# The Oxford University Arctic Expedition, 1935-36

By A. R. Glen

THE plans of the Oxford University Arctic Expedition, 1935–36, were briefly outlined in an article which appeared in NATURE of April 20, 1935, p. 604. The Expedition returned to England in September last after a stay of fourteen months in the barren North-East Land. The country, which is somewhat larger than Wales, has the greater part of its interior covered by ice cap; its coasts are broken up by many deep fjords which are divided one from the other by rocky promontories from which the ice covering has long since disappeared. The north coast, which fringes the Polar Ocean, was practically unknown, while there was also little knowledge of the east coast, which is made up of an almost continuous stretch of ice cliffs—these being the largest expanse outside the Antarctic.

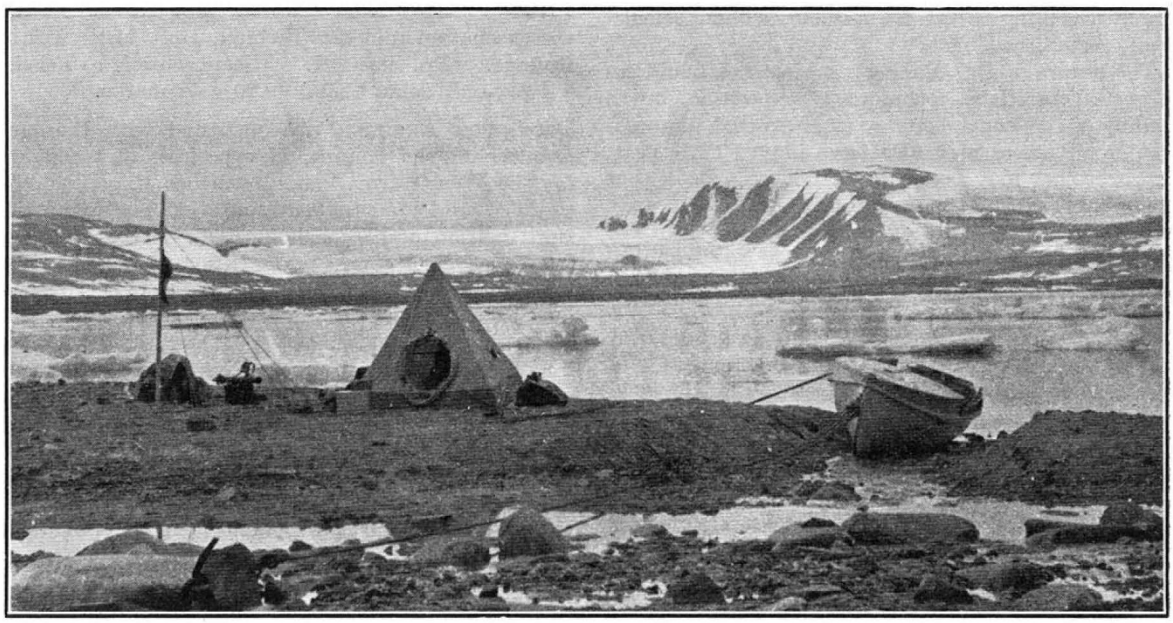

Fig. 1.
A CAMP ON THE NORTH COAST OF NORTH-EAST LAND DURING THE BOAT SURVEY JOURNEY IN THE FIRST SUMMER.

The personnel of the Expedition consisted of ten members who were as follows: A. R. Glen (leader and glaciologist), N. A. C. Croft (photographer), A. Dunlop Mackenzie (organizer), J. W. Wright (surveyor), A. S. T. Godfrey (surveyor), R. M. Moss (physicist), R. A. Hamilton (physicist), A. B. Whatman (in charge of radio research), D. B. Keith (biologist), K. J. Bengtssen (trapper).

The biological work of the Expedition will be dealt with in another article. For the remainder of the research, it may first be said that the whole programme of the Expedition was successfully achieved. Climatic conditions did nothing to facilitate this, for although the temperature never fell so low as had been anticipated nor were the gales so severe as had been feared, yet prevailing blizzard and predominant fog much complicated survey and geological investigations. During the summer of 1935, the western part of the north coast was surveyed in the course of a boat journey made by Wright, Keith and Bengtssen. The polar ice retreats from the coast during the summer, allowing the use of small boats until the bays begin to freeze again in September, and this party only returned to the base before the autumn gales began. In the following spring, Wright and Mackenzie started off with a dog team to sledge along the eastern part of the north coast so as to complete the survey and if possible to continue it down the east coast. In the previous autumn and winter, journeys had been made in the darkness to lay depots at three strategic points, Cape Leigh Smith, Palander Bay and Wahlenberg Bay, which

should be used by this spring survey party. What had not been allowed for, however, was the weather; continuous fog and low cloud made survey quite out of the question except on one or two days during each month. The result was that by the time the bay ice was beginning to break up in early July, a considerable part of the north coast still remained to be mapped. Wright and Mackenzie therefore returned to the base in Brandy Bay after a narrow escape from disaster when crossing Rijps Bay in an improvised boat. A second party was quickly fitted out, and a few days later Wright and Hamilton set off for Cape Leigh Smith, which they reached after nine days hard travelling. The weather suddenly became good, and in a fortnight's work the mapping of the north coast was completed (Fig. 1). The greater part of the survey of the rest of the country was also carried out by other sledge parties, and North-East Land must now be considered as one of the best mapped countries in the Arctic.

The main problem of the geological investigations was in connexion with the relation between the Hecla Hoek rocks and the granites and gneisses which are found around North Cape and also form the eastern part of the north coast. The eastern arcs of the Caledonian folding have affected this region, and although the absence of a full-time geologist greatly hindered this work, a considerable amount of research was carried out on these problems. The geological structure of the western part of the north coast was mapped in detail and some interesting discoveries were made in the little metamorphosed rocks of the younger Hecla Hoek series.

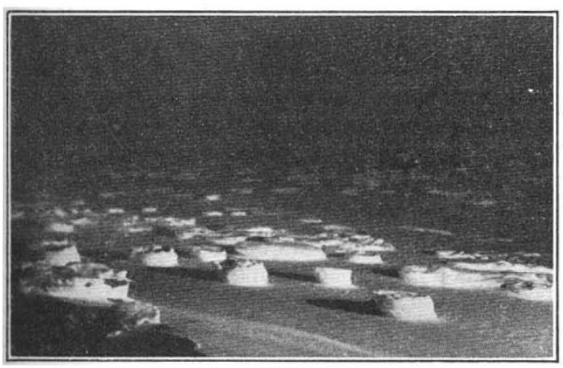

Fig. 2.
RAISED FOOTSTEPS ON THE SNOW SURFACE DURING THE WINTER. FOOTSTEPS ARE PACKED DOWN AND THE SOFTER SURROUNDING SNOW IS REMOVED BY WINDS, LEAVING THE FOOTSTEPS RAISED ABOVE THE REST OF THE SURFACE. TAKEN AT MIDDAY IN DECEMBER AT THE NORTHERN ICE CAP STATION DURING THE FOUR MONTHS WINTER DARKNESS.

Perhaps the most interesting work of the Expedition was in connexion with the glaciological investigations. In order to carry these out, it was planned to establish two stations on the inland ice, each of which should be maintained by two men over the winter. The only previous work of this

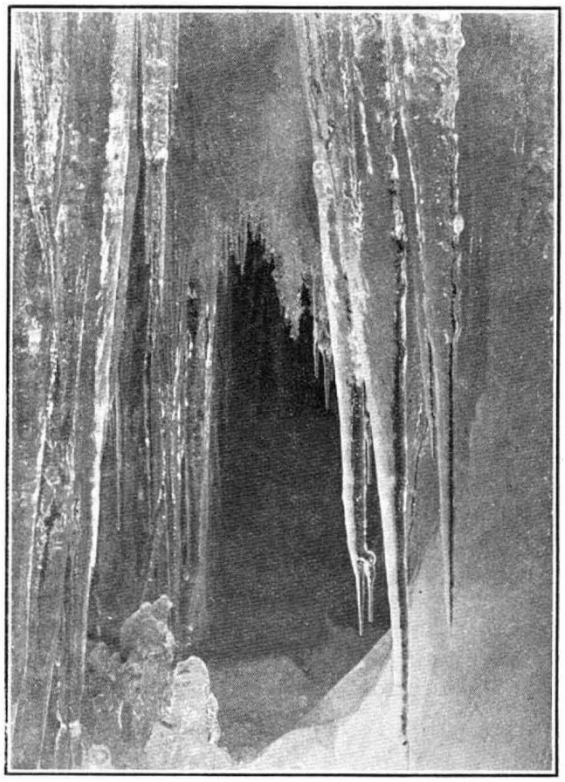

Fig. 3.
CREVASSE DISCOVERED AT THE CENTRAL ICE CAP STATION WHILE A SHAFT WAS BEING DUG TO 40 FT. BELOW THE SURFACE. A DEPTH OF 70 FT. WAS REACHED IN THE CREVASSE, BEING ONLY A FEW FEET FROM THE LAND BELOW.

nature was accomplished by the German expedition under the late Alfred Wegener, when their station Eismitte was set up in the centre of the Greenland ice cap. Difficulties of transport resulted in only the barest minimum of food and equipment being brought to Eismitte, and in appalling circumstances the Germans succeeded in producing a wonderful harvest of scientific results. Our problem was simpler in so far as distances were shorter, and we had the guidance of previous experience; but there were the same difficulties to be overcome in the way of blizzards and low temperatures, while four months darkness was a further complication. A solution was found in having the stations cut out of the ice, and amazing warmth and comfort was attained in this troglyditic existence. Moss was in charge of the central station for ten months, during three of which he was alone, while Glen and Dunlop Mackenzie formed a wintering party at the northern station (Fig. 2). Meteorological investigations were taken

three times daily at each station at the same hours as at the base, whence results were sent by wireless after each reading to Norway.

The net balance of the ice cap—that is to say, the ratio between the factors of accumulation and ablation—was determined for the west ice over the year, and preliminary discussion of the results obtained indicate that the northern part of the ice cap is probably both shrinking and retreating. The different factors obtaining both in accumulation and ablation were separately measured and their relative proportions assessed, while research was also made on various physical questions connected with the ice itself and with the change of snow into ice. The temperature gradient was measured down to a considerable depth, and it was found at the central station that the temperature remained at a fairly constant 0·0° C. at a depth of 70 ft. Certain indications of the thickness of the ice were obtained indicating that at least the west ice is very much thinner than had been thought. A crevasse was discovered while digging a shaft at the central station, and through it we were able to penetrate to a depth of more than 70 ft., where an unfrozen ice lake was found (Fig. 3). The walls of the crevasse were covered with a glittering array of ice crystals while magnificent icicles across the passages formed curtains which had to be cut down before a way could be found along them (see also NATURE, Nov. 7, p. 803).

At the base in Brandy Bay, Whatman and Hamilton were stationed practically continuously throughout the whole expedition. They were in charge of the important research on the ionosphere which was being carried out for the first time north of the auroral belt. Before departure from England, it had been feared that the severe climatic conditions would make it impossible successfully to accomplish this work, but so efficient was the whole apparatus and the Petter electrical generating unit, that not a single serious breakdown occurred over the entire year. The results are now being examined by investigators at the Radio Research Station at Slough, in co-operation with which, and also with the Norwegian Government Station at Tromsö, the records were taken. Special studies were also made of the aurora, and measurements were made of the atmospheric ozone.

By the end of August the scientific programme had been accomplished and the M.S. *Heimland* arrived in Brandy Bay on August 21. The base hut has been bought by the Norwegian Government, and after it had been inspected and the stores and equipment loaded on to the ship, we left Brandy Bay on the following evening.

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# Scientific Centenaries in 1937

By Eng.-Capt. Edgar C. Smith, O.B.E., R.N.

WHEN reference was made in these columns a year ago to the scientific centenaries in 1936, the first man of science to be recalled to mind was the famous German mathematician Johann Müller, or Regiomontanus, who was born in 1436. In reviewing the centenaries which will fall this year the first name to be included is that of Christopher Clavius (1537–1612) whose birth occurred a century later. Born at Bamberg, in Germany, he entered the Society of Jesus, taught for many years in Rome—earning for himself the appellation of "the Euclid of the 16th Century"—was employed by Pope Gregory XIII on the reformation of the calendar, and in 1604 published his most important book, "Geometria Practica". He died February 6, 1612. Another mathematical worthy of the sixteenth and seventeenth centuries was Henry Gellibrand, who was born in London in 1597 and died as Gresham professor of astronomy in February 1636 (O.S.) or 1637 (N.S.). It was Sir Henry Savile who turned Gellibrand's attention to mathematics, and at the Gresham College he became the close friend of Henry Briggs.

"Mr. Gellibrand's situation at the College, free Converse with the Lovers of Mathematical Studies, and diligent Enquiries, gave him," wrote Benjamin Martin, "an Opportunity of contributing much to the Improvement of Navigation, which probably would have owed more to him had he lived longer: But he was taken off February 9, 1636, in the 40th Year of his Life, and was buried in the Church of St. Peter the Poor, without any Inscription to his Memory".

The year 1637 also saw the birth of another English mathematician who had but a short life, William Neile, who died at the age of thirty-four years. He had been elected a member of the Council of the Royal Society at the age of thirty, and according to the antiquary Hearne, his