THE POLAR RECORD

NUMBER 7:
JANUARY 1934

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

1934

Price Two Shillings

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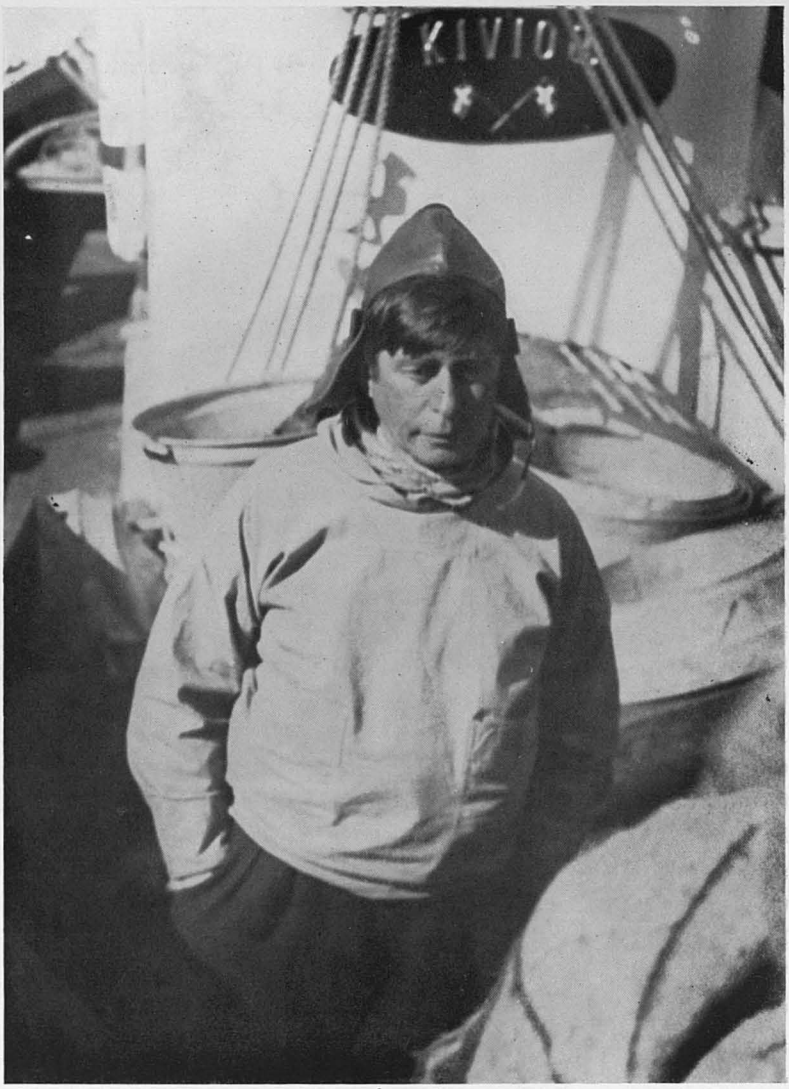


KNUD RASMUSSEN

FOREWORD

It is with great satisfaction that we record the rapid progress which is being made with the new building of the Polar Research Institute. The main structure is now complete, but owing to the necessity of thorough drying of the plastering before the mural painting can be done, it is probable that the formal opening will not take place until October.

We have great pleasure in adding that Lady Hilton Young (formerly Lady Scott) has executed a special bust of Captain Scott for the niche over the front door, and is also presenting a bronze statue in memory of the Pole Party, which will be placed in the grounds near the building.

The collections of books, original journals, pictures and samples of polar equipment have steadily increased of late years, but now that these can be worthily displayed, the Director of the Institute begs to remind well-wishers that the collections are still far from complete. In particular the library is still far from adequate to meet the many demands made upon it.

It may perhaps be generally assumed that an institute about to move into a handsome new building must already be well endowed, and it is therefore a fitting moment to point out that the maintenance of all its activities is still carried out on an annual income of less than £400 a year. This would be quite impossible were it not that hitherto a great deal of voluntary help has been available. The Committee of Management earnestly hope that in the near future people with the means to mark their appreciation and interest may help to endow the Institute, and relieve the Director and staff of their constant anxiety over making ends meet. The amount required to place the Maintenance Fund at a figure which will give this security is £5000.

Hitherto funds have not permitted the inclusion of book reviews in *The Polar Record*, but in view of its interest to the Institute it is felt that some notice should be taken of the recent appearance of the life of Dr E. A. Wilson, by Mr George Seaver. Dr Wilson's achievements as right-hand man to Captain Scott are known to many, his ability as an artist is also familiar to a fairly wide public, but it is safe to say that until this book appeared his extraordinary character as a man was known to very

few. Not the least service Mr Seaver has rendered with the book is the clear proof it contains that polar work is not mere adventuring, and that the noblest of characters may find attraction therein.

As proof of the general revival of interest in the polar regions, already shown by the many expeditions in the field, we are able to record the fact that two polar exhibitions, one in Leningrad and the other in London, have taken place during the last 12 months.

The exhibition in Leningrad, the first of its kind to be organised by the Arctic Institute of the U.S.S.R., took place from February 18 to May 24, 1933, at the Russian Museum. The exhibits were selected in order to show the progress made in the practical development of the Russian Arctic regions, and included geological, biological and hydrological sections, and a collection of maps. The journals and other relics of various expeditions were also on show, as well as a collection of pictures painted in the Arctic. A collection of articles of polar equipment provided by firms who are in the habit of supplying expeditions was a most important feature of the exhibition.

The Polar Exhibition at the Royal United Service Institution, London, is smaller in scope than the one at Leningrad, and of much more specialised appeal. Attached as it is to an Institution dealing exclusively with naval and military history, its exhibits chiefly recall the naval polar expeditions of the past, and are almost exclusively British. The Royal Geographical Society and the Scott Polar Research Institute have lent numerous articles, and many relatives of past explorers have been equally helpful.

OBITUARY

As a tribute to a great Arctic traveller, and one who had devoted his whole life to polar research, we print as our frontispiece a portrait of Dr Knud Rasmussen, whose recent death at the age of 54 has robbed the Eskimo of Greenland of their greatest friend. He will be remembered not only for many long and difficult journeys, but also for his even more lasting work of founding the Eskimo settlement of Thule, the most northerly trading station in Greenland. He was also a notable ethnologist, and his many writings, most of which have been translated into English, will long serve to remind us of a genial traveller, a scholar and a poet.

Mention must also be made of others formerly active in the polar regions, who have died during the past year. The Duke of the Abruzzi, known for his travels in many parts of the world, will be particularly remembered for his expedition in the *Stella Polare* in 1899–1900, when one of his officers, Commander Cagni, sledged from the north of the Franz Josef Land Archipelago, and surpassed Dr Nansen's record for a journey towards the North Pole.

Mr E. B. Baldwin led an expedition to Franz Josef Land, at the end of last century, and was with Peary on his expedition of 1893. Mention must also be made of a close friend of many polar travellers, Dr F. H. H. Guillemard, related to Lady Franklin, and one of the first to penetrate Kamschatka; also of Captain Carey and Dr O. M. Malte, both of whom died on active service, one while returning from an Antarctic expedition on *Discovery II*, and the other with the Canadian Government Expedition to the Eastern Arctic.

ARCTIC REGIONS

SVALBARD, FRANZ JOSEF LAND, AND RUSSIAN ARCTIC REGIONS

Norwegian Fisheries Arctic Expeditions, 1931–33.

The following note on the hydrographic work organised by the Norwegian Fisheries during the past two years has reached us through the kindness of Captain Thor Iversen. It serves to show the steady programme of investigation being carried out in a branch of polar research which receives far less publicity than it deserves.

Two expeditions, both of them organised by the Norwegian Fisheries, and led by Captain Thor Iversen, were at work during the summer of 1931. Einar Koefoed was assistant zoologist to both expeditions. The first, on board S/S *Sotra* of Kristiansund, started from Bergen on March 26, 1931, and in the course of three cruises to Bear Island and its vicinity carried out fishery investigations and hydrographic observations. A total of 144 stations were worked, and hydrographical observations made at 135. Towards the middle of June the expedition was at work off the west coast of Spitsbergen, the cruise concluding at Hammerfest on July 2.

The second expedition was undertaken later in the summer, leaving Hammerfest on July 12, 1931, on board the sealer S/S *Veiding* and returning there on September 29.

The programme of the expedition was very comprehensive, and during its course 111 stations were made, at 93 of which hydrographic observations were taken. Commencing work in the waters between Norway and Iceland, the expedition proceeded to Denmark Strait in the latter part of July, leaving for Jan Mayen in mid-August. After a visit to the East Greenland coast, lasting from August 18–25, a course was set due east for Ice Fjord, Spitsbergen, where work was carried out from August 30 to September 5, and again from September 12–14. During the intervening days observations were made off the west coast of Spitsbergen towards the southern limit of the pack-ice. Three hydrographic sections terminated the work of the expedition, as follows: September 15–20, westwards from Ice Fjord; September 20–25, in the waters of Bear Island; September 25–27, Bear Island—Norway.

Another expedition, also led by Captain Thor Iversen, was at work during the winter of 1932–33 in the waters off Spitsbergen and Bear Island, and in the south-east portion of the Barents Sea. The personnel again included Einar Koefoed, assistant zoologist, and Michael Michaelson, wireless operator. During December, 1932, work was carried out between Norway and Bear Island, off Ice Fjord, Spitsbergen, and from Bear Island eastwards to the edge of the pack-ice, and from there eastwards to the Skolpen Bank. At the beginning of January, the expedition made investigations in the south-east part of the Barents Sea, as far as Cape Kanin, returning later in the month to the waters off the Finnmark coast, and out to sea westwards from Ingö. In February the work was continued in the region between Norway and Bear Island Bank, and in the south-east part of the Barents Sea. During the course of the expedition 169 stations were worked, 158 of them with hydrographic observations.

Investigations were continued during the summer of 1933, and a third expedition, with the same officers, left Tromsö on board S/S *Heimland I* on June 9. The ship was equipped with a Marconi Echometer.

Work was started on June 18 in the waters between Iceland and Angmagssalik, as far south as Cape Tordenskiöld, and the expedition remained in the same locality until July 23. Specific hydrographic sections were made in several places in the eastern part of Denmark Strait. Finally the expedition put into Isafjordur, Iceland, remaining there five days. From July 30 to August 27 the expedition was again at work in Denmark Strait, and off the coast of East Greenland, as far south as Cape Farewell, returning to Isafjordur for two days, August 28–30. Hydrographic sections were made off the southern stretch of the East Greenland coast, and also between Angmagssalik and the Blosseville coast.

During the return voyage investigations were made on the Jan Mayen Bank, and the expedition reached Tromsö on September 13.

Fishery investigations and hydrographic observations were carried out during the whole expedition; 155 stations being worked, 136 of them with hydrographic observations. Meteorological reports, in connection with the Weather Report Service, were dispatched by wireless four times a day.

Soviet Union Expeditions, 1931–32.

In the last number of *The Polar Record* it was impossible, owing to lack of space, to print accounts of three expeditions carried out by the U.S.S.R. of which we had reports. We are glad to be able to rectify the omission in this issue.

Anadyr-Chukotsk Expedition, 1931–32.

A large expedition was at work in the Anadyr-Chukotsk district of Siberia during the years 1931–32, and the following brief account of its work is taken from the *Bulletin* of the Arctic Institute, Nos. 1–2, 1933. The work was divided between several parties whose activities will be described separately.

Geological party. This party, led by J. A. Sklar, who was assisted by the following:

DOBROVOLSKY, wireless operator,
M. T. KIRIUSHINA, assistant,
W. G. VASILIEV, topographer, geodesist,
An interpreter,
Two mechanics,

carried out a geological investigation of the area bounded by the southern slopes of the Anadyr Mountains. They succeeded in making a geological survey, about 60 miles in length, of the lower reaches of the Kanchalan River, and the position of the mouth of the river was astronomically fixed. Points were also fixed in the Yeropolsk area and at Markovo, where the party spent the winter of 1931–32. In the spring several dog-sledge journeys were carried out by the party, Chukchis natives being used as guides, until, at the beginning of the summer, these were paid off and the party made its way to the head waters of the Kanchalan, reaching their destination on June 4, 1932, as the ice was breaking. The summer was spent surveying the head waters of the river. On August 11, the party began their journey down the river, using canoes which they had made themselves out of sledges, walrus skins, and tarpaulin. On the way surveys of the mouths of the Rivers Impenequil and Irmecule, tributaries of the Kanchalan, were made, and on August 21 the party reached Anadyr.

As a result of the work of the expedition, a stretch of about 900 miles was surveyed, on a scale of 1:100,000. The interesting geological results of the expedition are described briefly in the *Bulletin* of the Arctic Institute, Nos. 1–2, 1933.

Geomorphological party. A party led by N. A. Menshikov made a journey by dog-sledge in the spring of 1932 along the Baranya River in the Yeropolsk district, and travelling by way of the Yablonovaya River reached Markovo. No further news has been received of the party, which was still away when the account of the expedition was published.

Botanical party. A party led by Miss L. N. Tiulina carried out botanical work and a study of soils in the Golden Ridges tundra during the summer of 1931, following up the work with an extensive investigation, covering about 25 square miles, of the district between the Alagan and Main Rivers. During the winter of 1931–32, the party, working from Markovo as a base, made observations on the soils of the mountain tundra in the neighbourhood of the Algansk volcanoes, and later studied the distribution of deciduous forest in the district round the Main River. In the spring of 1932 a base was established at Mount Terpukhoy near Yeropol, and a study of the permanently frozen soil in the tundra was made, with particular reference to frost erosion and the depth of the snow. The party then proceeded up the Anadyr River, and, after a short stay at Yeropol, established a base at the mouth of the Great Peledon River, which was a good centre for an investigation of the forest areas. Mount Talijack was then visited, after which the party returned to Markovo.

Seven hundred photographs were taken by this section of the expedition, and a large collection of specimens and samples of soil was brought back.

Zoological party. This party was led by L. A. Portenko, who was assisted by his wife and P. T. Butenko. They were accompanied by two camp assistants.

Starting in July, 1931, the party carried out zoological work in the area between the Tumanski, Anadyr, Taniurer Rivers and Lake Krasny, proceeding to Markovo at the end of September, for the winter. In the spring of 1932, a number of small trips were made by the geologist of the party. In June and July, 1932, two journeys were made to the Markovka and Anadyr Rivers, whence the party proceeded on board S/S *Itelmass* along the coast of the Chukotsk Peninsula, landing at most of the main bays from Holy Cross (Kresta) Gulf to Cape Dezhnev.

As a result of the work of this party a detailed biological survey was carried out, especially with reference to birds in the various districts mentioned above.

Ethnological party. This party, led by A. M. Mindalevich, made a study of the ethnology of the Chukchis. It was discovered that these

people have a form of hieroglyphic writing, and samples and translations of this have been submitted to authorities in Leningrad to be worked out.

Taimyr Hydrological Expedition, 1932.

An expedition, organised by the Hydrological Department of the U.S.S.R., was at work from August 2 to October 13, 1932. The personnel of the expedition, which numbered fifty-three, included the following:

A. M. LAVROV, leader.
VL. A. BEREZKIN, meteorologist.
VS. A. BEREZKIN, hydrologist.
A. J. DUBRAVIN, engineer.
V. P. PTOKHOV, medical officer, hydro-biologist.
I. M. SENDICK, magnetician.
N. I. SIGACHEV, navigator.
Professor V. V. SHULEYKIN, geo-physicist.
A. M. VERSHINSKY, hydrographer.
M. A. VORONZOV, astronomer.

A hydrological survey, by means of echo soundings, was made in Kalinin Bay, Pioneer Island, Severnaya Zemlya, and also in Schokalsky Strait, to the south of which a small archipelago, consisting of eight islands, was discovered. A survey was next made of the north-west coast of the Taimyr Peninsula from Cape Chelyuskin to Taimyr Gulf, taking in the Nordenskiöld Archipelago. It was found that the two Russian Islands, in the north-east of the archipelago, are in reality one large island, over 30 miles in length, extending to the north-west.

Hydrographic surveys were also made on the following routes: Cape Zhelaniya, Novaya Zemlya—Wiese Island—Severnaya Zemlya, continued in the direction of Einsamkeit (Lonely) Island, and Matochkin Shar. Tide observations were made during the course of the expedition, and collections made of plankton, etc. Meteorological and geo-physical work was carried out, and investigations of the upper air made by means of radiosondes. Actinometric observations with a continual registration of the intensity of sun and sky radiation were made by means of a self-recording solarigraph specially made on board S/S *Taimyr* by Professor V. V. Shuleykin. An extensive shoal, stretching for about 100 miles, was discovered by the expedition in Lat. 78° 40′ N., Long. 83° E., between Wiese Island and Severnaya Zemlya.

The expedition was fortunate in encountering exceptionally favourable ice conditions, which made it possible to carry out more exploration work than had originally been planned. The only ice seen was met with between Cape Zhelaniya and Wiese Island, in Kalinin Bay, and in the northern outlet of Schokalsky Strait.

Pacific Ocean Expedition (*Bering Sea Section*), 1932.

Working as a section of the Pacific Ocean Expedition, an expedition, sent out by the Hydrological Institute and the Pacific Ocean Fisheries Institute, and led by Professor K. M. Deriuguin, was at work in the western portion of the Bering Sea, and in Bering Strait, during the summer of 1932.

The expedition, on board S/S *Dalnevostochnik*, left Vladivostok on June 21, and started work at Petropaulovski in the south of Kamschatka, where profiles, by means of soundings, were obtained. Other profiles obtained were from Bering Island to Kamschatka, keeping 120 miles seawards of Cape Oliutorski; from Cape Navarin, 60 miles out to sea; and from Cape Navarin, by way of Providence Bay to the Anadyr River; from Cape Chaplin (Indian Point) to St Lawrence Island; from St Lawrence Island to the mouth of the Yukon River in Alaska; from Cape Dezhnev to the Diomede Islands; from the Diomede Islands to Cape Prince of Wales; and from Cape Intzov to Cape Thompson. The first three profiles were made twice, in July and September.

During the course of the expedition seventy-seven hydrological stations were made, and fifty-eight plankton stations. Ninety-six dredgings and trawlings reached a depth of about 11,000 ft. Current determinations were made by means of current meters and floats, 2500 temperatures were taken at different depths, and analyses were also made of the water samples obtained. Useful research into the circulation and currents in the areas between the Bering and Chukotsk seas was carried out, and it was found that a warm current flows north into the Bering Sea during the summer.

Some new varieties of deep-sea fish were discovered by the expedition, which brought back a large collection of *Echinodermata*, corals and fish.

The expedition returned to Vladivostok on September 9.

Relics of the Canadian Arctic Expedition (1921) *found on Wrangel Island.*

It will be remembered that in September, 1932, aeroplanes belonging to the expedition to the Chukchis region of Siberia led by S. V. Obrutchev were instrumental in rescuing the personnel of the station at Wrangel Island (see *The Polar Record*, No. 6, p. 79), the relief ship detailed for the purpose having been blocked in the ice.

News has been received that a note, written to V. Stefansson by A. R. Crawford during the Canadian Arctic Expedition of 1921, and found near

Doubtful Bay on the south coast by one of the Russian colonists, has been given to the leader of the Obrutchev expedition. As is well known, A. R. Crawford was one of the four men forming the Wrangel Island detachment of Stefansson's expedition. In 1923, after two years spent on the island, Lorne Knight, one of their number, was found to be seriously ill with scurvy, and as no relief ship had arrived, the other three members of the expedition decided to make for the Siberian coast, in order to fetch assistance. Knight died on June 23, 1923, and the other three perished on the ice on their way to Siberia. The only survivor, Ada Blackjack, an Eskimo girl, preserved the papers of the expedition, and handed them to the relief expedition in 1924.

The letter from Crawford reads as follows:

> July 3rd, 1922. 4.00 A.M. Ridge in sight bearing 15° W. of N. Mag. is sled pass after that follow water to north coast. Man pass—where river forks ½ mi. up bear N. Mag. Steeper but shorter. Following this fork to source (monument on east bank). Cross ridge and proceed as before. Doubtful harb. 6 mi. South Mag.
>
> A. R. Crawford for V. Stefansson.

It is believed that this note was left by Crawford for Stefansson to find on his return, to give him some indication of the best route over the main ridge of the island, for the beginning of his projected sledge trip over the ice to the north. As early as February, 1922, Knight had been planning to lay a depôt on the northern coast as a provision for that journey, and an entry in Knight's diary for June 28, 1922, reads as follows: "Crawford, with one dog carrying his rug, set out westwards in order to find a pass over the ridge." From a comparison of dates, therefore, it seems fairly evident that the note was written during this reconnaissance journey, and left by Crawford in the hope that Stefansson would find it on his return to the island.

Another interesting relic found on Wrangel Island was a sailor's ribbon, with the words "Fisheries Protection" written under a crown. It is believed that this belonged to a member of the crew of the *Karluk*, which was crushed in the ice near Wrangel Island in 1914. Some of the survivors of the wreck managed to reach Wrangel Island, and a camp was made near Cape Waring.

Both these relics are now in the Museum of the Arctic Institute of the U.S.S.R., Leningrad.

North-East Trading Expedition, 1932.

A large expedition, sent out by the Peoples' Commissariat of Water Transport, left Vladivostok in the summer of 1932 under command of

N. J. Evguenov, with the object of escorting vessels intended for the projected river fleet to the mouth of the Kolyma River. The expedition consisted of nine vessels: the steamers *Anadyr*, *Sever*, *Suchan*, *Mikoyan*, *Red Partisan*, *G. Zinoviev*, *Uritzky*, *Lütke*, and a schooner M/V *Tempo*. The vessels destined for the river fleet were as follows: two 500-ton barges, two 250-ton barges, and two steam tug cutters. The equipment of the expedition included two hydroplanes. The personnel, besides the leader, included the following:

J. K. ALEXEIEV, aerologist.
A. M. BENDNIK, pilot.
Captain A. P. BOCHEK, navigator.
A. B. GEWORKYANTZ, meteorologist.
G. L. HACKEN, observer.
N. N. HACKEN, hydrologist.
J. ISTOSHIN, hydrologist.
J. IVANOV, geo-physicist.
G. D. KRASSINSKY, engineer, hydrologist.
KOSHELEV, pilot.
J. TH. MOLODYKH, navigator.
A. B. OSTALTZEV.
K. A. RADVILLOVICH.
Dr L. M. STAROKADOMSKY, medical officer.
V. B. VOSTRIAKOV, wireless operator.
M. M. WOLFBERG.

Leaving Vladivostok on July 24, 1932, the expedition forgathered, together with the convoy of river vessels, towards the end of the month at Cape Dezhnev after a difficult voyage of some 3000 miles. Calls were made at Petropaulovsk (Kamschatka) and Providence Bay on the way. On July 23 the *Suchan* and the *Anadyr* were sent to the relief of two steamers, S/S *Lieutenant Schmidt* and S/S *Kolyma*, which had been forced to spend the previous winter near the Chukchis coast in the ice, having been caught up in heavy pack-ice during their return from the Kolyma the season before. The rest of the expedition remained at Cape Dezhnev, awaiting more favourable ice conditions. The *Suchan* and the *Anadyr*, however, encountered heavy pack-ice to the north-west of Cape Dezhnev, and drifted with it, back into Bering Strait. Meanwhile the main fleet was also in difficulties, the steady north winds, which arose towards the end of July, having considerably widened the belt of pack-ice round the coast, so that the entire expedition had to retreat further south.

Finally, the season being far advanced, and all hope of improvement diminishing as time went on, it was decided to leave behind the two large barges, which were in a bad state of repair, and make an attempt to convoy the whole fleet through the ice. This was begun on August 16,

and having proceeded with much difficulty through the heavy ice near the coast, the expedition, on August 23, joined the two ships *Lieutenant Schmidt* and the *Kolyma* near Cape Wancarem. The expedition reached Cape Shelagski on September 2, and from that point progress became slightly easier. Difficult ice was again encountered near the Aian Islands, but very soon conditions improved once more, and the convoy reached the Kolyma River on September 6. Two other river vessels were already there, having been escorted to their destination by the ice-breaker *Sibiriakov*.

Very severe ice conditions were encountered during the return journey, and finally it was found impossible to proceed. The crews of the following ships, *Anadyr*, *Sever*, *Mikoyan*, *Red Partisan*, and *Lütke*, spent the winter of 1932–33 in a sheltered bay near Cape Pevek in Chaun Bay, behind the Arutan Islands and well protected by stationary land-ice. A meteorological station was erected, and plans made for scientific work to be carried out, in spite of the absence of the scientific staff, most of whom returned to Leningrad on board S/S *Lieutenant Schmidt*. A good standard of health was maintained throughout the winter. During the winter the ships were reconditioned, new barges constructed, and a school and a hospital built for the benefit of the natives. The party were able to carry out topographical work in Chaun Bay. The scientific work consisted of observations connected with the International Polar Year, including pilot balloon ascents, and regular hydrological investigations. During the winter this work was in charge of N. N. Hacken. At the beginning of the winter, the leader was forced, by illness, to return to civilisation, and his place was taken by Captain A. P. Bochek, the second-in-command.

The condition of S/S *Uritzky* was, however, causing much anxiety. This vessel had had the misfortune to become separated from the other ships, and was frozen in the ice, in Lat. 70° 18′ N., Long. 168° 32′ E. Attempts to reach her were made by the ice-breaker *Lütke*, and were carried on from the beginning of September for about a month, but it was impossible to get nearer than about 5 or 6 miles. The young ice was about 6 in. thick, but a belt of heavy pack-ice in the neighbourhood of Cape Shelagski rendered that area completely impassable to ships. On October 7 it had become evident that all hopes of reaching the *Uritzky* were vain, and the *Lütke* was recalled. The ice-breaker rejoined the rest of the fleet at Cape Pevek, after negotiating the ice with much difficulty.

The *Uritzky* spent the winter drifting in the ice between Cape Shelagski and the Aian Islands, at the mouth of Chaun Bay. The drift was at first to the north-east, changing to north, and then to north-west. The vessel

was farthest from the shore when, at the end of November, 1932, she was in Lat. 71° 40′ N., Long. 168° 37′ E., 68 miles from Cape Shelagski and 63 miles from Aian Islands. Later the drift changed again to the south-east, and at times the ship was almost stationary. On March 18 the *Uritzky* was in Lat. 70° 37′ N., Long. 169° 52′ E., and at the end of March a party from the coast was able to reach the vessel, and take ashore the wireless operator, who was ill. During April the vessel, which was then some 30 miles north-north-west of Cape Shelagski, was visited by three relief parties, travelling by dog-sledge.

It was intended to revisit the *Kolyma* during the next navigation season with the whole fleet, but no further news has been received since the above account, which is taken from the *Bulletin* of the Arctic Institute, Nos. 6–7, 1933.

Soviet Union Expeditions, 1933.

During the year 1933, fourteen expeditions were sent out by the U.S.S.R., the plans for four of which were published in *The Polar Record*, No. 6. Up to the time of going to press full accounts of these had not been received, so we can only give a list of those expeditions undertaken, with such details of their execution as we have been able to obtain.

Tcheluskin Expedition, 1933.

This expedition, led by Professor Schmidt of the Arctic Institute of the U.S.S.R., was undertaken with the object of completing a navigation of the North-East Passage, both ways, if possible during one season, and of carrying relief to the Russian colonists on Wrangel Island, left there in 1932. The voyage was also in the nature of an experiment, with the object of discovering whether it would be possible to make regular journeys through the North-East Passage with ice-breakers of the type of the *Tcheluskin*. Scientific work was also planned, and included a special study of navigation conditions in the Laptev and East Siberian Seas, observations of the currents in those seas, investigations in marine biology, and a study of hunting and trading conditions.

The expedition, on board the ice-breaker *Tcheluskin*, reached the vicinity of Wrangel Island in November, 1933, after a particularly difficult passage, owing to heavy pack-ice and adverse winds. On reaching Bering Strait the vessel had been carried 78 miles out of her course in six days by unfavourable currents. The voyage was then continued, after an outbreak of fire, which was successfully extinguished by the crew,

but it was then found that heavy ice made it impossible to approach Wrangel Island. The relief party was, therefore, landed with the help of the small aeroplane taken by the expedition, and forty people, who wished to leave the island, brought back to the ship. The expedition then attempted to return to Murmansk by the same route as that taken on the outward journey, but met with heavy pack-ice, and was frozen in. News appearing in the press at the end of December, 1933, stated that the vessel had already, at that date, drifted some 1250 miles, with no prospect of getting free. In response to appeals sent out by Professor Schmidt, the leader of the expedition, attempts were made to reach the *Tcheluskin* by air from Providence Bay on the Chukotsk Peninsula, just south of Bering Strait, planes, built specially for Arctic work, having been sent from Vladivostok to take part in the rescue. Huts were also built at Providence Bay, and stores depôted, in order that the expedition could pass the winter there if necessary. The planes, however, were unable to reach the ship, the perpetual darkness making landing almost impossible, and the expedition has now decided to spend the winter on board the ice-breaker rather than attempt to reach the coast. The *Tcheluskin* is believed to be adequately supplied with provisions, and will keep in touch with the outside world by wireless. The aeroplanes remain in readiness at Providence Bay, and will make further efforts to reach the ice-breaker, should any necessity arise grave enough to justify the risk of such an attempt.

Wreck of the Ruslan, 1933.

Full details have now been received of the fate of the ice-breaker *Ruslan*, which was wrecked near Ice Fjord, off the Spitsbergen coast, on April 26, 1933.

As already reported in *The Polar Record*, No. 6, the *Ruslan* had gone to the assistance of the ice-breaker *Malyguin*, which had run aground on some rocks about 3 miles from Green Harbour, Ice Fjord, during the previous December. The rescue work had been completed by March 24, and after preliminary repairs at Barentsburg, the *Malyguin* left for Murmansk in the evening of April 24, in clear calm weather, escorted by the *Ruslan*. Near the entrance to Ice Fjord, about 18 miles from Advent Bay, the *Ruslan*, which was leading, wirelessed to the *Malyguin* to pass ahead, as the *Ruslan* had to await the arrival of the ice-breaker *Krassin*, which had gone to Longyear City, at the request of the manager of the Norwegian Coal Company, to clear the harbour of ice. By this time the

weather had changed, and a snow-storm, combined with a wind estimated at Force 8, soon caused the two vessels to lose sight of each other. At 10.0 p.m. the same night a wireless message was received from the *Ruslan* by the *Krassin*, stating that, as a result of the heavy swell encountered on emerging from Ice Fjord to the open sea, the vessel had got into difficulties. Those on board the *Malyguin* were unaware of this, as their receiving set had just broken, and was not repaired until the early morning of April 25. By that time the *Malyguin* was already some distance from the *Ruslan* on the way to Murmansk, travelling with open holds out of which the water had to be pumped constantly. Taking this into consideration, as well as the absence of a radio direction-finder, and the considerable distance between the two vessels, it was decided to leave the rescue of the *Ruslan* to the *Krassin*, seeing that the latter was still at Advent Bay, and had a radio direction-finder on board.

Having received instructions to this effect, the *Krassin* left Advent Bay on April 25, at about 2.30 a.m., and after calling at Barentsburg, started the search at 6.30 a.m., encountering extremely bad visibility on reaching the open sea. The search was continued for 79 hours, in the waters off Spitsbergen, from the entrance to Ice Fjord as far as the extreme south of the island, without result, the visibility remaining very poor. Finally, all efforts to locate the vessel having proved vain, the *Krassin* gave up the search, and returned to Murmansk. A dog-team was also sent out along the coast from Ice Fjord, southwards, with no better result.

Meanwhile it was evident from wireless messages that the condition of the *Ruslan* was very serious. The vessel had sprung a leak, and the pumps being choked with ice, the crew were forced to bail incessantly with buckets, continually having to break the ice. A later message stated that the vessel had begun to heel over, and that, in their efforts to keep her afloat, the crew had thrown all the coal overboard, extinguished the fires, and let all the water out of the tanks and boilers. This seemed to improve the position, but only for a short time; very soon the leak was found to be gaining, the men were exhausted, and the temperature was falling, and in the early morning of April 26 the vessel began to sink.

The crew abandoned the vessel in two life-boats, and as the snow-storm hid her from sight, they did not actually see her sink.

The first life-boat, which held nine people including one woman, was never seen again. The second was picked up after five days by a Norwegian ship, M/V *Ringsael*, after the crew had undergone terrible suffer-

ing, and the three survivors taken to Tromsö. Owing to the hurry in leaving the *Ruslan*, the only provisions taken in the life-boat had consisted of a little tinned food, two tins of condensed milk, and a small quantity of sodden biscuits. The bread had been washed overboard, and there was no fresh water, as all this had been let out in the efforts to right the ship. The men were reduced to sucking the icicles off their clothes. They were also very inadequately clad, having with them only the clothes they had been wearing whilst working on deck; nine out of the twelve occupants of the boat died, one by one, of the exposure, freezing to death in their sleep. The three survivors—the signaller, Bekussov, the pilot, G. Tochilov, and a sailor named Popov—kept themselves alive by incessant bailing. They had hoisted an improvised sail and this had been seen by M/V *Ringsael*.

Krassin Expedition to Novaya Zemlya, 1933.

Before this expedition had proved to the contrary, it had been considered impossible to reach the north-west coast of Novaya Zemlya during the winter, and when, in March, 1933, it was found necessary to send the ice-breaker *Krassin* to the relief of stations situated in that locality, it was felt that a grave risk was being run. Aeroplanes were taken, however, and it was planned that these should work in conjunction with the ice-breaker. The expedition was led by M. J. Shelelev; Captain J. P. Legsdin was in command of the ice-breaker, and the following scientists took part:

L. V. Antonov.
A. P. Goltzev.
R. K. Olavinsky.

The *Krassin* left Murmansk on March 17, equipped with two aeroplanes, a propeller sledge and three dog-teams. From reports from S/S *Knipovitch*, which had followed the west coast of Novaya Zemlya between February 12 and 15, it was learnt that the ice at that time was 30 to 35 miles west of Matochkin Shar, and it was believed that the prevailing east wind would drive it still farther to the west. This supposition proved correct. During the first part of the voyage between Murmansk and Matochkin Shar, the temperature remained at about 8° C. below zero, and rough seas were met with. The first ice was encountered in Lat. 72° 10′ N., Long. 46° 40′ E. The ice-breaker proceeded slowly until, on March 20 in Lat. 74° 16′ N., Long. 53° 52′ E., the ice became less closely packed. The open water reported on the west coast of Novaya Zemlya was reached the next day, in Lat. 74° 49′ N., Long. 54° 56′ E.

These favourable conditions continued as far as Admiralty Peninsula, where heavy ice was again encountered. The stores for the station at Admiralty Bay were landed by means of aeroplane and dog-sledge.

On March 26 the *Krassin* reached Archangel Bay, having found a passage near the coast more or less clear of ice, although heavy pack-ice could be seen out to sea. The stores were landed and a course set for Russian Harbour, which was reached on March 29. It had been hoped that a flight might be made at this point, for the purpose of locating and relieving the party belonging to the Polar Year Expedition, who had last been heard of as on their way to Cape Zhelaniya on foot, their propeller sledge having broken down on the way; but this proved to be impossible as, on April 2, as a result of a strong westerly wind, the *Krassin* was carried 40–50 miles out from Russian Harbour in the ice. The planes, which had been landed, were rescued with great difficulty, and the conveying of the stores to the Polar Year station was also hindered, and was not completed until April 4. The expedition then proceeded to Krasivaya (Beautiful) Bay, hoping to find a place from which the planes could take off, but none presented itself, and the *Krassin* was forced to go on to Cape Zhelaniya, arriving there on April 5. The three members of the Polar Year party, E. V. Petersen, Dr Wölcken, and M. M. Yermolayev, were found to have arrived there and were taken on board, and conveyed back to Russian Harbour. The return voyage was carried out with great difficulty, the pack-ice being so thick that the ice-breaker barely forced its way through with the aid of explosives.

On April 7 the expedition set a southerly course for Cross Bay, which was reached the next day, conditions being much the same as those encountered on the way north. Matochkin Shar, reached two days later, was the last station visited, and the expedition returned to Murmansk, no ice being met with after Lat. 73° 15′ N., Long. 50° 00′ E.

Persey Expedition, 1933.

The annual hydrological expedition, organised by the Oceanographical Institute, and working on board S/S *Persey*, was sent out as usual during the summer of 1933, under command of V. A. Vasnetzov.

The expedition started from Murmansk on May 12, and a hydrological section was made between North Cape (Norway) and South Cape, Spitsbergen, by way of Bear Island. The work was accomplished in spite of delays caused by the ice, which was met with 50 miles north of Bear Island. After a halt of three days at Barentsburg (Ice Fjord) for re-fuelling,

the expedition made another section from Prince Charles Foreland westwards. The ice was found to be about 200 miles west of Spitsbergen in Lat. 78° N., Long. 2° 10′ W., and further progress was barred. The expedition returned to Murmansk on June 3.

Finding of a Mammoth, 1933.

Mention must be made here of a mammoth, which was discovered in the neighbourhood of Irkutsk in December, 1933, in a perfect state of preservation. The animal's teeth were found to weigh over 15 lb. and its tusks were 7 ft. long and weighed about 38 lb. Even the brain was well preserved.

Taimyr Expedition, 1933.

During the summer of 1933 an expedition, led by I. Landin, carried out an investigation of the coast of the Taimyr Peninsula, and various islands in the vicinity.

The expedition left Dickson Island in August, 1933, on board three vessels, S/S *Beluga*, which was used as a base, and two 18-ton cutters, the *Stalinets* and the *Gido Yamo*, and a course was set direct to the Taimyr Peninsula. As a result of the work carried out by the party, many corrections were made to the existing maps, and twenty new islands were discovered. It was found that the two Mona Islands, discovered by Nansen, were actually part of a group of six small islands, four of which had been previously unknown. Einsamkeit (Lonely) Island, which had not been visited for eighteen years, was reached, and its position on the map corrected.

On the return journey, whilst rounding White Island, the *Beluga* struck a rock, and sustained serious damage. The crew abandoned the ship, having unloaded the stores and equipment into a cutter.

The expedition returned in December, and it is stated that a large expedition is being planned to return and continue the work. The programme will include an exploration of the interior of the peninsula, and the coast-line between the Lena and the Yenisei.

Other Expeditions.

The following is a list of expeditions planned for 1933, but of which no news has yet been received:

1. *Lena-Khatanga Expedition.* The work of this expedition was to include investigations of Nordvik Bay, and a geological trip to Cape

Oloviamny, Severnaya Zemlya, and was undertaken with a view to increased navigation along the northern sea route to the Lena.

2. *Hydrological Expedition to the Kara Sea.* The object of this expedition was to be a continuation of the investigations carried out on board the ice-breakers *Sedov* and *Taimyr* in 1930, and those on board the ice-breaker *Ruslan* in 1932.

3. *Expedition to the Eastern Shores of Novaya Zemlya.* This expedition was planned for the study of navigation conditions in the Kara Sea, and the currents between the Barents and Kara Seas.

4. *Geological Expedition to Novaya Zemlya.*

5. *Prospecting Expedition to Kostin Shar, Novaya Zemlya.*

6. *Hunting Expedition to Novaya Zemlya.* The object of this expedition was to be an examination of hunting and trading conditions in the islands.

7. *Bolshezemelskaya Expedition.* This expedition to the Bolshezemelskaya tundra, on the mainland to the south of Novaya Zemlya, was planned for the investigation of hunting conditions and stag-breeding.

8. *Geological Expedition to the Chukchis District.*

9. *Chukchis Air Expedition.* The object of this expedition was to continue the work of a similar expedition in 1932. It is hoped to complete in time an air survey of the whole area, as well as a geomorphological investigation.

10. *Geological Expedition to the Chersky Ridge.* It is hoped that a thorough exploration of the area between the Yana and Indigirka rivers might be carried out by this expedition.

11. *Expedition to the Laptev Sea.* The aims of this expedition were mainly hydrological, and the work was to be carried out by the ice-breakers escorting the trading fleet to the mouth of the Lena.

Besides the above expeditions, hydrographic work between Dickson Island and Cape Chelyuskin was planned as well as an investigation of the Nordenskiöld Archipelago.

Soviet Polar Year Stations, 1932–33.

The following news of the Polar Year stations maintained by the U.S.S.R. is taken from the *Bulletin* of the Arctic Institute, Nos. 5, 6–7 and 8, of 1933, as well as from various reports which have appeared in the press.

Russian Harbour, Novaya Zemlya.

In the early spring of 1933, as mentioned briefly in *The Polar Record*, No. 6, a party of three, consisting of M. M. Yermolayev (the leader of the expedition), E. V. Petersen, and Dr Wölcken, made a crossing of the ice-cap to Cape Zhelaniya, a distance of about 200 miles, making a survey of the region on the way. Two of the three men had made the journey twice in the previous autumn, using propeller sledges. The party started on February 22. It had been hoped to cover the whole distance in twenty-four hours, but after six hours' travelling, when less than half-way, the party were forced to stop, in order to re-fuel the sledges. The metal skis of the sledge had become hot owing to the speed of the journey, and had melted the snow under the runners, with the result that when the skis got cool, the sledge became frozen in so firmly that three days were spent by the party in their efforts to move it. Meanwhile, as the engine was being run incessantly, the supply of benzine became exhausted. The party waited ten days for a relief sledge party, until a shortage of provisions compelled them to make a forced march towards Cape Zhelaniya. On arriving at St Anna Bay on March 5, having covered 80 miles of their journey, Dr Wölcken was found to be too ill to walk farther, and the two other members of the party dragged him on the sledge as far as Krasivaya (Beautiful) Bay, 30 miles from Cape Zhelaniya. Here Dr Wölcken insisted on being left behind in a snow hut, while the other two proceeded to their destination. On their arrival at Cape Zhelaniya, a party of four from the station was sent out to fetch Dr Wölcken.

Much anxiety had been felt at the non-appearance of the party, and search parties had been sent out from Russian Harbour and Cape Zhelaniya, in spite of the bad weather prevailing at the time.

From the scientific work carried out on the journey it has been proved that the ice-cap covering the northern island of Novaya Zemlya disappeared during the inter-glacial epoch. A new ridge of mountains, running parallel with the west coast, was also discovered.

Dr Wölcken, who was a member of the Wegener Greenland Expedition, 1930–31, was in charge of the glaciological observations of the expedition, and observations were made at the following places, which were reached either by propeller sledge or by means of dogs: At a point near the base in Lat. 76° 10′ N., Long. 62° 40′ E., and at Blagopolutschja Bay (Lat. 75° 40′ N., Long. 63° 30′ E.) to the south-east of the base. The ice-cap covering the interior of the north island of Novaya Zemlya consists of a

long narrow strip, terminating in the south in the glaciers separating the mountains north of Matochkin Shar. In the north there is an ice-free area between the ice-cap and the sea.

A seismograph was taken by the party, and appears to have worked well.

Cape Zhelaniya, Novaya Zemlya.

Interesting relics were discovered at Ice Haven on the west coast of Novaya Zemlya, during the autumn of 1933, when the members of the Polar Year party at Cape Zhelaniya located the remains of the hut built by the Dutch navigator, Willem Barents, and his men, when their ship was beset in the ice in 1597. The hut had been discovered once before by the Norwegian, Captain Elling Carlsen, in 1871, but no real investigation had been made of the remains.

The various finds included iron hoops and rivets of barrels which had apparently been used for washing, as well as footwear, crockery and other articles. The remains of a boat and a harpoon were found on the shore near the hut. The hut was found to be 26 by 16 ft. in size.

The relics were taken to Leningrad, and placed in the Museum of the Arctic Institute of the U.S.S.R., and it is hoped that a party may be sent out by the Arctic Institute this year, to continue the investigations.

Cape Chelyuskin.

Work at this station during the early spring included hydrological investigations lasting from April 7 to 14, carried out by J. P. Koshkin and G. L. Rutilevsky. The stations, about 12 miles apart, were made at depths respectively of 649 ft. and 656 ft.

Extensive biological work was done by this expedition, including a zoological survey of Vilkitsky Strait, and the eastern side of the Chelyuskin Peninsula. Geological and topographical surveys were made over the whole peninsula; meteorological and aerological observations were also made, as part of the programme of the International Polar Year. The hydrological work was increased in scope as the spring advanced.

As regards ice conditions it is reported that a broad band of old hummock ice, 12 miles wide, was located round the south shores of Severnaya Zemlya during the early spring. At the beginning of June Vilkitsky Strait was covered with solid ice, but towards the end of the month patches of open water appeared.

Mopiay Island.

It had been hoped that a station might be erected at Sagastir, on the most northerly island of the Lena Delta, the site of the Russian station during the First Polar Year. The building materials and other equipment were conveyed to Sagastir by the steamer *Synok* in 1932, but, owing to the low-water level in the Lena Delta, it was found impossible to reach the projected site for the station. A base was therefore established on Mopiay Island, north-east of the American Mountain (the grave of De Long), with the intention of transferring the station to Sagastir when the move should be practicable.

Serge Kamenev Islands, Severnaya Zemlya.

It is reported by the chief of the station, N. P. Demme, that a journey was made to Red Army Strait, Severnaya Zemlya, in June, 1933. Some botanical and geological collecting was done, and it was noted that the strait was still full of ice.

Calm Bay, Hooker Island, Franz Josef Land.

From news received from the party stationed at Calm Bay, Hooker Island, it appears that the ice broke up very early in 1933, owing to a gale on April 11–13. A party consisting of the leader of the expedition, J. D. Papanin and Dr Scholz were away on a journey at the time of the break up, and were compelled to curtail their programme. They were then at Newton Island, south of Hooker Island, and were forced to return direct to the base, as open water between Northbrook Island and Hooker Island barred all progress to the south-east.

Another journey was made by a party led by J. A. Fedorov, in mid-April, during which a magnetic survey was carried out.

Rudolph Island, Franz Josef Land.

The following news has been received of work carried out at this station in the spring of 1933.

During a journey in March and April, a party led by F. J. Balabin, the chief of the station, made topographical surveys of various islands, including the newly discovered group situated 2 miles to the south-east of Cape Habermann, and the western half of Hohenlohe Island. In the spring, besides the topographical work, the usual Polar Year programme was carried out, including hourly cloud observations, measurements of snow and glacier movement, wireless investigations and biological work.

Barentsburg, Ice Fjord, Spitsbergen.

Reports from this station state that the winter of 1932–33 was very mild. Up till the end of February Green Harbour was free from ice, and did not freeze over until March, 1933. The ice went out at the end of May and by June 11 it had disappeared. The snow had also disappeared from the neighbourhood of the settlement by the middle of June. At the beginning of April the birds began to return, and the different species included guillemots, fulmars, eider ducks, etc. The geese reappeared about May 15.

On May 6 the first Norwegian ship entered Ice Fjord.

Oxford University Arctic Expedition, Spitsbergen, 1933.

An expedition, sent out by the Oxford University Exploration Club, and organised and led by Mr A. R. Glen, spent eleven weeks in Spitsbergen during the summer of 1933. Mr J. H. Martin, who was prevented from leading the expedition by severe frost-bite sustained in Canada during the early part of the year, was in charge of the affairs of the expedition in England. Full plans for the expedition were published in *The Polar Record*, No. 6, but as several changes were made in the personnel after the publication of the journal, a corrected list of those taking part is printed below:

A. Sledge Party.

W. L. S. Fleming, leader and geologist.
J. M. Edmonds, geologist, photographer.
A. S. Irvine, camp assistant.
L. C. Smith, R.E., surveyor.

B. Sledge Party.

Unit One: Seismograph.

R. A. G. Binny, R.E., leader, surveyor.
J. S. Benson, ass. surveyor, geologist.
O. Gatty, seismologist.

Unit Two: Coastal Survey.

H. R. de B. Greenwood, R.E., leader, surveyor.
A. C. Geddes, geologist.
A. K. Gregson, ass. surveyor.

Base Party.

A. R. Glen, leader.
E. E. Mann, surveyor.
J. Brough, geologist.
J. M. McC. Fisher, assistant.
C. H. Hartley, ornithologist.
J. de Lazlo, in charge of wireless.
R. H. S. Robertson, geologist.
F. E. Stott, marine biologist.

The expedition left England on June 27, and joined their ship, M/V *Isbjørn*, at Tromsö. Spitsbergen was reached on July 7, and the Base Party landed at Klaas Billen Bay, Ice Fjord. The ship then proceeded up the west coast of Spitsbergen to Treurenberg Bay on the north coast of New Friesland, where the three sledge parties were landed. A camp having been established near the Duner Glacier, a party consisting of W. L. S. Fleming, L. C. Smith, and R. A. G. Binny, with two sledges and 1000 lb. of equipment, made a journey lasting sixteen days, into the interior, with the object of laying a depôt, and carrying out reconnaissance work. During the journey the thawing surface was a great hindrance to progress, and during the ascent of 3000 ft. on to the ice-cap, the party only averaged 5 miles a day, as it was necessary to relay their loads. Meanwhile the other members of the sledging parties transported the rest of the gear to a point 7 miles up the Duner Glacier, and carried out considerable scientific work.

Sledge party A then began their survey of the interior and east of northern New Friesland, which lasted five weeks. A complete survey of the area was made, as well as of most of the 70 mile route taken by the party on their return to Klaas Billen Bay from the south of the ice-cap. The depôt was reached on August 25, and the party arrived at the base on September 10. The route taken was by way of the Lomme Bay Glacier between the Stubendorff and Chydenius Mountains.

A seismograph was taken by the expedition, with the object of determining the thickness of the ice by the methods used by Wegener in Greenland. The instrument was still at an experimental stage, however, and after a fortnight's trial it was found that the changes in temperature affected the fibres of the galvanometer. It is hoped, however, that the experiments made may prove of considerable value to the future development of the instrument. The seismograph party finished their work on September 1.

Meanwhile, the coastal survey party spent seven weeks on a stretch of coast about 80 miles in length from Mossel Bay in the north of New Friesland, to the head of Wijde Bay, using an 18 ft. whale boat and a small dinghy. A study of the geology of the region was made, and soundings taken along the coast; meteorological and ornithological work was also done.

The base party had meanwhile made a topographical and geological survey of about 400 square miles of Dickson Land, the unusually fine weather making it possible to carry out much more work than had been

planned. The work was carried out by J. Brough, E. E. Mann, and R. H. S. Robertson, and was begun on July 31. The northern part of Dickson Land was found to be very mountainous, intersected by glaciers, while in the south small plateaus of about 2000 ft. in height, and cut up by deep rocky canyons and dry stony valleys, were the outstanding features. The party made an ascent of Mount Citadel, the highest mountain in Dickson Land.

In July a single-handed boat journey of over 100 miles to Advent Bay, and back to the base, was made by E. E. Mann in an 18 ft. whale boat with a lug-sail. In August another journey in the same boat was made to the head of Sassen Bay.

The results of the expedition included a complete survey of the interior and east of northern New Friesland, from Treurenberg Bay, down the east coast of Wijde Bay, and across to the Norwegian trigonometrical points in Ice Fjord. The New Friesland ice-cap was found to consist of an ice-field, shaped like an elongated dome, rising to a height of 3300 ft. and bounded in the east by a series of flat-topped rock ridges. The geological formation of the Syd and Rosen Mountains to the east and south of Treurenberg Bay was studied in detail, and it is hoped that the results of this work, together with investigations made in New Friesland, will solve the problem of the relation of the Hecla Hook rock to the more highly metamorphosed rocks. Observations in marine biology and ornithology were also made, and 2500 infra-red and panchromatic photographs were taken.

M/V *Isbjørn* returned to Klaas Billen Bay on September 22 and the expedition left Spitsbergen the following day, reaching England on October 2.

Norwegian Expedition to Spitsbergen, 1933.

An expedition, organised by the Norges Svalbard-og Ishavs-undersøkelser, and led by Dr Adolf Hoel, visited Spitsbergen and East Greenland on board M/V *Polarbjørn*, during the summer of 1933. The Spitsbergen party was led by Mr Anders K. Orvin, and the personnel included a lighthouse engineer, Mr S. Aasebø.

Leaving Oslo on June 24, and Tromsö on July 5, the expedition reached Cape Linné on the south side of the entrance to Ice Fjord on July 8, and proceeded to land the material for the erection of the projected wireless station and lighthouse. These were built during the summer in Lat. 78° 3′ 8″ N., Long. 13° 38′ 3″ E. and Lat. 78° 3′ 9″ N., Long. 13° 37′ 7″ E.

respectively. The lighthouse has 3000 candle-power and a range of 13·8 nautical miles.

Lighthouses were also erected at Festningen (Lat. 78° 6′ 2″ N., Long. 13° 57′ 7″ E.) on the west side of the entrance to Green Harbour, and at Advent Point, at the entrance to Advent Bay (Lat. 78° 15′ 1″ N., Long. 15° 26′ 0″ E.), both with 130 candle-power and a range of 8·5 nautical miles. The lighthouses have functioned since September 12.

The *Polarbjørn* left Spitsbergen on July 14, bound for East Greenland.

The Wintering of Hunters in Spitsbergen, 1933–34.

News has been received of twenty-four hunters who propose to remain in Spitsbergen during the winter of 1933–34. A few will be distributed as follows: Wijde Bay, three; Magdalena Bay, two; South Fjord, Bell Sound, one; Horn Sound, one or two; North-East Land, two; Prince Charles Foreland, several. No information has been received as to the localities chosen by the rest.

Norwegian Polar Year Stations, 1932–33.

Work at the Norwegian stations at Bodö and Bossekop was carried out successfully during the last few months of the Polar Year, and has indeed run so smoothly that there is little to add to the report published in *The Polar Record*, No. 6. The special observations have now been concluded, and the world awaits eagerly the results of the year's work at these and other observation posts.

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

News has been received from Dr Jean Lugeon, Director of the National Meteorological Institute, Warsaw, of the safe return of the Polish Expedition, from Bear Island, where a year has been spent carrying out observations in connection with the International Polar Year. The party reached Poland at the end of September, having remained in good health throughout the year, and having obtained satisfactory results. These are now being worked out, and it is hoped that they may be published sometime in 1934.

Swedish Polar Year Stations in Spitsbergen, 1932–33.

During the International Polar Year two Swedish observation stations were established in Spitsbergen, one, chiefly for magnetic work, at the old Swedish coal mine, Sveagruvan, in Lowe Sound (Van Mijens Sound) at the head of Bell Sound; and the other, a high altitude meteorological

station, on Mount Nordenskiöld, above Longyear City, Advent Bay. The following news of their activities has been received from Dr F. Lindholm. Professor Carlheim Gyllenskiöld, who took part in the Swedish Expedition to Cape Thordsen, Ice Fjord, during the First International Polar Year, played a large part in the organisation of the present effort.

The Sveagruvan party included:

Dr F. LINDHOLM, leader.
F. AXELSON, wireless operator and assistant observer.
E. ERIKSSON, in charge of stores and cook.
I. PERSSON, engineer, a former manager of the Sveagruvan mine.
R. WIDEGREN, wireless operator at Longyear City.
E. VON ZEIPEL, M.A., scientific assistant. In charge of the geodetic photogrammetric work.

It left Stockholm on June 11, 1932, and travelling via Narvik, embarked at Harstad on board S/S *Inger Elisabeth* on July 16, arriving at Longyear City four days later. The following day the party left for Sveagruvan, having obtained passages on board a Norwegian ship. The expedition arrived at its destination on July 22, and immediately set about establishing winter quarters in the huts belonging to the disused mine.

Sveagruvan proved an excellent site for the magnetic and meteorological observations, and the instruments were set up on the low-lying tongue of land between Braganza and Svea Bays, about 600 yards south-east of the mine, and the slow-running variometers, mounted on aeroclite pillars in a cemented cellar, functioned from August 13 and August 30 respectively. The expedition was equipped with three sets of magnetic variometers, two of the La Cour type, together with a reserve set of Toepfer's variometer. Only the two former were used. The one, with a slow-moving recording drum, running at 15 mm. per hour, had been placed at the disposal of the expedition by the International Polar Year Commission; the other, with a recording drum moving at 180 mm. per hour, had been bought specially for the expedition. Photographic records of declination and horizontal and vertical intensity, were obtained almost without interruption throughout the whole year, and 375 records were taken. The quick-run magnetograph functioned from August 30, 1932, and 345 records were taken. The instruments for absolute magnetic measurements were set up in a wooden non-magnetic hut, which had been bought by the expedition, and which was set up between August 16 and 21, 100 yards north of the variation hut. During the year thirty absolute determinations of the declination, thirty complete H ($m \times H$

and M/H) determinations, as well as fourteen dip measurements, were made. On August 16, a special journey was made to Cape Thordsen on the north side of Ice Fjord (Lat. 78° 28′ 27″ N., Long. 15° 42′ 3″ E.), and magnetic measurements made at the site of the Swedish station maintained during the First International Polar Year, 1882–83. It will be remembered that S. A. Andrée was one of the party who spent that year at this spot.

Visual auroral observations were made simultaneously with the station on Mount Nordenskiöld, and at Longyear City, a station for parallactic auroral measurements having been erected there in September, 1932, and were carried out every three hours throughout the winter. The aurora was first observed on September 25, 1932, and the last display was on March 28, 1933, thirty-two days after the end of the polar darkness. The first parallactic photographs were taken on December 2, 1932, and wireless communication between the stations was maintained by means of the 1 kW spark transmitter, which had been left at Sveagruvan and which worked well after reconditioning, in conjunction with the Svalbard wireless station at Longyear City. Six hundred and ninety pairs of photographs were taken during the winter, two Störmer cameras, each mounted on a Bamberg theodolite, being used.

Meteorological observations were also made at Sveagruvan, and the aerological work included pilot balloon ascents, and air temperature and pressure measurements by means of Moltchanoff radiosondes which generally reached a height of 6 or 7 miles. During the spring and summer of 1933, 300 hourly records of the intensity of cosmic rays were obtained at the station.

The party continued their observations until August 31, 1933, and left Sveagruvan on September 4, reaching Stockholm nine days later.

The meteorological station on Mount Nordenskiöld (approx. 3500 ft.) was situated in Lat. 78° 10′ 8″ N., Long. 15° 26′ 4″ E., at a height of 900–1000 ft. The personnel of the station consisted of the following:

H. Olsson, B.A., leader,
R. Cederstam, cook and assistant observer,
O. Lagerqvist, wireless operator and assistant observer,

and the party arrived at Longyear City on June 27, 1932, on board the Store Norske Coal Company's boat *Caprino*, having left Stockholm on June 15. Owing to the depth of snow on the mountain the party found it impossible to begin building their huts until July 11, but the time was

spent in conveying the instruments and equipment to the site chosen. Dog transport was used whenever the snow permitted, but otherwise the work was done by hand. After much delay caused by storms and mist, and the warping of the timber for the huts, the building of the station was completed by September 18, the party receiving assistance from one of the miners from Longyear City. The living hut was constructed of galvanised sheet iron, with double walls, the space between the two walls being filled in with sea-weed. The instruments had, however, been erected by the end of July, and the first meteorological observations were made on August 1, 1932, being continued at the following hours, 01, 05, 07, 09, 11, 13, 16, 18 and 20 G.M.T., daily until February 1, when the instruments were almost entirely destroyed in a severe storm. From February 4 to May 5, observations were made every hour during the day, and these were continued until September 1, in addition to observations at 00, 02, 03, 04 and 23 G.M.T. During the winter great difficulty was experienced in keeping the instruments in working order, owing to the severe frosts. The observations included determinations of air pressure, wind direction and velocity, visibility and observations on clouds. Temperature and humidity observations were carried out between March 1 and September 1. A thermometer screen was erected on a plateau about 1400 ft. above sea-level. Sunshine was registered by means of a Campbell-Stokes sunshine recorder. Snow and other precipitations were measured twice a day; radiation measurements were also made whenever the weather permitted.

The expedition began the dismantling of the station about the middle of August, leaving Mount Nordenskiöld finally on September 1, 1933. Longyear City was left on September 6, the party sailing on board S/S *Ingerem*, bound for Bergen. Stockholm was reached on September 16.

Whilst at Sveagruvan, the Swedish Polar Year party were visited by Mr Nicholas Polunin, who was engaged upon ecological and botanical work in Spitsbergen.

Mr Polunin, having carried out similar investigations in Lapland, left Tromsö for Spitsbergen on board a sealer, about the middle of August. The vessel sailed up the west coast of Spitsbergen, and then along the north coast of Mossel Bay (Lat. 80° N.), making calls at the following places to land trappers and their stores: Bell Sound, Advent Bay, Prince Charles Foreland, Kings Bay, Amsterdam and Danes Islands, and several places in Wijde Bay. At all these points botanical investigations were

made, for comparison with the Vegetation Map published in the *Journal of Ecology* for 1928. On the return journey a stay of several days was made in Kings Bay, where Mr Polunin was able to make a comparison of the vegetation with that of Akpatok Island in Hudson Strait, which being also of limestone, and extremely exposed, supports an almost identical flora. Mr Polunin then proceeded to Sveagruvan, making his headquarters with the Swedish Polar Year party, who had invited him to be their guest. There he made an investigation of the vegetation round the head of the Sound, the last region marked as unknown in the Vegetation Map. A trip was later made to Coal Bay in Ice Fjord, a comparatively easy route being found in the valleys. Nine days were spent in going round Bell Sound in a canoe, and early in September a journey was made in an E.N.E. direction to Agardh Bay on the east coast, a rough survey of the vegetation being made on the way.

At the end of September, Mr Polunin returned to Tromsö, on board M/V *Thor*.

British Polar Year Station, Tromsö, 1932–33.

An expedition, directed by Professor E. V. Appleton, F.R.S., spent a year at Tromsö making special wireless investigations on behalf of the International Scientific Radio Union, and the British Polar Year Committee. The winter party consisted of two men:

Mr G. BUILDER, King's College, London.
Mr W. C. BROWN, Radio Research Board.

Professor Appleton and Mr R. N. Naismith of the Radio Research Board Station, who had assisted in the establishment of the station, returned to England at the end of the summer of 1932.

Two bases were established, 10 miles apart, a transmitting station at Simavik, on the island of Ringvasso, and a receiving station at Tromsö at the Auroral Observatory. The two places, which are connected by telephone, work on the same electric supply, served from the Hydro-Electric Power Station at Simavik, an arrangement which facilitates adequate synchronisation. Simavik is a settlement of four houses, all connected with the Power Station, built on a small plateau about 20 ft. above sea-level. The ground behind rises sharply to about 2000 ft., and the lake supplying the Power Station is on a plateau at about 1600 ft. Mr Brown, who was in charge of the transmitting station for the whole year, was given accommodation in the house of one of the engineers, while Mr Builder remained at the receiving station at Tromsö.

The stations were set up, with the help of the local inhabitants, and the ten tons of instruments installed, a few days before the beginning of the Polar Year. Observations were therefore carried out from August, 1932 to August, 1933.

The expedition specialised on the following observations, which appeared the most suitable to be undertaken in that particular locality: to make frequent measurements of the density of electrification in the ionised regions; and to keep as close a watch as possible on wireless conditions, so as not to omit to record any abnormalities. It was hoped in particular to discover why wireless waves frequently find difficulty in crossing the North Pole, which would otherwise be the best commercial route; and to study the means by which the sun produced and controlled the electrification in the Heaviside and Appleton layers of the atmosphere.

Professor Appleton reports that, as a result of the investigations of the party, both these problems have now been solved. It was discovered that during magnetic storms, which occur with a certain amount of frequency in Arctic regions, electrification at the lower levels of the Heaviside layer is increased to such an extent that the wireless waves are completely absorbed in this region, so that the layers can play no part in reflecting them, and thus increase the distance they might travel. This accounts for the sudden interruptions of wireless communication often experienced in the Arctic. It may be recalled that during the ill-fated polar flight of the airship *Italia* in 1928, there were two periods separated by about twenty-seven days when wireless communication between the airship and the outside world was interrupted. It is now proved that these were periods of intense magnetic activity, during which the wireless waves were absorbed, and not reflected by the upper atmosphere. The probability of a monthly sequence of conditions unfavourable to wireless will, therefore, have to be borne in mind by future expeditions to the polar regions. The effect of sunspots on wireless was also noted. During a year of sunspot maximum, such as 1928, magnetic and wireless disturbances are far more marked than in years when the spots on the sun are few.

The party was also able to reconcile the two theories of the electrification of both layers of the atmosphere, which are: (1) that electrification is due to the ultra-violet light of the sun, (2) that it is due to the bombardment of our atmosphere by streams of particles shut out by the sun. It can now be stated that the main cause of the electrification in both layers was the ultra-violet light of the sun, and in magnetically quiet

conditions this electrification was actually less in the Arctic regions than in England. This was to be expected on the ultra-violet light theory because of the flatter angle at which the sun's rays struck the earth near the Poles. On the other hand, while the normal undisturbed conditions fitted in with the ultra-violet light theory, it was only possible to explain the conditions during magnetic disturbances and auroral displays by the assumption that the electrification spread to abnormally low levels because of the influx of particles from outside the earth's atmosphere; other symptoms of this influx are the magnetic storms and auroras themselves.

The party received the greatest hospitality from the Norwegians both at Simavik and on the mainland. Their chief recreation was skating until the snow forced them to substitute skiing as a form of exercise. During the winter wireless reception, both from England and the continent, was excellent, and the party was able to make use of the B.B.C. transmissions for their scientific work. They were able to check their clocks by Greenwich time signals, thus ensuring much greater accuracy in the times for observations than would otherwise have been possible.

GREENLAND

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

This expedition, led by Dr Lauge Koch, has already spent two years at work upon the three-year programme of investigation in East Greenland, accounts of which have already appeared in *The Polar Record*, Nos. 2–6. The following report, received from Dr Lauge Koch, describes the progress made during the summer of 1933, during which much of the projected work was completed. The work of the expedition will be continued by parties at the three stations of Hochstetter Foreland, Eskimonaes, and Ella Island during the winter of 1933–34, and will be concluded at the end of next summer.

During the summer of 1933 the personnel of the expedition was increased to 109 members, 95 having taken part the previous season. Two ships, S/S *Gustav Holm* and S/S *Godthaab*, were used, and the expedition had also placed at its disposal two Heinkel sea-planes, equipped with 460 h.p. Jaguar engines, for reconnaissance work, and sixteen motor-boats. Eleven Iceland ponies were used for transport in addition to dogs.

Work during last season was carried out in the region between Kangerdlugsuak (Lat. 68° N.) and Peary Land (Lat. 82° 20′ N.). The original plan of the expedition had been to map the stretch of coast between Lat. 72° and 76° N. on a scale of 1 : 1,000,000, but it was found possible to extend the programme to include the entire coastline from Lat. 72° to 77°. The triangulation was carried out by four survey parties during the summers of 1932 and 1933, and by a party of six men during the winter of 1932–33. Air surveys, covering 30,000 km. (18,600 miles) in 1932 and 40,000 km. (24,800 miles) in 1933, were made, during which 2000 photographs were taken by means of 'Eagle' cameras. As a result of this work a map, on a scale of 1 : 200,000, with 50 m. contours, will be published shortly by the Danish Geodetic Institute. This will include the whole coastal belt of the area surveyed from the ice-cap to skerries off the coast.

One of the main objects of the expedition had been to ascertain the exact boundary of the ice-cap in the region surveyed, the results of Dr Koch's expedition in 1929 having proved the existence of a much larger ice-free area than had been marked on the maps previously. During the summers of 1932 and 1933 ideal flying conditions were experienced,

and it was thus possible to carry out the whole extended programme of work. The stretch between Scoresby Sound and Danmarks Havn (Lat. 70°–77° N.) had already been mapped in 1932, with the result that during the summer of 1933 work could be concentrated on Peary Land, where there were several geographical problems to be solved. The only previous maps of this part of North-East Greenland were those of Mylius Erichsen and Høeg-Hagen (1906–8), and the corrected version of these made by Captain Ejnar Mikkelsen in 1912. Several inexactitudes in Hagen's maps have been explained. Hagen had apparently run short of paper whilst drawing his maps, and was unable to mark the head of Independence Fjord, thus leaving unsettled the question of the Peary Channel. He was also, for the same reason, unable to indicate the main direction of Danmarks Fjord, which has now been proved to run north and south, but which he marked as running in an easterly and westerly direction in order to fit his map into the paper at his disposal. He had, of course, intended to correct his version of the map on his return to civilisation, but this was prevented by his death, and the rough charts, when found with Brønlund's body by Captain Mikkelsen's expedition, four years later, had with them no clue to their interpretation. The appropriate corrections have now, however, been made, as a result of Dr Koch's survey last summer.

It was also discovered that a large, hitherto unknown ice-free area lies between 79 Fjord and Danmarks Fjord, separating the ice-cap on the outer side of the Nordostrundingen from the inland ice to which it was formerly supposed to be joined. A long, partially ice-dammed lake was discovered to the west of this ice-cap.

Reconnaissance flights were made southwards from Scoresby Sound towards Kangerdlugssuak, following upon similar investigations made by Watkins, von Gronau and Lindbergh; and the land areas mapped. The whole peninsula was found to consist of a plateau built up of basalt rising to a height of 2000 m. and partially dissected by deep glacier-filled valleys. North and north-east of Kangerdlugssuak, however, some upheaval had apparently taken place during the Tertiary period, raising the original basalt plateau over 2000 m. Four mountain ranges occur in this region, with peaks up to 4000–4500 m. in height.

The hydrographic work of the expedition was carried out on board S/S *Godthaab*. A complete survey of the Scoresby Sound region was made by means of echo-sounding, temperature registrations, and the collection of samples of animal life at various depths, and of algae. It

was discovered that Nordvest Fjord is both the longest and deepest fjord in the world, being 300 km. (186 miles) long, and 1460 m. (780 fms.) in depth.

It is now possible to give some account of the archaeological work done by the expedition during the last two years. During the winter of 1931–32, the largest Eskimo site in East Greenland, situated on the south coast of Clavering Island, was entirely excavated. Two archaeologists were at work the following winter, one in the King Oscar Fjord, Franz Josef Fjord district, and the other at Hochstetter Foreland.

An important geological programme was carried out by the expedition, and during the summer of 1933, thirty-one geologists were at work. Their investigations may be divided into four groups:

(1) Practical prospecting investigations, during which the expedition discovered deposits of gold, silver, copper and zinc.

(2) Preliminary petrographical investigations, proving that the Caledonian folding in this part of Greenland is much more intense than was formerly believed, and that Hercynian movements, as well as eruptions, have played a very important part in the geological formation of East Greenland. It was also discovered that the Tertiary upheaval was accompanied by basaltic eruptions, as well as by folding, and the intrusion of a considerable quantity of granite.

(3) Investigations of the fossil remains of this district of East Greenland have been carried out since 1929, and large collections made of fossils belonging to the Upper Devonian period, about 20,000 specimens having been collected. Besides this, nearly 10,000 samples of Triassic fishes and other fossils have been secured by the expedition.

(4) The stratigraphic investigations and geological mapping of the area has now been practically completed.

Ten volumes of *Meddelelser om Grønland* have been reserved for the publication of the results of this expedition.

British Greenland Survey Expedition, 1932–33.

The three members of the British Greenland Survey Expedition, who spent a year studying weather conditions and making observations in connection with the proposed Arctic Air Route, at Lake Fjord, East Greenland, returned to England in September, 1933. The following account of the activities of the party during the last few months of their stay is furnished by the leader, Mr John Rymill, who took over the command of the party after the death of Mr H. G. Watkins.

After the expedition to Angmagssalik to buy dogs, described in *The Polar Record*, No. 6, Rymill and Chapman returned the 131 miles to Lake Fjord, in five travelling days, arriving at the base on March 5. There had been a shortage of food among the Eskimo, and consequently the new dogs were in a very bad condition. They were fit enough to start travelling, however, by March 20.

The first journey was planned to start from the depôt which had been left at the head of the Kangerdlugsuatsiak Fjord. On this journey it was proposed to make a survey of the country between the coast and the inland ice, and if possible, make an attempt on Mount Forel; but after the party had penetrated for some 40 miles, the country became so crevassed and broken that it was decided to turn back. The party returned over the same route, putting more detail into the survey on the way.

On returning to the base, a local survey, which had been started in December, 1932, was extended to cover an area of 225 square miles. This survey was finished by May 17, when another journey was started, penetrating the country to the north-west of Lake Fjord, and connecting with the survey made on the previous journey. After this journey there was one short trip left to do, to complete the survey of the country between Lake Fjord and the inland ice. This was done by May 29. The beginning of June was spent in repairing the boats, mending the fishing nets, and doing the many other things which must be done at the beginning of summer.

Towards the middle of June the pack looked open enough to let a small boat start for Angmagssalik. Rymill and Riley started on June 18, leaving Chapman to carry on the meteorological observations at the base. The two men were considerably delayed by the heavy pack-ice, and did not arrive at Angmagssalik until June 30. There they met Dr Knud Rasmussen, and he very kindly offered to take the expedition back as far as Iceland, when his ship returned to Denmark in September.

Rymill and Riley started back to Lake Fjord on July 16, and arrived two days later. On returning to the base, soundings were made in Lake Fjord, and the next fjord south; and by carrying a kayak up to the lake the party were able to take soundings there as well. Riley closed his meteorological station at Lake Fjord on August 18, after having kept unbroken observations since September 4 of the year before. Rymill and Riley then left in the motor-boat to continue the survey work done by A. Stephenson on the British Arctic Air Route Expedition, 1930–31. This was a survey of about 130 miles of coast-line. The pack-ice had, by

this time, left the coast, but the stormy weather, which is usual in the late summer, made navigation with small boats difficult on the more exposed parts of the coast. The party finished the survey, and reached Angmagssalik on September 4. Chapman arrived about the same time, having gone to Cape Dan with a party of Eskimo to continue his ornithological work.

The expedition learnt on arrival at Angmagssalik that the ship had been delayed, and would not sail until September 17. Chapman and Riley therefore returned to Sermiligak to finish off some astronomical observations for position, which they had not had time to do on the way down from Lake Fjord. They returned to Angmagssalik on September 16, and the ship left for Iceland on September 21.

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

Accounts of the activities of the French Polar Year Expedition have already been published in *The Polar Record*, Nos. 5 and 6. It only remains, therefore, to give details of the termination of the work carried out by this party, and of their return to France.

The party, consisting of fifteen men, were transported to their destination on board the ice-breaker *Pollux*, with S/S *Pourquoi pas?* in attendance; and arrived at the Eskimo settlement in Rosenvinge Bay, Scoresby Sound, in August, 1932. Three days were spent in landing the stores, totalling 380 tons, for the wintering party, after which the two ships returned to France.

The station, which was situated in Lat. 70° 30′ N., Long. 22° W., had been erected by a Danish carpenter during the preceding winter, and was equipped with central heating and electric light; a watch tower for auroral observations had also been built. A smaller sub-station was erected on a neighbouring hill at a height of about 1300 ft., and about 2½ miles distant from the main station. Wind retarded the building operations considerably, but the hut, after having been completely blown down on November 11, 1932, was ready for use by the middle of the next month, four men having been employed in its erection. The equipment of the two stations included a car, the first to be used in East Greenland.

During the year a very comprehensive programme was carried out. Meteorological observations formed the chief interest of the party. Pilot balloon ascents were made twice daily whenever the weather permitted, and on clear days the balloons were visible to about 30,000 ft., taking about an hour to attain that altitude. Radiosondes for determination

of the temperature and pressure of the upper layers of the atmosphere were taken by the party, and used whenever possible. Wind observations were also made as part of the routine of the station.

Several motor-boat trips were made to various parts of the fjord, and biological and geological specimens collected. During the year the party was able to complete a map of the district surrounding the base.

The weather experienced during the year was unpleasant, but not severe; a temperature of −30° C. registered in February, 1933, being the lowest recorded at the station. The winter of 1932–33 began early in Scoresby Sound, heralded by low temperatures and severe gales, and from October to April blizzards were frequent. With the advent of spring, however, conditions improved, and several summer sledge trips were made before Dr Charcot returned in July to take the party back to France. With the exception of one member, the wintering party maintained excellent health throughout their stay.

Dr Charcot's East Greenland Expedition, 1933.

The expedition, led by Dr Charcot, for the relief of the Polar Year party, left France at the end of July, 1933, on board S/S *Pourquoi pas?* She was accompanied by the ice-breaker *Pollux*, under command of Commandant A. Mailloux. After a short call at Akureyri, North Iceland, a course was set direct to Scoresby Sound, which was reached on July 28, after a certain amount of pack-ice had been met with. A party of three men from Cambridge University were given passages on board *Pourquoi pas?* from Akureyri to Hurry Inlet, Scoresby Sound, where they spent eighteen days carrying out ecological work, being picked up at the end of that time by the ship.

Pollux left Scoresby Sound on August 16, taking the Polar Year party back to France. Dr Charcot supervised the evacuation of the station, and his expedition was also able to carry out a certain amount of scientific work.

During ten days spent on Milne Land, in the interior of the fjord, a large collection of fossils was made by Dr Parat and M. Drach; help being afforded at the same time to a German geologist belonging to Dr Lauge Koch's expedition, who was engaged on the same work. Some botanical collecting was done, and Dr Devaux was able to make some corrections to the existing maps of the island. Besides this, a collection of magnetic sand was made by Professor R. Chevallier, and actinometric measurements of glaciers were carried out by Dr Devaux. Hydrographic

work, which was in charge of Commandant A. Chatton, included a series of soundings in Scoresby Sound, in Hurry Inlet and along the Blosseville Coast, echo-sounding apparatus being used as well as wire line. The expedition was accompanied by a painter, M. Creston.

Leaving Rosenvinge Bay on August 18, the expedition visited Cape Dalton, where a collection of Tertiary fossils was made; and then, ice conditions being exceptionally favourable, they were able to traverse the Blosseville Coast, discovered exactly one hundred years before by Lieut. Blosseville of the French Navy, who perished in an attempt to reach it. A landing was made in D'Aunay Bay, and a cairn erected to commemorate the first visit of a French expedition since the coast was discovered.

Turning eastwards at Cape Grivel, the expedition reached France again on September 4, 1933.

Cambridge East Greenland Expedition, Hurry Inlet, 1933.

A small expedition from Cambridge University, consisting of:

G. C. L. Bertram, St John's,
D. L. Lack, Magdalene,
B. B. Roberts, Emmanuel,

were at work in East Greenland during the summer of 1933.

The party left Hull on July 4, and after a stay of three weeks in Iceland, joined the French expedition under Dr J. B. Charcot, who had kindly invited them to be his guests on S/S *Pourquoi pas?* The expedition was delayed at Akureyri by bad ice conditions in Scoresby Sound, and the Cambridge party made use of the extra time by carrying out an ornithological survey on the little-known island of Grímsey, 45 miles off the north coast of Iceland.

S/S *Pourquoi pas?* left the three members of the expedition in Hurry Inlet, a subsidiary fjord of Scoresby Sound, on August 2, and a base camp was established at Constable Point. A study of land and freshwater fauna was made in the country round Hurry Inlet, where the vegetation is perhaps the richest in East Greenland. The party had with them a 16 ft. dinghy, with a lugsail, which was used for various short journeys to different parts of the fjord. The Liverpool Land ice-cap was crossed, and a certain amount of mapping done, both there and in Jameson Land. A large collection of insects was made, and also a series of experiments to determine the effect of low temperatures upon the geographical distribution of Arthropods in the Arctic. In Liverpool Land, the fauna of a nunatak was investigated.

After the evacuation of the French Polar Year Station in Rosenvinge Bay, S/S *Pourquoi pas?* returned to Hurry Inlet on August 18, and picked up the English expedition, which was landed at Tobermory, on Mull, on the way back to France.

Dutch Polar Year Station, Angmagssalik, 1932–33.

The Dutch Polar Year Expedition which spent a year at Angmagssalik, East Greenland, carrying out observations in connection with the International Polar Year, has now returned to Europe, having reached Copenhagen on September 20, on board S/S *Gertrud Rask*. The regular observations were carried out until August 27.

News has been received that the leader of the expedition, Dr Van Zuylen, intends to remain at Angmagssalik for another year, to carry out auroral (visual and photographic), magnetic and absolute magnetic observations, and learn the language. The magnetographs were adjusted in November, 1933, and since then satisfactory results have been obtained.

Nordkap II Expedition, 1933.

A small expedition, under the leadership of Mr John K. Howard of Boston, U.S.A., visited the East Greenland coast during the summer of 1933. The chief object of the expedition was hunting, but some scientific work was done, and Mr Laurence Kilham made some interesting bird observations.

The expedition left Gloucester, Mass., on June 24, on board M/V *Nordkap II*, a Norwegian sealer; setting a course for Cape Farewell, Greenland. The personnel, besides the leader, consisted of the captain, Isak Isaksson, a Norwegian crew of nine, and the following:

A. Cleaves, paleontologist.
E. Fox, geologist.
L. Kilham, biologist.
H. Mallinckrodt.
Dr W. G. Smillie.
D. V. Talcott, owner of the schooner *Nordkap II*.

On reaching Cape Farewell, the expedition turned north, and skirted the edge of the pack-ice to a point slightly north of Angmagssalik, afterwards proceeding to Isafjordur, North Iceland. Here a stay of nine days was made, while ornithological work was done. On July 31 a course was set for the Greenland coast, the expedition reaching Cape Brewster on August 2. The first ice was encountered the next day. At Myggbukta, which was reached on August 6, the party met Dr Adolf Hoel on board

his ship, M/V *Polarbjørn*, and later a visit was paid to one of Dr Lauge Koch's ships, which was also in the vicinity. The period from August 6 to 19 was spent in Franz Josef Fjord, and its various branches, and in Dusen Fjord; and the vessel was able to reach a point only a quarter of a mile from the head of Kjerulf Fjord. The expedition landed on Ymer Island, Andrée Land, and Strindberg Land, and two of the party made a crossing of the latter from North Fjord to Geology Fjord. The northern arm of Ymer Island was also crossed from Franz Josef Fjord to Dusen Fjord. During the fortnight spent in the region, a survey of musk ox conditions was made, 209 animals being seen; the party saw all the reported land mammals except the wolf, and collected forty-one birds of thirteen different species. Over 8000 ft. of film were taken.

The expedition left Franz Josef Fjord in the afternoon of August 19, were out of the ice by the night of the 20th, and reached Reykjavik three days later.

Norwegian Expedition to East Greenland, 1933.

An expedition, organised by the Norges Svalbard-og Ishavs-undersøkelser, and led by Dr Adolf Hoel, was at work in the region between Davy Sound and Sabine Island, East Greenland, during the summer of 1933.

Having first visited Spitsbergen in order to erect a wireless station and various lighthouses in Ice Fjord, the expedition, on board M/V *Polarbjørn*, reached Wollaston Foreland on July 18, the passage from Spitsbergen having taken four days.

The personnel consisted of the following:

Dr Adolf Hoel, leader and geologist.
Thor Askheim, topographer.
Asbjørn Hagen, botanist.
Lieut. Rolf Kjaer, Norwegian Navy, hydrographer.
Commander Rolf von Krogh, Norwegian Navy, hydrographer.
Bernhard Luncke, topographer.
Rolf Mørk, physician.
Søren Richter, archaeologist.
Wilhelm Solheim, topographer.

There were also fifteen assistants, a wireless operator, and a crew numbering eleven. The ship was commanded by Captain Kristoffer Marø.

The expedition was able to remain thirty-four days in Greenland, the ice conditions being extremely favourable on the east coast this summer. The programme consisted chiefly of a continuation of the work done in

1932 in the same region. Two survey parties were landed on Sabine Island, where base-line measurements were made, after which survey work, by means of triangulation and photogrammetry, were carried out on Sabine Island, Pendulum Island, Clavering Island, and Wollaston Foreland. A third surveyor worked southwards from Sofia Sound to Cape Parry on Traill Island. Geological and botanical work was carried out at a number of points between Peter Bay in the north and Antarctic Sound in the south. An automatic tide gauge functioned for thirty days in Clavering Fjord. A series of magnetic observations were also made and archaeological work was done on Traill Island and Geographical Society Island. Hydrographic work was carried out on the coast between Bontekoe Island and Cape Herschel, and also in Clavering Fjord.

The expedition left Myggbukta on August 22, arriving at Jan Mayen two days later. Aalesund was reached on August 27.

Norwegian Polar Year and Radio Stations in East Greenland, 1932–33.

A full Polar Year programme, including pilot balloon ascents, cloud observations, and auroral photography, was carried out at Myggbukta (Lat. 73° 29′) during the International Polar Year; the station having been supplied with various new instruments. Observations were made at this station at 01, 07, 13 and 18 G.M.T. The station is being maintained during the winter of 1933–34.

Of the other four Norwegian Polar Year stations in East Greenland, three, Jonsbu (Lat. 75° 20′ N., Long. 20° 28′ W.); Storfjord (Lat. 68° 10′ N., Long. 31° 50′ W.), and Finnsbu (Lat. 63° 24′ N., Long. 41° 17′ W.) have been closed down; but two men, one of whom is a wireless operator, have remained at Torgilsbu (Lat. 60° 32′ N., Long. 43° 11′ W.), which will be maintained as a radio station during the winter. During the summer of 1933, the three stations, Storfjord, Finnsbu and Torgilsbu, were visited by an expedition on board S/S *Signalhorn*.

Twenty Norwegian hunting parties will be at work in the region between Davy Sound and Dove Bay during the winter of 1933–34.

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

A full report of this expedition up till May, 1933, was published in *The Polar Record*, No. 6. There is no need, therefore, to recapitulate; it merely remains for us to continue the account from the point reached in the last issue of the Journal.

On June 13 Dr Belknap, Mr Demorest and Mr Schmeling started on

a journey onto the ice-cap, with the object of establishing a meteorological station for observations in connection with the proposed Arctic Air Route, and also the expedition's part in the programme of the International Polar Year. Fifteen dogs were taken, and the equipment carried on two sledges. For the first 6 miles of the journey the party travelled over the sea-ice, but this was found to be breaking up, and a hasty return to the land was carried out, fortunately without accident. The same difficulty was experienced in crossing two other fjords on the route. Two land crossings and two fjords having taken four days to negotiate, the party reached, on June 17, a glacier which was thought to be the only route up onto the ice-cap for a stretch of 30 miles. The first few miles of this glacier were badly crevassed, and progress was also hindered by bad visibility and weather; and the fact that the party were running levels to determine accurately the elevation of the station to be established. The first 55 miles took ten days; but after this the weather improved, and the party for the rest of the journey were able to average over 30 miles a day on a good surface. A station was established in Lat. 74° 39′ N., Long. 47° 29′ W., 75 miles from the divide separating the east and west slopes of the ice-cap, and was named Camp Watkins, after the late leader of the Pan-American Airways Expedition to East Greenland. Here Dr Belknap was left, alone, to spend a month carrying out observations, and Mr Demorest and Mr Schmeling returned to the base with the dogs. The first part of their return journey was covered rapidly, the total mileage for the first two days being 56 and 73 miles respectively; but 30 miles from the edge of the ice-cap crevasses and thaw streams made progress extremely difficult. It was found impossible to return by the same route taken on the outward journey, so the party turned north skirting the edge of the Cornell Glacier, which is one of the most active in North Greenland, and the last two days before reaching the coast were spent in a maze of crevasses, down which the dogs fell frequently. Land was reached on July 7, and here the party had to leave their sledges and carry out the last 5 miles of the journey on foot. The base was reached on July 8.

Dr Belknap made meteorological observations at Camp Watkins until August 19. The weather at first was fine, but on July 11 a storm began, which lasted until July 28, and which was characterised by south-westerly winds reaching a velocity of 30 m.p.h. with gusts of 45 m.p.h.; although the prevailing winds in this area were believed to be from the east, with clear calm weather. At this time Dr Belknap had a severe

attack of snow blindness. A fine period followed, however, and Dr Belknap was able to dig out his tent, and build a cairn to guide the relief party, which was due the first week in August. On August 3 bad weather again set in, and with the disappearance of the midnight sun on August 10, the first signs of winter made Dr Belknap eager for the arrival of the relief party, his knowledge of the difficult conditions likely to be encountered at the edge of the ice-cap making him anxious as to their safety. He determined to leave the station as soon as possible, and go to meet them. A renewed attack of snow-blindness, however, and a storm which began on August 11, and lasted for five days, prevented a start being made until August 19 when the relief party was more than a fortnight over-due. Meanwhile Dr Belknap made a small sledge out of extra skis and a wooden box, and also, having no compass, a rough sundial with which to navigate. He took with him a tent and sleeping bag, and food for thirty days. For the first two days his progress was very slow. The surface of the ice-cap was covered with 6 in. of soft snow, on which skis were useless, and at the end of the second day Dr Belknap had covered only 12 miles. On the third day, however, to his great relief, he met Mr Demorest and Mr Schmeling, on their way to Camp Watkins to fetch him. The next day, Mr Demorest with his dog team went on to Camp Watkins to recover the rest of the equipment, and on his return the whole party set out for the base.

During Dr Belknap's absence at the ice-cap station, Mr Demorest and Mr Schmeling had been prospecting routes up onto the ice-cap in order to find a better ascent for their second journey to Camp Watkins in August. It was finally decided to start from a land mass between the Ussings and Cornell Glaciers, 50 miles from the base. A motor-boat was lent by the Danish officials at Upernivik, and the equipment and dogs transported to this point early in August. The ice-cap was reached after a climb of 1500 ft. through a steep-walled canyon, and a start made over the ice-cap on August 6. Progress at first was very slow owing to thaw streams, but on the third and fourth days conditions improved, and the party were able to cover 26 and 30 miles respectively. On the fifth day a blizzard began, which lasted five days, and left a bad sledging surface of deep soft snow. The party had been rationed for only sixteen days, and this delay meant a shortage of both man and dog food, and the condition of the dogs declined rapidly. Three days later, however, the party met Dr Belknap, and the three men set a course for the base. The return, with weakened dogs, and the further handicaps of bad

sledging conditions and short rations, took considerably longer than the outward journey. On September 7 the party had only eight dogs left out of a team of fourteen, and were forced to make a depôt of various instruments in order to lighten the sledges. Only 7 miles were covered that day, as the party had reached the badly crevassed area fringing the ice-cap, and bad visibility forced them to camp and wait for better conditions. The next day, the weather had improved, and 20 miles were covered, the party reaching the head of the Cornell Glacier. Lower temperatures had improved travelling conditions, and the next day the land was reached, and a depôt discovered on the shores of the fjord, placed there by the Danes from Upernivik. A motor-boat, sent by the Danish officials at Kraulshavn, picked up the party two days later.

During these journeys the party at Peary Lodge had also been carrying out scientific work of various kinds. The botanist, Mr Gardner, made a comprehensive collection of the flora of the region. Glacier measurements were made, and it was found that the Cornell Glacier had not moved since November, 1932. This was expected, as there was heavy sea-ice round the foot of the glacier. During these investigations the party found a note, written by Professor Tarr of the Cornell Expedition of 1896.

A sounding machine had been taken for measurement of the thickness of the ice-cap, but the results were unsatisfactory, owing to the low temperatures.

The expedition has now returned to Michigan, having caught the last boat from Upernivik to Copenhagen.

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

News of the work of the German station on Kajartalik Island, Arsuk, South-West Greenland, during the closing months of the Polar Year has been received from the *Archiv für Polarforschung*, Kiel, which was responsible for setting up the station.

In the spring of 1933, the party, consisting of Dr Max Grotewahl, and Dr Kern, was increased by the arrival of Dr Burkert and Herr Albrecht, both of Berlin, who left Copenhagen for Greenland on May 6, 1933, travelling on board S/S *Hans Egede*. They landed at Sukkertoppen, and tried to reach their destination by motor-boat by way of Godthaab; but ice conditions rendered this impossible, and they were forced to return to Godthaab to await a better opportunity. Finally they were able to reach Ivigtut on board S/S *Disko*, and they eventually arrived

at Kajartalik by means of small boats; their equipment being transported by umiak.

The programme of observations for the summer was similar to that carried out during the winter which was described in *The Polar Record*, No. 6, with some additions. Dr Burkert took charge of photography, and obtained interesting photographs and films of the moon; a series of coloured and infra-red photographs were also taken: and later in the year, photographs of the aurora. Several journeys were made in order to carry out terrestrial magnetism observations and measurements in the districts surrounding the station; and Dr Grotewahl visited Fredrikshaab on board S/S *Erik Raude* in order to ascertain the best sites for magnetic observations, returning in a small boat. A similar journey, lasting four weeks, was undertaken by Dr Grotewahl, Dr Burkert, and Herr Albrecht, during which magnetic measurements were made in the district between Kajartalik and Julianehaab along a stretch about 150 miles in length, the party travelling in small boats and sleeping in a tent at night. Terrestrial magnetism observations were also made at twelve points between Fredrikshaab and Julianehaab, as well as at Kajartalik itself. At all these magnetic stations the declination was obtained, and at five of them the horizontal intensity and inclination as well.

Other work included determinations of the number of particles of dust per space unit by means of an instrument designed by Professor Heymann. The party also collected earth and mud samples; and samples of the stomach contents of birds and fish, and bacteriological observations were made.

Dr Grotewahl and Dr Kern returned to Europe on board a ship belonging to the Cryolite Mining Company, S/S *Julius Thomsen*, at the end of September, 1933; the rest of the party following on board the same ship in mid-November.

Dr Therkel Mathiassen's work in West Greenland, 1933.

In continuation of his previous archaeological work on Greenland (Upernivik, 1929; Sukkertoppen, 1930; Angmagssalik, 1931–32), Dr Therkel Mathiassen was at work during the summer of 1933 on the excavation of ancient Eskimo settlements in Disko Bay, West Greenland. He was assisted by Mr Erik Holtved.

Having visited about thirty ruined villages in the Christianshaab and Jakobshavn districts, Dr Mathiassen reached his main objective, Igdlutalik, a small island near Torsukatak Fjord: and started investigations

of ten house sites and forty ancient graves. The site appears to have been inhabited at two different periods during the last two centuries before the Danish colonisation (1740); and also in very early times from the first Eskimo migration into the country. In the middle of June, 1933, when this report was sent to us, Dr Mathiassen had already collected about 500 specimens and 40 skeletons. He proposed moving north at the beginning of July; and hopes to continue his work in 1934 in the Julianehaab district.

Dutch Aerological Station, Reykjavik, 1932–33.

A full account of the work of this station up till May, 1933, appeared in *The Polar Record*, No. 6. The following report on the last few months at the station has been received from the President of the Dutch Polar Year Committee, Dr H. G. Cannegieter.

The party report that the weather experienced in Western Iceland from April to August, 1933, was not good; consisting of long overcast periods with continuous low cloud, which prevented flying. On clear days, however, the visibility was very good indeed, and from a height of 19,000 ft. it was possible to see the mountains of Greenland. The coldest weather was experienced at the beginning of April, with temperatures down to −40° C. at 16,000 ft. The mean summer temperature was similar to that in May and October in temperate regions. Round about mid-summer the atmospheric conditions were sometimes remarkably constant for periods of ten days or more. From July 19 to 29 ground temperatures of 12–15° C. were registered; with a constant temperature of −20° C. at 16,000 ft. during the same period. The lowest temperatures in July and August were 1°·3 C., at 3200 ft.; −11°·1 C., at 9800 ft.; and −23° C., at 16,000 ft., the highest being 12°·4, 4°·4 and −6° C., at the same levels.

After the last snowstorm in early April no more storms were experienced until the first autumn snowstorm at the end of August. During the summer ice crystals were observed in the clouds at heights of 6500 and 16,000 ft.

During the whole year 330 flights were made on 261 days. On clear days several pilot balloons reached the stratosphere. Sometimes exceptionally strong winds were observed above 9800 ft.

Dr Cannegieter himself was at the station from July 17 to August 12 conducting research into the stratosphere. From July 21 to 31 and on August 9 and 10, seventeen ascents were made with Moltschanoff radiosondes. Three of the seventeen instruments dropped when the balloons

burst were found and sent back to Reykjavik, and as a result of fourteen ascents, the temperature up to the stratosphere and also within it, could be measured. The highest ascent reached about thirteen miles. The mean height of the tropopause was found at 29,000 ft. The mean temperature at the beginning of the stratosphere was $-49°{\cdot}5$ C., varying between $-55°$ C. and $-46°$ C.

The expedition left Iceland on September 15, and reached Holland on September 22. The observations were carried on up till August 31, the closing date of the International Polar Year.

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

The two members of the Danish-Swiss Polar Year party,

M. Th. Zingg, Switzerland, leader, meteorologist,
M. Jensen, radio operator,

who spent a year on Snaefellsjökull (4920 ft.) on the west coast of Iceland, have now returned to Switzerland and Denmark respectively. The following report of their work during the last months of the Polar Year has been received from Professor P.-L. Mercanton, of Lausanne.

The party state that at the station, which was built on the east side of the mountain, on a small crater, at a height of 2600 ft., the drifts reached a depth of 19 ft. during the winter. By the beginning of May the snow had begun to melt, and no more fell after the middle of June. During the summer the rainfall was very heavy, and throughout the year the numerous clouds which enveloped the station proved a great hindrance to the observations. When the station was free from cloud, the visibility was very good; and it was possible to see about 30 miles further than from lower down the mountain, where it was very often misty below 900 ft.

The meteorological observations at the station were carried out regularly with satisfactory results, and were concluded on August 31. Cloud observations were made by the party throughout the year. During the summer wireless reception was found to be poor, and communications with the Greenland stations in particular were much more irregular than at other times. The radio station at Snaefellsjökull ceased to function at the beginning of August.

During the summer M. Zingg accompanied the Icelandic glaciologist, Herra J. Eythorsson, on an investigation of the Snaefellsjökull ice-cap; and assisted him in continuing a series of glaciological observations begun in 1930. It was found that the margin of the ice-cap had receded

about 400 ft. in three years. The ice-tongues had also receded about 16 ft., and showed hardly any superficial moraine. The large depression in the cape to the north of Snaefellsjökull was discovered to be a glacial cirque, and not a crater filled with snow as had been previously supposed. The party also report that the edge of this cape had retreated one-third of a mile. M. Zingg, who is also a geologist, took the opportunity of studying the structure of the mountain during this journey, and of making a collection of rock specimens.

The party evacuated the station at the end of August, and managed to transport their equipment to sea level in a fine interval between two periods of bad weather. They reached Reykjavik on board a coastal steamer, S/S *Bruarfoss*. The hut, together with its fittings, has been sold to the Iceland Tourist Association, to be used as a shelter for parties making the ascent of the mountain.

On reaching Reykjavik, M. Zingg visited Drangajökull, Isafjordur and Reykjanaes in company with Herra Eythorsson. He then returned to Switzerland by way of Bergen, and Copenhagen. M. Jensen, meanwhile, had reached the Faroe Islands on his way to Denmark.

In connection with this station we have been asked to correct a misstatement which appeared in the last number of this Journal. The Joint Director of the undertaking with Professor P.-L. Mercanton was Dr D. La Cour, the Director of the Meteorological Institute of Denmark, and not Dr Thorkelsson of Reykjavik, as reported. Dr Thorkelsson had originally hoped to take part in the management of the station, but owing to the financial condition of Iceland at the time, this proved impossible. We had not received the news of his withdrawal when going to press, and must apologise for this inaccuracy.

Miss Smith's Expedition to Vatnajökull, Iceland, 1933.

During the summer of 1933, Miss F. J. Smith made a journey round the margin of Vatnajökull, the largest ice-cap in Iceland.

Leaving Reykjavik at the end of June, Miss Smith reached Gardsanki by car. This is the easterly limit of the road, and here she was joined by three Icelandic guides, with fourteen ponies. The journey was continued by way of the southern margin of the ice-cap following the south coast. Some difficulty was met with to the north of Vatnajökull, especially in the crossing of the rivers, which were rendered more difficult to negotiate by the presence of blocks of ice carried down from the ice-cap. The largest river took forty minutes to cross. Only one river, the Kreppa, was found

to be unfordable, and a detour was made northwards to avoid it, during which it was necessary to cross the lava desert of Ódáðahraun. On one occasion the ponies were fifteen hours without water, and twenty hours without rest, owing to the long distances between the oases. The maps of the district were also found to be unreliable, which delayed the party. In the course of the journey some time was spent on Brúarjökull, a northern lobe of the ice-cap, following up the tributaries of the River Jokulsá-á-brú. The party reached Ásar, their destination, twenty-nine days after leaving Reykjavik.

Volcanic Activity in Iceland, 1933.

A communication from Reykjavik informs us that there has been renewed volcanic activity in Central Iceland, during November and December, 1933. In November a terrific explosion in the centre of Iceland was heard by farmers living in the north-eastern districts, and the next day, great tongues of fire were seen a long distance away in the barren regions of the interior. The focus of eruption is not known exactly, but it is either in the neighbourhood of Trölladyngja-kistufell or in Vatnajökull itself.

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

News of the work at the Austrian station on Jan Mayen during the closing months of the International Polar Year has been received through the kindness of Professor Schmidt of the Meteorological Institute, Vienna.

The party, consisting of three men,

Dr HANS TOLLNER, leader,
Dr RUDOLF KANITSCHEIDER,
Herr FRITZ KOPF,

arrived at the island in June, 1932, and a base was set up in Jameson Bay on the south-east coast, at the reserve house of the Norwegian Meteorological station, and about 3 miles from the site of the Austrian station during the first Polar Year.

Work during the year was much impeded by frequent gales and storms, especially in the early spring during the period from February to May, 1933. Certain of the magnetic instruments were thrown out of action on several occasions by magnetic storms. Full terrestrial magnetism observations were, however, carried out, in spite of obstacles, from September, 1932, to August, 1933, two quick run magnetographs being used. The work included the taking of observations corresponding to those made fifty years before by the Austrian party during the First Polar Year. This was carried out during April, 1933, at the site of the Polar Year station of 1882–83 on the north-west coast of the island.

Astronomical observations were also made, both at the new and the old stations.

Other work included the visual observations of aurora, of which the best displays occurred at the same time as the magnetic disturbances, between February and May, 1933. Meteorological work was also done.

Geological, botanical and zoological work was carried out when the weather permitted, and the resulting collections are to be presented to museums in Vienna.

Life at the station was passed without serious incident, and the party received much kindness from the Norwegians at the radio stations. On one occasion two members of the party were forced to spend a night in the open during a gale, but no serious consequences resulted.

The party concluded their observations in July, 1933, and by the beginning of August had returned to Austria. It was feared that if the expedition delayed its departure, bad weather might make it impossible to leave the island.

Meteor Expedition to Iceland and East Greenland, 1933.

Following upon similar expeditions carried out since 1928 under the auspices of the Deutsche Seewarte, Hamburg, a party on board the survey vessel *Meteor* was at work from August 7 to September 23, 1933, carrying out an oceanographical investigation of the currents in the region between North Iceland, Jan Mayen and Scoresby Sound, East Greenland. The personnel was drawn principally from the staff of the Deutsche Seewarte, and was as follows:

Professor Dr B. SCHULZ, leader.
FRIEDRICH, mechanic.
Dr FRIESLEBEN.
Dr K. KALLE.
Dr MEYER, meteorologist.
Dr F. ZORELL.

During the course of the expedition twenty-nine oceanographical stations were made, 2–2½ nautical miles apart, and a series of soundings taken. As a result of this work it has been found that the Reykjanaes Bank, which previous expeditions had already shown to be connected with the mid-Atlantic Ridge, is situated to the north-east of Jan Mayen. A meteorological programme, including pilot balloon ascents, was also carried out, and six ascents were made with radiosondes.

The expedition touched at the following places: Reykjavik, Isafjordur, Akureyri, in Iceland; and at Jameson Bay, Jan Mayen. The ice prevented any landing in Scoresby Sound.

THE ESKIMO KAYAK

Seal hunting by means of the kayak and harpoon is an essential feature of Eskimo culture, especially in those regions where the occurrence of moving pack-ice renders other forms of hunting the seal difficult or impossible.

Their ability to construct and manage this type of boat has long been a source of wonder to Europeans, who have been content until quite recently to consider the art of kayaking as unattainable by them, and indeed unnecessary.

The successful use of kayaks on the two Watkins expeditions to East Greenland has now introduced a new element in arctic exploration, and has made the ability to use a kayak a useful addition to the qualifications of a polar explorer.

It has been found that Europeans can become as expert in the management of a kayak as the Eskimo, and that by making use of the native method of hunting, it is possible to "live off the land" to an extent never dreamed of by earlier explorers. But the experience gained during the British Arctic Air Route Expedition has shown that it takes a long time to learn kayaking in cold water, and it also takes a long time to have a kayak built. The purpose of this article, therefore, is to give instructions for the building and management of the kayak for the benefit of those making use of that form of boat for expeditions in the future.

Before the British Arctic Air Route Expedition (1930–31) demonstrated the value of learning the art of kayaking, the only Europeans to attempt it had been Nansen and his companions after their crossing of Greenland in 1888, whilst waiting at Godthaab for transport back to Norway; however, they never mastered the art of rolling, and when hunting always made use of an outrigger, to prevent any possibility of being overturned. Kayaks were also used by Nansen and Johanssen during their famous journey from the *Fram* in 1895–96. These were built on board the *Fram*, bamboo being used for the framework. They were covered with sailcloth, caulked with crushed pastel and train oil and finished off with stearine, pitch, and resin. Food was stored in bags inside the kayak, raised slightly on bamboos. These kayaks were 12 ft. long, 3 ft. wide, and 18 in. deep. They were carried on the sledges by the two men until they were forced

to continue the journey by water. Usually the two kayaks were lashed together, and a sail set, and the sledges lashed broadside across the two.

The first mention of the Eskimo in European literature occurs in the *Íslendingabók* of Ari Thorgilsson inn Frodi (1067–1148), in the account of the discovery of Greenland by Erik Raude as quoted by Dr Nansen in *In Northern Mists*: "As early as Erik's first voyage to Greenland they found at once dwelling places both in the eastern and western settlements, and fragments of boats and stone implements, so that from this it can be seen that over the whole of that region there had been present the same kind of people who also live in Wineland and who are the same as those the Greenlanders call Skraelings." In the sagas there is little mention of the Eskimo, from which it has been deduced that the Norsemen did not actually meet with the natives of the country, until later, when on longer journeys to the north, they encountered them in the neighbourhood of Disko.

Eskimo kayaks and the method of rolling them were first described in modern times by Hans Egede in 1745:

> Now, as to the Greenland boats, there are two sorts of them; the one, which the men alone use, is a small vessel, sharp and pointed at both ends, three fathoms in length, and at most but three quarters of a yard broad with a round hole in the midst, just large enough for a man's body to enter it, and sit down in it, the inside of the boat is made of thin rafts tacked together with the sinews of animals, and the outside is covered with seal-skins, dressed and without hair; no more than one can sit in it, who fastens it so tight round his waist, that no water can penetrate it.... They do not fear to venture out in them in the greatest storms...though they may happen to be upset, yet they easily raise themselves again with their paddle; but if they are upset unawares (as it often happens) and the boat be not close and tight about their waist, they are inevitably drowned.

It is believed that the kayak has changed very little for many centuries. Few relics of kayaks are ever found, however, and we are thus ignorant of the different stages of their evolution. Possibly the earliest complete specimen of a full-size kayak now extant is the one taken in the North Sea in the eighteenth century, and now in the Anthropological Museum of Marischal College, Aberdeen. Its capture is described in *A General Description of the East Coast of Scotland*, by Francis Douglas, published in Paisley in 1782, as follows:

> ...a canoe, taken at sea, with an Indian man in it, about the beginning of this century. He was brought alive to Aberdeen, but died soon after his arrival, and could give no account of himself. He is supposed to have come from the Labradore coast, and to have lost his way at sea.

The occupant of this kayak and other men like him, who occasionally appeared on the shores of the Orkneys and the north coast of Scotland

were given the name of "Finnmen" by those who saw them, but it is now proved by an examination of the kayak and the hunting equipment taken with it, that it must have come from the east coast of Greenland, somewhere along the stretch between Angmagssalik and Kangerdlugsuak. This is proved beyond doubt by the harpoon, which is of the type used to this day by the older generation of hunters at Angmagssalik.

The kayak varies very much according to locality. The Labrador and South Baffin kayak is very big and heavy, with a broad level stern and a long peaked stem; some of the older models have the stern slightly turned up. The Mackenzie River model turns up in a half moon shape at stem and stern, which is said to be also a characteristic of the old type of East Greenland kayak. The Alaskan kayak turns up at the stem, but slopes down a little at the stern. The paddles vary also according to locality. The double paddle used by all Eskimo east of the Mackenzie was probably developed from the Indian single-blade paddle, a pattern still used by the Eskimo of Southern Alaska. In the Yukon district both forms of paddle are to be found.

The kayak is still used by the sea-hunting Eskimo throughout the Arctic, although along the Alaskan and part of the Canadian coast, it is giving place to the various types of wooden boats which have been introduced by Europeans. It is in the comparatively ice-free waters inhabited by some of the eastern Eskimo that the kayak has reached its highest state of proficiency both in construction and use.

The best kayak men are to be found in Greenland, possibly those inhabiting the country in the vicinity of Cape Farewell, in the extreme south of the island. These men spend the greater part of the year in their kayaks, exposed to the bad weather and stormy seas of the North Atlantic. They have, therefore, evolved a different kayak technique from the people inhabiting the more northern parts of the Eskimo territory, where the kayak can only be used for a short part of the year, and where big seas, like those of the North Atlantic, are not common. The rest of the people of Greenland, except those of Thule, are not far behind the southerners in their skill.

Although the kayak is still used extensively on the west coast, it is no longer the main part of the material culture, as it is on the east coast. The west coast people have been in constant communication with Europeans ever since 1721 when Hans Egede and his wife Gertrud Rask made their home not far from the place where Godthaab now stands. These people, under the careful administration of the Danes, have

gradually adopted European civilisation and have, to a certain extent, given up their old hunting methods. But the east coast people did not come in contact with the Europeans until the arrival of Lieutenant G. Holm at Angmagssalik in 1884. As this article is dealing with the utilisation of the kayak in exploring, it is these people of South and East Greenland and their modern use of the kayak, who are most interesting, as their methods of seal-hunting and travelling in summer could be modified to meet the conditions met with in other parts of the Arctic, whereas the more northern kayaks and hunting methods could not be so readily adapted to deal with varying conditions.

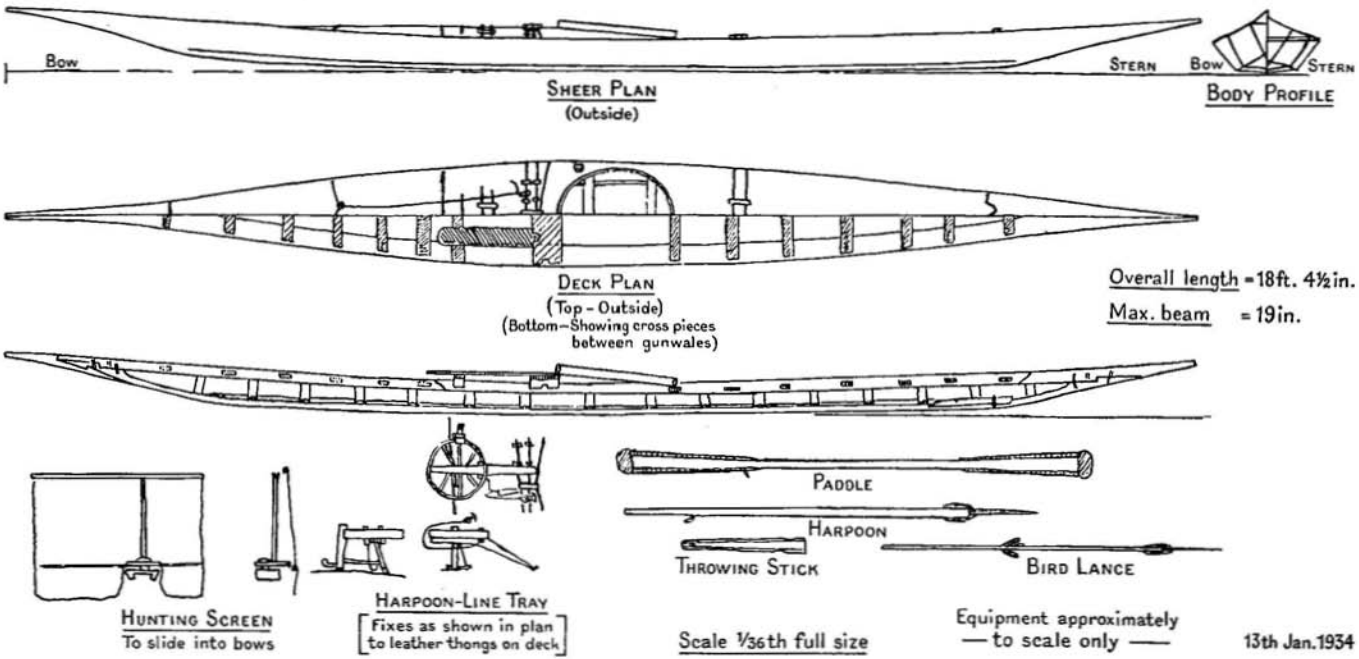
While the present form of administration continues in East Greenland, the art of kayaking can never die out, as the people are not allowed to become dependent on the importations of the Europeans; they are still self-respecting hunters, supporting themselves and their families by hunting by their old methods, which are very much better adapted to their particular conditions than anything which they can learn from the white man. The only modern addition to their hunting equipment is the rifle. This is not nearly as important as it sounds, when dealing with summer hunting, although it has had a great influence on the winter hunting methods.

All the Eskimo carry rifles on their kayaks, but in the summer a seal will sink as soon as it is dead. The hunter must therefore get within harpoon range before attacking it, and many of the more expert hunters will harpoon their seals immediately without shooting them first.

Seals are nearly always too shy for it to be possible to get within harpoon range from any kind of boat other than a kayak. This of course applies to coastal hunting in open water, and not to the hunting of bladder-nose seals while lying on the pack-ice, as is done by Norwegian and Newfoundland sealers.

As any person proposing to live off the country in the north will meet with the coastal conditions rather than the pack-ice conditions, it is absolutely necessary for him to learn the use of the kayak and Eskimo hunting methods.

The advantage of this is made apparent to any person reading the history of exploration in the north, with its long list of tragedies and sufferings, most of which could have been avoided if Eskimo living and hunting methods had been adopted.



LINES OF A KAYAK FROM ONE BUILT BY AN EXPERIENCED ESKIMO

The Construction and Management of a Kayak.

There appears to be nothing in literature on the art of making and using a kayak, but owing to an interesting series of events in Cambridge, *The Polar Record* is able to print instructions on these points.

In January, 1933, Mr Augustine Courtauld of the British Arctic Air Route Expedition kindly presented his Eskimo kayak to the Institute, and a few days later an undergraduate of St John's, J. I. Moore, asked if he might take measurements of it in order to make one of his own. He had finished it by mid-February, using oiled canvas instead of sealskin.

There was no one in Cambridge who could teach him how to roll it when made, so he proceeded to interpret the short description of rolling, printed in *Northern Lights* (narrative of the British Arctic Air Route Expedition), as best he could. Constant practice in the Cam, in the arctic weather of Lent Term, assisted by B. B. Roberts and C. Bertram, enabled him to devise a means of rolling, not quite the same way as the Eskimo use, but efficient enough. They went further still, and taught themselves to execute the roll with the throwing stick instead of the paddle, and finally with the hand alone, a feat which only a very few of the Eskimo can manage.

In October the returned members of the late Mr Watkins' Lake Fjord Expedition, who are skilled kayakers, were in Cambridge, and were much interested to hear of the local developments. They brought their Eskimo kayaks and, together with Moore, they spent many hours on the river, comparing styles. "Slow motion" films were taken of the different methods and of the trick rolls, and as these were mostly taken from a high diving board, they show, better than any diagrams or verbal description, the movement of the paddle in the process of rolling.

It is from the notes and drawings of Moore, in consultation with Mr John Rymill, that the editor has compiled the following instructions on building and using the kayak.

Building a Kayak.

The Eskimo builders, dependent as they are on what drift wood they can find, use some very skilful jointing, and as few lashings as possible, the framework being held together to a large extent, by the tautening of the sealskins which are put on wet, dried to secure contraction, and then treated with blubber and fat. They use no measurements, all the

dimensions being estimated by eye, and on account also of the comparative scarcity of wood, no two kayaks are exactly alike. The best kayak made for Mr Rymill was made from the wood of a large packing case. Since the kayak must be a close fit for the user, it is always made for a certain man, and for this reason also the ordinary European, larger and more rigid of leg than the Eskimo, cannot get into one made for an Eskimo, and has to have one specially built for him.

The details of the construction of Moore's kayak from the measurements of the Eskimo one, are too long and technical for printing in full, but are available for consultation and copying at the Institute. It must suffice to say that it followed closely the Courtauld kayak. This kayak, however, was built by a young Eskimo in Sermilik Fjord, and is not a very good example. There are now four other kayaks at the Institute of much better modelling. Moore's kayak cost just over £3, for materials, hire of boatbuilder's quarters, use of tools, etc. The lines of a better kayak, as drawn by Moore, are shown in the accompanying diagram.

Rolling the Kayak.

It must be explained at once that the term "rolling the kayak," used to describe the action of setting the kayak upright again after a capsize is an unfortunate one, implying as it does that the process consists of the man sweeping round under the water, and using such momentum as might be attainable to aid in righting himself.

In practice the property of momentum does not come into the matter at all, and it is actually easier to pause in the upside-down position before making the motions for righting oneself, and it should be possible to come up in the same direction as that from which the capsize took place.

It is very easy to forget that the art of rolling the kayak, so often practised as a trick, is indeed the essence of kayak hunting, since without ability to right the kayak, the hunter would be drowned at the first accidental capsize. Strangely enough, many of the Eskimo themselves never learn to roll, and need always to hunt in couples, one man to rescue the other if necessary. It is estimated that more than half the deaths among the Eskimo men in East Greenland are due to drowning in kayaks.

The secret of successful rolling appears to be to regard the kayak as part of oneself and to keep one's head in whatever position one gets into. A good example of this ability is shown by an occurrence witnessed by

J. Rymill last summer. He had lent his shotgun to a skilled hunter, who was accustomed to a rifle, but had never used a shotgun before. He went out in his kayak and took his first shot at a bird, at an angle which would have been safe for a rifle, but which was too wide for the kick of a shotgun, and he immediately capsized. When he found himself upside down, he unbuttoned the special bag on the kayak for the gun, slipped it in and buttoned it up again, and then took the paddle from its fastening, and rolled himself upright again, not in the least disturbed, except that the lighted pipe, which had been in his mouth, was, naturally enough, extinguished.

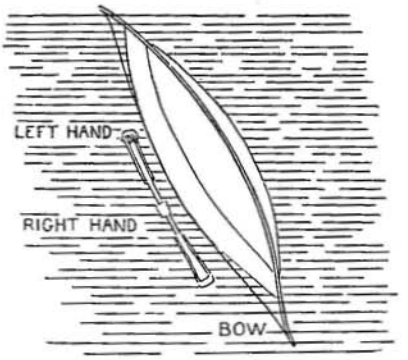
Before attempting to learn to roll, it is as well to become accustomed to paddling the kayak about, getting used to the "feel" of it, and experiencing its comparative stability when the paddle is held resting on the surface of the water, or clipped under the thongs in front of the ring, and sticking out at right angles to the line of the kayak.

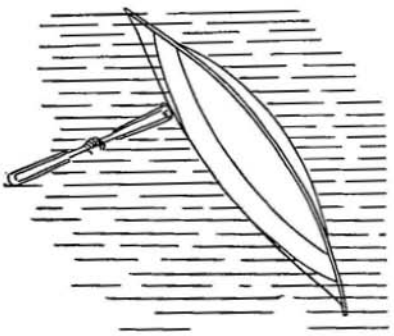
The actual movements during the roll are decidedly difficult to put into words, and they can be varied within limits, but an attempt will be made here with the aid of the diagrams, to describe the method used by Moore, with an appendix by Rymill on the Eskimo method.

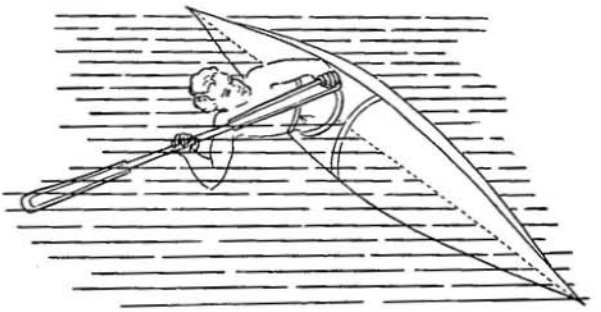
The position before the roll is commenced is shown in Fig. 1, the paddle held at or near the end with the left hand, and at the centre with the right hand. The left hand is kept close to the left hip in this and the later positions. The body is twisted round with the right shoulder well forward so that the kayaker is facing sideways.

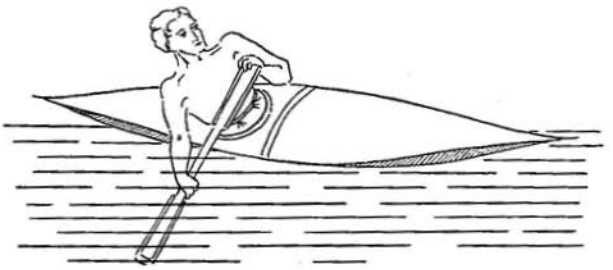
The kayak is then capsized by leaning to the side, and the position of body and hands remain the same until the kayaker is completely upside down and the paddle is at or above the surface at the other side. The paddle is then turned in the hands so that its broad face is parallel to the surface of the water as in Fig. 2, and then, pivoting it in the left hand on the hip as before, it is swung out from its position until it is at right angles to the kayak. The body is still twisted to face the paddle side. The paddle is then pulled sharply downwards and slightly backwards, through the water, with the right hand, the body at the same time being turned to face the front of the kayak. Perhaps a better description of this movement would be to say that the paddle, with its temporary resistance against the water, is used as a support by which to hoist the body round into the vertical position.

As this sweep is carried out, the body is thrown backwards as in Fig. 5, so as to lessen the resistance to the water about the point of buoyancy.









ROLLING POSITIONS

The Eskimo Method.

The roll just described is the easiest to learn, but is not steady when the kayak is capsized in a big sea. The best way of righting the kayak in this case is the "storm roll," which is done as follows.

When the kayak is upside down, the body is bent as far forward as possible until the head is a few inches from the deck of the kayak, and this position is kept until the kayak is upright again. The paddle is held near the end in the left hand, and at the centre with the right hand, the paddle lying flat against the side of the kayak and parallel to the surface of the water. The left hand is then pushed as far forward and upwards as possible, while keeping the back of the paddle flat against the kayak until the fingers of the left hand rub against the bottom of the kayak. While the left hand is being pushed forward, the right hand is brought back over the head. This may all be described as the first movement. The second movement is pulling the paddle sharply to the right with the right hand, and raising the left hand until it is level with the deck of the kayak. The kayaker should then be in an upright position with the body bent well forward.

Besides these utilitarian rolls there are a number of trick rolls, which may be rarely or never used, except as a form of competition, but the achievement of which must all add to the sense of security against any form of capsize. The most difficult of these is to right the kayak by using the hands alone.

It is not generally realised how extraordinarily seaworthy a kayak is, and that it can survive weather too bad for ordinary boats, provided the kayaker himself is capable of the necessary endurance, and has a reasonable degree of skill. A few instances are therefore appended in proof of this fact. The most compelling evidence is the journeys of Eskimo from East Greenland to the Orkneys and Aberdeen in the seventeenth and eighteenth centuries. Food and water for at least ten days can be easily carried, although the kayak weighs only thirty or forty pounds. Rest is obtained by inserting the outer end of the paddle in a special fastening of the bladder used in harpooning seals, and using it as an outrigger, or even using a second piece of wood like a paddle at the other side. This arrangement renders the kayak steady enough for the man to recline. In a heavy sea the waves wash right over the kayak itself against the man's body, but beyond wetting his face, this does not seriously inconvenience him.

Two anecdotes to confirm this seaworthiness can be cited. In 1931 when at Cape Farewell, H. G. Watkins met an Eskimo who had just returned from being blown out to sea for four days in a phenomenal storm. He was much exhausted, because he had to roll constantly due to capsizes from waves which were curling so high that they threw him over endways.

A better instance still is a journey from Cape Dan to Angmagssalik last summer by two Eskimo and F. Spencer Chapman in kayaks. The sea was so high that a 100-ton Norwegian vessel put into the fjord for shelter, and the sea-going motor-boat belonging to the expedition could not attempt the journey. It took the kayaks a longer time to do the distance than the normal six hours but, except for the endurance required, there was no danger. Chapman had to roll once during the period, but his capsize was due more to a defective glove than to the particular wave which threw him over.

There is, therefore, a great deal to be said for the partial adoption of the skin kayak as an accessory to polar exploration in certain areas of the Arctic.

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

The British Polar Year party continued to carry out observations until August 31st, 1933. Before the spring "break-up" made ice travelling impossible, Grinsted went down to the Old Fort for two weeks, and further auroral photographs were taken. All the auroral photographic plates were developed by the end of April, a total of 1570 plates, representing 4710 pairs of exposures.

After the end of March, with rapidly increasing daylight, the auroral watch became much less strenuous. Photography being no longer possible, only one man was required on late duty, so that there were always four on day duty, making the computing work which is done in pairs much simpler and quicker. Apart from the regular routine observations, most of the time was spent in computing, and the reading of charts. During the winter, owing to the dryness of the atmosphere, and its effect on the charts, the magnetograms were stored in damp chambers, and handled as seldom as possible. When conditions became suitable, therefore, there was almost a whole year's set of charts to be read, which, together with the other work, kept the party busy right up to the end.

The "break-up" came later than was expected. Planes from the south continued to use skis until April 27, when the river "went out" at McMurray, ten days later than in the previous year. At Rae the ice remained until much later. During early May there was a good deal of "overflow" water on the ice, which later disappeared as the ice lifted. Travelling on the ice was still possible in the third week in May. The first rain fell on May 4, but it was not until the end of the month that any considerable fall occurred. Then, continuous rain, together with a strong wind, lasting two or three days, caused a great deal of the ice to break up and disappear. For some time it had been in a "candled" state, though still 2 or 3 ft. thick. If left stationary, candled ice remains intact for a long time, but once it is subjected to any movement the candles very easily become separated, and jostling against one another, rapidly melt away. By June 2 there was sufficient open water for a plane to alight with floats. It was not till June 23, however, that the first boat came in from Fort Resolution, and even then there was still a lot of ice in the main lake.

During the summer parties went down twice to the Old Fort, for periods of ten and six days respectively, in order to carry out further magnetic observations, and astronomical observations for determining azimuth and longitude. The latter was required in order to determine the length of the photographic base, between the Old and the New Forts, a length subsequently determined to be 14·8 miles.

On the whole, the summer of 1933 was less pleasant than that of 1932. Occasionally the temperature rose to between 70° and 80° F. in the shade, but usually, and especially towards the end of August, the weather was cold, wet and windy. Towards the end of August, the auroral watch again began to take up more of the party's time, and in the last week the aurora was active from 9.30 p.m. to 3.30 a.m., the party made notes every five minutes, but no photography was done.

The routine life was interrupted now and then by unexpected happenings. On one occasion two members of the expedition, whilst following three moose in order to photograph them, discovered that candled ice, though 3 ft. thick, was not so substantial as it looked. They were safely extricated, wet and dripping, by two other members who were following them. On another occasion while Morgans was preparing to generate hydrogen, not having actually begun, there was a loud report, a splintering of glass, and the roof of the hydrogen shed was lifted bodily into the air. A few seconds later Morgans walked out of the hut, to report that the only damage was that the hydrogen storing bag was now in shreds, and hanging from the beams of the erstwhile roof.

Observations were concluded on August 31. The next fortnight was spent in packing up the instruments and equipment. Five of the party flew out to Edmonton in a MacKenzie Air Service machine on September 14, reaching McMurray in six hours, but were unfortunately held up there for two days by bad weather, and finally reached Edmonton on September 17. Mr Stagg, the leader of the party, followed later.

Canadian Arctic Patrols, and Krüger Search Expeditions, 1931–1933.

The annual Eastern Arctic Patrol, organised by the Canadian Government, took place as usual during the summer of 1933, the expedition starting from Montreal on board S/S *Nascopie* on July 8. The party was much larger than that of previous years, and included a number of Government scientists and administrative officers of the Department of the Interior and the Royal Canadian Mounted Police. The personnel was as follows:

D. L. McKeand, officer-in-charge.
W. C. Bethune, assistant officer in charge.
Dr J. A. Bildfell, medical officer.
Dr H. C. Gunning, geologist.
A. Philip Norton, secretary and historian.
Dr M. O. Malte, botanist.
W. E. K. Middleton, meteorologist.
Dr Ivan W. Parnell, parasitologist.

Royal Canadian Mounted Police.

Inspector T. V. Sandys-Wunsch, in command.
Constable A. E. Fisher.
Corporal H. Kearney.
Corporal W. G. Kerr.
Constable S. S. Spalding.

After a call at Cartwright, Labrador, and at several places on both sides of Hudson Strait, the expedition set a course for Hudson Bay, where a visit was made to Charlton Island, at the south end of James Bay. The expedition then visited Churchill, afterwards calling at Southampton Island, and points on the southern shores of Baffin Island. The posts on Devon and Ellesmere Islands were then visited, and a call made at Robertson Bay, North-West Greenland, 50 miles south of Etah, to return the Eskimo who had been employed by the police in the search for Dr Krüger. This was the furthest north reached by the expedition, and was about 724 miles from the North Pole.

On the return journey southwards, Pond Inlet and the remaining stations on Baffin Island were visited, and the expedition, after calls at Port Burwell and Cartwright, reached St John's, Newfoundland, on September 27.

The party landed at each place visited, and carried out their various duties, whether of administration or scientific investigation. The Officer-in-Charge and his Assistant were primarily concerned with the condition of the natives, as regards health, sanitation, abundance or scarcity of wild life with its bearing on supplies of food, clothing and fuel; the state of the white communities at the posts and missions, and the general well being of the population. The work of the Royal Canadian Mounted Police is well known.

The expedition found that, generally speaking, the health of the population of the Eastern Arctic has been good: but on the whole the fur catch during the 1932–33 season was poor, and this, with the low price of pelts, had caused some hardship. Fortunately seal and walrus, on which the Eskimo depend largely for food for themselves and their dogs, and also to some extent for clothing, were fairly abundant. Walrus were caught much further south in Hudson Bay than is usual. The caribou

season opens on September 1, and those hunters who had returned to Pangnirtung when the expedition arrived there in mid-September stated that these animals were fairly plentiful, but, since at no other posts had the hunters returned, it was impossible to ascertain whether this condition was general. Lemming and Arctic hare were reported to be plentiful, which, according to past experience, indicates an improvement in the number of fox in the winter of 1933–34, and the following season.

The white whale season, which was over when the expedition reached Cumberland Gulf, Baffin Island, had proved to be an unusually good one. Pangnirtung is the centre of this industry, and from it the *Nascopie* carried a large consignment of rendered whale oil and whale hides.

To assist in preventing undue hardship, the Department of the Interior distributed 10,500 lb. of dried buffalo meat. Five hundred green buffalo hides were also distributed to those looking after Eskimo relief, at the various posts, to be issued to those natives who have an inadequate supply of caribou skins or other bedding. These supplies constitute a reserve which is only used to relieve destitution. The handling of Eskimo relief was reviewed during the past year by the North-West Territories Council for the Minister for the Interior, and it was decided that relief should be in the hands of the medical officer when present; failing him, by the Mounted Police, and when neither of these were available, it should be entrusted to the nearest missionary or trader. It was made clear to all that hunters are expected to provide for their families; it is only in the case of failure to obtain necessary supplies that relief is extended to alleviate suffering. The Department of the Interior medical officer, who acted as ship's doctor, visited all the sick at every post, and performed a number of operations. In their normal state the natives are nomadic, moving seasonally from sea-coast to inland hunting grounds, and this change of abode, combined with the different ways in which white men spell native names makes identification difficult. To overcome this, the police took finger prints of those persons treated by the medical officer regarding whom later reports were desired.

Thousands of miles of patrol were carried out by detachments of the Royal Canadian Mounted Police stationed on island and mainland posts in the Eastern Arctic, according to the reports brought back by the expedition. The chief interest in these patrols centres round the three-year search for Dr Krüger and his party; and the safe arrival at Craig Harbour, on the south coast of Ellesmere Island, of the police detachment from Bache which had performed the greater part of this work.

The Bache Peninsula post, which had been manned since 1931 by a detachment consisting of Corporal H. W. Stallworthy, in charge, and Constables A. Munro and R. W. Hamilton, was not reached by the 1932 expedition, and consequently the detachment was forced to rely on its reserve provisions during the remainder of that year, and the early part of 1933. However, due to the difficulty experienced every year in reaching Bache Peninsula, the members had been instructed by wireless to move south to Craig Harbour, where fresh supplies had been landed for them. This they accomplished in the spring of 1933, and when the *Nascopie* arrived they were taken on board, and a new detachment left at the reopened Craig Harbour post. An increased knowledge of Ellesmere Island has rendered it possible to make the necessary patrols from Craig Harbour, and it has been decided that Bache shall not be occupied for the present.

With the relief of the Bache Peninsula officers the fruitless search for the Krüger expedition was closed. When the Government patrol ship *Beothic* went north in 1931, the late Inspector A. H. Joy, the veteran Arctic traveller, who was conversant with the area in which the Krüger party were to have carried out their investigations, had mapped out extensive patrols for the Bache Peninsula detachment in what was to prove a fruitless search for the missing scientists. The reports brought back by the *Nascopie* show that 3000 miles were covered by the patrols, and that on the north-west coast of Axel Heiberg Island a message had been found in a cairn by the northern patrol party, recording that the Krüger party had visited Lands Lokk, north of Axel Heiberg Island, and at the western extremity of Ellesmere Island, and were proceeding to Meighen Island. The patrol was prevented by bad ice conditions and the scarcity of game from reaching Isachsen and Meighen Islands, and no trace of the missing men was found elsewhere. The search was briefly described in *The Polar Record*, No. 6, the news having been received in outline by wireless.

The following scientific work was carried out by the expedition. Geological examinations were made in the areas on the south shore of Hudson Strait and near Cape Smith on the west side of Hudson Bay where the geologist was landed while the expedition visited the southern end of the bay, and where mineral deposits were mapped and studied in some detail. At Lake Harbour, on Baffin Island, the old mica mine and graphite deposits were examined, and new data on the structural geology of the district obtained. The coal deposits near Pond Inlet, at the

northern end of Baffin Island, from which the settlement derives its supply of fuel, were studied and samples collected. At this point, as well as elsewhere on Baffin Island and also on Devon and Ellesmere Islands, important information concerning glacial history was obtained. The representative of the Department of Marine inspected the meteorological stations at Port Burwell, Lake Harbour, Port Harrison, Churchill, Dundas Harbour, Pond Inlet, and Pangnirtung; and new stations were installed at Coral Harbour, on Southampton Island, and at Clyde River, Baffin Island. The station at Craig Harbour was re-established and refitted. Information was obtained regarding the topography of the areas in the neighbourhood of the stations, with relation to its effect on temperature, winds and precipitation. During the voyage special observations on optical phenomena were made. Parasitological research was also carried out. The botanical work was unfortunately terminated at Charlton Island by the illness and subsequent death of Dr O. M. Malte.

Admiralty Surveys in Labrador.

The expedition on board H.M.S. *Challenger*, which is engaged upon a detailed hydrographic survey of the Labrador coast between Indian Harbour and Cape Chidley, returned to Labrador in July, 1933, to continue the work of the previous summer; and it is reported that the survey proceeded satisfactorily in spite of gales and the hindrances caused by fog and rain. The ship has now returned, having reached Portsmouth at the end of November, but a detached party has been left behind at Nain to carry out triangulation and coast-line work during the winter. The party, consisting of

Lieut.-Commander E. H. B. BAKER,
Surgeon-Lieut. E. W. BINGHAM,
Lieut. DEANE,
and four seamen,

will make their headquarters at the Moravian Mission at Nain, and are well provided with dog-teams and sledging equipment. Two members of the party have had previous Arctic experience, Surgeon-Lieut. Bingham, who was a member of the British Arctic Air Route Expedition, 1930–31, and one of the seamen, who was on the Murmansk coast during the war.

The Labrador Survey is expected to occupy several years.

Danish-American Archaeological Expedition to Alaska, 1933.

An expedition, led by Mr Kaj Birket Smith and Miss Frederica de Laguna, of the University Museum, Philadelphia, carried out archaeo-

logical investigations in the Cook Inlet region of Alaska, during the summer of 1933. The party began work in May, and returned to Philadelphia at the beginning of September.

Full details of the work of the expedition are not yet available, but it is reported that many well-preserved remains of a people belonging to an early Eskimo culture were found in a large cave, which had apparently been used as a burial vault. The most interesting finds were three canoes, about 12 ft. long, 2 ft. wide, and 2 ft. deep, hollowed out of logs and complete with paddles and a whaling lance. Their construction is of particular interest, as this is the first evidence of dug-out canoes having been used by the Eskimo.

Besides the canoes, ten skeletons were found, in an excellent state of preservation; as well as stone axes and lamps, shell pendants and fragments of wooden armour. Two blue beads found in the cave were the only evidence of contact with Europeans.

The specimens brought back by the expedition were to be on view during the winter of 1933–34 at the Philadelphia University Museum.

Hubbard Alaskan Expedition, 1933.

An expedition, led and financed by the Rev. Bernard J. Hubbard, was at work during the summer of 1933, making a study of volcanic activity in the Krenitzen group of the Aleutian Islands; and carrying out archaeological and geological research.

The party, consisting of

Rev. BERNARD J. HUBBARD, leader, geologist,
Professor R. CHISHOLM, geologist,
GEORGE GETTY, trapper,
EDGAR LEVIN, geologist,
GEORGE PETERSEN, trapper,

started work in May, 1933, on the island of Unimak, which is the nearest of the group to the mainland. Here an ascent was made of Mount Shishaldin, which had already been climbed by the same party in 1932. The ascent was made with the greatest difficulty owing to gales and blizzards, the party being repulsed twice before the summit was finally reached on July 3. During archaeological investigations on Unimak Island, the party discovered what had evidently been a weapon factory in prehistoric times, as weapons were found in different stages of construction. It is believed that those engaged in making the weapons had been surprised at their work by a party of marauders, and the subsequent discovery of a skull transfixed by an arrow seemed to bear out this theory.

After spending six weeks at Unimak, the party proceeded to Akutan, a small island south-west of Unimak, and made an ascent of the Akutan volcano (4000 ft.) which had not been previously climbed. The crater was found to be about 9 miles in circumference, one of the largest in the world, and to be active in several places. In the crater a lake was discovered, about $2\frac{1}{2}$ miles in length, and filled partly with ice and partly with hot water. Severe gales were experienced by the party during the ascent, during which they were forced to lie up for forty-eight hours. In spite of the bad weather, however, they managed to take 300 photographs, and 6000 ft. of film. The transport on this and other journeys was carried out with the help of dogs.

The archaeological work included the investigation of various sites of stone age native villages; and a war mask cave was discovered, and marked down for future excavation by the party. Father Hubbard hopes to lead his eighth expedition to this region in 1934, starting in the early spring.

The party returned to Seattle early in September.

Bartlett-Norcross Expedition, 1933.

An expedition, led by Captain Robert Bartlett, and partially financed by Mr Arthur D. Norcross, who accompanied it, left Brigus, Newfoundland, on board the famous schooner *Effie Morrissey* at the end of July, 1933, with the intention of following in the tracks of Parry's expedition of 1821. The rest of the personnel included the following:

J. Angel.
W. Bartlett, first mate.
H. Batten.
J. Bird.
J. Crowley.
J. Dooling.
B. Dove.
L. Gushnue.
G. Richards.
B. Pritchard, cook, who had accompanied Peary.
P. Smith, photographer.

The original intention of the expedition had been to take the route through Fox Channel and Fox Basin on the eastern side, following as closely as possible that taken by Parry's ships; but on reaching the entrance to Fox Channel thick pack-ice prevented any further progress. The expedition, therefore, made its way south of Southampton Island, and through Rowe's Welcome. Up to that point the voyage had been

uneventful. Thick pack-ice was again encountered at the entrance to Hecla and Fury Strait, and the expedition was forced to turn back, without making the passage of the strait as had been planned. On the way north Winter Island, where Parry wintered in 1821, was visited, and graves left by his expedition were restored. The party also landed at Pinger kalik, at Arlagnuk Point, in the north-east of Melville Peninsula, and a visit was paid to an Eskimo summer settlement.

During the course of the expedition, in spite of bad luck both as to weather and ice conditions, large collections of flora and fauna were made, and the party were able to re-chart Fox Basin. Mr Junius Bird, the archaeologist of the expedition found remnants of an extremely old Eskimo culture including spear heads, snow shovels and parts of sledges.

The return journey was made by way of the eastern side of Fox Basin, where severe snowstorms and gales were experienced; and through Fox Channel and Hudson Strait. No pack-ice was seen in Hudson Strait, though icebergs were met with as far south as Newfoundland.

The expedition returned to Brigus on September 24.

Canadian Polar Year Stations, 1932–33.

News of the closing months of the International Polar Year at the Canadian stations has been received through the courtesy of the Director of the Canadian Meteorological Service. Previous accounts of this work have been published in *The Polar Record*, Nos. 5 and 6.

The observations at Cape Hope's Advance (Lat. 61° 5′ N., Long. 69° 33′ W.) were carried out from August 1, 1932, to September 30, 1933. During this time 675 pilot balloon ascents were made, with a mean duration of about fifteen minutes. Twenty-eight flights were made of over an hour each, while one flight lasted for just over three hours. Of the ten flights made during the period July 17–21 (two flights each day), seven lasted over an hour, the mean duration for the ten flights being sixty-two minutes. Practically all aurora occurring previous to midnight was observed and recorded, unless the sky was obscured by cloud, as was frequently the case, and nearly 1300 photographs were taken, regularly spaced at five-minute intervals. Visual observations were made, in general, at fifteen-minute intervals.

The party have now returned, the transport to and from the station being made by means of the Canadian Government ice-breaker, *N/B McLean*, which spends each summer patrolling Hudson Strait.

News has been received that the four members of the Canadian Polar Year party at Chesterfield Inlet, consisting of

Mr F. T. DAVIES, in charge,
Mr B. W. CURRIE,
Mr F. T. MCVEIGH,
Mr J. RAE,

have now returned, arriving at Churchill on board the H.B.C. schooner *Fort Severn* on September 16, 1933.

They report that the weather experienced at the station during the winter was milder than usual, although the autumn of 1932 was very stormy. February was found to be the coldest month, the temperature falling to $-50°$ F.

Observations were continued until the first week in September, 496 pilot balloon flights being made, as well as 87 kite flights with the Marvin meteorograph. The rocky nature of the ground proved a handicap to kite work; kites being frequently broken on landing, which necessitated constant repairs. Auroral observations were re-commenced with the beginning of autumn; and spectrographic records showed the existence of the auroral green line whenever the spectrograph was exposed, even during overcast nights. In addition to 1000 pairs of double station pictures of aurora, about 2000 single station photographs were taken.

Electrical and magnetic work included a continuous record of potential gradient, obtained for the first five months, April to August. Magnetic and earth current registrations were continued until a few days before the departure of the party. Considerable trouble was experienced with the recorder clocks, and the party were forced to discontinue the use of the quick run magnetograph. One or other of the ordinary run magnetographs was in operation continuously, and only a few earth current traces were missed. Magnetic and earth current traces were highly disturbed throughout the year.

Magnetic observations were carried out during August, 1933, at Baker Lake, 170 miles north-west of Chesterfield, and also at Marble Island, 40 miles south of Chesterfield, where observations had been taken by Mr W. E. W. Jackson in 1912, and Lieut. Gordon in 1884. The following data show that considerable change has taken place since 1912.

Magnetic Observations at Dead Man Island (near Marble Island)
Lat. 62° 45′ 5″ N., Long. 91° 13′ W.

Observer	Date	Declination	Dip	Hor. int.
Lieut. Gordon	Sept. 2, 1884	8° 40′ W.	87° 20′	—
Mr Jackson	Aug. 2, 1912	7° 40′ W.	87° 16′	0·0303 C.G.S.
Mr Davies	Aug. 24–31, 1933	12° 49′ W.	86° 38′	0·0362 C.G.S.

During observations, changes of as much as 1½° in ten minutes were noted. The dip is greater than at Chesterfield (86° 22′), which is 40 miles nearer the magnetic pole. One of the areas in Hudson Bay in which ships' compasses are completely unreliable lies just south of Marble Island. This island, which is about 10 miles long, by from 1 to 2 miles wide, runs nearly east to west, and is considerably shorter than the charts indicate.

Mr R. C. Jacobsen who was in charge of the station at Coppermine, returned by plane to Edmonton, leaving on August 30. The aerological and general meteorological work was carried on until that date, and during the winter both visual and photographic auroral work was carried out.

The pilot balloon flights totalled 622; some of these lasted for more than an hour, the longest being eighty-seven minutes. Seventy kite flights were made, but these were usually short because of the very shallow winds. On several occasions the upper air data from the pilot balloons were utilised for the guidance of commercial aircraft proceeding to Coppermine from Great Bear Lake.

A night sunshine recorder was constructed, and used during the summer. The longest stretch of unbroken sunshine recorded was only fifty-three hours, on account of the frequently disturbed weather. Many marked warm and cold fronts were experienced, especially in the summer months.

In the aurora work, an all-night watch, visual and single-station photographic, was maintained. Some 750 photographs were taken, this line of investigation being hindered by the fact that in the area round Coppermine bright forms always moved very rapidly. But on the whole, auroral activity seemed to be at a minimum, there being many clear nights on which not the least trace of aurora was to be seen, and on most nights, the displays were quite weak. On the other hand, as much as seventeen hours of continuous activity was observed. On no occasion was any sound heard from the aurora, nor was any aurora seen that appeared to be close to the ground.

At Meanook observations by means of the regular station magnetic recorders, and the La Cour magnetographs were continued until the end of September, 1933, and are being continued after the close of the International Polar Year. The magnetographs were controlled by absolute observations. For a short interval during the winter some difficulty was experienced with the mechanism and clock of the La Cour rapid recorder.

Visual auroral observations were made whenever conditions permitted. The period of pulsation of a very marked form of pulsating aurora was found to be the same as that of the magnetic micropulsations occurring during that time.

Meteorological work included continuous records of humidity, pressure and temperature. About 100 pilot balloon flights were made, several of which were of over an hour's duration. On July 21, 1933, noctilucent clouds were observed, and a number of photographs taken. Calculations to determine their minimum heights are now in progress, and will be published shortly.

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

No news has been received of these stations since the publication of the account in *The Polar Record*, No. 6. It is hoped that a full report of their work may be published in the next number of this journal.

Miss Hutchison's Expedition to the Aleutian Islands and Point Barrow, 1933.

Miss I. W. Hutchison, who spent the year 1929 in Greenland, has just returned to Herschel Island off the Yukon coast, from the Point Barrow region, where she has been making botanical collections. At the beginning of winter, Miss Hutchison was making her way by sea round Point Barrow, hoping to catch the last boat of the season but heavily packed ice rendered this impossible. When frozen in, she was forced to make the 350 mile journey by dog sledge to Herschel Island, where she arrived at the beginning of January, 1934, having experienced on several occasions temperatures of 70° F. below zero.

Miss Hutchison left England in the early summer of 1933, with the intention of visiting the Aleutian Islands to carry out anthropological and botanical studies. She then proposed to proceed to Point Barrow, to continue the same work in that region.

THE ROYAL CANADIAN MOUNTED POLICE

By A/Superintendent V. A. M. Kemp,
Adjutant, R.C.M. Police

The Royal Canadian Mounted Police, which extends its strong rule of order and kindness over the whole of Arctic Canada, is perhaps the most famous police force in the world. Last year it celebrated its Diamond Jubilee, and thus it seems fitting that those who are themselves Arctic travellers of no mean repute, and who do so much for those who live in the far north, should have recognition in these pages devoted to polar explorers and their works.

The Force was founded in 1873 as the North-West Mounted Police, by an Act of the Canadian Government introduced by the first Prime Minister of Canada, Sir John A. Macdonald. Since that time there have been many changes, even the name of the Force has been altered twice, and the uniform worn nowadays by a member of the Royal Canadian Mounted Police is very different from that of the old North-West Mounted Police. The nature of the work, too, has undergone many changes since the Force first took over the establishment of law and order in the north. But, one feature, the nature of its frontier work, still links it with the hectic days of '73.

Canada, with its vast area of over three and a half million square miles, and a population of approximately ten and a half millions, is most densely peopled in the south. A glance at the map shows that from Quebec westwards all the provinces are of great extent, and in the north are very sparsely settled. A mobile police force is, therefore, required to supervise and control these remoter districts. In the provinces of Quebec, Ontario and British Columbia, as well as Nova Scotia and Prince Edward Island, this work is performed by the Provincial authorities. In the remaining six of the nine provinces, the Royal Canadian Mounted Police maintain police supervision.

In addition to the nine provinces of Canada, there are two areas known as the Yukon Territory and North-West Territories respectively. The Yukon, in the extreme north-west of Canada, with an area of 207,000 square miles, is noteworthy as being the scene of the famous Klondyke Gold Rush of the late 'nineties. The North-West Territories embrace all Canada between the inaugurated Provinces and the Yukon, a vast hinterland of nearly a million and a half square miles, populated by only twelve thousand inhabitants. Before 1905 the present provinces of

Saskatchewan and Alberta, and the northern portion of Manitoba were also part of these Territories, but in that year changes were made which provided the two provinces in question with their own Provincial Governments.

With the exception of a few islands in Hudson and James Bays, the entire Territory lies to the north of the 60th parallel of latitude. The bulk of the population consists of native Indians, while a few thousand Eskimo inhabit areas to the north of the zone of trees.

By virtue of the British North America Act, the preservation of law and order is the responsibility of each province, but, by agreement between the Dominion Government, under whose control the Force operates, and the provinces concerned, in six of the nine provinces the Mounted Police is, apart from the urban centres, the only Force employed. In the Yukon and North-West Territories, however, the Dominion Government still maintains direct control, with the result that the Federal Force, the Royal Canadian Mounted Police, performs all police duties.

It is not possible here to dwell at length on the conditions prevailing in the remoter parts of Canada. One or two points, however, seem worthy of mention. The most important is that while there are no railroads, no paved highways, and very little cultivated land, the impression commonly found, that the far north of Canada is "Barren Land," is entirely erroneous. While it is true that in a considerable area of the territories there is no standing timber, the dozens of varieties of flowers which bloom in summer are proof of the error of classing the area as "barren lands." As is well known there are no towns in the North-West Territories, in fact a settlement of sixty or over is commonly regarded as being a centre of civilisation. Small settlements of from half a dozen to thirty are found along the Mackenzie River system, and along the Western Arctic Mainland coast. In the Hudson Bay country, and in the Eastern Arctic, these settlements are still more remotely situated, and widely separated. There are no drones in the hive of the North-West Territories. Every individual residing in those parts is there for a purpose. The natives, invariably improvident, devote their energies to procuring their livelihood, by trapping or hunting. The white resident, whether trader, trapper, missionary or policeman, has his work to do; the trader in supplying the other residents, either native or white, with the staple supplies, the missionary in visiting and attending to his flock, and the policeman in carrying out the unusually long list of duties peculiar to the north.

Comparatively speaking, crime is not very prevalent in the far North.

The Indian, as a result of long contact with the missionaries and police, is a fairly law-abiding individual, and the Eskimo are likewise becoming educated in the observance of the law. The Eskimo, two or three decades ago, knew nothing of the white man or his laws. They followed a code which, while at times harsh when compared to civilised standards, maintained a very fair semblance of law and order, and thus their tractable and peaceable dispositions can be readily appreciated. Infanticide was previously considered a fitting means of ridding a nomadic people of superfluous burdens. Aged or infirm people were a handicap, which meant delays in reaching hunting grounds, with the resulting hardship for the active and able-bodied, so their code allowed them to turn such individuals out to perish by themselves. The Mosaic law had its prototype in the Eskimo code, and various other practices were carried out, barbaric in our eyes, but to those unenlightened people, the height of common sense. It is a happy indication of the process of education which has been undertaken, that these people have practically cast off such customs, that infanticide is a thing of the past, and that Eskimo murders are so rare as to excite comment when they occur.

To control the area of the North-West Territories, a series of detachments are maintained by the Royal Canadian Mounted Police. The Territories are divided for administration purposes into five sub-divisions. The largest of these, the Eastern Arctic, consists of six detachments, with a total of seventeen all ranks. The most southerly detachment is at Port Burwell, slightly to the north of Parallel 60, while the most northern is at Bache Peninsula, only 11 degrees from the North Pole. In the North-West Territories there are four additional sub-divisions. First, the Western Arctic, with headquarters at Aklavik, N.W.T., having a total of twenty all ranks. Thence, coming southwards, following the course of the mighty Mackenzie, we find Simpson, the headquarters of the sub-division bearing its name. The strength of this sub-division is twenty-two all ranks. The most southerly along the Mackenzie waterway is the Fort Smith sub-division with a total strength of twenty all ranks. Lastly the Hudson Bay sub-division, consisting of two detachments at Chesterfield Inlet and Baker Lake, controls the area along the western shore of Hudson Bay and inland to the Height of Land.

A vessel visits these northern detachments annually, carrying supplies and relief. The period of service in these isolated spots is two years, although not a few of those who have returned to civilisation are eager to go back for a further term of two years in the North. The distance

between each post is so great that one detachment is rarely able to visit another, and as there is no winter contact with the world outside, other than by wireless, the men look forward with great eagerness to the return of the supply vessel the following summer.

Conditions in the Eastern Arctic are very different from those in other parts of the North-West Territories. The formation of the terrain is very rocky, glaciers and icebergs are common, and there is a very considerable rise and fall in the tide. In the Western Arctic there is no appreciable rise in the tide, no glaciers are to be found, and a rocky type of country is found only in the eastern section.

This, of course, necessitates a considerable change in the methods to be followed when undertaking patrols. With the exception of the recently introduced aeroplane flights, patrols are rarely taken overland in the summer. Water transport is an absolute necessity, and patrols follow rivers, lakes or shores of the coast in proceeding from one point to the other. In this respect there is very little difference in the methods followed in the Eastern and Western Arctic. In the winter, however, there is a considerable change noted. Irrespective of the section to be covered, dog-teams are invariably used by winter patrols. Aeroplane flights are made regularly from Edmonton in Alberta to the mouth of the Mackenzie River, and mail is taken by air in a few days, which formerly took two months to reach its destination. But as this means of transport is expensive, the local detachments perform their winter patrols more or less by the time-honoured method of *mushing*.

In the Eastern Arctic, owing to the nature of the country, the fan-shaped method of dog driving is used, the dogs being attached to the sledge by individual traces of varying length. The necessity of transporting large loads in the Eastern Arctic, due to the absence of trading posts, results in dog-teams ranging from ten to eighteen in number. In the Western Arctic, where different methods are used, the dog-teams will average from five to eleven. There the *Nome* hitch is used. This consists in teaming the dogs in equal numbers on either side of a main trace which runs from the forward part of the sledge. To each dog's harness is attached a secondary trace which is fastened to the main trace. The leader draws directly on this central or main trace. This system is found to be most convenient in the Western Arctic, where the trails usually run over flat sea ice. Seams open up in the ice, and pressure ridges will form, but the treacherous crevasses, which present such a menace to travel in the Eastern part, are not found in the West.

The sledges used are either the *basket* type, or the heavy flat *komitik*. The *basket* sledges are made of hickory or ash, with slender steel shod runners. At a point about 8 in. from the ground level, the floor of the sledge is constructed, while from the front to the rear at rising heights from the ground, the sides of the sledge are built terminating in two steering handles in the rear. Into this *basket* the sledge wrapper of either deerskin or canvas is placed, and after a load is placed in position the free edges of the wrapper are brought over, and the entire load lashed securely. These basket sledges are extremely light, and being built of hard-wood are very durable and strong.

The flat *komitik*, built of heavier wood, is not fitted with the *basket* effect, and the runners are made of stout wood shod with steel. They are much heavier than the basket sledges, but their general utility is enhanced by the application of the mud-runner. This is a very simple process. The sledge is overturned, and a coating of wet mud is applied evenly over the length of the runners. Over this mud is poured water which rapidly freezes, and the icy surface thus created renders the sledge more tractable. Loads of a thousand pounds and more can be placed on these mud-runner sledges, and the entire conveyance can be very simply moved over the trail, whether of ice or hard snow. In the Western Arctic both types of sledge are used.

It should be mentioned here that, in the wooded country away from the Arctic coasts, where the winds are less severe, the snow is not packed to the density which is found on the sea-ice. Sledges are very rarely used in such parts, the favourite mode of transport being the toboggan, a flat sledge, the floor of which is presented directly to the snow. This width of surface prevents the toboggan from sinking deeply into the snow, which would be the case with the narrow runners of the sledge. The hitch used in the bush country is different also. Here the tandem is usually followed, one dog being directly in rear of another, from the leader back to the "wheel dog." A common set of traces reach from the leader, and are attached to the toboggan itself.

Police supervision in the Arctic is maintained by the Royal Canadian Mounted Police by a system of patrols. When practicable, such patrols are operated on an inter-detachment basis. By this means, an effort is made to interview all residents during the year, for the purpose of delivering mails, investigating their general health, assisting in matters of difficulty, and maintaining general police supervision. The mileage covered by each detachment varies according to its geographical exi-

gencies, the number of points to be visited, and other similar influences. As an illustration of the distances covered by each detachment, it may be stated that an average of 2000 miles per annum is not unusual in the Western Arctic, which sub-division the writer had the honour to command during the years 1927, 1928, and 1929. By adding to this the distance covered in the summer by the R.C.M. Police Diesel schooner *St Roch*, which distributes freight and supplies to the Western Arctic annually, almost 20,000 miles are covered each year by the Royal Canadian Mounted Police personnel in the Western Arctic alone.

Possibly the most outstanding patrol made in recent years was that of the late Inspector A. H. Joy, who was accompanied by Constable R. A. Taggart and one native, during the spring of 1929. This patrol started from Dundas Harbour, proceeding east along the south coast of Devon Island, past Cornwallis and Bathurst Islands to Melville Island. Thence north and east, passing Ellef Ringnes and Amund Ringes Islands, skirting Axel Heiberg Land, and finally crossing Ellesmere Island to the Bache Peninsula Detachment, a total of 1800 miles. During the course of this patrol no other living soul was seen, but game conditions were observed, and Canada's sovereignty over these remote islands was thus maintained.

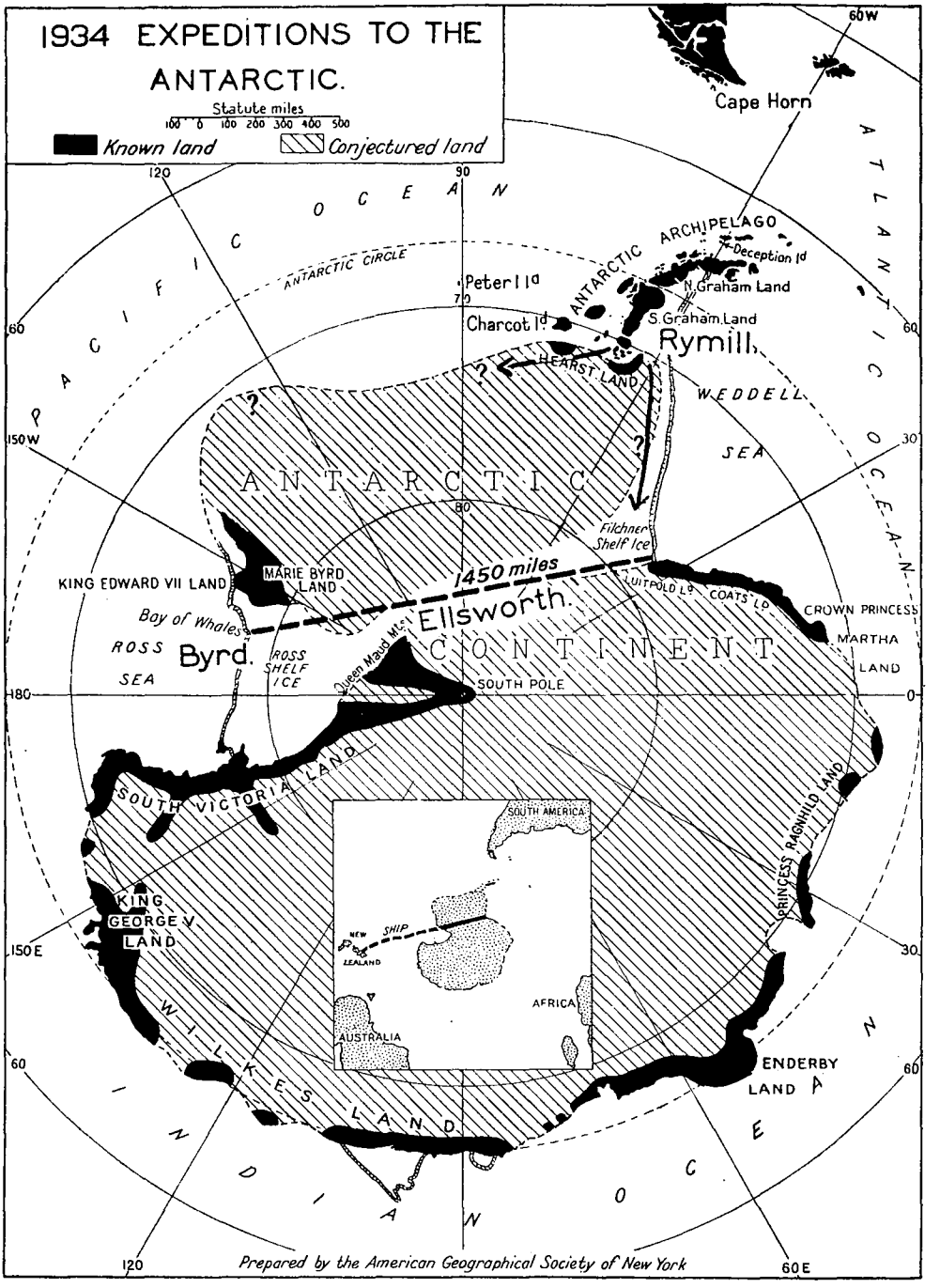
ANTARCTIC REGIONS

Ellsworth Antarctic Expedition, 1933–34.

We regret to announce that, owing to the crippling of his plane, *Polar Star*, as a result of the sudden break up of the ice in the Bay of Whales, Mr Lincoln Ellsworth has been compelled to postpone his projected Trans-Antarctic Flight. The plans for the expedition were given in *The Polar Record*, No. 6, and an account of its activities up to the time of its unlucky termination is given below.

Mr Lincoln Ellsworth, the leader of the expedition, reached New Zealand on August 11, and there awaited the arrival of the expedition on board M/V *Wyatt Earp*, the re-named Norwegian sealer, *Fanefjord*, which left Bergen on July 30, 1933, complete with the aeroplane. The ship touched at Capetown at the end of September, and arrived at Dunedin, New Zealand, on November 10, after encountering severe gales. After the aeroplane had been unloaded and overhauled, it was again stowed away in the hold, and on December 5 the expedition left for the South. In addition to the leader, the party consisted of: Mr Bernt Balchen, the Norwegian aviator who accompanied Admiral Byrd on his flight to the South Pole in 1929, who will act as pilot; Sir Hubert Wilkins; Dr Jorgen Holmboe, meteorologist, who will make upper air observations and forecast flying conditions, and Captain Baard Holth with a crew of twelve men.

On December 13 the vessel entered the pack ice in Lat. 63° S., and twenty-two days were spent in working a way through a belt 454 miles wide. For long intervals, totalling twelve whole days, the ship was held up completely, but apart from the rudder, which was slightly twisted, no damage was done. Mr Balchen had a slight accident when at the wheel due to the sudden sticking of a piece of ice when going astern. In a dispatch dated January 5, it was stated that the ship was clear of the ice, and the Great Ice Barrier was sighted at 5.50 the next day. Discovery Inlet was reached, and found to be free of pack-ice, and the expedition turned east, coasting the Barrier, and arrived at the Bay of Whales in the morning of January 6, in favourable weather. On January 11 a trial flight was made, and the plane *Polar Star* found to be in perfect order for the flight, which was planned to take place as soon as a few wireless trials had been made. It was planned that the flight should be made by


1934 EXPEDITIONS TO THE ANTARCTIC.
Statute miles
100 0 100 200 300 400 500
Known land
Conjectured land
Cape Horn
60W
ATLANTIC OCEAN
PACIFIC OCEAN
INDIAN OCEAN
ANTARCTIC CIRCLE
ANTARCTIC ARCHIPELAGO
Deception Id
N.Graham Land
S.Graham Land
Rymill.
Peter I Id
Charcot Id.
HEARST LAND
WEDDELL SEA
Filchner Shelf Ice
ANTARCTIC CONTINENT
1450 miles
Ellsworth.
KING EDWARD VII LAND
MARIE BYRD LAND
Bay of Whales
ROSS SEA
Byrd.
ROSS SHELF ICE
Queen Maud Mts.
SOUTH POLE
LUITPOLD L.
COATS L.
CROWN PRINCESS MARTHA LAND
SOUTH VICTORIA LAND
KING GEORGE V LAND
WILKES LAND
PRINCESS RAGNHILD LAND
ENDERBY LAND
SOUTH AMERICA
AFRICA
AUSTRALIA
NEW ZEALAND
SHIP
120
90
60
30
0
30
60
60E
120
150W
150E
180
Prepared by the American Geographical Society of New York

Mr Lincoln Ellsworth and Mr Balchen, while the rest of the party remained at the base. A course was to be set direct for the head of the Weddell Sea.

On January 12, however, the party were still waiting to start, the wind having changed to north-east, carrying with it frequent squalls.

After the trial flight the *Polar Star* had apparently been moored on what was thought to be firm ice. Later messages received by wireless from the expedition contained the startling news that on January 13 the ice had broken up suddenly in consequence of the wind, and that the ship had been cast adrift and the plane wrecked. It appears that when the break-up occurred, the plane slipped through a crack in the ice, sustaining considerable damage. Fortunately the wings prevented the machine from sinking, and a party of ten men directed by Mr Balchen succeeded in rescuing it, and re-embarking it on board the *Wyatt Earp*. Here a thorough examination was made, and it was found that the damage would necessitate a return to New Zealand for repairs. As it would be impossible to return to the Antarctic again this season, Mr Ellsworth was forced to give up all hope of making the flight this year, and the expedition is now on its way back to civilisation.

Byrd Antarctic Expedition, 1933–34.

An expedition to the Antarctic, the second to be led by Rear-Admiral Richard Byrd, left the United States in the early autumn of 1933. An announcement of the plans of the expedition were made in brief in *The Polar Record*, No. 6.

The advance party, taking with them most of the stores, sailed from Boston on September 25, on board S/S *Bear* of Oakland, built at Greenock in 1874, and famous as one of the Greeley relief ships, which had been acquired from the U.S. Coast Guard Service. Admiral Byrd himself, with the aeroplanes and the rest of the equipment, left later, on October 21, on board S/S *Jacob Ruppert*, which was named after Colonel Ruppert, the chief supporter of the expedition. It was planned that the two ships should meet at Dunedin, and proceed together to the edge of the pack. There S/S *Jacob Ruppert* would be used as a base ship, while S/S *Bear* would make the voyage through the ice to the Bay of Whales, where Admiral Byrd intends to set up his winter quarters at Little America, his old base. This procedure was planned to obviate the necessity of a return journey to New Zealand for stores, but the arrangement has been modified, owing to the stormy weather encountered by S/S *Bear*, which considerably delayed the voyage to New Zealand from Panama. The S/S *Bear*

reached Napier, N.Z., on January 3, eleven weeks after leaving the United States.

The personnel of the Expedition numbers seventy, and includes many members of Admiral Byrd's previous expedition. The scientific staff and officers include the following:

CLAY BAILEY, radio operator.
QUINN BLACKBURN, surveyor.
S. CORY, supply officer.
V. CZEGKA, supply officer.
E. J. DEMAS, engineer.
Captain H. F. GJERTSEN, commodore. (With Amundsen in the Antarctic, 1910–12.)
W. O. HAINES, meteorologist.
GUY HUTCHESON, radio operator.
Captain BENEDIK JOHANSSEN, ice pilot.
HAROLD JUNE, chief pilot.
ALTON A. LINDSEY, biologist.
C. G. MORGAN, geophysicist.
D. PAGE, artist.
Dr EARL B. PERKINS, zoologist.
S. D. PIERCE, radio operator.
Professor T. POULTON, physicist.
Commander W. K. QUEEN, engineer officer.
K. RAWSON, navigation officer. (Macmillan Expedition, 1927.)
P. SIPLE, biologist.
Dr GUY SHIVEY, medical officer.
Captain A. INNES-TAYLOR, in charge of dogs.
Captain W. H. VERLEGER, of S/S *Jacob Ruppert*.

The long list of equipment taken by the expedition includes a Curtis Condar biplane, and a Kellett autogiro, as well as spare parts for the two aeroplanes left behind by the expedition, in 1930, at Little America, which it is hoped may still be fit for use. Tractors and snow-mobiles have also been taken. Dog transport will be relied upon to a large extent, and 180 sledge dogs have been taken; of these 150 were bred in New Hampshire at Wonalancet, while the remaining 30 were obtained from the Royal Canadian Mounted Police. Two cows have also been taken.

Rear-Admiral Byrd has with him a short-wave wireless transmitting set, and thus it has been possible to obtain reports of the progress of the expedition, since its start from New Zealand. The main party, on board S/S *Jacob Ruppert*, left Wellington, New Zealand, on December 11; and on December 27 news was received that, after having encountered fog and pack-ice during the previous week-end (in about Lat. 66° 20′ S., Long. 144° W.) Admiral Byrd had decided not to progress further until the conditions were more favourable. His plan, on an improvement in the weather, was to force his ship through the ice as far south as possible, in the vicinity of the 143 W. meridian, and then make a flight towards

the land. He was able, later, to carry out the latter part of this programme, and flying along the 150 W. meridian, reached 70° S. The plane was piloted by Mr Harold June. After four hours in the air, however, they were forced to return to the ship by lack of petrol, having seen no land, no ice-barrier, nor any very heavy pack-ice.

Another flight was made later, along the 117th W. meridian, by a party consisting of Rear-Admiral Byrd, Mr Harold June, Mr William Bowlin, Mr J. A. Pelter, and Mr Carl Peterson. Flying over a large ice-field, the party reached Lat. 72° 30′ S., a distance of 150 miles from the ship. No land was seen. The visibility was for the most part poor, observations being handicapped by thick layers of cloud.

A full programme has been planned for the expedition, which includes a repetition of Rear-Admiral Byrd's flight over the Pole, and if possible another flight, towards the Weddell Sea, with a view to extending any discoveries made by the Ellsworth expedition. An aerial survey of the land round the magnetic pole is also planned; and other flights will be over Marie Byrd Land, discovered on the first expedition. It is stated, however, that the chief work of this year's expedition will be the investigation of lands already discovered from the air, with special reference to the mineral deposits in those areas. The scientific programme is unusually wide in scope.

When the main party has been landed at Little America, the two ships will return. The expedition expects to remain in the Antarctic until the open season of 1934–35; but will continue to be in communication with the outside world.

Plans for R.R.S. Discovery II.

In October, 1933, the R.R.S. *Discovery II* left England on her third Antarctic voyage. She delivered mails and stores at Tristan d'Acunha on November 16 and began her routine series of investigations on the plankton and hydrology of the Southern Ocean during the course of her passage from Tristan to South Georgia. In accordance with the programme arranged she will work along the ice-edge and through Bransfield Strait to Adelaide Island, and after returning via the Straits of Magellan to the Falkland Islands will proceed eastwards to New Zealand. Her object on this voyage is to examine conditions in the extreme south of the Pacific sector of the Antarctic, concerning which little information has hitherto been obtained. After a brief stay at Auckland she will return on a course similar to that taken on her eastward journey, making during

both passages full series of observations in a belt of ocean extending some 200 miles to the north of the ice-edge.

On completion of this work the vessel will resume her investigations in the area of the Falkland Islands' Dependencies, proceeding to South Africa for refit in May, 1934. A series of winter observations is contemplated during August of that year and in the ensuing season it is hoped to find opportunity for continuing coastal surveys in the Falkland sector. The *Discovery II* is now equipped with the recording type of echo-sounding apparatus, which has given very satisfactory results in tests made during her passage to the south.

The scientific work is in charge of Dr N. A. Mackintosh, assisted by Mr H. F. P. Herdman, Mr A. J. Clowes and Mr T. J. Hart. Lieut. A. L. Nelson, R.N.R., is in executive command, the other deck officers being Lieut. L. C. Hill, Lieut. R. Walker, Lieut. H. Kirkwood and Mr T. H. B. Oates. The engineer officers are Lieut.-Commander W. A. Horton, Mr A. N. Porteous and Mr R. G. Gourlay. The ship's surgeon is Dr J. A. Purser.

The Graham Land Expedition, 1934–37.

Plans for a British expedition to the Falkland Islands Dependency are now sufficiently advanced for publication.

The leader and organiser is Mr John Rymill, who was a member of both the Watkins' expeditions to East Greenland, and leader of the second one after the death of Mr Watkins. The main object of the expedition is to explore and survey the unknown coastline of the continent both east and west of Hearst Land, beyond the point in Lat. 71° S. reached by Sir Hubert Wilkins in his flight from Deception Island in 1929. Using a small vessel of less than 100 tons the party will endeavour to establish a base in Marguerite Bay, in Lat. 68° S., where the ship will remain for two winters. From the base journeys by dog-sledge and aeroplane will be made in each of the three summers to the south-west and the south-east. The party will be a small one, probably nine men, so the scientific programme is a modest one, exploration being the main purpose of the expedition.

Included in the party will be Mr W. E. Hampton, as second-in-command, and Mr Quintin Riley, both members of the British Arctic Air Route Expedition to Greenland, 1930–31.

The Royal Geographical Society has very generously voted the sum of £1000 in support of the expedition, and financial assistance from other

sources is now being sought, a total of £10,000 being required. Compared with the cost of former Antarctic expeditions this is a small sum for two and a half years' work.

It will be recalled that although British explorers of over a century ago did much towards the discovery of this outlying portion of Antarctic lands, there have been only two major expeditions in the last hundred years in this sector, Dr Bruce's *Scotia*, and Sir Ernest Shackleton's *Endurance*. Neither of these were able to make a landing. The only British expedition which has ever spent a winter in Graham Land was a party of two men, Bagshawe and Lester, who wintered in Lat. 65° S., near Wilhemina Bay, in 1922.

For that reason, if for no other, it is earnestly to be hoped that the nation will take an interest in this expedition, and that well-wishers will express their goodwill in a practical form.

ANTARCTIC WHALING

(1) *Season* 1932–33.

Seventeen floating factories and one land station operated. Total catch was approximately 2,450,000 barrels produced from 21,539 "Blue-Whale-equivalents" (1 Blue = 2 Fin = 2½ Humpback = 5 Sei). The floating factory average production of oil per "Blue-Whale-equivalent" was 114·60 barrels as against 104·29 barrels in 1930–31. This improvement was due partly to the fact that the worst equipped factories did not operate, but chiefly to the terms of the quota agreement (vide *The Polar Record*, July 1932)—as is illustrated by the averages of the floating factories which operated both in seasons 1930–31 and 1932–33. The average of the twelve floating factories which came under the terms of the agreement rose from 105·76 to 117·66.

A table is appended containing facts of interest concerning the floating factory fleet which operated during this season.

(2) *Season* 1933–34.

A quota agreement has again been made for this season, but a Norwegian Company with two floating factories, *Pelagos* and *Suderoy*, in addition to Southern Whaling and Sealing Co., Ltd., is now operating outside the terms of the agreement. The total number of whales killed is nevertheless expected to be less than last season, as the parties to the quota agreement have accepted a reduced total of "Blue-Whale-equivalents"—17,074 for 1933–34 vice 18,584 for season 1932–33. A further land station at Leith Harbour, South Georgia, has been re-opened this year.

The *New Sevilla* (British), which last year produced about 750 tons of whale-meat-meal of a record high quality, is repeating her experiment this season and a slightly larger production of still better quality is expected. Other floating factories are experimenting in this field, but though technically the production on floating factories of large quantities of meat-meal of high quality is now possible, present prices offer little encouragement to the very large investment of capital which would be required.

Floating Factory Expeditions operating in the Antarctic, 1932–33.

Nationality	Floating factories	No. of digesters	No. of whale catchers	Total crews	Digesters per whale catcher	Approximate production 1932–33 (barrels)	Floating factory average production of oil per whale				
							1932–33	1931–32	1930–31	1929–30	1928–29
Br.	Southern Empress	88	7	—	12·57	171,500	101·1	91·6	100·0	118·9	103·6
,,	Southern Princess	76	7	581	10·86	187,300	98·9	95·0	106·8	93·4	—
,,	Salvestria	109	7	295	15·57	128,297	121·3	108·9	111·1	129·0	—
,,	Sourabaya	89	6	260	14·83	108,135	119·3	121·8	120·6	127·0	—
,,	New Sevilla	82	6	292	13·67	117,642	116·3	—	108·3	—	—
,,	Tafelberg	76	6	272	12·67	127,435	116·8	—	100·8	—	—
N.	Lancing	54	5	179	10·8	95,533	103·8	—	102·8	109·2	89·5
,,	Thorshammer	81	6	239	13·5	118,670	123·4	—	119·5	113·9	96·6
,,	Ole Wegger	96	6	240	16·0	118,670	122·8	—	99·4	100·6	—
,,	Solglimt	75	6	240	12·5	118,670	126·5	—	102·7	105·4	—
,,	Skytteren	75	5	250	14·6	107,492	121·2	—	112·6	96·9	—
,,	Kosmos	102	8	323	12·75	179,500	109·5	—	100·2	87·0	—
,,	Kosmos II	120	8	318	15·0	222,244	117·4	—	—	—	—
,,	Sir James Clark Ross	90	7	255	12·86	156,895	119·7	—	94·8	—	—
M.	Hectoria	94	7	262	13·43	114,252	116·5	—	110·5	120·7	—
,,	Vestfold	111	7	252	15·86	163,747	117·7	—	—	—	—
,,	Svend Foyn	111	8	273	13·88	160,150	117·5	—	—	—	—

1. Br. = British; N. = Norwegian; M. = Mixed. Expeditions are classified according to the flags of floating factories and catcher. These correspond fairly closely with the countries which benefit from the taxation of profits, and with the nationality of the *de facto* Managers.

2. 1 "Digester" = 1 Open Boiler = 1 Pressure Boiler = $\frac{1}{6}$ Hartmann Nygaard or small Kvaerner apparatus = $\frac{1}{9}$ large Kvaerner apparatus.

3. 1 "Whale" = 1 Blue Whale = 2 Fin Whales = $2\frac{1}{2}$ Humpback Whales = 5 Sei Whales.

NEW ZEALAND ANTARCTIC SOCIETY

At a meeting held on November 2, 1933, at Wellington, New Zealand, with Mr A. Leigh Hunt in the Chair, it was decided to form a New Zealand Antarctic Society. A provisional list of officers was drawn up, and it was proposed that Sir Douglas Mawson, Rear-Admiral Byrd and Admiral E. R. G. R. Evans should be asked to become patrons.

The object of the Society is to group together all those resident in New Zealand who are interested in the Antarctic, and its exploration. Its activities are to include the assistance of members of Antarctic Expeditions, and the spreading of knowledge of the Antarctic continent in its every aspect.

The officers of the Society, as elected at the inaugural meeting, are as follows:

President: The Hon. Mr Justice Ostler.

Vice-Presidents: Mrs Ferrar, Mr R. G. Simmers, Mr R. A. Falla.

Council: Miss E. M. Black, Mr E. C. Collins (Secretary), Mr B. L. Donne, Dr J. Henderson, Mr A. Leigh Hunt, Mr J. Pearce Luke, Mr A. A. Kirk, Mr A. E. Mabin, Mr W. B. Oliver, Mrs K. Preston, Mr F. S. Pope, Mr L. B. Quartermain, Dr Graham Robertson, Mr A. J. Toogood, Capt. P. Whiteford, Mrs G. B. Wilson.

ANTARCTIC CLUB

At the request of the Secretary, we print a short account of the annual function of the Antarctic Club.

The Sixth Annual Dinner of the Antarctic Club was held on January 19, 1934, the President, Captain R. G. England, being in the Chair. Thirty-six members, representing thirteen different expeditions, were present, including the Honorary Member, Dr H. R. Mill. The guests of the evening were Mr John Rymill and Lieut. Martin Lindsay, both members of the British Arctic Air Route Expedition to Greenland, 1930–31. Mr Rymill's plans for an expedition to the Antarctic are published elsewhere in this Journal, and Lieut. Martin Lindsay is also planning another expedition.

After the Toast to His Majesty the King, the Club Toast "to those who have voyaged to explore the Antarctic regions, and have not returned" was drunk in silence. The Toast to Absent Members followed at 9 p.m., the names of many members who were unable to be present being called out from the various tables. Professor Debenham then gave an account of the work carried out in the Antarctic during the year, and later proposed the health of the Guests, both of whom replied.

During the evening Commander J. B. Adams, O.B.E., D.S.O., R.N.R., who was second-in-command of the late Sir Ernest Shackleton's Expedition in the *Nimrod* in 1907, was elected as President for 1934.

RECENT POLAR BOOKS

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

AVERY, HAROLD. *No Surrender!* The story of Captain Scott's Journey to the South Pole. Illustrated by Rowland Hilder. London: Thomas Nelson & Sons, Ltd. [1933.] 8 × 5½. Pp. viii + 266. 3*s.* 6*d.*

GEORGI, JOHANNES. *Im Eis vergraben.* Erlebnisse auf Station "Eismitte" der letzten Grønland-Expedition Alfred Wegeners. Munich: Paul Müller, 1933. Illustrated. 6 × 8½. Pp. 224.

KERR, LENNOX. *Ice.* London: Lane, The Bodley Head, Ltd. 1933. 6*s.*

LINDSAY, MARTIN. *The Epic of Captain Scott.* London: Peter Davies, 1933. Illustrations and sketch maps. 8 × 5. Pp. 178. 5*s.*

MILL, HUGH ROBERT. *The Life of Sir Ernest Shackleton, C.V.O.* London: William Heinemann, 1933. Illustrations and maps. 9 × 5½. Pp. 312. 5*s.* (Cheap edition.)

MONAHAN, ROBERT S. *Mount Washington Reoccupied.* Battleboro, U.S.A.: Stephen Daye Press, 1933.

SCOTT, J. M. *The Land That God Gave Cain.* An Account of H. G. Watkins' Expedition to Labrador, 1928–29. London: Chatto & Windus, 1933. Illustrations and maps. 5½ × 9. Pp. 281. 12*s.* 6*d.*

SEAVER, GEORGE. *Edward Wilson of the Antarctic.* London: John Murray, 1933. Illustrations and maps. 8½ × 5½. Pp. xxxiv + 300. 10*s.* 6*d.*

SORGE, ERNST. *Mit Flugzeug, Faltboot, und Filmkamera in den Eisfjorden Grönlands.* Berlin: Drei Masken Verlag: 1933. Pp. 208. M. 4.80.

TURLEY, CHARLES. *Nansen of Norway.* London: Methuen & Co. 1933. Illustrations and sketch maps. 7½ × 5. Pp. 210. 5*s.*

ZIMMERMANN, MAURICE. *États Scandinaves. Régions Polaires Boréales.* (Géographie Universelle. Edited by P. Vidal de la Blanche and L. Gallois, Tome III.) Paris: Armand Colin, 1933. Illustrations and maps. 11½ × 8. Pp. 310. 90 fr.

ERRATUM

The Polar Record, No. 5, January, 1933: *Page* 24. *For* Simarik *read* Simavik.