



Photo: K. Holmen

Meadow with cotton-grass (*Eriophorum Scheuchzeri*) on the south coast of Brønlund Fjord,
2 August 1947.

A PRELIMINARY ACCOUNT OF THE DANISH PEARYLAND EXPEDITION, 1948-9

By P. C. Winther and other members of the expedition

EIGIL Knuth and Ebbe Munck had hoped to reach the northernmost part of Greenland, the area north of Independence Fjord called Peary Land, on their North East Greenland Expedition in 1938-9. Owing to unfavourable ice conditions the expedition ship, *M.V. Gamma*, was not able to sail farther north than Danmarkshavn in latitude 77°N ., and a winter base was established in Mørkefjord. During the winter several sledge parties approached Peary Land, and experience gained on these trips intensified their ambition of a thorough scientific investigation of this region. Previous land exploration had consisted of sledge journeys, by Danish and American explorers mainly, on which it had not been possible to carry out detailed scientific work. Of these the Peary Expeditions between 1891 and 1909 and Lauge Koch's Jubilee Expedition of 1920-3 are the best known.

After the war Eigil Knuth's and Ebbe Munck's plan for an expedition to Peary Land was made possible by funds provided partly by a grant from the Danish Government, partly by contributions from Dansk Ekspeditionsfond (Danish Expedition Foundation), a recently formed institution financed mainly by Danes living overseas. A Danish Pearyland Expedition Committee was formed in 1946, consisting of the heads of the institutions and bodies which had given support, and scientific representatives from Copenhagen University. Eigil Knuth, the leader of the expedition, was to be responsible for all practical arrangements. The Royal Danish Navy placed Catalinas and their crews at the disposal of the expedition and the Grønlands Styrelse arranged for supplies to be carried to north-east Greenland in their ships.

It was not considered practicable to transport supplies to the winter base in Peary Land by ship, owing to the unpredictable extent of the ice on the northeast coast of Greenland. It was therefore decided to divide transportation into two stages, and to set up a south base which ships could reach each summer with reasonable certainty. From the south base supplies would be flown to Peary Land in Catalinas. Flying boats are very suitable for this kind of work and Catalinas have a fairly long range and carry a pay-load of 2 tons.

This scheme for establishing a winter base in Peary Land was dependent on the existence of sufficient open water for the Catalina to land and discharge supplies. A reconnoitring expedition was therefore sent out in the summer of 1947. The site for the south base was chosen in Young Sund, north of Clavering Ø, $74^{\circ}16\text{N}$. The expedition ship, *S.S. Godthaab*, sailed from Copenhagen on July 1 and twenty-four days later anchored

off the south base in Young Sund, under Zackenberg mountain. At the same time the Catalina "Mallebuk" of the Royal Danish Navy also arrived.

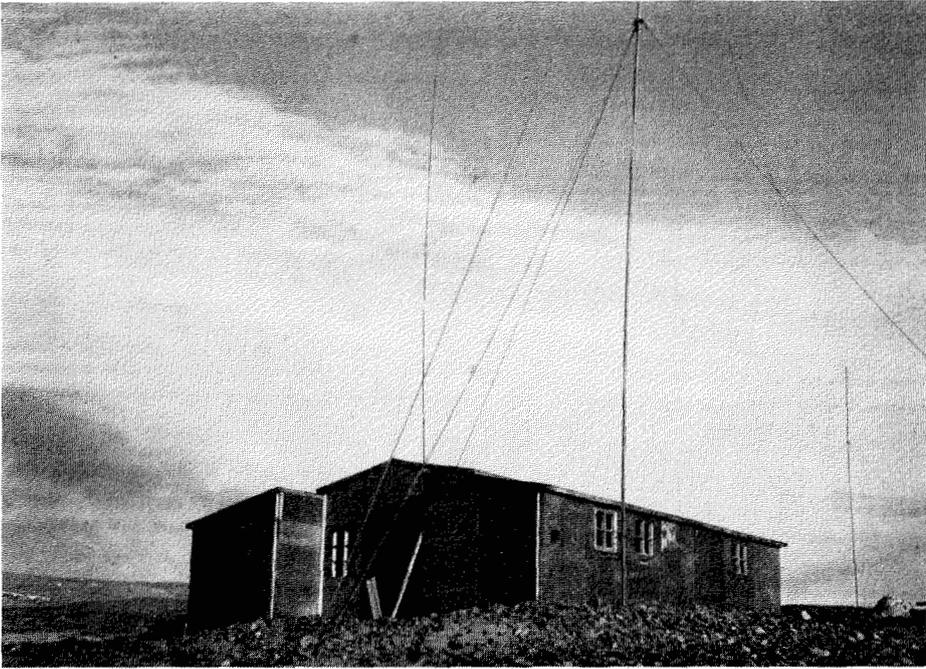
On July 27 the Catalina left for Peary Land carrying Eigil Knuth and a party of eight men including a geologist, a botanist, a zoologist, a glaciologist, and a radio operator. After 6 hours' flight it was discovered—as was hoped and expected—that the small Jørgen Brønlund Fjord, a branch of Independence Fjord, was free of ice. The small party and their supplies were landed on the southern coast of the fjord at the place which was later chosen for the site of the winter base. Owing to an accident to the aircraft when landing at the south base, the party at Brønlund Fjord had to remain there for a fortnight. The scientists spent the time making a preliminary survey of the immediate surroundings of the site for the winter base to assist them in preparing a research program for the winter of 1948-9.

Unfortunately the delay caused by this accident prevented the original plan of making several flights with supplies to Peary Land. By the time the aircraft had been repaired it was possible only to fetch back the party from Brønlund Fjord. New ice was forming on the fjord and the rapidly approaching winter made an immediate departure of ship and Catalina from the south base advisable.

During the winter of 1947-8 the detailed working program of the expedition was prepared as far as the limited knowledge of the country would permit. The hut for the winter base was designed to measure 23 x 23 feet, and to have six rooms. It was also hoped that a small hut could be built at some distance from the main hut for keeping spare clothing and provisions as a fire precaution. The first wintering party was to consist of:

Eigil Knuth, archaeologist and leader
Johannes Troelsen, geologist
Kjeld Holmen, botanist
Palle Johnsen, zoologist
Børge Fristrup, glaciologist
Aage Jacobsen, radio operator
Aage Sahlertz, assistant and cook
Karl Filemonsén, Greenlander

The main expedition arrived at the south base in Greenland towards the end of July, 1948, and the flights from Zackenberg camp to Brønlund Fjord were begun. With the help of three Catalinas twenty-two flights were made and 37 tons of supplies, including such things as materials for the hut, food, fuel, scientific equipment, household articles, dogs, sledges, and hunting and fishing gear, were carried north. The wintering party was fully occupied for the first weeks after the last plane left Brønlund



Winter station in Brønlund Fjord.

Fjord in erecting the house, securing it against the storms expected with the first snowfall, and arranging supplies in the very limited space available. The first snowfall occurred in September and by September 20 the fjord had frozen over and was safe for sledging. It was therefore possible to make several sledge trips into the interior before the total winter darkness prevented the party from leaving the station. On October 16 the sun finally disappeared to reappear on 26 February 1949.

The following brief summaries describe the work carried out and the results obtained on sledge journeys and on walking and motor boat trips during the first wintering of 1948-9.

GEOLOGY (By *Johannes Troelsen*)

Geological investigations were carried out in the vicinity of Brønlund Fjord (August 1947) and along Midsommer Søen, J. P. Koch Fjord, the south coast of Peary Land, G. B. Schley Fjord, and the southwestern coast of Independence Fjord (1948-9). The darkest winter months were partly occupied by magnetic observations near the base camp at Brønlund Fjord.

Tillites were discovered among the sediments of the eo-Cambrian Thule group. These indurated glacial drift deposits are always of interest as indicators of pre-Pleistocene glaciations.

On the foreland of the Franklinian (Smith Sound) geosyncline Early

Cambrian, Late Canadian (Lower Ordovician), Middle Ordovician and Silurian fossils were collected. Around Schley Fjord, where the Lower Paleozoic strata are somewhat folded, detrital sediments were found to be slightly more common than on the foreland.

In eastern Peary Land, the folded Lower Paleozoic sediments are unconformably overlain by marine strata of Pennsylvanian (Triticites), Early (?) Permian, and Triassic age. Beds with petrified wood and leaves of deciduous trees may be of Cretaceous or of Cenozoic age. Rotated faults and local folding have affected the strata after the deposition of the last-mentioned formation.

Basic intrusives of eo-Cambrian (?) age penetrate the Thule group, while other intrusives are of post-Cambrian age. Basic sills of post-Ordovician but pre-Pennsylvanian (Triticites) age were observed in eastern Peary Land.

Post-glacial marine terraces were measured in a number of localities, and the former distribution of glaciers and ice caps was studied in southern and eastern Peary Land.

Signs of recent volcanic activity were discovered near Brønlund Fjord. A number of small gravel cones, topped by craters with thick deposits of gypsum, sulphur, pyrite, and copiapite,¹ rest upon the dolomites of the Thule group, which have been torn and disrupted, apparently by escaping gasses. The craters are cold, but must be of very recent date, geologically, as the soft copiapite deposits are untouched by wind erosion. Though minute craters with crusts of copiapite occur on the Pleistocene marine terraces, the cones can hardly be referred to as mud volcanoes as most of them rest upon the surface of the non-bituminous eo-Cambrian dolomites.

¹A basic ferric sulphate.

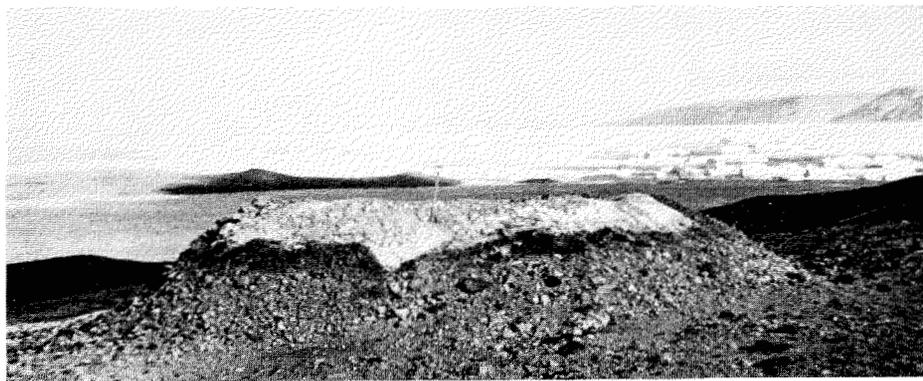


Photo: J. C. Troelsen

Solfatara, south coast Brønlund Fjord. Light-coloured crust on rim consists of gypsum, copiapite, and sulphur. Independence Fjord in background.

It may be of some significance that the area in question is cut by a number of normal faults.

K. Ellitsgaard Rasmussen, who is now in Peary Land, plans to concentrate his efforts on a petrographic examination of the core of the folded Roosevelt Fjældene, which form the northern peninsula of Peary Land.

BOTANY (By Kjeld Holmen)

From a phytogeographical point of view Peary Land is a high-arctic desert owing to the dryness of the climate. The scarce precipitation and the low humidity of the air during summer are insufficient for plants to exist. Therefore we find vegetation only along the rivers and in the snow-patches.

The vegetation along the rivers consists in the lowland of two types, a *Carex aquatilis*-meadow in moist sandy soil and an *Eriophorum Scheuchzeri*-meadow on wet ground.

In the snow-patches we meet with several types of vegetation: in the wet part there is always an *Eriophorum polystachyum*-bog with *Ranunculus sulphureus* and rich in mosses. On the dry slopes we find *Dryas punctata*-heath with *Carex nardina* or *Kobresia myosuroides*. Between these two types the solifluctional soil results in a rather dry *Salix arctica* vegetation and in somewhat moist soil there is a *Carex misandra* vegetation with *Oxyria digyna* and *Saxifraga oppositifolia*.

In the highlands, that is from 500 to 1000 metres above sea-level, we meet with two types of vegetation. In moist peaty soil there are patches with *Cassiope tetragona*. In dry stony ground there is a "fell-field" vegetation with such plants as *Poa arctica*, *Trisetum spicatum*, *Saxifraga nivalis*, and *S. groenlandica*.

On the east coast of Peary Land the continental plant societies such as the *Dryas*-heath are almost lacking. Instead of these we have types of vegetation dominated by mosses and lichens, especially *Rhacomitrium lanuginosum* and *Cetraria* spp.

The collections brought back from Peary Land comprise about 90 species of vascular plants, 120 mosses, 20 liverworts (no *Sphagna* were recorded), 60 lichens and several other thallophytes.

In the Brønlund Fjord area plant sociological, ecological, and cytological investigations were made during the wintering in 1948-9. The results of this work will be published later in *Meddelelser om Grønland*.

ZOOLOGY (By Palle Johnsen)

Peary Land is very interesting zoogeographically and had not previously been visited by a zoologist. Endeavours were made to collect as many different species of vertebrates and invertebrates from land, sea, and

fresh water, as possible and some 300 were secured. As would be expected the fauna proved to be very much like the fauna of the east coast of Greenland, though somewhat thinned out; however some species show affinities with the fauna of west Greenland. Practically all the species found represented northernmost records. Many berlese-funnel samples were taken to collect the microfauna of the soil both during the sledge journeys and, in connection with ecological investigations of the biotypes, near the winter station. A thorough study was made of freshwater life, which consisted mainly of midges and crustaceans. For the first time in the Arctic bottom-samples were taken in a large lake at considerable depths. The work in Midsommer Søen showed that the lake was poor in plankton but that the bottom was very rich in midge larvae, even at depths of 50 metres. These larvae must be the main food of the arctic char. In winter the ice-cover on Midsommer Søen reaches some 2.5 metres in thickness.

The greater part of the invertebrates has not yet been determined. An account of most of the invertebrates and of the vertebrates will later be published in *Meddelelser om Grønland*.

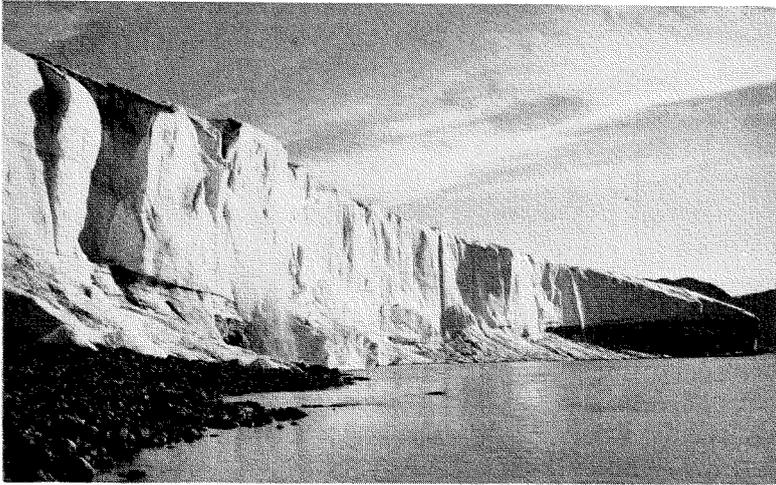
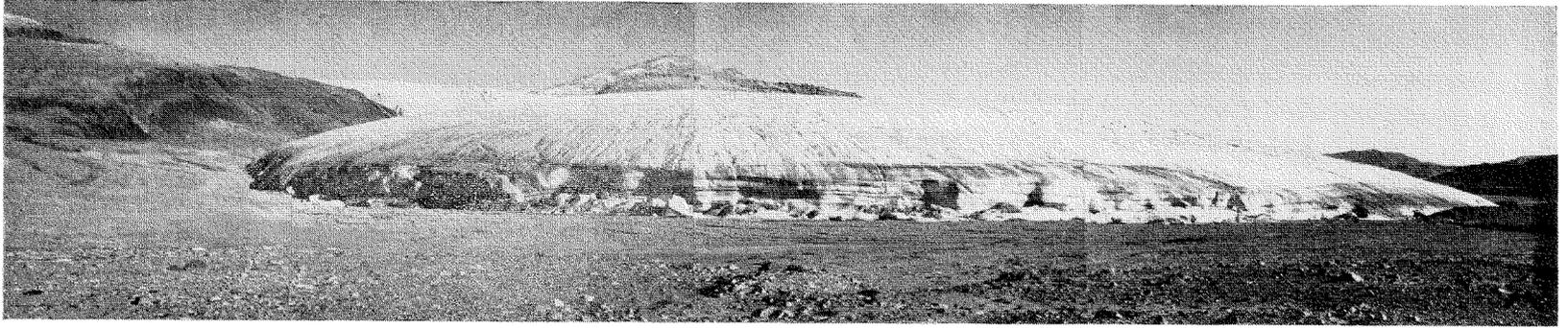
The birds seen during the first wintering were: fulmar, red-throated loon*, brent goose, snow goose, old squaw*, king-eider*, gyrfalcon*, rock ptarmigan*, ringed plover*, turnstone*, sanderling*, knot, dunlin, red phalarope, long-tailed jaeger*, glaucous gull*, arctic tern*, snowy owl, redpoll, and snow bunting*. Species marked with an asterisk are known to breed in Peary Land.

Mammals seen during the first wintering were: hare, lemming, arctic fox, polar bear, weasel, ringed seal, and musk-ox. The polar wolf, which was fairly common during Lauge Koch's visit in 1920, was not seen, nor were any tracks found; it is suggested that the wolf must have become extinct here in recent times as in East Greenland. The abundance of musk-oxen was astonishing, particularly in the Wandel Dal and on Herlufsholm Strand.

METEOROLOGY AND GLACIOLOGY (By Børge Fristrup)

The wintering station at Brønlund Fjord was included in the regular network of Greenland weather stations. Self-recording instruments were used to measure temperature, humidity, pressure, hours of sunshine, and insolation. Readings were made every three hours, and transmitted four times a day. In spite of the comparatively weak radio set the regularity with which these observations were received in Denmark was very satisfactory.

A secondary meteorological station was established on Chr. Erichsen Bræ at a height of about 1,100 metres above sea-level. Self-recording



Glaciers in Etukussuk Dal.

Photos: B. Fristrup

instruments were set up, and during the spring, summer, and fall months complete synoptic observations were made at the same hours as at the main station. In addition numerous meteorological observations were made by Knuth, Holmen, and Fristrup on sledge trips.

The climate of Peary Land is characterized by high winds of gale force in almost all months of the year; a calm is very rare. The temperature range is decidedly continental with a January mean of -32°C . (-26°F .) and a July mean of 6°C . (43°F .). Summer temperatures may be surprisingly high, readings above 15°C . (59°F .) being not uncommon especially in July, which is a frost-free month. The climate is very dry, and the greater part of the precipitation falls as snow in the months of August and September.

Owing to the low precipitation, only 114 mm. annually at 1,100 to 1,200 metres, the snowline lies at about 1,200 metres. Even in winter the land is so sparsely covered with snow that dog-travel is confined to the sea ice and the rivers. The snow is exceptionally dry, and the falling snow frequently resembles a very thin drizzle.

Of the glacier types, the ice cap and the highland glacier are the most common as would be expected from the altitude of the snowline. In the interior around Independence Fjord most of the glaciers belong to one or other of these types, both of which are frequently found in western and northern Peary Land and in eastern Peary Land to the south of Schley Fjord. Chr. Erichsen Bræ is a typical ice cap glacier. Snowbank glaciers are also common in Peary Land; they are generally small, but may reach a considerable size in the upper reaches of the valleys. The glaciers descending from the Inland Ice or from the greater ice caps are another type. Academy and Marie Sophie Bræer at the head of Independence Fjord descend from the Inland Ice, while the two tongue-shaped glaciers in Etukussuk Dal descend from Chr. Erichsen Bræ.

The annual ablation and accumulation were measured by the same methods used by Professor Ahlmann on the Frøya Bræ, Clavering Ø. The annual accumulation along a line across Chr. Erichsen Bræ was found to be 114 mm. of water and the ablation 162 mm. The ablation is therefore considerably higher than the accumulation, and examination of the moraines also showed that Chr. Erichsen Bræ is receding. From the maps of the Danmark Expedition of 1906-8, the Thule Expeditions, and Lauge Koch's Jubilee Expedition of 1920-3 the glaciers at the head of Independence Fjord and the glacier descending into Hagen Fjord appear to have receded and to have shrunk considerably in size. According to marks put up in 1947 the front of Chr. Erichsen Bræ has receded about 35 metres annually since that time. Investigations of the thickness of the layers of ice in a shaft dug in Chr. Erichsen Bræ seem to show that during the time the glacier was formed the annual excess accumulation



Photo: E. Knuth

Tent rings in Brønlund Fjord.

was about three times as great as the present accumulation. Today, Chr. Erichsen Bræ is practically a mass of dead ice, and the rate of movement is insignificant.

A special study was made of the glaciers at the head of Independence Fjord and their rate of movement was measured. The very beautiful tongue-shaped glaciers descending into Etukussuk Dal and the glaciers around Astrup Fjord were among those investigated. Some flights were made over the glaciers for this work.

ARCHAEOLOGY (*By Eigil Knuth*)

The task of the archaeologist during the wintering in Peary Land was to examine the area for Eskimo tent rings and especially for winter dwellings. By such finds it was hoped to throw some light on the Eskimo migration routes. During the brief stay in Peary Land in the summer of 1947, tent rings, shelters, and meat caches were found at several places in the Brønlund Fjord region.

On sledge journeys to Astrup Fjord and Neergaard Elv further tent rings and flint tools such as knives, scrapers, arrow heads, and microliths were found. At Kap Ludovika a winter house and a solid tent foundation were discovered as well as Eskimo meat caches and fox traps. The winter house was later uncovered and measured. It was rectangular in construction and built of large limestone blocks. There was no sign of a passageway and the back walls were several metres high. It is possible that the roof may have been made of skins. The house, as well as the tent founda-

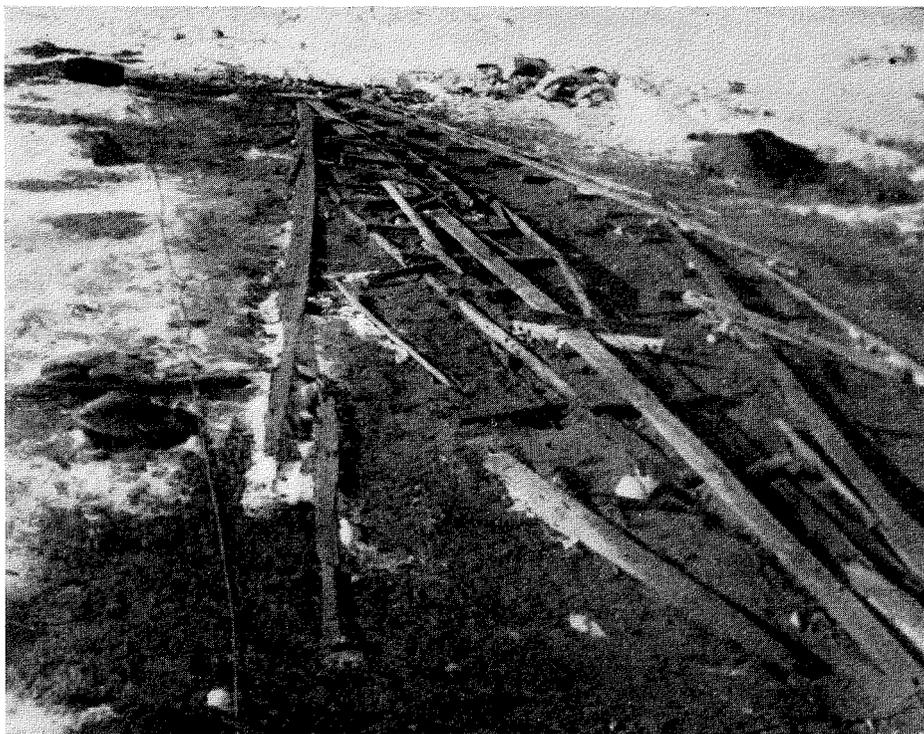


Photo: E. Knuth

Remains of umiak found at Herlufsholm Strand.

tion in the immediate vicinity, seemed similar in type to houses seen in Benton Bugt, Washington Land on the Second Thule Expedition. Several artifacts were found in the ruins of the house such as trace-buckles, a whalebone spoon, and a weapon-head.

On Herlufsholm Strand the remains of a umiak were found on a snow-free terrace. The umiak was made of wood and had whalebone nails.

Until the material has been thoroughly examined it is not possible to say more than that the existence of the Cape Dorset culture has been proved at localities on the south side of Brønlund Fjord and of the Thule culture on the north side of Brønlund Fjord.

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During August 1949 sixteen flights were made to Peary Land, taking in supplies and the new wintering party. Besides the leader, Eigil Knuth, who will remain in Peary Land for a second winter, the party consists of:

Thorkild Nielsen, geographer
Knud Ellitsgaard Rasmussen, geologist
Børge Ib Haagensen, radio operator
Kristen Sørensen, radio operator
Jens Geisler, Greenlander
Tobias Samuelson, Greenlander

This wintering party will return in 1950, and the object of the Danish Pearyland Expedition will have been fulfilled: the wintering for two consecutive years of a party of scientists in Peary Land, the northernmost country of the world.