

CROSSING NORTH PEARY LAND IN SUMMER 1953

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NORTH Peary Land, the most northerly part of Greenland, is a large peninsula bounded on the east and north by the Arctic Ocean, and on the south by Frederick E. Hyde Fjord and its western prolongation, a deep valley leading to Harder Fjord. It is crossed from east to west by a mountain range, 60 to 70 km. wide, which contains alpine peaks 6,300 feet high. The valleys are mainly occupied by glaciers, but there are large ice-free areas on the north coast and the shores of Frederick E. Hyde Fjord.

Since 1900, when Peary journeyed along the north coast of Peary Land and discovered Kap Morris Jesup, the area has been visited by several explorers and scientists. J. P. Koch reached the east coast of north Peary Land in 1907, and in 1909 MacMillan and Borup visited Kap Morris Jesup. In 1921 Lauge Koch led the Danish Jubilee expedition round the north coast, making scientific observations from which a geological map of Peary Land was drawn. Since then Danish expeditions to east and north Greenland have been frequent, and a program of mapping and geological surveying has been carried out. This was continued by the Danish East Greenland expedition 1953, under the leadership of Lauge Koch, which was composed of geologists working in east Greenland from the base on Ella Ø, 73°N., who included J. Haller, studying the Caledonian metamorphics at the edge of the ice cap; E. Wenk and P. Bearth, mapping plutonic centres in Scoresby Land; H. Butler, continuing his studies of the Devonian, and M. Sommer working in Lyells Land. In addition two groups of geologists worked in north Greenland from the base at Centrumssø, 80°N. They were P. Adams and J. Cowie, mapping the Danmarks Fjord region, and F. Müller and the writer with a twofold plan of work: to complete the geological map started the previous year, in Kronprins Christians Land, and to cross north Peary Land, making a geological reconnaissance. This journey was made during the first part of our field season.

From 1948 to 1951 I had been studying the structure of the Caledonian mountains of central east Greenland and in 1952 both Müller and I had worked from the base at Centrumssø, Müller studying the arctic soils while I continued geological mapping. However, the unknown interior of north Peary Land interested us greatly, and during the winter we worked out a plan to cross the peninsula, based on a thorough study of aerial photographs which were kindly made available to us by Colonel Helck, Geodætisk Institut, Copenhagen. As Catalina and Norseman aircraft (on floats) are the main form of transport on Lauge Koch's summer expeditions it was essential to

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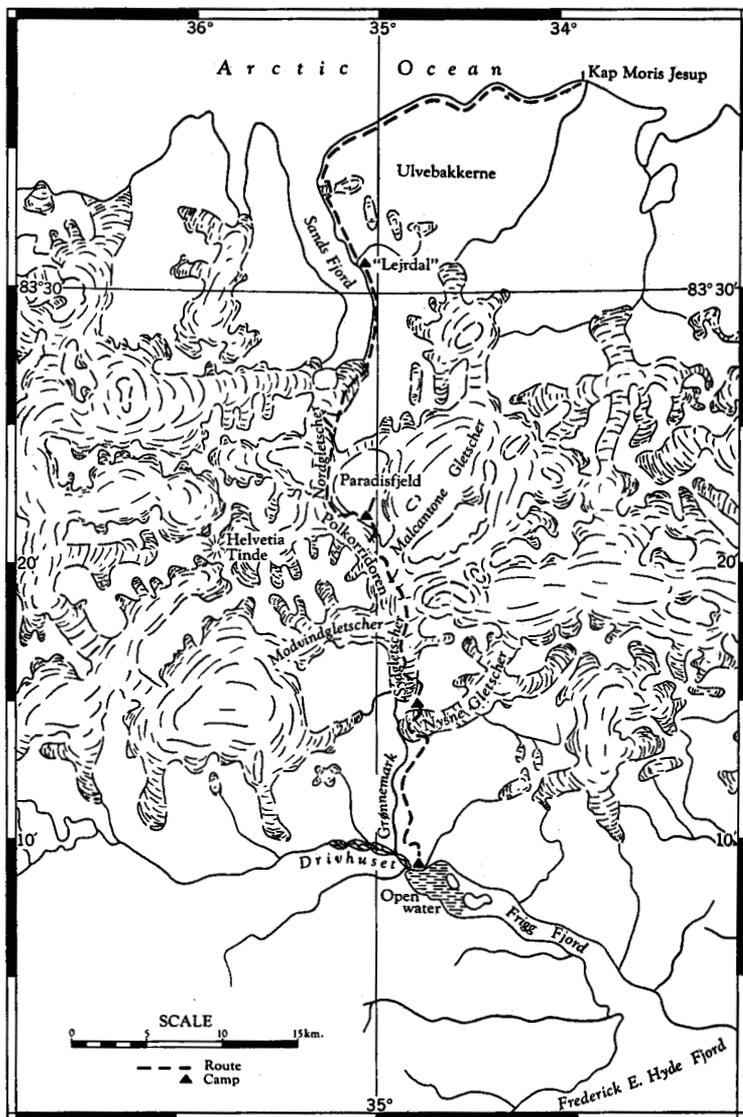


Fig. 1. North Peary Land showing the route followed to Kap Morris Jesup.

find open water for landing at the starting point of our journey. From the air photographs we concluded that the only place in north Greenland that would be free of ice every summer was the head of Frigg Fjord, a small side branch of Frederick E. Hyde Fjord (Fig. 1). Lauge Koch had seen this fjord from the air in 1938 and had named the area Drivhuset (hot house). The distance from Centrumssø to Frigg Fjord was farther than the loaded Norseman could fly with safety, and the use of the Catalina was impossible owing to the high cost. The problem of transport to Frigg Fjord was solved on August 1 when permission was obtained to call at the Danish-American airfield, Nord, for refuelling and so the Norseman could be used.

We wasted little time packing our equipment and took off almost immediately for Nord, where we were most hospitably received. We departed from Nord at midnight, and our pilot, Hans Lunding, headed the aircraft over Independence Fjord towards Peary Land. For some time heavy mist prevented us from determining our position, and it was not until we reached the outer part of Frederick E. Hyde Fjord that conditions improved. At 2.30 a.m. on August 2 we put down on the ice-free waters of Frigg Fjord (Fig. 2). The aircraft left shortly after, the pilot having arranged to return for us on August 10 at 6 p.m.

Towards midday Müller and I started walking northward, both carrying heavy loads. After crossing the desert-like delta cones and gravel terraces of the interior of Frigg Fjord, we entered a deep, northward-ascending valley. To our surprise there was a dense vegetation cover of *Cassiope tetragona*, *Dryas integrifolia*, and *Salix arctica*, and we decided to call the valley Grønnemark (Green country). A large glacier, the Nysne Gletscher (New Snow Glacier), forms a barrier across Grønnemark, and from its crest we had an impressive view of high peaks farther north. Beyond the Nysne Gletscher a broad glacier, Sydgletscher, flows down the valley and we set up camp at its foot. On August 3 we went up the Sydgletscher. The surface was composed of small ridges 3 to 10 feet high, and walking was difficult until we found a good path along a stream bed. Before long the weather began to turn stormy, and snow was falling by the time we reached the pass Polkorridoren (previously known as "Nordpassagen"). Here we had the choice of following the Malcantone Gletscher, on our right, northeast to another more distant pass, or of following the large Nordgletscher, on our left, down a steep-walled valley. We decided to take the latter route because the rock walls promised good geological opportunities. On the way we encountered several large streams flowing in deep ice gorges which were difficult to cross (Fig. 3). Later we managed to cut steps down the glacier flank, and made our second camp on the beach of a small blue lake (Fig. 4).

Next day, August 4, was sunny, and after climbing up about 600 feet from camp we enjoyed a wonderful view of mountains to the north, including Helvetia Tinde, 6,500 feet, the highest mountain in north Greenland. Travelling down Nordgletscher we met the same problems as on the Sydgletscher, and again the only passable route was along the surface rivers. We were able to avoid a large, highly crevassed bend of the glacier by following a steep canyon which descended almost to sea level. After eight hours walking we reached the head of Sands Fjord, which opens into the Arctic Ocean. Until now we had encountered no serious difficulties, but the east coast of Sands Fjord was one long obstacle course. The mountainous sides rise steeply, with only a narrow strip of boulder and scree at the water's edge. It took us six more hours to reach "Lejrdal" (Camp valley) delta, which we had chosen as the base for our journey to Kap Morris Jesup.

We set out towards the cape in the early evening on August 5, hoping to make the journey there and back (about 60 km.) in sixteen to twenty hours. We spent all that evening, all the next day, and the early hours of



Fig. 4. View down Nordgletscher from our camp near the pass.

August 7 walking. Along the shore of Sands Fjord there was a strip of boulders similar to that encountered previously; in addition, near the entrance to the fjord we came upon a steep glacier dropping almost vertically into the water. We climbed the rock wall on the southern edge of the glacier until, at about 700 feet, we came to a flat ledge where we could cross the glacier and climb down on the north side. When we finally left the fjord and turned east we found that the ice foot, on the shores of the Arctic Ocean, provided an excellent uninterrupted route for several miles. About this time Müller observed a large animal following us; it was a white polar wolf, now very rare in Greenland.

On August 6, at 8.45 a.m., we reached the cairn on Kap Morris Jesup. Inside the cairn we found a tin containing the *Danebrog*, the Danish flag, and after some searching, another tin containing Lauge Koch's report made in 1921. We copied this, made some additional notes, placed the copy and notes in the cairn, and took the original report away with us. We made

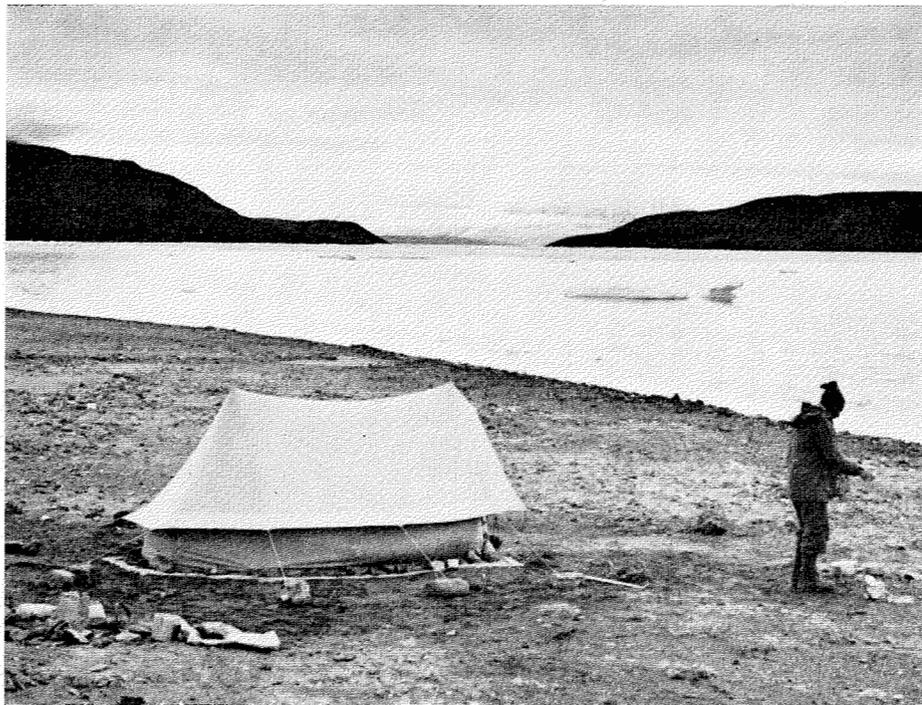


Fig. 2. The ice free water of Frigg Fjord.

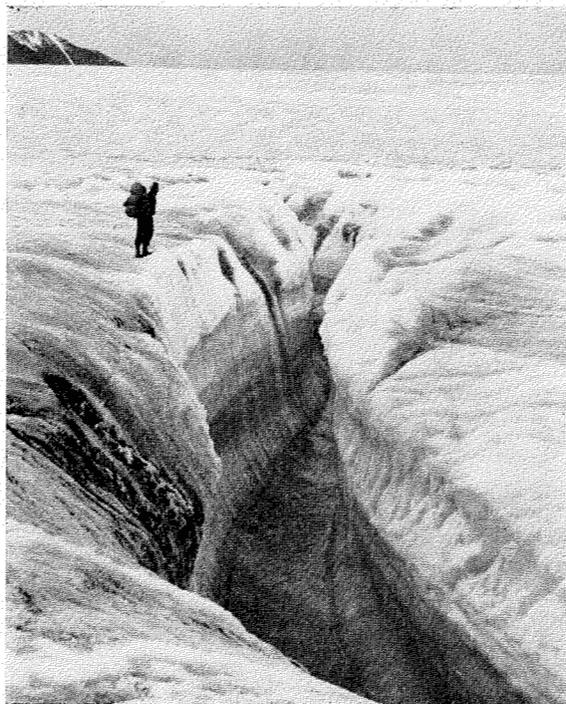


Fig. 3. Ice gorge on Nordgletscher. In the background, the pass Polkorridoren.

observations on the geology, zoology, botany, and weather conditions. Once again the flora was impressive; here about 700 km. from the north pole, we found a closed moss vegetation and about twenty different higher plants, including *Saxifraga flagellaris*, *S. caespitosa*, *S. oppositifolia*, *Papaver radicum*, *Cochlearia officinalis*, *Epilobium latifolium*, *Melandrium apetalum*, *Arenaria* (?) *rubella*, *Cerastium alpinum*, *Alopecurus alpinus*, *Carex incurva*, and *Deschampsia* spec. We started back at midday, and reached our base camp in Sands Fjord early in the morning on August 7.

We were very tired and rested until late that night before setting out for our camp near the pass. As we walked we tried to fill some details into the rough geological picture obtained on the journey to the north coast. We halted frequently to collect geological samples, and the weight of the food we had carried out and eaten was more than replaced by the specimens. It was 2 a.m. on August 9 when we reached our camp site between the Sydletscher and Nysne Gletscher. The weather was unfavourable, and the dense mist forced us to stay in the tent for twenty-four hours. Our last provisions were eaten, and we were very glad when, on the 10th, a strong wind cleared the mist. We covered the last stretch to our camp in Frigg Fjord quite quickly, arriving at 3 p.m. on August 10, three hours before our appointment with the aircraft. Unknown to us bad weather had prevented Hans Lunding from flying and we spent an anxious time waiting for him. We had little food left at camp, because of the weight limit of 75 kg. for all our equipment when we flew in. However this situation was known, and around midnight on August 12 the Catalina "Pluto", commanded by Captain Pedersen with Lauge Koch himself on board, managed to put down on Frigg Fjord. As we took off and headed along Frederick E. Hyde Fjord, clouds closed in over Frigg Fjord, and we flew to airfield Nord over thick clouds.

Our purpose, to make a geological cross-section of north Peary Land, was fulfilled, although most of the data were collected on the march carrying heavy loads. A summary of the geological results is appended. A detailed report is to be published elsewhere, in German with an English summary¹, and a paper linking our observations with the latest geological results from Ellesmere Island is in preparation.

Summary of the geology of north Peary Land

The mountains of north Peary Land are part of the belt of Caledonian folding that extends from north Ellesmere Island to north Greenland. The rocks range in age from Precambrian to Upper Silurian, although in Ellesmere Island the Devonian is also reported to have been affected by late orogenic movements.

In south Peary Land unfolded Carboniferous and younger strata lie discordantly above the Silurian. Our section (Fig. 5) through north Peary Land only showed strongly folded rocks, some of which had been

¹Fränkl, E. 1955. 'Rapport über die Durchquerung von Nord Peary Land (Nordgrönland) im Sommer 1953'. *Medd. om. Grøn.* Vol. 103, No. 8 (In press).

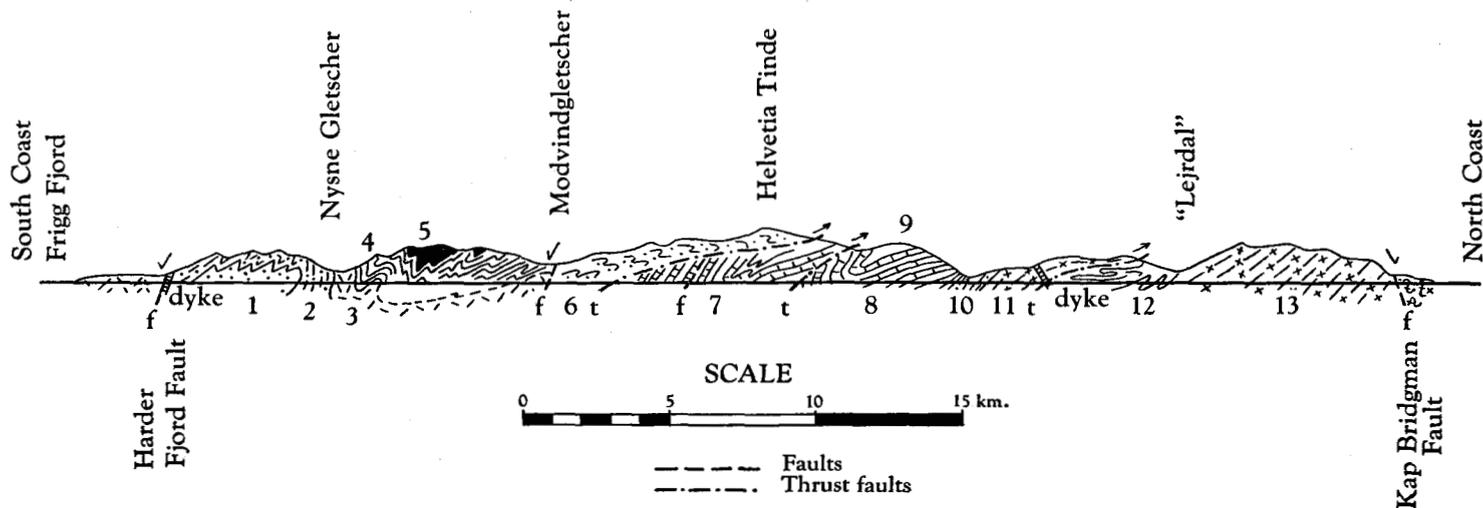


Fig. 5. Schematic cross-section through north Peary Land.

Stratigraphy

1. Grønnemark sandstones (1,000 m.+). Coarse-grained, light coloured sandstones and arkoses with layers of dark shales. **2.** Grønnemark shales (ca. 500 m.). Red shales and graphitic shales, slightly hardened, alternating with sandstones and limestones. **3.** Frigg Fjord mudstones (ca. 400 m.). Red and green shaly mudstones with (?) volcanic bombs. **4.** Nysne Gletscher graphitic slates (ca. 750 m.). Arenaceous slates with high graphite content above about 300 m. of unknown lithology. At the base slates alternate with limestones, which are gradually replaced above 300 m. by sandstone. Nysne Gletscher graphitic slates are considered to be slightly altered graptolite shales. They have been tentatively correlated with the Cape Tyson formation (Niagaran) of western north Greenland. **5.** Sydgletscher sandstones (300 m.+). Marly, micaceous, grey sandstones, weathering greenish and yellowish. The Sydgletscher sandstones have much in common with the Polaris Harbour formation which follows above the Cape Tyson formation. **6.** Polkorridoren series (800 m.+). Lithology unknown. Hard, layered, grey or dark green rocks lying as a nappe, thrust towards the north, on marbles and phyllites. **7.** Strongly disturbed zone of dark marble and rusty-weathering phyllite; the latter sometimes contain graphite. **8.** Marbles alternating with rusty-weathering phyllites. **9.** Yellowish-weathering series, lithology unknown. **10.** Quartzitic, fine-grained slates. **11.** Sands Fjord quartz-phyllites. Some gneiss layers were found in this series and are thought to be altered arkoses. **12.** Ulvebakkerne marbles. Light coloured marbles with thin layers of rusty-weathering phyllites, both intensely folded. **13.** Kap Morris Jesup quartz-phyllite. Salty, micaceous quartzites and sandy mica-schists with some garnet-bearing layers.

metamorphosed. These rocks may be divided into two zones by a line which crosses Polkorridoren. To the south there are slightly metamorphosed, strongly folded sediments, whilst on the north side the amount of metamorphism increases rapidly towards Kap Morris Jesup. It is assumed, therefore, that the centre of the geosyncline today lies beneath the Arctic Ocean. The strong compression in the northern part has led to overthrusts, some of which attain nappe-like dimensions. In contrast with the Caledonian zone of east Greenland, the overthrusts are directed towards the centre of the folding belt. Faults with downthrow on the south side and WSW.—ENE. strike, were formed in late or post-orogenic time. Younger faults trend W.—E. or WNW.—ESE., and their pattern largely controls the present topography; the two most important fault lines are the Harder Fjord in the south and Kap Bridgman fault in the northeast. North Peary Land was uplifted as a block between these two faults in preglacial time, and the landscape of today has developed from this initial relief, modified by local glacial erosion.