regularly; one of the balloons was followed for 138 minutes when an elevation of approximately 15 miles was reached. Interesting results have also been obtained by noting the differential temperature between 4 ft. above the ground and that at the top of the radio mast, about 100 ft. above. A complete meteorological programme has been maintained, and synoptic weather messages, as well as continuous records of the various instruments, made.

The principal meteorological station, at Coppermine (Lat. $67^{\circ} 42' N.$, Long. $115^{\circ} 30' W.$), has specialised in aerological work, making use of pilot balloons, radiosondes, signalling meteorographs, and kites. Up till the end of January 1933, 35 kite flights have been made, and at least half of these show a temperature inversion up to $8^{\circ} C.$ Remarkable inversions have also been indicated by the meteorograph ascents. The radiosonde instruments have not proved successful, though on one occasion the party were able to follow the signals to a height of $5\frac{1}{2}$ miles, when the instrument became steady, indicating that the balloon had reached the stratosphere, the lowest temperature recorded being 230° absolute. At Coppermine auroral photographs have been taken in accordance with the single station programme, and a log of the aurora taken. In addition, photographs have been taken of snow-flakes, ice crystals, clouds and other phenomena. The differential electrical thermometers have been used between the top of the radio mast (100 ft. above), 4 ft. above the ground, and on the ground itself; and it is hoped in this way to get some measure of the radiation that is passing out into space especially during the long winter night.

The permanent observatory at Meanook has been operated with the addition of La Cour magnetograph equipment. The party here have also tried to correlate the rapid fluctuations in the aurora with the changes in

the magnetic elements. This has been very noticeable on certain occasions when flashing aurora were visible.

In addition to the stations already mentioned, special auroral observations have also been taken at Aklavik, Fort Norman, Fort Smith, Prince George, Victoria, Saskatoon, Winnipeg, Fort George, Cochrane, Ottawa, Arrosstock, N.B., Pond's Inlet, Pangnirtung, Nottingham Island and Resolution Island. This year, however, the aurora has been exceedingly disappointing as it seems to be almost at a minimum, and very few brilliant displays have occurred since the stations were in a position to observe the phenomena.

Cloud observations, especially in connection with the International Polar Year, have been taken at Victoria, Winnipeg, Toronto, and St John, in addition to the regular Polar Year stations.

Polar Year Stations in the United States and Alaska, 1932-33.

The United States is co-operating in the programme of the International Polar Year by the maintenance of two special stations in Alaska, the College-Fairbanks station, and one at Point Barrow, the site of a station occupied by the United States during the First Polar Year, 1882-83.

The construction of the College-Fairbanks station was not begun until August 1, 1932, but in spite of heavy rain, and some delay in the delivery of materials, the buildings were completed sufficiently by September for the instruments to be installed. The programme at this station is a very comprehensive one, including magnetic variation and absolute measurements, earth current records, detailed visual and photographic auroral observations, measurements of variations in magnetic vertical intensity by the Mitchell loop method, atmospheric potential gradient, air conductivity, ionic content, Aitken nuclei-counts, and radio measurements on the height of the ionised regions of the upper atmosphere. The last named measurements, together with meteorological observations on an enlarged and intensified programme at the United States Weather Bureau station, are being made at Fairbanks by Dr H. B. Maris of the Naval Research Laboratory, who has the co-operation of the station of the United States Army Signal Corps. The measurements of earth currents, and of the atmospheric electric elements are receiving particular attention.

The Point Barrow Expedition landed in a blinding snowstorm on September 6, 1932, and the buildings for the station were sufficiently

near completion for the meteorological observations to be started on September 15. The construction of the magnetic buildings was begun soon after; and magnetic records have been obtained since October 1. On March 10, 1933, Mr C. J. McGregor, in charge of the station, reported that the weather during the winter had been unusually clear, permitting the taking of nearly 4000 photographs of the aurora, some of them obtained simultaneously with the stations at Nome and Fairbanks. Up to March 10, 320 balloon flights had been made. Observations on sky colouring and clouds are also part of the programme.

A station on the summit of Mount Washington, the highest peak of the White Mountains (6288 ft. above sea level), is being occupied by a party organized under the direction of Joseph B. Dodge of the Appalachian Mountain Club, with the co-operation of Dr Charles F. Brookes, Director of the Blue Hill Observatory, Professor J. W. Goldthwait of Dartmouth College, and Dr N. E. Gilbert, President of the New Hampshire Academy of Science. The wintering party consists of three men, experienced mountaineers, as follows:

R. S. MONAHAN, Pawtucket, R.I.
SALVATORE PAGLIUCA, General Electric Co., Lynn, Mass.
ALBERT SISEM, Brookline, Mass.
or
ALEXANDER MACKENZIE, Albany, N.Y.

They will remain on the summit from October 15, 1932, to June 15, 1933. The programme includes meteorological, auroral, radio, and other observations forming part of the Polar Year programme. A subsidiary station at the headquarters of the Appalachian Mountain Club at Pinkham Notch will provide a basis of comparison for the observation made on the summit, 4281 ft. above. During the month of February, 1933 the summit of Mount Washington was enveloped in cloud for about 80 per cent. of the time, thus impeding the auroral observations. An improved form of heated anemometer, after being tested in a wind tunnel at the Massachusetts Institute of Technology, was installed in March, and it is hoped that it will now be possible to obtain a record of wind velocity at any time regardless of weather conditions.

In addition to work at these special stations Polar Year Observations are also being carried out at Blue Hill Observatory, Massachusetts, where auroral, radio, and meteorological work is being done; at Houlton, Maine; at New York, N.Y.; at Wyanet, Illinois; and at Tucson, Arizona,

where special earth current observations are being made; and at 86 stations maintained by the United States Weather Bureau, at 13 of which special auroral work including spectroscopic observations is being done, and at 3 of which (Fairbanks, Nome and Point Barrow) parallax photographs are being taken.

Special high speed recording magnetographs have been installed at Huancayo, Peru and Watheroo, Western Australia, through the good offices of the Carnegie Institution of Washington.

Transfer of Reindeer Herds into Canada, 1929-33.

Mention was made, in *The Polar Record*, No. 5, of a Reindeer herd, destined for consignment to the Canadian Government, which has been driven slowly east, across Alaska, for the last 3½ years, and which was last heard of some 300 miles from the Mackenzie River.

Further news of this undertaking was received in May, 1933. The herd, which was then at Blow River, about 30 miles west of the Mackenzie, is, it is stated, to wait until the freezing of the Delta next winter before undertaking the last stage of the journey into Canada proper. The herd, numbering 2300 reindeer, left Buckland Bay on the west coast of the Alaskan Peninsula in November 1929, as the result of a contract between the Canadian Government, and the Lomen Reindeer Company of Seattle, and has been following a route mapped out for it from the air by means of special reconnaissance flights. Mr Andrew Bahr, a Lapp, is in charge of the herd, assisted by trained dogs, and a party of Lapp and Eskimo herders, some of whom are accompanied by their families.

At the end of their 1800 mile journey the animals will be consigned to a special reserve, consisting of 5000 square miles set aside for them in the vicinity of the Mackenzie river, where it is hoped that reindeer breeding will be carried out on a large scale. The choice of locality is the result of 7 years work on the part of Messrs E. and R. T. Porsild, who undertook research into the question of reindeer breeding in Canada on behalf of the Government. A price of \$60 per head will be paid for the animals on delivery.

It is hoped that the reindeer will gradually take the place of the caribou, which have been much depleted by indiscriminate hunting, and that they will form a permanent food supply for the Eskimo, who will be taught to herd the animals and preserve them. It is expected that the herd will be settled in the reserve by the end of November, 1933.

Mr Finnie's Expedition to Coronation Gulf, 1932-33.

News has appeared in the press, though not in any detail, of a one-man expedition, lasting a year, made by Mr Richard Finnie, of the Northwest Territories Department, Canada.

Mr Finnie, who accompanied Major Burwash on his flight over the North Magnetic Pole, and was also with him when the relics of the Franklin Expedition were discovered, spent the winter of 1932-33 at Coronation Gulf, making a study of the Coppermine Eskimo. His journeys included one made in company with the Doctor to the settlement, as far as the Krusenstern trading post on Coronation Gulf.

ANTARCTIC REGIONS

Ellsworth Antarctic Expedition, 1933-34.

The Antarctic expedition, planned and financed by Mr Lincoln Ellsworth, will take place during the Antarctic summer of 1933-34. The party will leave Norway on August 1, 1933. The personnel, numbering 15, will consist of: Mr Lincoln Ellsworth, leader, navigator and photographer; Mr Bernt Balchen, pilot; a radio operator, a meteorologist, a mechanic, the ship's crew of 9 men and Sir Hubert Wilkins, who will accompany the expedition as reporter and meteorologist, but will not take part in the flight.

The expedition has the use of M/V *Faneffjord* (500 ton), bought in Norway by Mr Ellsworth at the beginning of 1933: she is a three masted, single deck vessel, 135 × 29 ft., with a speed of 8-9 knots, and a cruising range of 9000 miles.

A Northrop Delta low wing monoplane will be taken, 29 ft. 4½ in. in length, with a wing spread of 48 ft., and equipped with a Pratt and Whitney 600 horse power Wasp engine, capable of over 200 m.p.h. and a cruising radius of 4200 miles. She has already undergone extensive tests in Canada, where the winter temperatures approximate to those likely to be encountered in the Antarctic summer. The plane has been fitted both with wheels and ski; the latter, made of laminated hickory, 7 ft. 8 in. long, and 21 in. wide, and complete with new pneumatic shock absorbers, have been specially designed by Mr Balchen. Powerful air brakes, beneath the wings, will enable the plane to be slowed down to 25 m.p.h. in the event of a forced landing, and will also increase the possible gliding angle. The weight on the plane during the flight will be about 7500 lbs. This will include 500 gallons of gasoline, the emergency camp equipment, and provisions consisting of pemmican, chocolate, biscuits, nuts, raisins and malted milk. The wireless apparatus will consist of a special aeroplane transmitter and receiver, with generator driven by the engine.

The object of the expedition will be a trans-Antarctic flight, for the purpose of discovering the nature of the land between the Ross Sea and the Weddell Sea. Depending on the ice conditions, the party hope to reach their proposed base, the Bay of Whales, during the latter part of December. Mr Lincoln Ellsworth, as navigator and photographer, and Mr Bernt Balchen, as pilot and wireless operator, will then make the flight at the earliest opportunity, setting an easterly course for the Filchner Barrier, which will take them about 400 miles from the South

Pole. On arrival at the Weddell Sea, no landing will be attempted, but the party will at once return to the base. The double journey of 2900 miles is expected to take 20 hours. The navigation will be done by dead reckoning, and hourly observations of the sun. During the flight, photographs will be taken every 10 seconds by means of a new type of camera, operated by a clock. When flying at 3000 ft. this camera will record a continuous strip, $1\frac{1}{2}$ miles wide, of the route traversed. Two Zeiss hand cameras for oblique and vertical photographs will also be taken. In the event of bad weather the party will land and wait for conditions to improve. They will remain in touch with the ship by radio throughout the entire flight.

The expedition is not expected to stay more than one week in the Ross Sea, but sufficient supplies have been taken to enable the party to winter in case of necessity.

Norwegian Antarctic Expedition, 1933.

It was with great regret, on the part of those interested in polar exploration, that news was received, in March, of the abandonment of the Norwegian Antarctic Expedition, which had set out from Norway in order to carry out a thorough exploration of the sector of the Antarctic between Enderby Land and Coats Land (Long. 50° E.— 30° W.).

The party, consisting of Captain H. Riiser-Larsen, Hallvard Devold and Olaf Kjelbotn, left Fredriksstad, Norway, on December 31, 1932, on board the whaler *Thorshavn*, having been given free passages through the kindness of Consul Lars Christensen. Cape Town was reached on January 26, and the ship left for the south next day. Enderby Land, the original destination of the expedition, was sighted on February 8, across an immense ice-field. Two attempts to reach the land were made in small whale-catchers, but each time the ice prevented progress, though on one occasion the vessel managed to get within 5 nautical miles of Proclamation Island. These adverse conditions were due largely to the prevalence of west winds, and the existence of a line of ice-bergs along the seaward side of the ice-pack.

The impossibility of reaching the coast either by ship, or by sledging over the broken surface of the ice, was soon realised. The captain of the *Thorshavn* was anxious to return north with the cargo, and the party transferred to the *Thorshammer*, and prepared to wait until a change of wind should free the coast from ice. Unfortunately the *Thorshammer* was forced to follow the other whalers westwards: a storm, with an easterly wind, was encountered, which promised dispersal of the ice, but by the

time the storm was ended, 5 days later, Enderby Land was already some 600 miles to the east.

Finally, on March 5, 80 miles to the east of Princess Ragnhild Land, the party went on board the whale-catcher *Thorlyn*, and penetrated the light pack-ice, accompanied by two other whale-catchers *Thororin* and *Thorgant*. They then discovered a small bay in the floating pack-ice, which seemed a suitable place for landing, the belt of ice making the actual coast as inaccessible as before. The bay was protected on the south by three icebergs, thought to be aground, while protection was given to the east and south-east by another large ice-berg. Before landing, the party made a reconnaissance trip on skis to ascertain the chances of the bay remaining firm in the event of a sudden break-up of the sea-ice. It seemed, judging by the state of the ice, that the bay had been in existence for at least seven years, and would therefore be likely to remain intact for some years to come. In addition, conditions seemed to show that winter was advancing rapidly, and that the formation of new ice would reduce the danger of the pack going out. During the *Norvegia* expedition, about the same time of the year, the freezing of the sea had already put a stop to all navigation near the coast. Captain Riiser-Larsen, reassured as regards the ice, and knowing this to be his last chance that season of reaching the Antarctic continent, decided to land; the fifty dogs, and 100 cases of equipment were disembarked on to the ice of the small bay, and the whalers left.

The plans of the expedition had, of necessity, undergone a certain amount of modification, and it was now proposed that a hut should be erected on land-ice, and a visit then made to Queen Maud Land, as soon as the sea-ice should be firm enough for travel. The party would then return to the hut, and afterwards undertake the main journey westwards as previously planned.

The first night was spent in a tent on the edge of the ice, and next day, March 6, the first part of the equipment was successfully moved to a place of greater safety. On returning for the second load in the evening of the same day, the party were dismayed to find that the ice had begun to break up, the dogs and equipment being already isolated on various small floes. Nothing could be done that night, and next morning the conditions were even worse, but a few of the dogs and some of the stores were rescued temporarily with the help of a duralumin boat. On March 8, the situation had become so grave that a wireless message was broadcast, asking for help. By this time the ice had completely broken up, and was

drifting rapidly out to sea. The dogs had disappeared; the three men had still got their tent, and a small remnant of the stores, but the floe upon which they were drifting was getting continually smaller, fragments being constantly broken off by the action of the waves, and by collisions with other pieces of ice. They managed ultimately to transfer themselves to a large iceberg, and here hours of extreme discomfort were passed, until they were rescued by the whaler *Globe 5* on March 11.

Without dogs or equipment it was impossible to continue the expedition, and Captain Riiser-Larsen and his companions have therefore returned to Norway. They hope, however, before long, to fit out another expedition, and to make a second attempt with the same object.

Byrd Antarctic Expedition, 1933-34.

News has appeared in the *New York Times* for January 31, 1933, and other American papers, that this expedition, which was postponed from the autumn of 1932 on account of Rear-Admiral Byrd's election as Chairman of the National Economy League, will now take place during the Antarctic season of 1933-34, but that Rear-Admiral Byrd will continue his political work until the expedition sails.

The party will number about forty, and will consist, as far as possible, of members of Rear-Admiral Byrd's first expedition. The organisation is in the hands of Mr Victor Czegka. The cutter *Bear*, which was one of the relief ships of the Greely Expedition, fifty years ago, has been purchased from the Pacific Coast Guard Service, and is being fitted out at Charleston Navy Yard. The party are taking a Ford tri-motored plane, and two motor sledges of improved type on a Ford tractor chassis, with special truck driving gear enclosed in tubes capable of pre-heating oil, and with improved chains and wider ski-runners. The members of the expedition, however, will rely mainly upon dog transport, and 150 sledge dogs will be taken.

The objects of the expedition have not yet been published, in full, but they are believed to include another south polar flight with special exploratory work in the neighbourhood of the Pole. The expedition will be prepared to winter in the Antarctic.

Norwegian Polar Year Observations in the Antarctic, 1932-33.

Observations, in connection with the International Polar Year, were made on board the following whaling ships in the Antarctic during the season 1932-33: *Sir James Clark Ross*, *Ole Wegger*, *Kosmos*, *Solglimt*, *Kosmos II*, *Westfold*, *Svend Foyn*, *Sketteren*, *Thorshammer* and *Hektorja*.

ANTARCTIC WHALING SEASON, 1932-33

We print below a summary of the situation in the Whaling Industry at the end of last season, for which we are much indebted to Captain H. K. Salvesen.

Antarctic whaling operations during the season, 1932-33, showed that the stock of whales may still be large, but that, in the western area at least, a considerable decline is apparent. Final figures of catch and production are not yet available, but it is clear that, owing mainly to the self imposed restrictions of the quota agreement, there was much less wastage, and that the average production of oil per Standard Blue Whale is over thirteen per cent. above that for the season 1930-31.

Until recently, it was hoped that there would be a further reduction in the catch for next season, but the refusal of one of the companies to co-operate, now makes it probable that the other companies will either come to a quota agreement based upon a considerably larger catch than last season, or that they will fail to come to any agreement at all.

THE WORK OF R.R.S. *DISCOVERY II*, 1931-33

BY D. DILWYN JOHN, M.SC.

Senior Scientific Officer.

The Royal Research Ship *Discovery II* left London for her second commission in Antarctic waters on October 3, 1931 and returned on May 5, 1933. A note on her work in the Falkland sector of the Antarctic in the summer season of 1931-32 appeared in *The Polar Record*, No. 4, and a short account of her cruises in the winter of 1932 was published in *The Polar Record*, No. 5. The whole commission is summarised in this article.

The greater part of both the summer seasons of the commission (that of 1931-32 and that of 1932-33) was spent in making intensive and very similar hydrological and plankton surveys of the waters of the Falkland Sector. These were the sixth and seventh seasons in which a vessel, or vessels, of the *Discovery Committee* had worked in this region; the surveys were in part repetitions of those of earlier seasons, and, in part, extensions. They covered the waters between the pack-ice in the south, and the sub-Antarctic in the north, from west of Drake Strait and Graham Land to east of the South Sandwich Islands. Each survey was carried out by crossing the region from north to south or south to north, four or five times at equal intervals, making two full hydrological and plankton stations each day. Since each station took $3\frac{1}{2}$ to 4 hours to complete, they were less than 100 miles apart. Closer observations were made round South Georgia and in Bransfield Strait—old whaling grounds—repeating those of earlier seasons, and on each visit to the ice-edge, where whale food (*Euphausia superba*—the “krill” of the Norwegians) was always taken in the nets.

The two surveys differed from one another in their southern limits, with the different ice conditions of the two years. The stations of the survey of the second season (1932-33) are shown in the frontispiece: the edge of the pack-ice lay south of the Antarctic circle to the west of Graham Land in October, 1932; the Bransfield Strait was completely free of ice in early November; the South Orkneys were open in late November—the ice lay a short distance to the south of the group, and ran in a north-easterly direction to the South Sandwich Islands, besetting the southernmost of them. Many of the observations of this survey were repeated late in the season, in February, 1933.

The survey of the previous season (1931-32) was begun a little later in the year. The ice in the west was farther north than it was later in the following season. It was found in Lat. $64^{\circ} 14' S.$, Long. $75^{\circ} 59' W.$, to the west of Graham Land and lay to the north of the South Shetland Islands in late November; heavy pack lay immediately to the north of the South Orkney Islands and ran in that latitude to a point south of South Georgia in early December. The observations to the east of the South Sandwich Islands were, in this season, made in the New year (1932), and in the direction north to south. Streams of loose ice were met in Lat. $61^{\circ} 30' S.$ near the twentieth meridian in mid-January. They offered no serious obstacle to the vessel's progress southwards.

It was particularly desirable to obtain observations as far south as possible into the Weddell Sea. The large area, embracing the South Orkneys, South Georgia, and the South Sandwich Islands, which is influenced by the stream of water flowing out of the Weddell Sea, is peculiarly rich in plant and animal life compared with the area to the west of it; it was supposed that the explanation would be found in the history of the water which enters the Weddell Sea from the east, along the Antarctic coasts, and circulates round it to flow out in a north-easterly direction.

The season was early, the ice open, the floes small and the wind southerly, so that there seemed every reason to hope that the sea would become still more open and that the ice might blow away altogether. The vessel continued through the light ice to the high latitude of Lat. $69^{\circ} 59' S.$, Long. $23^{\circ} 53' W.$, and found there a wall of heavy, rafted, and impenetrable pack. In this position the water was that entering the Weddell Sea from the east; it was planned to return north along a north-westerly course so as to obtain a section across the water flowing northwards to escape from the Weddell Sea. After a day's steaming the temperature fell, the leads of open water between the floes froze, and the floes became heavier and more closely packed; progress was very difficult and slow, a leak was sprung through the hull to an oil-fuel bunker and the rudder stock became twisted. Temporary repairs were made to the rudder by the ship's engineers. They sufficed until the vessel reached South Georgia where more lasting repairs were carried out by the staff of a whaling station. A thorough overhaul took place in Simon's Town dockyard in March.

The work carried out by *Discovery II* in the winter months of 1932 is discussed and described in *The Polar Record*, No. 5. It consisted of a series of V-shaped cruises to and from the ice-edge, east-about from South

Africa (in April) to South America (in early October). On each cruise one full hydrological and plankton section was made each night. The positions of these stations and the course of the cruises are shown in the frontispiece. Immediately after they were completed the second intensive survey of the Falkland Sector, which has already been described, was made. The one V-shaped cruise required to complete the circumnavigation of the Antarctic—that from the South American side to South Africa—was made in the month of March, 1933. Its turning point was at the ice-edge in the high latitude of Lat. 69° S., Long. 9° E. At the same time, at about 200 miles to the east, Captain Riiser-Larsen made his unsuccessful attempt to make land across the ice.

The *Discovery II* made a complete circumnavigation of the Antarctic, covering all but one sector in the winter months. Four previous circumnavigations have been made, two of which were British. They were those of Cook (completed in 1775), Bellingshausen (1819-21), Biscoe (1830-32) and that of the *Norvegia* in 1930-31.

The cruises of the *Discovery II*, with their regular series of comprehensive observations at short intervals, will lead to an enormous advance in the knowledge of the hydrology and the planktonic life of Antarctic and sub-Antarctic waters.

The scientific staff numbered six: four zoologists, one hydrologist and one assistant. The hydrologist (Mr G. E. R. Deacon) and his assistant were able to analyse all the water samples the day after they were taken. The zoologists (Messrs Dilwyn John, J. W. S. Marr, George Rayner, and F. D. Ommanney) made a routine of analysing the daily hauls of the larger surface plankton. The correlation between changing water and the changing forms of life, the seasonal changes, the special features of water and life near the ice, near submerged ridges and land, could all be followed as the work proceeded. Throughout the commission the Deep Water Echo Sounding machine was in constant use; by a system of watches a sounding was taken every half hour, i.e., one to about every 4½ miles of steaming. Over 9000 were taken in all. Those on the circum-polar cruises were in seas where extremely few, if any, soundings had been taken before. An immense number has now been taken, on this and the previous commission of *Discovery II*, in the Falkland Sector of the Antarctic.

One very short period of the commission—the month of January, 1933—was spent in work other than that on plankton and hydrology. In that month the vessel went to the South Orkney Islands, found weather

conditions were more suitable than might have been expected, and made a complete running survey of the group, taking numerous in-shore soundings. The existing charts were very unsatisfactory: the position assigned to the whole group was wrong, and the coast-lines of all but Laurie Island, which had been surveyed by Bruce, were inaccurately shown. The *Discovery II* survey was made by Lieut. A. L. Nelson, R.N.R., the chief officer. Numerous observations on the geology and biology of the islands were made.

Mr Rayner left the ship for a short period round about Christmas, 1932 to undertake whale-marking cruises from a commercial catcher round South Georgia. He had 500 darts of a new pattern. Whales were plentiful and all the darts were fired, and over 50 per cent. were hits. Some time must pass before the value of the experiment can be known.

The work of the Commission ended with a long line of hydrological and plankton stations which were begun south of the Antarctic circle in Long. 9° E. and extended up the deep basins of the east Atlantic to a point north of the Equator. A similar line was made in the west Atlantic at the end of the first commission. They serve to make clear the details of the constant interchange of water which takes place between the Atlantic and the Antarctic—an interchange, the movements of which extend north of the Equator.

The very end of the commission was marked by tragedy. In the Bay of Biscay the Captain, Commander W. M. Carey, R.N. (Retd.), who had also commanded *Discovery II* on her first commission, was lost overboard. He was admired and loved by all on board and the success of the commission was due very largely to his skill, his strong interest in the Antarctic, and above all, to his good humour and fellowship in work that was often monotonous and trying. Throughout both commissions he had chosen to keep the exacting middle watch and had spent long hours collecting and examining all possible records of weather and pack-ice in the Antarctic and attempting to correlate them. Those who served under him have lost one with whom they were glad to sail.

THE POLAR MEDAL

ADDITIONAL NOTES

BY J. RICHARDSON REYNOLDS, C.I.E.

We print below an extract from an interesting letter received from the grandson of Sir John Richardson, M.D.

May I add the following notes to the very interesting article by Mr J. M. Wordie in the fifth number of *The Polar Record*.

The first Arctic Medal was 1.3 inch in diameter. The artist was L. C. Wyon, as can be seen on the medal itself. This particular head of the Queen was never reproduced on any other medal (cf. J. H. Mayo's *Medals and Decorations of the British Army and Navy*). Representations of the medals, except in portraits, are rare. An early one is on the cover of John Brown's important work: *The North-west Passage and the plans for the search for Sir John Franklin*, first edition, 1858; second edition, 1860.

My brother, Willingham Franklin Reynolds, has in his possession one of the first medals earned, namely, that presented to John Hepburn, A.B., hero of Franklin's First Expedition in 1819. Hepburn had been with Franklin in the *Trent*, in Buchan's Expedition of 1818; and in 1851, at the age of 62, he went with Kennedy in the *Prince Albert* to look for his old commander.

There is also before me one of the semi-printed forms used in issuing the original medals: "Admiralty, Somerset House, W.C., June 9, 1857. . . I enclose the medal to which you are entitled for the Arctic Expeditions. . . (Signed) Accountant General of the Navy. . . To Sir John Richardson, M.D."

There is a misprint in the Gazette of 1857; the *Blossom* Expedition started in 1825; it may also be noted that the *Enterprise* and *Investigator* sailed on their second voyage in 1850, and the *Rattlesnake* in 1853, although all three were commissioned in the earlier year; and that the date of the *Isabel's* voyage was 1852, not 1850.

The following may also have qualified for medals:

- 1848 *Nancy Dawson* (R. A. Shedden): a volunteer searching yacht, which went nearly to Point Barrow in company with the *Plover*.
- 1850 *Mary* (Sir John Ross): a 12-ton yacht which accompanied the *Felicia*, though whether she had a separate crew is uncertain.
- 1845 *Baretto Junior* (N. W. Griffith): transport to Whale Fish Island to fill up Franklin's ships in 1845.

It is curious that the Antarctic was not included in the grant in view of the *Erebus* and *Terror* Expedition of 1839 under Sir James Clark Ross.

All the crew of the *Fox*, 1857, received Arctic Medals; vide p. 236 of Sir Clements Markham's *Life of McClintock*, 1909. McClintock himself had no other service medal.

Photographs of Rae, taken late in life, show clearly the clasps on his medal, as described by Mr Wordie.

In connection with the above, Mr Wordie sends us the following extract from a letter received by him from the Secretary of the Admiralty, dated January 14, 1933:

In 1920 the award of the medal in bronze without clasp, was approved to those members of the *Aurora* Relief Expedition, who had not already been awarded the medal. Those who were already in possession of the medal were awarded a clasp

inscribed "Antarctic, 1917." This relief expedition left New Zealand in December, 1916, and returned to Wellington on February 9th, 1917. These awards were not gazetted, and no press notice was issued.

We must draw attention to the fact that in the illustration of Polar Medals in the last number, there is an apparent inconsistency, in that the clasp of one medal is on the obverse, and of a second medal on the reverse side. This was done by the photographer in order to show the clasps, which should, however, be worn on the obverse side only, above the head of H.M. the King.

ANTARCTIC CLUB

The Fifth Annual Reunion Dinner of the Antarctic Club was held on January 13, 1933, 38 members being present. Captain R. G. England was elected as President, and the guest of the evening was Dr J. B. Charcot. Twelve expeditions were represented, as follows:—*Southern Cross*, 1898–1900; *Discovery*, 1901–4; *Scotia*, 1902–4; *Morning*, 1902–4; *Terra Nova*, 1903–4; *Aurora*, 1911–14; *Endurance*, 1914–17; *Graham Land*, 1921; *Quest*, 1922–23; *Discovery*, 1929–31.

Dr Charcot in his speech expressed his deep appreciation of the honour done to him by the Antarctic Club in welcoming him as their guest. He spoke with admiration of Captain Scott and Sir Ernest Shackleton, whom he regarded as his instructors in Antarctic work, and remarked on the fact that the Antarctic Club has ninety members, all of whom had taken part in the British expeditions to the South Polar regions, whereas in France, had there been such a club in 1914, there would have been eleven persons eligible for membership, now there were but eight.

Sir Douglas Mawson, having reached England that day for the first time since his latest expedition in the R.R.S. *Discovery*, was then accorded a toast of welcome. In his reply he gave the members a résumé of the results obtained by that expedition, and described the scenery of the sectors of the Antarctic continent newly discovered by him.

RECENT POLAR BOOKS

The following books, recently published, have come to our notice:

- ARNESSEN, ODD. *Vi Flyver over Eirik Raudes Land*. Oslo: Nasjonalforlaget, 1932. 24 × 19 cm. Pp. 162.
- BERNACCHI, L. C. *A Very Gallant Gentleman* ('No Surrender Oates'). London: Thornton, Butterworth, 1933. Illustrated. 5½ × 8½ in. 8s. 6d.
- BLÖNDAL, DR SIGFUS. *The Life of the Icelander Jón Ólafsson*. Translated by Dame Bertha Phillpotts. London: The Hakluyt Society, Vol II, 1932.
- BERSEN, A., SAMOILOVITSCH, R. L., and WEICKMANN, L. *Die Arktisfahrt des Luftschiffes Graf Zeppelin im Juli*, 1931. Wissenschaftliche Ergebnisse. Mit einem Geleitwort von Hugo Eckener. Gotha: Justus Perthes, 1933. (Petermanns Mitteilungen: Ergänzungsheft Nr. 216.) Illustrated. Maps. 7½ × 11 in. Pp. 113. RM. 21.
- BLOSSOM, FREDERICK A. *Told at the Explorers Club*. True Tales of Modern Exploration. New York: Harrap, 1932. Illustrated. 10s. 6d.
- FRIIS, ACHTON. *Wilde Weite Arktis*. Stuttgart: J. Engleborns Nachf. 1933.
- INGSTAD, HELGE. *Land of Feast and Famine*. London: Gollancz, 1933. 16s.
- MACHEK, G., OEDL, F., SCHARFETTER, H., TRATZ, E. P., and UNTERSTEINER, R. *Bergland in der Arktis*. Die Österreichische Spitsbergen-Fahrt, 1931. Graz: Deutsche Vereinsdruckerei, 1932. Pp. 272.
- MARSHALL, ROBERT. *Arctic Village*. Smith-Haas, 1933. \$3.
- BREITFUSS, L., DEFANT, U., HJORT, J., SVERDRUP, H. U., WEGENER, K., and WEICKMANN, L. *Polarbuch*. Neue Forschungsfahrten in Arktis und Antarktis mit Luftschiff, U-Boot, Schlitten, und Forschungsschiff. Berlin: Mittler und Sohn, 1933. Illustrated. Pp. 130. RM. 4.80.
- SMITH, CHARLES MARSHALL. *Norsemen of Adventure: a Survey of the Exploits of Dominant Norsemen from the earliest times to the Norman Conquest*. London: Longmans, 1933. Illustrations and Maps. 16s.
- SUTTON, RICHARD L. *An Arctic Safari: with Camera and Rifle in the land of the Midnight Sun*. London: Henry Kimpton, 1933. Illustrated. Pp. 200. 12s. 6d.
- WEGENER, ELSE, and LOEWE, FRITZ. *Alfred Wegener's letzte Grönlandfahrt*. Leipzig: F. A. Brockhaus, 1932. Illustrations. RM. 8.
- WEGENER, PROFESSOR DR KURT. *The Scientific Results of the German Greenland Expedition*. Alfred Wegener, in the years 1929 and 1930-31. Part I. Leipzig: F. A. Brockhaus, 1933. Complete work, RM. 180.
- WELZL, JAN. *The Quest for Polar Treasure*. New York: Macmillan & Co. \$2.00.
- WEYER, E. MOFFAT. *The Eskimos, their environment and folkways*. New Haven: Yale University Press, 1932. London: Humphrey Milford, 1932. Diagrams and Maps. 9½ × 6 in. Pp. xliii + 492. 30s.

ERRATA

The Polar Record, No. 5, January, 1933:

Page 50. For Fairbanks read College-Fairbanks.

Page 54. For Lat. 50° E. to 30° W. read Long. 50° E. to 30° W.

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