

HELGE BACKLUND'S TRAVELS

1929.

Summer expedition in the s.s. "Godthaab". Departure from Copenhagen June 16th. Arrival at Greenland July 21st, after a 22 days' passage through the ice-belt.

As the available maps were very primitive, some fjords and bays having not yet been mapped, it soon proved necessary in several places to make a more detailed, but very time-consuming mapping for the use of the geologists. To begin with the mapping was carried out by KOCH, BACKLUND, and SEIDENFADEN, subsequently chiefly by the latter two. These maps are further dealt with in the report on the expedition in 1930.

There were no plans as to a continuation of the work in the ensuing years.

During the summer BACKLUND was to continue the practic-geological investigations commenced by the present author in 1926—27 in addition to other scientific work. The expedition carried the proofs of my two papers "The Geology of East Greenland" and "Stratigraphy of Greenland", and notably the former contained (pp. 58—60) a theory which differed greatly from those arrived at on earlier investigations, viz. that the Archæan was only present in the interior of Scoresby Sund and in the innermost ramifications of the fjords northward to and including Kejser Franz Josephs Fjord. East of this area there occurred a late-pre-Cambrian series (Eleonore Bay Formation), in most places but slightly metamorphosed, and farthest eastward, on Liverpool Land and northward from Kejser Franz Josephs Fjord, the gneisses known from earlier expeditions and previously referred to the Archæan, were supposed to constitute the central part of a Caledonian folding range and thus to be chiefly built up of late-pre-Cambrian and older Palæozoic sediments. BACKLUND's main task this summer was to find out whether or not this theory would hold good. Further, he wished himself to make detailed investigations of the younger East Greenland eruptives, mainly basalts.

In accordance with the above program, BACKLUND first had the

opportunity to investigate the supposed Caledonian granites and gneisses (on Clavering Ø and around Nordhoeks Bjerg and during a traverse of the country between the interiors of Loch Fyne and of Moskusoksefjord), and subsequently, during investigations of the so-called inlier in the western part of Moskusoksefjord and on Strindbergs Land and Fränkels Land, to study the problems relative to the Eleonore Bay Formation. Finally, the superposition of this formation on the Archæan was investigated in Antarectics Sund, the interior of Kejser Franz Josephs Fjord, Kempes Fjord, and Segelsällskapets Fjord. The basalts were investigated on Clavering Ø, around Loch Fyne and Moskusoksefjord, and at Kap Franklin. A geological investigation of the areas north and south of Davy Sund, which were but little known geologically, had to be given up owing to the unfavourable ice conditions.

Summary of Travels.

July 21st.—In the early morning BACKLUND and KOCH went ashore near the trappers' hut at Kap Mary. The hut was built on basalt, and the mountain behind it was likewise made up of this rock. After a short visit ashore, we returned to the ship, and the "Godthaab" proceeded into Gael Hamkes Bugt to the edge of the fast ice. At 1 p.m. all the members of the expedition went ashore at Hirds Fox Farm west of the river that runs through the broad valley situated between Brinkley Bjerg (crystalline) and Rundetaarn (basalt) parallel with a N—S fault-line. BACKLUND and NOE-NYGAARD made a trip westward to study the crystalline; returned in the evening. It consists of granite and micaceous gneiss, dark grey and steeply tilted, overlain unconformably by calcareous sandstone. Then follows a bed (about 100 m) of glassy quartzite, which strikes N. 25° E. and dips 35—40° towards the east. Quartz vein with sulfides, garnet-bearing veined gneiss, hornblendic gneiss with felspar veins. Above follows predominantly whitish-grey garnet gneiss, coarser towards the cape, on its surface wind-polished stones.

July 22nd.—Excursion northward along the west side of the valley to the watershed and onwards to the lake opposite Kisbjeig.

Near the middle of the valley, at the watershed, the crystalline was exposed between younger sediments and block-moraine soil flow.

Returned along the east side, below the basalts. On board late in the evening.

July 23rd.—The "Godthaab" sailed into Young Sund to the north side of Clavering Ø.

July 24th.—At 10 a.m. BACKLUND, with an assistant and a tent,

was set ashore inside Basaltö, NW. of Djævlekløften and at once went up the mountains. Returned to the tent at 10 p.m.

Investigated the basalts, and measured several terraces. Observed dislocated Mesozoic sediments consisting of black shales with brown concretions deposited on porous conglomeratic Arkose sandstone. Noticed blocks of limestone and conglomerates with brachiopods (*Spirifer?*). A basalt sill was found near the pass at a height of 433 m.

July 25th.—From 10 a.m. to 11 p.m. excursion up through Djævlekløften to the crystalline (with sulfides) in Forposten and the opposite west side towards the top. Three basalt levels were ascertained.

July 26th.—From 11 a.m. to 11 p.m. excursion to the valley west of the basalt along the boundary towards the crystalline rocks (with sulfides at the bottom of the valley) to the west. The distribution of the basalt was studied, and it was found to be represented by faulted sills thrust against the crystalline rocks in the west, that is to say, with a considerable drag effect.

July 27th.—The "Godthaab" started towards Kap Stosch. In the evening excursion along the shore for a study of the Devonian conglomerates.

July 28th.—Motorboat trip into Loch Fyne. At 5.30 p.m. BACKLUND and SEIDENFADEN tented near the river mouth north of Nordhoeks Bjerg.

July 29th.—Excursion along the river from 8 a.m. to 10 p.m. Studied the granite, which was here represented by pink porphyritic granites with microcline phenocrysts up to 6 cm long and pale-blue idiomorphic quartz and with inclusions of grey calcareous sandstone. In contact with chondrodite-bearing limestone the granite is fine-grained and crumbling. Black chert with white veins. The granite shows finger-like intrusions in the Eleonore Bay Formation. Contact much brecciated. The Eleonore Bay Formation forms arches overlain by porphyritic granite. Pargasite limestone and cordierite shales. Lumps of unconformable white pegmatite in graphite-bearing andalusite-quartzite. Above, white granite dykes in cordierite-quartzite (altitude c. 500 m). The whole overlain unconformably by Devonian? or Carboniferous? horizontally bedded sandstones, alternately brown and green, now with conglomeratic, now with diagonal stratification. Basalt at 859 m crowns the sediments.

July 30th.—Excursion from 2 p.m. to three o'clock next morning to the northwestern sediment area.

Study of basalt sills with cavities filled with limestone or zeolith. The highest point towards Nørlunds Alper (970 m) consisted of coarse conglomerate. Three basalt sills at an altitude of 900 m (13 m), 810 m, and 755 m above sea-level (24 m).

July 31st.—Later in the day an excursion northwestward along

the eastern slope of Nordhoeks Bjerg past three lakes. At the shore white porphyritic granite intruded in and eliminating the white quartzite was observed.

Aug. 1st.—The camp was removed, in motorboat, to the head of Loch Fyne in rain and a high wind. With difficulty the outfit and a cano were carried up the steep shore.

Aug. 2nd.—Reconnaissance trip westward towards Moskusoksefjord from 2 p.m. to 2 a.m. of August 3rd. Fog impeded the view.

Aug. 3rd.—From 4 p.m. to midnight investigations of basalt beds overlying each other from 135 to 800 m altitude. Then the substratum of the basalt was formed by striped red aplitic granite. Farther upwards amphibolite-striped pegmatite.

Aug. 4th.—Excursion to Ladderbjerg, starting at 10 a.m.

Studied the granite to the east, as also the superposition of the covering sediments and the height of the superposition (granite and basalt on a level with the Badlanddal, same surface at two higher levels), further, basalt dykes in the crystalline rocks, basalt sills on the latter (in sediments), and basalt beds (i. a. plagioclase-porphyrific) higher up alternating with sediments (tuff? = Ladderbjerg). Interesting forms and paths of erosion in the crystalline rocks in, and for the drainage of, the northern end of Giesecke Bjerger. At 450 m, level surface of granite dipping slightly towards the west, reaching 500 m eastward and thus sloping at increasing angles (up to 10° ?) westward. Lower level of basalt surface at about 550 m altitude, intermediate sediments of Mesozoic-Tertiary type. Basalt sills, too, alternating with yellow, upwards coarse, sandstone at any rate up to 750 m.

Aug. 5th.—The ascent on August 4th took place from the east, the descent, on August 5th, towards the north. Returned to the tent at Loch Fyne at 8 a.m. after twenty-two hours' march. Removed the tent to the valley of Granitelv to a place near a tributary rivulet south of the height figure 250 m on the map of the Geodetic Institutc.

Aug. 6th.—Removed the remainder of the goods, provisions, and collections to the new camp.

Aug. 7th.—At 4 a.m. a reconnaissance was made to find out whether it would be possible to pass the Granitelv. Successful hunting. At 8 p.m. reconnaissance of the Granitelv valley with its porphyritic granite with fluidally arranged phenocrists, lath- and table-shaped, with aplite and pegmatite veins, which intersected the parallel arrangement of the phenocrists, whose surface sloped steeply downward ($70-80^\circ$). The reconnaissance went as far as opposite Vuachebjerg on the other shore right to the (Devonian) Carboniferous superposition. The conglomerates were studied.

Aug. 8th.—Arrived at the tent in dense fog at 7 a.m. after an eleven hours' march. At 4 p.m. the camp was moved across Granitelv

by means of a cano to the inner part of Moskusoksefjord to a point just east of Ankerbjerg, at the mouth of the rivulet descending from Point 208 m on the map of the Geodetic Institute of 1933, where the tent was pitched on

Aug. 9th, at 3 a.m. after nearly twelve hours' march with heavy loads. Later in the day KOCH visited the camp. NOE-NYGAARD joined the party.

Aug. 10th.—At 12.30 p.m. to 11 p.m. excursion northward for a study of the porphyritic granite and its variations, and its relations to the sediments of Devonian type. Studies of faults and conglomerates in a canyon on the east side of Salèvebjerg as far as the Arve valley. Folding of the sediments with different axial drops and varying directions of strike were ascertained. A cairn was built on a southern spur of Salèvebjerg just west of the point marked 209 m.

Aug. 11th.—Triangulation in the morning. Started at noon on an excursion northwestward to investigate the relation of the folded sediments to the crystalline rocks (granite) north of Ankerbjerg and the horizontal sediments (Devonian?) in the southern and southeastern slopes of Salèvebjerg and the conditions on Sernanders Bjerg. The westward limit of the fault and a porphyry dyke were ascertained in the eastern valley side of Sernanders Bjerg, where it was penetrated by black shales.

Aug. 12th.—Returned through the valley along the eastern side of Sernanders Bjerg southward to the plain traversed by Ankerbjergselv. Went subsequently eastward along this river to the tent, arriving there at 7.30 a.m. after nineteen and a half hours' march. The remainder of the day was spent with triangulation.

Aug. 13th.—The camp was taken in cano and jolly-boat across Moskusoksefjord to the south side just opposite Ankerbjerg, and thence, after building of a cairn, measuring of angles, and a short reconnaissance, to the eastern edge of Ankerbjerg. Met the "Godthaab", and the party spent the night on board the ship.

Aug. 14th.—In the morning the "Godthaab" took the party to the southwestern edge of Ankerbjerg, where some cairns were built, angles measured, and granite samples collected. Thence the party continued in motorboat to the foot of Ramsays Bjerg on the south coast of the fjord, where sections were measured in Cirkusdal and basic and acid effusive rock samples were collected. Arrival at the tent at 10.30 p.m.

Aug. 15th.—Angle measurements in the morning with building of cairns at the foot of Ramsays Bjerg. Later (at 5 p.m.) the camp was removed to the mouth of a large rivulet east of Högboms Bjerg on the north coast by means of a motorboat. Tented here at 8 p.m.

Aug. 16th.—Excursion at 10.30 a.m. to the top of Högboms Bjerg

(diabase), which was measured to be 1346 m (1339 m on map of Geodetic Institute) to the south, 1285 m (Geod. Inst.: 1297 m) to the north, and the snow-dome towards the Anker valley c. 1300 m. Unconformity between horizontal red sandstone (Devonian) rich in conglomerates and dislocated folded formation rich in effusives was observed. According to KOCH the latter belong to the Eleonore Bay Formation. Faults were studied during the descent.

Aug. 17th.—Arrived at the tent at 1 a.m. Subsequently supplemental measurements of angles, and at 8 a.m. the whole camp was taken on board the "Godthaab". Went ashore near the mouth of Moskusoksefjord south of Kap Bull later in the day to study a granitic inlier, faulted Cambro-Silurian beds overlain by Devonian beds on the south coast. Proceeded in the ship into Geologfjord.

Aug. 18th.—Went by motorboat into Geologfjord and went ashore north of Primulabugt. Studied the structures, folding and thrusting tectonics with tension, boudinage, and faults of the Eleonore Bay Formation.

Aug. 19th.—Proceeded past Kap Weber into Kejser Franz Josephs Fjord, past Teufelsschloss (in the night) to Junctiondal, where the contact between the crystalline rocks (= Metamorphic Complex) and the Eleonore Bay Formation was studied. During this visit the granitisation problem in relation to the Eleonore Bay Formation first attracted our attention.

Aug. 20th.—The ship proceeded to Ella Ø. Started at 9 a.m. in the motorboat on a reconnaissance to the fossiliferous Cambrian beds, visited POULSEN's camp. Started at 1 p.m. in motorboat into Kempes Fjord, and tented on the north side near the boundary between the Eleonore Bay Formation (to the east) and the crystalline rocks (to the west). Excursion northwestward along and across the contact; observation of morainic material right up to the ice-dammed lakes. Returned back owing to increasing darkness.

Aug. 21st.—Motorboat journey into Kempes Fjord past Kap Beijer, Kap Bayard, and Kap Knut Søderstrøm for study of the structures and the distribution of rocks in the vertical fjord sides up to 1400 m high. Amphibolite bands with boudinage observed. Landing at Kap Hedlund, where quartzite had been eliminated by granitisation. Excursion up the mountain slopes. Proceeded towards Ella Ø, where the party met L. KOCH in a motorboat, searching for a new anchorage for the "Godthaab". Passed the night on board the ship.

Aug. 22nd.—The "Godthaab" started at 6 a.m. past the mouth of Vega Sund and onwards past Kongeborgen to Segelsällskapets Fjord. Scattered ice and fog.

Aug. 23rd.—Went by motorboat into Forsblads Fjord, and tented

there at 1 a.m. NOE-NYGAARD joined the party as assistant. Excursion towards the interior of the fjord to study the stratigraphy and thickness of the Eleonore Bay Formation. Returned to the tent at 11 p.m.

Intrusive granitisation in relation to the granites (red and grey) of the "substratum", and gneisses were observed.

Aug. 24th.—At 11 a.m. excursion in a jolly-boat to the second glacier on the south coast, where the interrelationship of the two granites and their relations to the quartzite were studied. Visited Caledoniaø, where granitisation phenomena concerning black shales and limestone were studied. Returned at 10 p.m. after a difficult trip in stiff headwind and increasing swell.

Aug. 25th.—Started at noon on an excursion in motorboat into Alpefjord past Kap Mæchel inside Arwidssons Ø. Landing near the quartzites with granite veins on the north side, with beautiful large bedding planes. Farther towards the interior a glacis of light-grey granite weathering brown and with red granite dykes. Landings in two places on the south side. Arrival at the "Godthaab" at 9 p.m.

Aug. 26th.—The ship headed southeastward, towards Davy Sund, but was soon forced by the ice to turn, so it proceeded up through Antarctics Sund to Kejser Franz Josephs Fjord.

Contact between crystalline rocks (W) and the Eleonore Bay Formation (E) on the south side of Kejser Franz Josephs Fjord, corresponding to Junctiondal, was studied from motorboat and on foot in the early morning. Comparatively flat structures intersected by pegmatite veins were observed around and west of the large former Eskimo settlement at Nanortalik.

Aug. 27th.—The "Godthaab" proceeded into Kejser Franz Josephs Fjord to Ridderborgen, where an anchorage was chosen off Knækelven, and an excursion, which lasted till late in the night, was made up the valley.

In the valley surprising findings of red and grey quartzites and conglomerates in the form of erratic boulders were made. Numerous samples and a large boulder of grey quartzite with ripple-marks were collected to be handed over to the Mineralogical Museum, Copenhagen.

Aug. 28th.—Excursion in motorboat to the foot of Ridderborgen. Subsequently the party sailed out of the fjord, going ashore at the cape near Kjerulfs Fjord, the mouth of Engdalen, NW. of Arthurs Dal, the northeastern side of Ättestupan, a valley near Payers Gletscher, the mouth of Niggli Dal, the cape opposite Kap Lapparent, and at the mouth of Isfjord. On board the ship at 9 p.m.

Aug. 29th.—The ship rode at anchor in fog off Teufelsschloss. BACKLUND visited Blomsterbugten and Kap Weber, geologist parties went ashore in both places, and Strindbergs Land, where BACKLUND and

SEIDENFADEN went ashore. In the evening excursion along the shore towards Waltershausen Gl.

Aug. 30th.—Tent place at the mouth of Brogetdal on Strindbergs Land. Excursion from 10 a.m. to 8 p.m. towards the north and north-west for studying the Eleonore Bay Formation and older, partially tectonically intersected basalt.

Aug. 31st.—At noon excursion towards the northwest and southwest past Gunvors Bjerg and the series of lakes to the valley northward. Again observations of postbasaltic movements (probably Palæozoic). Return to the camp at 2 a.m. (September 1st) in darkness. Had to spend a couple of hours on the top of a large stone owing to an attack by musk-oxen.

Sept. 1st.—Dense fog all day. Consequently only work in the immediate neighbourhood of the tent.

Sept. 2nd.—At 8 a.m. the camp was taken on board the ship, subsequently the camps near Teufelsschloss, after which the ship proceeded into Kejser Franz Josephs Fjord. Fog most of the day.

Sept. 3rd.—In the forenoon the ship had to heave to owing to the fog, which, however, lifted about noon, when the ship continued to Vinterøer and anchored there.

Sept. 4th.—The party went by motorboat to Kap Humboldt, Kap Wijkander, and Robertsons Ø, where collections of basalt were made, and a fault with Devonian in the north and Carboniferous in the south, extending in the direction of Sofia Sund, was studied. Proceeded subsequently to Rudbecks Bjerg, with basalts and light porphyries along the shore. Returned to the ship in the evening.

Sept. 5th.—BACKLUND and SEIDENFADEN went to Kap Franklin, where they tented on the south side. Basalts and liparites in Continental Carboniferous were studied.

Sept. 6th.—Continued excursions in the neighbourhood of Kap Franklin. In the evening snow.

Sept. 7th.—At noon the camp was taken on board the "Godthaab", which subsequently left the coast for good.

Sept. 28th.—The expedition arrived at Copenhagen.

1930.

Expedition ship s.s. "Godthaab". Departure from Copenhagen. on June 14th. Departure from the Faroes June 23rd. On June 28th BACKLUND paid a short visit to Jan Mayen for collecting samples of olivine sand from the weathering products of the basalt.

On July 1st, the ship entered the ice, which was very scattered. Late in the evening of July 4th she reached the land water near Sabine Ø.

About this time a two weeks' period of unsettled weather, which highly impeded the work, set in.

BACKLUND was to continue his work of the preceding summer. Special stress should, however, be laid on the preparation of a geological map of the eastern part of Clavering Ø, the region around Wordies Gl., and the region around the interior of Moskusoksefjord. The topographical basis for the geological maps were prepared by BACKLUND and SEIDENFADEN, at times assisted by GROTEWAHL and KOCH. The geological mapping was done by BACKLUND.

Summary of Travels.

July 7th.—Owing to bad weather it was impossible to set the party (BACKLUND and SEIDENFADEN) ashore in Kirchenpauers Bugt till this morning. BACKLUND at once commenced an investigation of the basalts, and preparations were made for a triangulation of the area. Rather bad weather, in the night rain.

July 8th.—The weather continued bad, with storm and rain, and in the night the tent was in part torn asunder. At 1 p.m. an excursion was made to a basalt sill, which was measured, and a small cairn was built. Spring set in late this year, and during the first half of July the work in the field was much impeded by soil-flow. In the course of the day the gale carried the ice out of Young Sund.

July 9th.—The bad weather continued all night with rain and snow. In the morning the storm died down, and the measuring of bases for the triangulation could be commenced. At 1 p.m. the party climbed the mountains, but in the afternoon the cartographic work had to be interrupted owing to fog. A cairn was built at an altitude of 442 m. In the afternoon twelve Eskimo graves were discovered behind the tent.

July 10th.—Dense fog until the afternoon. Large ice masses had accumulated along the coast, but still it was possible to carry provisions in motorboat to the camp. At noon angle measurements were commenced from the cairns previously erected. By midnight it was clear, and the sun shone.

July 11th.—An excursion was made, but it was much impeded by soil-flow. Reached the water-shed to the south, which consisted of a flat basalt sill inclined towards the south (= flat conical sheet). Angle measurements were made, and a cairn was built at a height of 257 m. Fine weather.

July 12th.—Returned to the tent at 2 a.m. In the afternoon supplemental triangulation was made from Kap Breusing, and basalt dykes and layers were studied in yellow-greyish-blue shales (Neocomian?).

July 13th.—In the morning rain, later it cleared. Supplemental

measurements were made from a small cairn at a height of 442 m, as also levelling of terraces on the east coast of Clavering Ø; the latter work, however, was much impeded by solifluction.

July 14th.—Fine weather. In the forenoon the camp was taken on board the "Godthaab", which in the afternoon started for Hirds Fox-farm, where a party consisting of KOCH, BACKLUND, SEIDENFADEN, and NOE-NYGAARD was landed.

July 15th.—Fine, sunny weather. While KOCH and SEIDENFADEN ascended Brinkley Bjerg to make theodolite observations, BACKLUND and NOE-NYGAARD made an excursion to the locality of siliceous rocks above the house. It was found in a layer of coarse quartzite interbedded in grey garnet gneiss at about 380 m altitude. At 800 m the crystalline quartzite was overlain by grey dolomitic calcareous shales, and in addition light-yellow to dark-grey limestone, locally brecciated and horizontally bedded, dipping somewhat towards the west. Traces of recrystallised brachiopod shells were observed, higher up again calcareous shales with stylolith formations (Carboniferous-Permian). The quartzite underlying the basal conglomerate exhibited oxidised green copper spots. Farther down the crystalline contains several rust zones. At the foot of the slope the above-mentioned limestone was found resting on the crystalline at a low altitude, which shows that a fault of about 800 m occurs here.

July 16th.—Fine weather. Started in motorboat for Store Finsch Ø in scattered ice. Visited a stranded Norwegian ship there. Investigation of gneiss rich in biotite and granite. Angle measurements from the highest point of the island (c. 388 m), and the various generations of of the aplite dykes and their influence on the relief were studied. In the afternoon it grew foggy, but the party succeeded in returning to the ship.

July 17th.—Fine weather. Near Hirds Fox-farm complementary observations and investigations of the crystalline at the boundary towards the sediments were made. In addition, faults and terraces were examined and measured.

July 18th.—Fine weather in the forenoon, later increasing wind and some fog. The ship returned from Hirds Fox-farm to Young Sund.

July 19th.—A party comprising BACKLUND, SEIDENFADEN, and NOE-NYGAARD was set ashore in Grønnedal at the head of Kirchen-pauers Bugt.

Complemental triangulation and basalt investigations were made, and a cairn was erected at a height of 300 m. Continued the ascent towards the basalt crest of Langelinie, and a cairn was built on the top at an altitude of c. 820 m, whence angle measurements were made. Foggy during the descent.

July 20th.—High-lying fog. Excursion along the shore northward, measuring terraces and their remnants in solifluction soil along the slope of Forposten towards Basaltø.

July 21st.—Fog. Excursion eastward along the coast. Remains of four Eskimo huts and four tent rings were discovered. In the afternoon, when the weather cleared, supplemental observations were made and a cairn was built.

July 22nd.—Dense fog all day, so the party remained near the camp. Construction of maps.

July 23rd.—Banks of fog all day. Complementary measurements southward. The magnetician GROTEWAHL joined the party and made magnetic observations.

July 24th.—The shore was blocked by ice. In the forenoon a motorboat from the ship made two attempts to approach the camp, but only the third time did it reach the shore about 500 m west of the tent. The camp was taken on board, and the ship started towards Kap Stosch without being troubled by ice. Here two tent camps were erected on the shore, one party consisting of L. KOCH, NOE-NYGAARD, and BØGVAD (geologist of the Nanok Company), and another party consisting of BACKLUND, SEIDENFADEN, GROTEWAHL, WITTRUP HANSEN, and COULET SVENDSEN. Each party had one of the ship's motorboats at its disposal.

July 25th.—In the night wind and rain, but in the morning the weather improved. In the forenoon the BACKLUND party started in motorboat to Jordanhill.

Investigation of the Jordanhill granite along the shore: flesh-coloured veined gneiss with amphibolite and weathered micagneiss. Furthermore, reconnoitring of the edge of Wordies Gl. Camped for the night on the terminal moraine in front of the glacier.

July 26th.—Inspected the terminal moraine, which was partially made up of quicksand on an icy substratum, and though the party was equipped with a Nansen-sledge, the reconnaissance showed that it would be impossible to travel on the glacier. Many mud volcanoes were observed, and the surface of the glacier was very rough and in places almost impassable.

July 27th.—BACKLUND and GROTEWAHL made a reconnaissance of Jordanhill with a view to a mapping of Wordies Gl. and an investigation of the possibility for finding a way up the glacier and an orientation of the structure of Jordanhill. The edge of the plateau consisted of brick-red granite at an altitude of 1105 m. Farther eastward a cairn was built at 1050 m, whence triangulation was made. Triangulation was likewise made from the highest point of Jordanhill (1399 m, according to the Geodetic Institute 1410 m), and a cairn was built of erratic boulders of garnet gneiss with coarse lath-shaped inclusions.

July 28th.—The tent at the south coast of Jordanhill was reached at 5 a.m. after sixteen hours' march. It was decided that WITTRUP HANSEN and SVENDSEN should take care of the motorboat, while BACKLUND, GROTEWAHL, and SEIDENFADEN should try to find a way inland along the south side of Wordies Gl.

July 29th.—Started in the morning in motorboat to the southern edge of the glacier, but shallow water compelled the party to change to the two canoes, for one and two persons respectively, with a light tent without sleeping bags and reduced provisions. The canoes went up the marginal river of the glacier immediately below the steep glacier wall. After several havocs, and all members of the party having got wet to the skin, they reached, by rowing and by dragging the canoes against the stream, a point opposite Rungstedsgl. Here quartzitic gneiss with abundant chlorite-sericite were observed.

July 30th.—In the forenoon clothes and provisions were dried. In the afternoon an excursion on foot was made to Promenadedal. Here faulted and dragged Devonian rocks with brecciated quartzitic granite were found on the east side, and vertically tilted Devonian beds on the west side. Farther westward the Devonian dips constantly about 45° towards the east. The basal conglomerate increases constantly in height, and about 2000 m farther on it rests with a vertical faultcliff against a much brecciated grey dolomite with white veins (E.B.F.), which dips steeply towards the west. Sandy shales and micaceous flaky schists of grey and reddish-brown colours and grey lenticular clay shales of a thickness of about 45 m form the vertical area between the conglomerate and the grey dolomite which dips towards the west. The grey dolomite is c. 30 m thick and is overlain by whitish-yellow quartzite with a northwesterly dip, and is underlain by grey calcareous shales alternating with grey quartzite. Off the mouth of a valley from the south (in easterly continuation of Promenadedal near its mouth) a black limestone with white veins forming a hill 225 m high, on which a cairn was built, and whence triangulation was made. Returned to the tent at 11 p.m.

July 31st.—In the afternoon an excursion to the western end of Nørlunds Alper across quartzitic granite-gneiss. Reached the top at 2 o'clock in the morning of

Aug. 1st.—Height 1420 m (Geod. Institute 1474 m). Angle measurements were made towards the northwest and east, and connection was obtained with the cairns on Jordanhill. During the ascent strongly bedded red quartzite gneiss, almost horizontal-lying, was noted. At the top greyish-white hornblende granite, crumbling and gneissy.

Aug. 2nd.—Departure from the camp at the south side of Wordies Gl. at midnight. Arrived at the tent north of the glacier on Jordanhill

at 7.35 a.m. Very clear weather. Reconnaissance and studies of the crystalline at the southern foot of Jordanhill along the shore. Structural details were drawn and photographed. The triangulation was completed by the aid of base measurements at the shore and angle measurements from the ends of the base to check the barometric height observation of the cairn (1090 m) on the plateau's edge.

Aug. 3rd.—Departure in motorboat from Jordanhill at 11 a.m. Arrival at Kap Stosch at 4 p.m. measurements for checking from the cairn at Kap Stosch in order to obtain connection towards the west.

Aug. 4th.—Departure in motorboat to the head of Loch Fyne. For five hours investigation of peat beds in relation to moraine and glaciofluvial terraces. Subsequently back to Kap Stosch and on board the "Godthaab".

Aug. 5th.—In the morning departure from Kap Stosch in the "Godthaab", heading eastward. Reached the trappers' station Knudshoved in the evening.

Aug. 6th—7th.—Stay at Knudshoved owing to thick fog.

Aug. 8th.—The fog persisted all night. In the forenoon it cleared, and the ship left Knudshoved. After a short visit to the Myggbukta wireless station the ship headed towards Kap Franklin.

Aug. 9th.—In the early morning KOCH's party with NOE-NYGAARD and BØGVAD was set ashore near Margrethedal west of Kap Franklin, and the ship proceeded into Kejser Franz Josefs Fjord to the interior of Moskusoksefjord. In the afternoon BACKLUND, GROTEWAHL, SEIDENFADEN, LØPPENTHIN, and COULET SVENDSEN were set ashore at the mouth of Vastidal. In the evening triangulation was made from the camp site in order to link up with the observations made the previous year. Further, investigations were made of the unconformable series with various tectonic disturbances, at the base red horizontal Devonian beds in Sederholms Bjerg tilted up to 80° and dipping towards the west and east. Red porphyry intercalated in this substratum, in which grey limestones and dark shales also occurred.

Aug. 10th.—Sederholms Bjerg was ascended in fine weather. Its eastern end was measured to be 1287 m (Geod. Institute 1407 m for the top farther westward). A fault was ascertained between a porphyre-bearing sediment series and the main part of Sederholms Bjerg's red sediments, which were steep, up to vertical, enclosing grey sediments to the east. Investigations of the upper red series. Sketches were drawn, and photographs were taken from the top.

Aug. 11th.—Reached the camp at 2 a.m. after thirteen hours' march and work. In the afternoon observations were taken from the camp site in order to obtain connection with the new-built cairn on Sederholms Bjerg. Furthermore an excursion was made westward to the mouth of

the river with measurements of terraces, and onwards to the porphyry contacts at the mouth of Paralleldal.

Aug. 12th.—By noon the camp was removed, after a cairn had been built on the shore. After a visit to the shore at Högboms Bjerg (Prospektdal) and an inspection of the porphyries there, we continued to the eastern side of Gastisdal on the other side of the delta. A reconnaissance was made up the valley. The red porphyries on the east side of Ramsays Bjerg wedge out towards the south. They were underlain by a reddish-brown porphyry lens. White felspar-bearing quartzite with a basal conglomerate eastward is probably of Caledonian age.

Aug. 13th.—At 1 p.m. excursion southwestward to investigate the relations of the Devonian and the Carboniferous to La Cours Bjerg (granite, crystalline) and the position of a red granophyre in relation to these formations. The granite was coarse, grey, and banded. The granophyre occurred in a sediment, which was faulted against the eastern crystalline (La Cours Bjerg). Both granites overlain unconformably by a conglomerate with balls of a light reddish-brown quartzite, grey limestone, yellow chert, and dull-red felspars in a matrix of red and grey felspars with quartz, probably the same Carboniferous as was ascertained on August 2nd. The conglomerate was partly vertical and faulted. The excursion ended at the threshold in the valley at about 300 m altitude, where a cairn was built. Returned to the tent at 10.20 p.m.

Aug. 14th.—Fog in the mountains. Various levellings were carried out in the valley in the forenoon. Investigations of red granophyre below the Carboniferous beds. Back to the tent late in the evening.

Aug. 15th.—In the forenoon angle measurements from the terrace above the camp to various cairns in the north and west in order to obtain connection with the measurements of the previous year. Subsequently excursion in motorboat to the valley between Högboms Bjerg and Ankerbjerg across the fjord to collect Carboniferous fossils and to ascertain the position of the faulted Carboniferous beds in relation to the Devonian (with red granophyre) in the west and the crystalline in the east. In addition collection of Devonian scleroderms.

Aug. 16th.—In the forenoon the "Godthaab" arrived and after taking on board the camp, headed out of the fjord. The kerosene depot laid out the previous year on Strindbergs Land was inspected. Subsequently the ship proceeded out through Kejser Franz Josefs Fjord.

Aug. 17th.—In the early morning Koch's party from Margrethedal came on board, and the "Godthaab" continued through Sofia Sund to Ella Ø, where GROTEWAHL went ashore to take magnetic observations on the shore. The ship then proceeded through Kong Oscars Fjord towards Segelsällskapets Fjord, but off the southern end of Kongeborgen she had to turn, owing to thick winter ice, and go northward.

Aug. 18th.—About 1 a.m. the ship anchored in the western part of Sofia Sund. Started in the morning out through Sofia Sund, passing Bontekoe Ø about midnight.

Aug. 19th.—Passed Kap Parry in the forenoon in scattered ice, but the winter ice still lay along the coast right down to the northern point of Liverpool Land. An attempt to reach Kap Simpson had therefore to be given up. The ship proceeded eastward in highly scattered ice. At about 7 p.m. she was free of the ice and headed towards the mouth of Scoresby Sund.

Aug. 20th.—Near Kap Swainson the ship met some ice. At the same time it grew foggy, so the ship had to keep at some distance from the coast.

Aug. 21st.—The “Godthaab” lay fog-bound off Scoresby Sund all day.

Aug. 22nd.—As a strong northerly wind was coming on, the ship laid her course towards Reykjavik.

Aug. 26th.—Reached Reykjavik, whence the expedition continued in the liner to Copenhagen, arriving there on September 1st.

1931.

The chief work to be done this summer was the building of the stations for the scientists who were to pass the winter in East Greenland. As this work was considered to make such great claims on the time and equipment of the expedition that no large-range summer working parties could be equipped, it was decided that Professor BACKLUND should not join the expedition this summer. However, Professor BACKLUND took part in the planning of the geological work during both the summer and the winter, and went in the expedition ship as far as Helsingør in order to give the geologists the last instructions.

1932.

BACKLUND's investigations in the southern and eastern parts of Clavering Ø in 1929 and 1930, and MALMQVIST's investigations in the same areas in 1931 had given rise to a number of problems concerning the occurrence of minerals within this area, which necessitated a closer investigation by means of up-to-date electrical prospecting apparatus carried out by BACKLUND and MALMQVIST in cooperation. The apparatus were borrowed from the “A/B Svensk Elektrisk Malmletning”. Two ponies were bought in Iceland to serve for the transport of the heavy instruments, a skilled horseman was engaged, and the party was finally joined by S. KAMMAN, civil engineer. Twenty-two days were spent on this work (cf. special report on the work).

As the ice conditions were favourable northward, BACKLUND and his above-mentioned companions were to make a practic-geological reconnaissance of the slightly known areas west of Hochstetters Forland and Kuhn Ø. This work took thirteen days.

Brief Summary of the Excursions.

July 15th.—The ship lay for some hours near Bontekoe Ø, and BACKLUND accompanied by MALMQVIST, KAMMAN, SEIDENFADEN, and EIGIL NIELSEN made a four hours' motorboat trip to the island. They climbed the summit of the island (287 m), and basalt layers dipping 38° to the southeast and dikes striking N.—S. and dipping towards the west were studied. At the top black basalt with fluidal structures towards the SSE. was observed. Irregular deposition of the basalt beds with vesicles indicates the original surface of the lava. In the lower part of the island purple-coloured plagioclase-porphyrite with step-faults towards the NW. and dykes. Zeolite formations and unconformities were observed between the beds.

July 17th.—Arrival at Eskimonæs at 9 p.m.

July 18th.—Departure from Eskimonæs at 9 a.m. heading towards the mouth of Granatelv east of Hallebjergene. The BACKLUND-MALMQVIST party (4 persons) was set ashore with a heavy prospecting equipment, provisions, a tent, and two ponies. The landing was finished at 1 p.m. Unfortunately the ponies managed to get loose, but were caught in the course of the afternoon, and in the evening the whole camp broke and went northward to the plateau east of Hallebjergene with two full-loaded ponies and four heavy rucksacks. The transport was extremely difficult owing to the stony ground.

July 19th.—Camped at 1 p.m. 3 km inland. After some hours' rest the party went on, and in the evening reached Prospecting Camp at about 700 m altitude west of Vestmars Bjerg. Reconnaissance westward and northward late in the evening.

July 20th—31st.—During this period prospecting was carried out from the camp, comprising base measurements, line measurements, electro-magnetic measurements, geological reconnoitring, and drawing of maps.

Aug. 1st—9th.—Final measurements were made, and blasting by means of dynamite carried out down to two ore-bearing deposits, a very hard work owing to the small number of men. The return to the shore took place on August 8th in two tempi with heavy loads. In the morning of August 9th KOCH and SEIDENFADEN visited the camp in motorboat, and in the afternoon the camp was taken in a motorboat to Eskimonæs, while the ponies were ridden back to the station. Here KAMMAN took charge of the motorboat "Asut" and in the evening started north-

ward to Hochstetters Forland at the same time as the "Gustav Holm". The other members of the party were on board the "Gustav Holm".

Aug. 10th—11th.—At midnight the motorboat arrived at Hochstetters Forland, and the "Gustav Holm" arrived in the morning of August 11th, when the party at once set about to equip the "Asut" for the voyage into the fjord. At 9 p.m. the boat started with BACKLUND and MALMQVIST as geologists, SEIDENFADEN as botanist and cartographer, and KAMMAN as motorman. After fetching a jolly-boat at Kulhus station, they proceeded to the north side of Kuhn Ø, where the party went ashore in two places in the course of the night. Granites, quartzites, and migmatites were observed both at the cape east of Kap Mosle and eastward below the hanging glacier, and the plateau remains on the top between these two localities were inspected. Pegmatitic lenses in grey banded and spotted biotite granite. A seemingly flesh-coloured granite of a somewhat younger date, occurred in the form of sharp dykes and veins. Amphibolites were numerous as folded bands with boudinage structures near the crest to the south, and by biotite aggregations along the salbands the amphibolites pass into grey biotite-banded granite gneiss. Dense- to fine-grained areas were free of minerals and almost purely quartzitic. To the west the beds were slightly undulated, almost arched. The lowland to the west and south was covered by solifluction soil difficult to pass. In the west, faulted Caledonian sediment remains were met with, while crystalline penetration is remarkable to the east. The sediments dip 45—70° towards the east and northeast and form, owing to erosion, a coast cliff about 8 m high. At Kap Mosle there occurs eastward at the top grey banded and somewhat silicified limestone penetrated by pink, both conformable and unconformable granite dykes, which run at right angles to the bedding plane and dominate quantitatively. The position of these dykes indicate a flat, westward dipping, almost horizontal orientation of their plane of intrusion. The minerals in the veins are distributed into zones orientated with their longitudinal axes at right angles to the vein walls; the veins cannot, therefore, be regarded as actual fluidal intrusives, and the phenocrysts are not intratellurian formations. The granite replaces whole blocks of sediments (limestone and quartzite), which nevertheless retain their original orientation between the coarse granite masses, even the smallest flakes retain the original sedimental orientation. A transverse banding of the granite reflects the original alternation of the sediments; it is hardly possible to interpret the occurrence of the granite as due to a violent intrusion. At the base of the limestone suite there occur sericitic shales pierced by conformable granite veins, which dip towards the opposite side (eastward); the shales are traceable in the field without demonstrable folding, but contain some biotite; intersecting dykes are likewise present, though of subor-

dinate importance. This shaly area belongs to the low western portion of Kuhn Ø, and lends to the landscape a zebra-banding in beds dipping towards the west and northwest. On the surface the granite dykes weather out as walls between the depressions resulting from erosion of the sediments.

Aug. 12th.—About midnight the boat headed towards Kap Negri, at whose top a light-grey granite cropped out; at the middle a dark biotite band with remnants of earlier structures in several conformable wedge-shaped stripes. Below followed banded grey biotite granite with intersecting dykes; the structures dip slightly towards the east with indications of dislocation westward in the dark (brown) bands, which are older than the late transverse dykes. — Ullas Ø presents steep cliffs all around the shore, with a serrated crest at the top, almost pillar-like seen from the east. The island consists of two different parts, the eastern higher part, made up of massive light-grey granite, and the smaller western part, which dips in below the eastern part with a boundary plane dipping about 35° towards the east, is made up of numerous irregular bands of brown biotite shales in a sparse light-grey granite matrix. Only a few biotite bands and stripes are seen at the base of the eastern half; in spite of the dipping boundary plane the general orientation is almost horizontal.—The south coast of the fjord is made up of grey granite, which is broad-banded and dip slightly towards the east. The fjord is cut sharply into a plateau about 1200 m high, with flat ice caps in the south, north, and west; the plateau is slightly undulating, with shallow valleys, cut off sharply by the steep to perpendicular mountain walls of the present coast. Mørkeklint, the corner bluff at the southern bend of the fjord, exhibits pillar-shaped erosion remnants upwards. Here the granite material is of somewhat subordinate importance, whereas the quartzitic material dominates. The western shore of the southern branch of the fjord descends from a height of nearly 1500 m with terrace-shaped ledges towards the large N.—S.-running valley, and the plateau of the eastern shore is likewise resolved into a series of more or less isolated cylindrical plateau remnants towards the broad Odins Dal at the southwestern corner; this leads in a straight line towards Lindemans Fjord, and in its middle part, halfway down towards the fjord, horizontal bedded (yellowish-brown) sedimentary formations are seen. At the point where the fjord turns northwestward, the northern shore forms a peninsula about 300 m high (Maagenæs, according to the map of the Geodetic Institute), built up of more or less uniform red granite west of a shallow bay (Asut havn). Tented in the cove. Two theodolite parties were equipped, one was to climb Maagenæs (SEIDENFADEN, KAMMAN), while the other (BACKLUND, MALMQVIST) was to go northeastward to the nearest spur

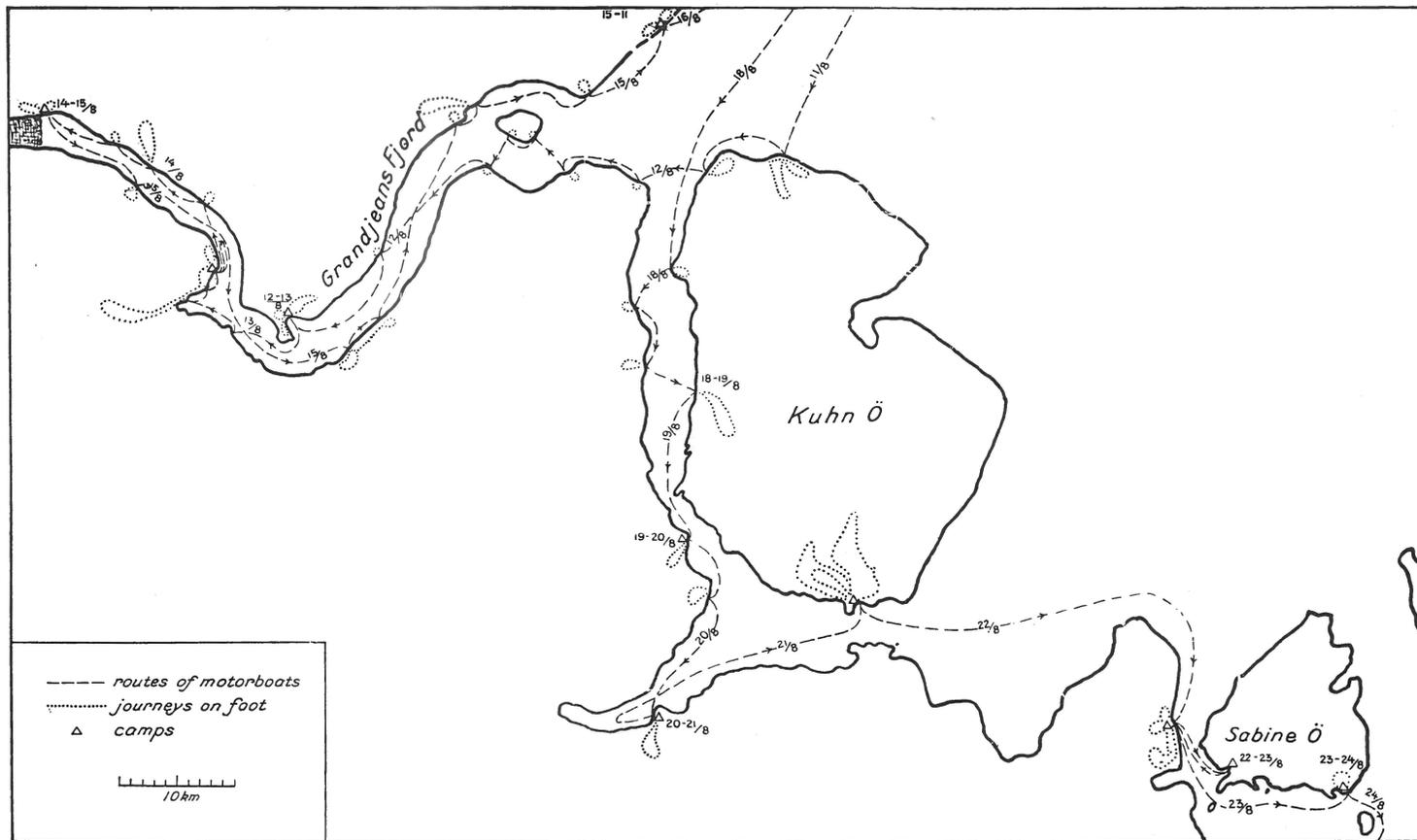


Fig. 158. BACKLUND's journey in Grandjeans Fjord and west of Kuhn Ø in 1932.

of the plateau. On the way northeastward, at an altitude of 145 m, the party observed an erosion remnant of horizontal basalt with flow structure, apparently younger than the formation of the fjord. Angle measurements all round the horizon were made at 267 and 321 m, respectively, cairns were built, and sketches of the landscape prepared.

Aug. 13th.—In the early morning the party started northwestward to Betulahavn, where observations and angle measurements were made from a delta cone. The folding of the southern wall is of a different type from that observed in the outer part of the fjord, consisting of highly folded granitised formations with an overthrust fold westward, in between massive lumps of granite, and below the smaller inverted folds dipping westward, the whole mass being granitised by hornblende bands. An excursion on foot was made to Birkedal past the lower lakes. The sides of the valley were glacier-polished and its bottom scoured by glaciers; it consisted of garnet gneiss and garnet amphibolites, finely banded and folded and with a steep axial dip towards the north and south. The northern side of the valley was a level face free of vegetation, whereas the mouth of the valley was packed with morainic gravel. After returning to the boat, the party proceeded northward, with an extra observation station in order to obtain connection with the observations made from the previous stations and to build cairns. An excursion was made to the cape between Betulahavn and the outer fjord. Another cartographic station was established on the cape, and a cairn was built. The opposite northern wall is almost vertical, with squeezed out and boudinaged amphibolite beds (with white felspar aureoles) in the west and alternating wavy banding of red and grey granitic materials in the east. Strong fjord winds and heavy sea prevented further advance that day. The party had to return and spend the night at the cape near Betulahavn.

Aug. 14th.—Started in the early morning to the cartographic station on the north coast at the boundary towards the brown series, where angle measurements were made, and cairns were built. Proceeded into the trough-faulted deep fjord in calm and sunny summer weather. The south side forms an unbroken wall with three markedly hanging glaciers reaching halfway down the slope, which is built up of a brown rust-coloured series of micagneiss. Here a broad fold of a new type occurred, without minor folds. At Jættevæggen (Seven Pillars of Hell) there occur bastion-like light granite pillars with limestone bands, extremely beautifully eroded out in cylinder-shape. Heinkels Gl. at the head of the fjord is flat and forms no terminal cliff. The lateral moraine on the north side was utilised for angle and altitudinal measurements from a point 31 m above sea-level. Spent the night here.

Aug. 15th.—Sailed out through Grandjeans Fjord, making a halt

some distance east of the mouth of Odins Dal. Here base and angle measurements were made, and some rock samples were collected. Proceeded to a point WNW. of Ullas Ø. The relation between quartzitic arkose and granite was investigated. Cartographic observations were made from the crest (460 m high) between two river mouths. Sailed around Ullas Ø from the north side, passed Kap Toula (just opposite Kap Negri with the same type of granite), which was measured to be 920 m (Geodetic Institute 927 m), and proceeded to the lowland around the mouth of the fjord, which was made up of staurolite shales southwest of Kap Buch. The tent was pitched not far from the trappers' hut, and the night was spent there.

Aug. 16th.—Short reconnoitring of the finely banded andalusite-staurolite micaschists, which dip 60—70° towards the east, and whose relations to the granite westward is doubtful. Sailed then into Ardencaple Fjord, whose mouth was rather much blocked by ice. A strong fjord wind with rain forced the motorboat towards the north coast, where the party took shelter behind a rock against the strong gale, rain, and strong current with ice drifting to and fro. On an excursion across the steep shore cliffs near the river west of Wildspitze and onwards to the trappers' hut southeast of Kap Daly a dominating reddish porphyric granite was ascertained. Tented and spent the night here.

Aug. 17th.—As continuous ice-drift and strong wind prevented voyage into the fjord, the motorboat turned and sailed out past Kap Klinkerfues and into Peters Bugt, where black brecciated dolomite was observed near the shore east of the first river northeast of the trappers' station Jónsbú; then followed greyish-yellow dolomite with replacement structures, intersected by a fault breccia with highly limonitised hematite. Farther eastward the steep and tectonised limestone beds are overlain by flat-lying sandstones and marls with Mesozoic fossils. Spent the night a little north of the station Kulhus. From this point SEIDENFADEN returned on foot to the "Gustav Holm", which lay off Kulhus, and was replaced by SØRENSEN.

Aug. 18th.—In the early morning the motorboat went to Fligelys Fjord. On the west side of Kuhn Ø, in the narrowest part of the sound northward, near a trappers' hut, a red and highly streaky granite was ascertained, which contained numerous pegmatite dykes with lime exudate; stripes of granite occurred in the limestone. The granite is, as a rule, diffusely banded, it dips rather strongly towards the east and strikes N.—S. Numerous fragments of shales in the granite, passing into biotite streaks. In the western margin of the fjord, immediately south of the replacements and the river mouth, a sediment is found, which is penetrated by granite and with banding = earlier bedding, but the sedimental structure has partially vanished. The banding is

marked by biotite-chlorite shales and garnet-bearing balls, which form thickenings between aplitic grainy rocks. Farther southward, on the western shore of the fjord where it is growing broader, granite is met with, followed, some distance farther up, by Mesozoic coarse conglomerates and sandstones with balls of crystalline, which dip 30—40° southeastward. At the top the conglomerate is overlain by platy grey sandstone arkose. Higher up, in the western slopes, red gneiss with rust zones *in situ* occur again. It is doubtful whether faults occur between the crystalline and the Mesozoic sediments, but an intersection of the sediments by a system of fissures indicates the possibility of faulting. Tented on the shore cliff of Kuhn Ø at the foot of the basalt cone marked 750 m (on map of Geodetic Institute).

Aug. 19th.—Studied horizontal Mesozoic sediments, shales (with ammonites) and sandstones at the shore, which were pierced by a N.—S. going vertical basalt dyke (c. 4 m thick) at a height of 257 m; the sandstone was overlain by calcareous marl (310 m). Above followed grey, thinly bedded clay, which rested unconformably on an uneven substratum; the clay is diagonally bedded. Measured angles from the basalt top (465 m). Left the place late in the evening, passing Kap Givagt with its tidal skerries to the trappers' hut at the cape south of the sound and tented there.

Aug. 20th.—Climbed a mountain 504 m high (508 m according to the Geodetic Institute) on the west side above the tent to make triangulation northward and eastward, and built a cairn. Gneiss was found on the top. The slope consisted downward of secularly weathered gneiss, weathering breccia overlain by conglomerates, and sandstones, the basal formations of the Mesozoic deposits farther northward. Proceeded subsequently to the cape towards Lindemans Fjord, where angle measurements were made on a granite-gneiss platform below and northeast of Hohe Kugel. From this place the party went across Lindemans Fjord and camped for the night west of the large delta at the mouth of Lindemansdalen.

Aug. 21st.—On an excursion to the top of the mountain Porten, 460 m high (Geodetic Institute 469 m), north of Dombjerg, angle measurements were made from this point towards the N., NW., and NE. In the broad Slettedal the hills are made up of banded gneiss granite with ultrabasic inclusions of different kind, split or round, with a peculiar regional orientation. Along the shore, that is to say, east of the fault line(?) running along Lindemansdalen, arkose sandstone with conglomerates rest upon the banded gneiss, which is here much secularly weathered. An excursion in motorboat into Lindemans Fjord showed a surprising distribution eastward of the enormous clay deposits of the delta, which prevented us from going ashore on the west coast. Con-

sequently the motorboat turned and went to Kuhn Ø, where we camped near the southernmost point of the island.

Aug. 22nd.—The southern cape of Kuhn Ø consists of gneiss. On the south side of the sound (Kap Schumacher) the crystalline (banded gneiss) again crops out under the overlying sandstones, and reaches an altitude of about 4000 m. Nearest the bay west of the anchorage at Kuhn Ø, red granite occurs *in situ*, which in the shape of broad, horizontal, N.—S. going dykes pierces biotite shales. The dykes grow increasingly steeper eastward. A very marked dolerite dyke runs in the direction N. 30° E. and dips 65—70° towards the west; it is exposed, due to weathering, on a level gneiss surface (345 m) but then changes its direction to N. 25° W. with a vertical position (355 m). The substratum of the sediments south of the ravine at 443 m altitude consists of a gneiss-like red granite, whose surface dips slightly towards the south and is cut off southward by an E.—W.-running fault with subsidence of the north side. The sandstone is arkose-like with inconsiderable carbonaceous matter, it is brown, higher up grey with numerous calcareous concretions, up to 0.5 m in diameter, and poorly preserved fossils at an altitude of 488 m; a belemnite remnant was met with at 510 m. At 383 m the sandstone is pierced by a basalt dyke striking N.—S. and dipping 60—70° towards the west. A well developed terrace was observed in the harbour cove at 42 m altitude. An excursion was made along the coast to the place where the fossiliferous sandstones overlie the crystalline in the northwest in the shape of a terracic ledge. — Broke the camp after the ice conditions had improved, and headed towards Kap Berlin, which was passed, and proceeded towards the shore to the first river north of Falskebugt, where we went ashore. Observed the crystalline and the Eleonore Bay Formation intimately connected and overlain uncomformably by Mesozoic strata. Rain and fog with squalls of snow prevented further investigation. Camped for the night on the east side of Claveringstrædet south of Kronebjerg on Sabine Ø, in Heimlands Havn.

Aug. 23rd.—In fog and close-packed ice the motorboat returned to Wollaston Forland, where complementary investigations were made of the relations between the Eleonore Bay Formation and the granites north of Falskebugt. A porphyric migmatite was studied in Falkebjerg. Grey gneiss granite with a N.—S. or N. 30° E., somewhat varying strike, and dipping towards the SE. and with muscovite-bearing pegmatite, belongs to the series of strata. An excursion was made inland towards the broad N.—S. going valley and toward the delta in Falskebugt; the valley separates the crystalline from the Mesozoic black laminate slates with sills of basalt. Rain and southeasterly gale gradually prevented our work, and in snowstorm we reached back to the motorboat, which

went across to Germania Havn, where the party found shelter in the trappers' station there to dry our clothes and provisions.

Aug. 24th.—Rose early. The new-fallen snow now lay as far down as 50 m above sea-level. After a short reconnoitring in the neighbourhood of the station, our voyage was continued southward past Hvalrosø (a sill dipping c. 10° towards the SSE.) in scattered, rapidly drifting ice, past Kap Herschell, where a short landing was made at the trappers' station, towards Kap Berghaus, where grey, coarse, younger granite in the form of steep N.—S. going dykes with pegmatitic varieties in banded garnet gneiss striking N.—S. and dipping inconsiderably towards the east and with conformable bands of biotite gneiss were studied. Proceeded subsequently to Kap Mary, where a halt was made, and by midnight reached Eskimonæs, where the party entered the "Gustav Holm".

Aug. 26th.—Went ashore and made a short excursion on Strindbergs Land. Dense fog.

Aug. 27th.—At 7 a.m. the ship weighed anchor and headed towards Ella Ø, whence the return voyage was started.

1933.

The BACKLUND party was equipped with the largest motorboat of the expedition, the "Polypen". The programme of the summer was 1) an investigation of Liverpool Land, which on account of its isolated position was of particular interest for the total picture of the Caledonian movements, and 2) an investigation of the geology of the regions around Carlsberg Fjord, Nathorsts Fjord, and Fleming Fjord in connection with a visit to the southernmost part of Traill Ø, where interesting eruptives were present. Owing to the unfavourable ice conditions BACKLUND was unable to reach these tracts in 1929 and 1930.

The party consisted of H. G. BACKLUND, E. H. KRANCK, TH. SAHLSTEIN-SAHAMA, A. NOE-NYGAARD, and STEEN HASSELBALCH, the latter acting as motorman and wireless operator.

The expedition arrived at Scoresbysund on June 25th. An ice reconnaissance made next day showed that it might be possible to commence the work along the southern part of Liverpool Land. The motorboat was lowered from the "Gustav Holm", and in the evening the party left the ships, which had cast anchors off Kap Hope, and camped at Kap Tobin, where BÜTLER's party likewise arrived.

June 27th.—In the course of the day both parties made investigations around Kap Tobin. In the afternoon the BACKLUND party sailed up past Kap Hodgson along the edge of the fast ice, reaching Rathbone Ø in a rather strong southwesterly wind, and camped there.

June 28th.—In the morning BÜTLER's party arrived at the camp.

Investigations and triangulations were made from the western half of Rathbone Ø. The top was climbed for cartographical reasons.

June 29th.—Squalls of snow. The north side of Rathbone Ø was investigated, and rock samples were collected on an excursion on the ice along the shore. Triangulation from the northwestern cape, and studies of the migmatite problem and erosion forms were made.

June 30th.—Reconnaissance of the eastern half of Rathbone Ø, at first from the ice, subsequently from the plateau with its 55 m high erosion remnant. Owing to close-packed ice the party had to return to Kap Tobin, where they met the French geologist ROTHÉ, who had spent the winter at the magnetic station in Scoresbysund. He joined the party for the following days. Camped at Kap Tobin.

July 1st.—In the course of the day an attempt was made to get out of the ice, which was closely packed by the strong southeasterly wind. In the evening the camp was visited by KOCH in dense fog.

July 2nd.—Dense fog and pack-ice eastward. The party returned to the ships off Kap Hope. Fresh provisions were stowed into the motorboat, which then, accompanied by KOCH and SEIDENFADEN in another boat, sailed into Hurry Fjord, where the ice barrier was encountered about 4 km from the mouth. Here KOCH's motorboat turned back, and the party camped in company with BÜTLER's party late in the evening.

July 3rd.—Investigation of the crystalline in the erosion surface of western Liverpool Land. Discovered eclogite in the granite gneiss (= migmatite). The investigation was carried on by three parties, namely BACKLUND and NOE-NYGAARD, BÜTLER and ROTHÉ, and KRANCK and SAHLSTEIN. While KRANCK and SAHLSTEIN remained at the camp to continue the investigations there, the others went northward and camped on Liverpool Land at the mouth of Sødal opposite Constable Pynt.

July 4th.—A reconnaissance up the glacier was made by three parties from 3 p.m. to 2.30 next morning.

July 5th.—The "Gustav Holm" arrived at Fame Øer, and after the return of the geologists in the night, HASSELBALCH went southward in the boat to fetch KRANCK and SAHLSTEIN. BACKLUND investigated the shaly formations with clay shales and quartz ortoclase porphyry in dykes north of the tent.

July 6th.—On HASSELBALCH's return voyage with KRANCK and SAHLSTEIN on board the motorboat was stopped by pressure ridges some distance up the fjord, and at last the ice forced the boat on to the shore. It was the aforementioned last remnant of the winter ice, which still moved to and from in the fjord. At noon the boat got into wireless connection with the "Gustav Holm" and reported about the situation. Not till the evening, at flood tide, was there so much movement

in the ice that the motorboat managed to get free and proceeded towards the camp, which, however, in the morning had been moved farther towards the interior of the fjord to the mouth of Kalkdal.

July 7th.—The motorboat arrived at 3 a.m. Later in the day an investigation was made of dyke formations and sediments of Palæozoic age at the mouth of Kalkdal and of the drainage conditions of the valley eastward. Discovered a post-Caledonian pre-Mesozoic overthrust.

July 8th.—The area north of Kalkdal and the other side of the valley were investigated. ROTHÉ returned to the colony.

July 9th.—The party paid a visit on board the "Gustav Holm", which lay at Fame Øer. An excursion was made to Fame Øer and the coast southwest of them.

July 10th.—Excursion northeastward from the interior of Hurry Fjord towards Bodal and Hodal to investigate the superposition of Mesozoic sediments with a porphyrite sill. In the evening a visit was made to the "Gustav Holm", where collections were delivered.

July 11th.—Sailed to Nøkkedal c. 20 km north of Kap Hope.

July 12th.—Excursion up the valley to investigate the granite of Hurry Fjord.

July 13th.—Broke the camp at 3.30 a.m. Collections were delivered to the "Gustav Holm", which lay off Kap Hope, and provisions were taken in. The motorboat then continued eastward towards Kap Tobin in very dense fog along the edge of the fast ice in Rosenvinges Bugt. Near Kap Swainson the party was headed by a strong northerly gale, which forced them to turn and seek a harbour. Sailed into a small bay in the rocky shore, but when after a couple of hours the wind abated, the party proceeded northward. Near Raffles Ø the fog lifted somewhat, and it was fairly clear as far as Rathbone Ø, when the fog grew dense again. Following the edge of the fast ice, the party reached Kap Greg after a troublesome voyage. The geologists spent the night in the trappers' hut found in the bay here. At 10 p.m. the position of the camp was reported over the wireless to the "Gustav Holm".

July 14th.—The geologists started out at 9 p.m., since at this season one is least troubled by fog in the night. Investigation of Kap Greg and mapping from the top of the cape.

July 15th.—The geologists returned at 5 a.m. In the middle of the day investigations were made around Kap Greg, especially of biotite stripes and amphibolite lenses. Still much fog, but BACKLUND decided to depart northward and go into Storefjord¹). Left Kap Greg at 10 p.m. and sailed northward along the ice edge.

¹) Some days before BACKLUND had received a sketch map of Storefjord drawn by KOCH from the aircraft and showing several previously unknown ramifications of the fjord.

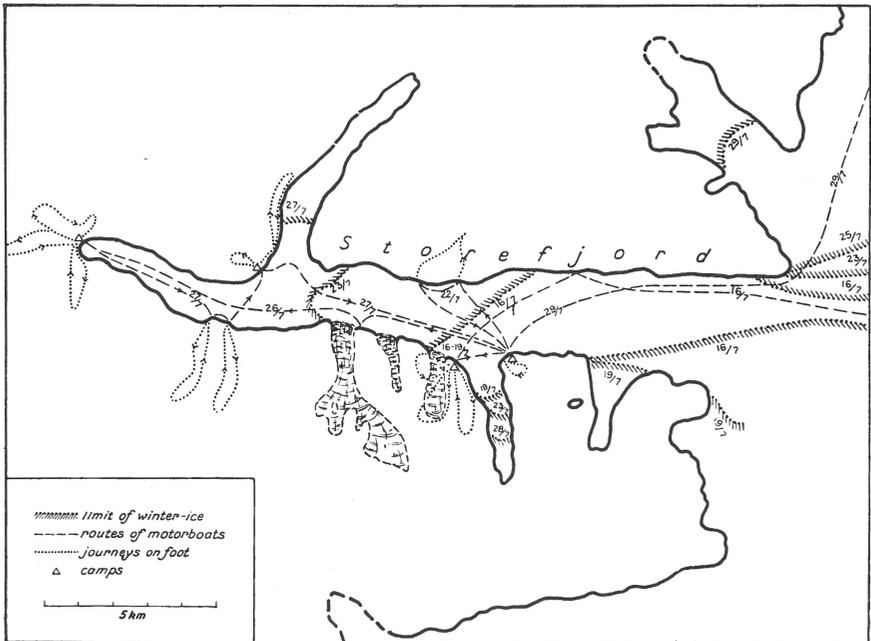


Fig. 160. BACKLUND's travelling routes in Storefjord (Liverpool Land) in the Summer of 1933.

July 16th.—Reached, in the morning, the mouth of Storefjord, where the boat was seriously damaged, a cogwheel on the crank shaft breaking. The sails were set, and thanks to a northwesterly wind, the party reached a harbour in the southern shore of Storefjord. At 7.45 p.m. HASSELBALCH reported over the wireless to Ella Ø the position and the damage.

July 17th.—Fog and rain all day. Small excursions along the south coast of Storefjord.

July 18th.—In the morning foggy, later it cleared. Excursions were made in the neighbourhood of the camp, among other things the relation of the grey gneiss to the quartzites was studied. In the evening a wireless message was received, stating that the "Godthaab" was approaching the camp and would probably arrive about 2 o'clock next morning.

July 19th.—In the night BACKLUND rowed in the jolly-boat across the southern bay of the fjord eastward to some hot springs on the cape east of the bay. Here he climbed a mountain top to make observations. At 3 a.m. the "Godthaab" arrived, but the geologists did not return till 10 a.m., when the boat was taken on tug southward, while a fresh cogwheel was being made on the ship.

July 20th.—The "Godthaab" arrived at Kap Hope with the motor-

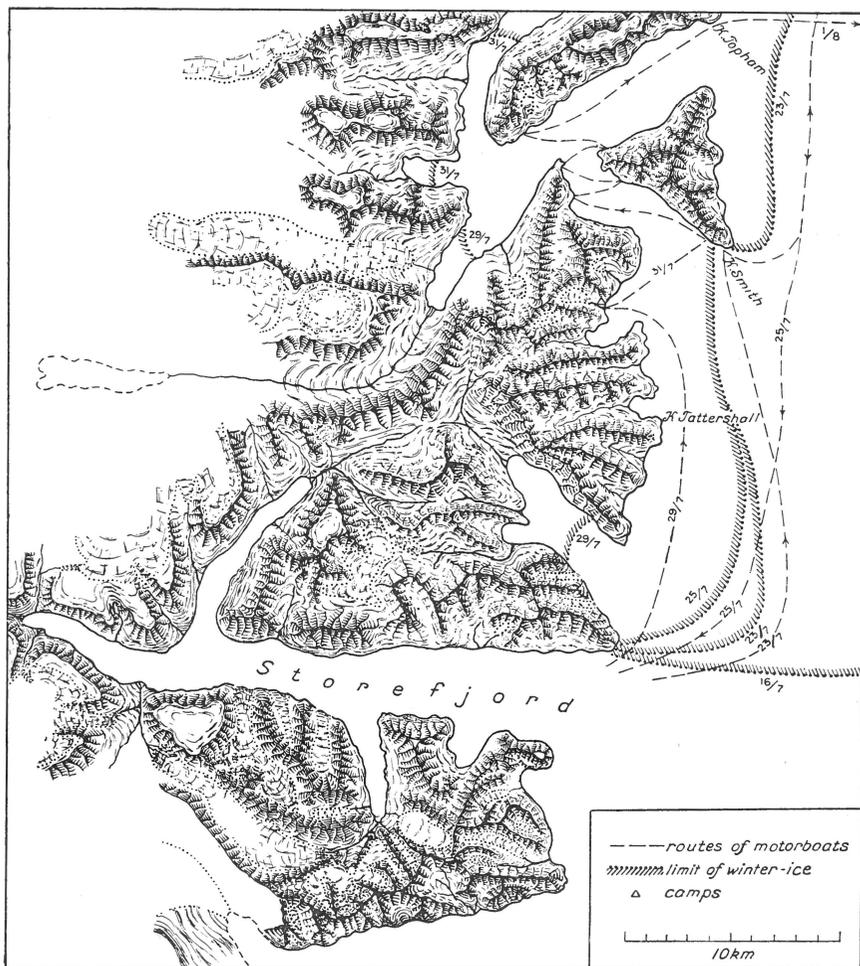


Fig. 161. BACKLUND's topographic map of the region round Storefjord (Liverpool Land) 1933.

boat in tow. The boat had been repaired in the course of the night, and a trial voyage proved successful. In the evening the motorboat started in very dense fog towards Storefjord.

July 21st.—A halt was made behind a skerry near Kap Hodgson, where there was a high swell, the wind blowing on the shore. Gneisses with hornblendite lenses were investigated. Subsequently a visit was made to the east side of Raffles Ø, which was now free of ice, and also near Rathbone Ø the ice had broken up. Tented in fine weather near the hot springs (60°) on the south side of Storefjord in the first bay to the south.

July 22nd.—Sailed across the fjord, where a mountain top 850 m

high was climbed for cartographic observations. Studied granite and a basalt dyke.

July 23rd.—As the winter ice was still unbroken in the interior of Storefjord, the party sailed out of the fjord and northward along the coast in a rather strong wind past Kap Tattershall and Kap Smith, where a landing was made with investigations of granites and a basalt dyke. Off Kap Topham the ice was still landfast, so it was impossible to camp there.

July 24th.—Passed Kap Hewitt and Reynolds Ø in the morning. An attempt was made to go ashore on Murray Ø, but it was still surrounded by pack ice. Subsequently an attempt was made to go ashore on Canning Land, but the whole Carlsberg Fjord proved to be filled with winter ice. The edge of the fast ice now approached Kap Wardlaw, though it lay at a distance of 2 km from the shore. Proceeded then in the motorboat along the high, much packed fast-ice edge that extended across Davy Sund towards Kap Simpson, where we intended to go ashore. Towards the east there was open water with only occasional ice floes, and the weather was fine. About midway between Kap Wardlaw and Kap Simpson the boat encountered drift ice, and nearer Kap Simpson the ice began to pack, so we had to turn and go southward. About 5 p.m. KRANCK and SAHLSTEIN went ashore on Murray Ø across the ice. Short stay here.

July 25th.—Passed Kap Topham shortly after midnight, and about 2 a.m. reached the mouth of Storefjord, where fairly large masses of drift ice occurred. Succeeded in making our way through the ice and camped on the old camp site near the hot springs.

July 26th.—The ice had now nearly drifted out from the interior of the fjord, so we sailed in comparatively ice-free water to the head of the fjord, where a small river with a large lagoon and abundant drift wood is found. Cartographic observations and investigations were made towards the south, west, and north. Granitisation of limestone and clay sediments, superposition of Triassic deposits, alnoeite dykes, and double granitic transformation in quartzites were studied.

July 27th.—Fine weather. Worked intensely on the mapping and the geological investigation of this hitherto almost unknown fjord. Excursions were made both towards the north and south outside the head; along the valley to the south young granitisation was observed, and in the north complete granitisation. HASSELBALCH and NOE-NYGAARD carried out mapping from a mountain top 670 m high on the north side of the fjord. In the evening KOCH, PETERSEN, and KRAMME paid a visit to the motorboat-party in the interior of Storefjord on their way to Scoresby Sund in the seaplane. Returned subsequently to the former camp site near the hot springs.

July 28th.—Storm and rain. Packed collections and constructed maps.

July 29th.—The weather improved in the course of the night. The camp was broken, and the party started about 6 a.m. The mouth of Storefjord was partly blocked by ice, but we managed to get through and proceeded in more scattered ice towards Kap Tattershall. A fairly good harbour was found in a bay southwest of Kap Smith, and the party camped on an old moraine. Mapping work and investigations of contact-metamorphic limestone and granodioritic granitisation.

July 30th.—Dense fog. It was arranged that the "Godthaab" was to fetch the party at Kap Topham. The motorboat was in constant wireless communication with the "Gustav Holm" in order to be kept informed of the position of the "Godthaab"; however, the ship still rode at anchors in Scoresby Sund awaiting an improvement of the weather.

July 31st.—The weather had improved somewhat, and at 8 a.m. the party broke camp and sailed to the sound inside Hildegard Ø, where magnificent granitisation in limestone was studied in the western and southern capes of the island. No ice was encountered here, and the fjord inside the island was likewise almost free of ice. Granitic formations were studied, and mapping was carried out in the fjord, where a sound was discovered NE.—N. of Kap Topham and a valley extended southwestward towards the innermost northern bay of Storefjord. The genetic conditions of the banded gneiss was investigated. About 6 p.m. the fog appeared again, and at 9 p.m. the motorboat headed towards Kap Topham in dense fog. The "Godthaab" arrived by midnight.

Aug. 1st.—The motorboat was taken in tow by the "Godthaab", which now sailed towards Ella Ø. Passed Sofia Sund by midnight.

Aug. 2nd.—Reached Ella Ø in the morning and took in provisions there. The plan was to try to reach Davy Sund from the north. However, reconnaissances from the air showed that the winter ice was still unbroken between Kap Simpson and Canning Land. Started southward in the evening.

Aug. 3rd.—Reached, in the morning, Menanders Øer, where the tent was pitched. Here basalt dykes and sills in (Carboniferous) sediments were investigated, and the superposition of Devonian beds on Eleonore Bay beds was observed north and west of the camp site.

Aug. 4th.—In the morning foggy, but in the forenoon it cleared so much that an excursion in motorboat could be made to the south coast, whence the party proceeded on foot inland towards Syltoppene, where the substratum and facies formation of the Devonian beds were studied. Returned to the camp on Menanders Øer in the evening.

Aug. 5th.—Excursion in the motorboat to a broad valley (Skeldal) southeast of Menanders Øer and a trip up through the valley. Basaltic

dykes and sills in the Carboniferous were studied. On account of sill-forming basalts there was a good deal of soil-flow in the valley, which was also haunted by gnats.

Aug. 6th.—In the morning the camp on Menanders Øer was broken, and the party sailed into Noret. After a visit on Rans Skær, which consists of two large basalt knobs, the southern a sill?, c. 21 m high = thick, the northern a dyke? or boss?. Visited also Archers Øer, where shallow water difficult to pass was encountered. Abundant drift wood was observed here. Reached the bay west of Mesters Vig late in the evening.

Aug. 7th.—Foggy. Made an excursion inland, where basalt sills and dykes were studied across broad delta plains towards the valley in the east. Moved then to the lowland east of Mesters Vig north of Pictet Bjerge.

Aug. 8th.—Investigation of the basalts in the sediments west of Antartics Havn.

Aug. 9th.—Tried to reach the house at Kap Brown in Fleming Fjord, where a depot of kerosene was found. Passed Kap Syenit, where the "syenite" was studied, in the morning. The syenite has made its way up through the sediments without disturbing the latter, with basalt dykes of two different ages and position: sills older than the "syenite" and vertical dykes younger than the "syenite". An ascent of Kap Biot showed that landfast ice still lay in the outer parts of both Fleming Fjord and Nathorsts Fjord, so the attempt to reach the house at Kap Brown had to be given up. Sailed then along the fast ice edge across Davy Sund to Drømmebugten in Traill Ø, whence the party planned to return to Ella Ø along the north coast. Tented in Drømmebugten on the west side inside a broad delta.

Aug. 10th.—Made an excursion along the west side of Drømmebugten in order to determine the age of the crystalline, which is younger than the (Carboniferous?) sediments. Observed great granitisation phenomena in the sediments, which were intersected by a series of younger effusives.

Aug. 11th.—Made an excursion along the outer coast in order to observe the position of the granite above the acid effusives. Pneumatolytic-hydrothermal formations were studied.

Aug. 12th.—Excursion to the head of Drømmebugten to study contact-metamorphic and hydrothermal formations (with sulfides) younger than the Tertiary basalts. It would seem that there were here possibilities for the formation of ore, however, no such formations of economic importance were met with, but hydrothermal transformations were observed. Large tuff masses were found on the east side of Drømmebugten.

Aug. 13th.—In the forenoon packing and labelling of the collections and discussion of the results. In the afternoon an excursion southwards with ascent of a top about 750 m high in order to investigate the inter-

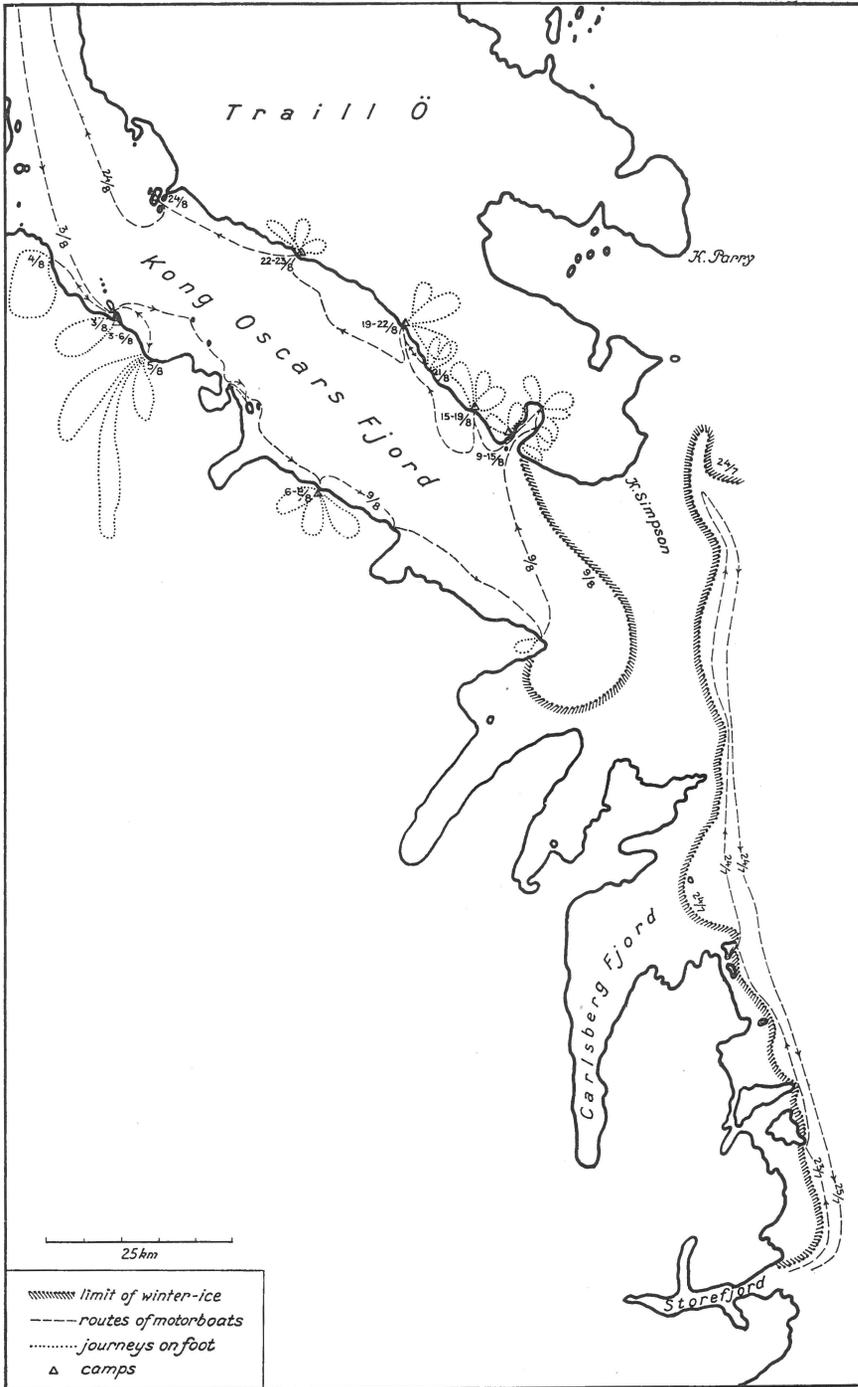


Fig. 162. BACKLUND'S journeys in the late summer of 1933.

action between effusives, sediments, and intrusives. A trachytic series of porphyries older than the basalts was ascertained.

Aug. 14th.—Excursion to the NE. side of the inner part of Drømmebugten with collecting from oxidic and sulphidic pneumatolyte formations, which form hydrothermal transformation products, which appear particularly as purple-coloured areas in the northeast. Primitive gold analyses were also made. The group of porphyries was investigated, and in the canyon valleys black Mesozoic marine shales were found to form the substratum of the porphyries. Quartz-bearing syenites younger than the basalt sill were annotated.

Aug. 15th.—The camp was removed to the mouth of the valley on the east side of Forchhammers Bjerg whence the motorboat with HASSELBALCH and NOE-NYGAARD proceeded to Ella Ø to supplement our supply of fuel. In the afternoon a short excursion was made to the south side of Forchhammers Bjerg to study the sandstone there.

Aug. 16th.—At 5 a.m. the motorboat reached Ella Ø, after announcing her arrival over the wireless. The party at Forchhammers Bjerg divided, KRANCK walking northwestward, SAHLSTEIN northward, and BACKLUND northeastward. Arkose sandstone, passing upwards into dark to black shales alternating with porphyry older than the basalts, was studied. Marine terraces were observed at an altitude of 90 m. Basalt sills at the top of the mountains were also studied; they were younger than the brown porphyries, but older than the light-coloured liparites and quartz-porphyries. Sliding of the upper series across the lower one northward was ascertained, with lens-shaped constriction of dykes and sediments as well as folding with axial dip towards the northeast. At the top limestone with dull-red syenite porphyries, overlain by a conglomerate about 4 m thick, and this again is overlain by a brown calcareous sandstone, crowned at the top by a dolerite sill older than the white liparite tuff.

Aug. 17th.—At midnight the motorboat left Ella Ø and in eleven hours reached the camp at Forchhammers Bjerg. In the forenoon it was blowing up for a regular gale, which lasted all day and night till the afternoon of the next day. It was difficult to keep the motorboat free of the shore, there being no natural harbour. One of the tents was overturned by the wind and was flooded by a mountain stream, but a spare tent was pitched instead of it.

Aug. 18th.—The weather improved. Equipment, collections, clothes, and provisions were dried. Subsequently all the geologists made an excursion to the west side of the overflowing river. Observed here sandstone, and then shales with eruptives consisting of coarse gabbro older than granite and probably representing metasomatically transformed dolerite, partly banded. By thrusting (sliding) both had been crushed in the eastern slope of Forchhammers Bjerg, by which the sand-

stones had been divided into leaf-like flakes and lenses of a length of 200 m and had been thrust across each other, during which process the gabbro had been separated from its super- and substrata. Carboniferous sandstone had been thrust across the Mesozoic sediments. Then follows a coarse breccia with quartz porphyries, hornblende diorites, and Carboniferous? sandstones with Mesozoic black shales; sandstones (Carboniferous?) are always followed by brown and blue porphyries. — As the ice approached the shore, we hurried back to the camp. NOE-NYGAARD and SAHLSTEIN did not return till about midnight, when it had grown quite dark.

Aug. 19th.—Broke camp at midnight. The ice was now somewhat more scattered, but forced the motorboat a long way southward. Went ashore on the west side of Steenstrups Bjerg and camped in the valley NW. of the river. As the weather was bad, the party spent the day packing and labelling the collections.

Aug. 20th.—The whole party made an excursion up through the valley, where Mesozoic fossils were observed. In the spring the geodesists stationed at Ella Ø had observed plant fossils there. Studied basalt sills and found a sill 50 m thick with a thinner parallel sill above, which was intruded into a sandstone rich in coal and with stylolites. A third sill at an altitude of c. 400 m was observed. Above the latter (at c. 700 m) a vertical porphyry dyke was found. At the top a vesicular basalt dyke was observed at an altitude of 765 m. No plant fossils were observed, but white microgranite was present.

Aug. 21st.—Made a motorboat trip to a narrow valley between Forchhammers Bjerg and Steenstrups Bjerg. An excursion was made up the valley and along the southern margin of Steenstrups Bjerg. A basalt sill, c. 80 m thick, was ascertained at the mouth of the valley at a low level; it was separated into two sills in the south side of Steenstrups Bjerg. In addition porphyrites, grey porphyritic granites younger than the red granites, both of them younger than the basalt, were observed. In Cirkusdal, towards the northwest, sandstone was found at the base (horizontal), then followed black shales, both cut through by a series of magmatic rocks. Towards the east and west, older gabbro in a horizontal position was penetrated by grey granite; the gabbro probably belonged to the transformation products of the dolerite. All these beds were penetrated by a dark quartz porphyrite, which also pierced the grey granite. Behind the latter a pink plutonic rock occurred, which was not penetrated by quartz porphyrite. This rock occupies the largest areas within the mountain crests in the northeast towards Kap Parry.

On top of the upper basalt sill there follows, towards the south, in the cliff facing the shore, arkose sandstone dotted with rust, alternating with beds of a dull white porphyry. These beds are overlain by a dull

red micaceous arkose sandstone, which at an altitude of 570 m contains concretions of rusty calcareous sandstone, overlain by coarse-grained red bituminous sandstone with a narrow porphyrite sill at an altitude of 610 m and with *Scolithus*-like formations. A dyke of vertical basalt (20—30 cm) occurs in a large-flaked bituminous sandstone. Above follows (10 m) a thinly laminated liparite (or trachyte-tuff?), overlain by 10 m of blackish-grey micaceous schists representing a sliding horizon. Above follows tuff-like siliceous shales, covered by red, coarse, bituminous sandstones, which are penetrated by a dark porphyrite dyke, highly deformed and shaly and dipping towards the northeast. Westward, on the other side of the dyke, the same series of strata is repeated with a white siliceous schist of liparitic character and black shales and a coarse red sandstone pierced by a vertical basalt dyke. Repetitions of the series of strata in several places indicate slidings. At the base, on the shore in the west, coulisse-shaped overthrust black shales are found. Returned by midnight to the camp west of Steenstrups Bjerg.

Aug. 22nd.—The camp was removed northwestward to the foot of Svinhufvuds Bjerge. A coarse basalt sill was observed near the camp. An investigation was made of the section of Svinhufvuds Bjerge (Carboniferous, Permian, Trias) with basalt sills. Fossils were collected in two localities (cf. NOE-NYGAARD and FREBOLD 1938).

Aug. 23rd.—After labelling and packing of samples and after making a trip in the motorboat along the shore southeastward in order to gain a general view of the conditions, the party sailed northwestward to Haslums Øer, where the tent was pitched. In the afternoon studies of the basalt. Dense fog.

Aug. 24th.—The fog around Haslums Øer continued, but lifted later in the day, and the party started towards Ella Ø, where they arrived at 8.30 p.m.

Aug. 25th—26th.—Stayed at Ella Ø. Packed collections.

Aug. 27th.—The "Gustav Holm" arrived at 8 a.m., and in the afternoon left Ella Ø for good. The ice in Davy Sund had now at last got loose, so that the ship could pass down through Kong Oscars Fjord towards Scoresby Sund, where the "Polyppen" was set ashore and covered for the winter.

1934.

July 25th.—Sailed into Scoresby Sund along the south coast. Near Kap Leslie a depot of kerosene was established on the shore. As the water is very shallow here and with many stones, the kerosene barrel sprung a leak during the transport from the boat to the shore.

July 26th.—In the early morning the "Gustav Holm" reached Bjørnerøer. The seaplane was lowered, and with BACKLUND as a passenger

a reconnaissance flight was made in fine weather at a height of about 3000 m along Nordvestfjord to the mouth of Flyverfjord and onwards across the land to Alpefjord, thence via Rødeø and Danmarks Ø to Kap Leslie, across Bjørneøer to Sydkap, where the "Gustav Holm" had cast anchor. The result of the flight was as follows:

The middle part of Nordvestfjord was still occupied by large masses of partly landfast ice, but it was in great motion. Suitable camp sites were not observed till around the mouth of Flyverfjord. The interior of the fjord was free of ice except for numerous icebergs. The valley towards Rypefjord showed in its eastern slope, in the southern part, a deep red colour and to some extent also red sediments. Rypefjord was free of ice, while fairly large floes had gathered in Rødefjord near the mouth of Øfjord. On the western cape between Rypefjord and Rødefjord extensive glacial and postglacial formations occurred, below which red horizontal sediments cropped out in the west. The north side of the cape was well suited for tenting, particularly because the glacier on the north side of Rypefjord is not very active, while the south side (the northwestern corner of Rødefjord) is less suitable, since numerous icebergs drift out from the glacier in the west. On the west side of Rypefjord, also, the rocks are in part intensely red-coloured, but it is doubtful whether red sediments occur, too, though the erosion forms suggest their presence. On the west side of Storø, two localities are highly red-coloured, one of which, at any rate, represents younger sediments; a red spot was observed on the east side, too. Tenting might be possible on the east side of Sorteø and on the headland west of Storø at the foot of the red sediments, where, however, icebergs were constantly passing from the west. The fjord was ice-free right out to Rødeø, but west of the island the production of icebergs was very intensive and long rows of icebergs were drifting out. At the mouth of Føn fjord there was likewise an accumulation of bay-ice, which extended almost to Danmarks Ø, while between this island and Bjørneøer the ice was scattered. The basalt ledges at the top of both sides of Føn fjord were especially imposing; they were absolutely horizontal, and on the south side (Gaaseland) they were reduced, by erosion from either side, to a plateau less than one kilometer broad.

Immediately after the party's return to the ship, the "Polyphen" was launched (H. BACKLUND chief, HASSELBALCH motorman and wireless operator, WENK and LUPANDER geologists, and V. BACKLUND assistant and cook). A depot of fuel and provisions was established near the Eskimo house at Sydkap, and subsequently the motorboat proceeded westward along the coast to the mouth of the river that drains the double lake Holger Danskes Briller. Tented here for the night on crystalline rocks.

July 27th.—Reconnaissance towards the north, northwest, and west: red and grey granite, the latter with gneissic varieties and crushing zones, were inspected. In the west the basal beds of a sediment series, with conglomerates and of different age, were studied. A cairn was built on the south side of the lake immediately above the large delta. Later the whole party made an excursion eastward. Many gnats around the lake.

July 28th.—Started early, sailing in the motorboat eastward into the mouth of the fjord to study the dolomite-limestone wall (yellow, grey = Carboniferous-Permian?) along Schucherts Flod, and subsequently made a short march eastward. At noon the motorboat sailed in dense fog, which gradually lifted, at first southwestward along the coast, inside the islands near Sydkap, subsequently southward towards the islands in the middle of the fjord, halfway to Bjørnøer. The fog grew dense again, so the party camped for the night on the midmost of the three islands in the middle of the fjord. A reconnaissance of the island showed: limestones with amphibolites and dark peridotites, alternating with red and grey granites and broad bands of brown micaceous gneisses. Pegmatites were numerous. Visited the other islands in the jolly-boat. An old musk-ox was grazing on the low southern part of the northernmost island.

July 29th.—Broke camp early and started southward, sailing in scattered ice. Banks of fog, which lifted when the motorboat approached the northernmost, largest, and highest of Bjørnøer. Went ashore in the small bay at the northern end of the island, and climbed the island to the top, where a cairn was built. Studied the highly crushed (boudinaged) amphibolite band and the double breccias with grey granite. The motorboat then proceeded southeastward along the north coast of the northern island. The whole eastern and greater part of the island is made up of brick-red aplitic to granophyric microcline granite. Went ashore in a small bay and reconnoitred the southeasternmost headland. The trappers' hut, indicated here on older charts, did not exist. Subsequently the motorboat went round the southeastern point of the island and into the sound south of it, across the sound, and then along the level, smooth grano-diorite slopes which form the northern coast of island No. 2. Tented at the western end of the island, near a series of lagoon-like shallow bays, which at ebb-tide were separated from the sea. A short reconnaissance of the shore in the evening.

July 30th.—Excursion, lasting all day, towards the east, south, and west of island No. 2, across the instructive and well exposed horizontal flats with their granitisation phenomena. A cairn was built on the highest point at the western end of the island, and some bearings were taken, which showed that an orientation within the group of islands on the basis of the existing maps was hardly possible. Clear and fine weather.

July 31st.—Broke camp early. The "Polyphen" sailed back (eastward) along the north coast, then southward through the sound towards island No. 4, where the tent was pitched during storm and rain. The "Polyphen" had to change anchorage several times, as the anchor did not hold, and the connection with the shore was interrupted. The storm and rain continued all night and part of the next day.

Aug. 1st.—In the afternoon the weather improved so much that connection was obtained with the motorboat, but in the evening storm, rain, and snow set in, and all was wet in the tent. The connection with the motorboat, in which HASSELBALCH stayed, was again interrupted.

Aug. 2nd.—The weather improved, and the wet clothes were dried. Excursions were made towards the east, south, and southeast in partial sunshine; from a good outlook in the north some angles were measured, and a cairn was built. Another cairn was built at the highest point of the island, whence we had a good view towards the south. The trappers' hut indicated on earlier maps is situated at the southeastern end of Bjørneø No. 4. Highly instructive metamorphosed rocks of the granitisation type were observed. Already now it can be stated with fairly great certainty that in a tectonical respect and as regards its types of metamorphism the crystalline belongs to the Caledonian. In the granitic and gneissic terrain east of Sydkap the indications were less convincing. The camp was broken, and the motorboat went east around Bjørneøer Nos. 4 and 5 and proceeded south of the latter to the north of No. 6 to the marked point "Första Nålbrevet" (needles). Went ashore, during the voyage, at the trappers' hut on the east coast of island No. 4 and on the south coast of Nos. 4 and 5. Tented for the night on No. 6.

Aug. 3rd.—The fine weather was utilised for fixing a vertical base (on the second needle) and for triangulation to the cairns previously built and to islands and capes (WENK, HASSELBALCH, BACKLUND jun.), and for building of cairns on the needle. Structures and rocks around the needles and north of them were studied on foot (BACKLUND sen.) and the southwest coast of island No. 7 in jolly-boat (LUPANDER).

Aug. 4th.—The camp was removed to the west coast of Bjørneø No. 9, that is to say, the southern end of "Sista Nålbrevet", where a vertical base was established and measurement of angles were made, a cairn was built (WENK, LUPANDER, BACKLUND jun.), while BACKLUND sen. studied the geology of the north side of the island. The lack of vegetation and loose deposits favoured the study.

Aug. 5th.—The camp was removed to the southwest coast of Bjørneø No. 3, where a number of supplemental measurements and investigations were made along the western margin of the islands. A couple of cairns were built, and the geology was studied in the north and west. Near the islands and in the sounds between them lay numerous

huge icebergs, which, when the currents moved out of the fjord, sailed in long rows out of Nordvestfjord and Øfjord, but when the current moved towards the interior of the fjord, they accumulated in the deep sounds between the islands, where they capsized, so that the motorboat and the jolly-boat had constantly to be watched in order that they should not be crushed to pieces by the swell; the motorboat had to change anchorage with the turn of the tide, and the jolly-boat had to be hauled above the high-water-mark during the night. The voyage in the sounds was likewise often troubled by these waves caused by the capsizing of the bergs, and careful navigation was required. However, the islands represented a unique example of extensive horizontal clean-washed rock surfaces in which the structural details were especially well exposed for study; they formed a complement to the vertical sections in the fjord sides, whose details, however, were not easily accessible for study owing to their steepness and numerous ravines. However, the many days (July 30th—August 5th) bestowed on the investigation of the Bjørneøer was worth while; a map on the scale of 1:50,000 was prepared of this group of islands, which consists of twenty-two islands and skerries, eleven of which are fairly large, mostly with phantastic outlines both on level surfaces and in sections.

Aug. 6th.—In the early morning the motorboat started towards Sydkap to fetch a supply of fuel and to deposit the collections near the Eskimo house at Sydkap. There was a dense fog and ice-floes drifted out of Nordvestfjord, so it was difficult to keep our course. By noon the fog grew thicker, so we decided to go into the deep and well sheltered bay just west of Sydkap; strong currents and an increasing foehn wind carried large masses of ice-floes out along the north coast of the fjord, probably the last ice masses from the interior of the fjord. Tented at the head of the bay on ground affected by solifluction, while the rain was pouring down.

Aug. 7th.—In the morning the weather cleared, and we began to dry our clothes, but a thick fog was visible farther out in the fjord. A reconnoitring was made towards the north and northwest, towards the valley in which the lake Holger Danskes Briller is situated, and a cairn was built on a prominent hilltop more than 1000 m high. The rocks with their well developed crushing zones were studied. In the evening an excursion was made southward to the mouth of the bay, where pegmatization in various, partly micaceous, rocks and a thick Tertiary basalt dyke attracted our attention.

Aug. 8th.—In the night the fog lifted, and in the early morning the party started for the Eskimo settlement at Sydkap, where the collections of rock samples were deposited. The motorboat took in a supply of fuel and then proceeded towards Nordvestfjord. To begin

with the upper part of the south coast was concealed by fog, but gradually the fog lifted. A short visit was made ashore at the western margin of Pythagoras Bjerg where limestone breccias, ultrabasites, and boudinaged dark amphibolites were studied. On the continued voyage highly scattered fjord ice with a few icebergs were met with. The ice forced the boat towards the south coast. At the same time the fog reappeared, and it began to rain. The motorboat turned into Nordbugten, but as the bay seemed to be very shallow, we stopped at the western side of the mouth and tented for the night on the flat shore terrace (blocks of slightly metamorphosed sediments were found here) immediately above the high-water mark.

Aug. 9th.—Shortly after midnight the weather cleared and we had a wide view towards the south and southwest. Owing to the very unsettled weather lately the tent was immediately broken, and we proceeded on our voyage. Three valleys, diverging towards the south, debouched in the broad amphitheatre in the south, where a number of huge plateau icebergs rotated. The mouth of Flyverfjord was marked in the west by a high, vertical granite pillar (red streaked migmatite of the Hangö type) in the form of a rounded cape with a narrower and lower land connection; on its western side a vertical water cascade, about 500 m high, was seen. The northeastern corner, also, of Hinks Land was marked by a vertical granite pillar of obliquely streaked, slightly banded migmatite (= Kap Basel), connected with the land behind merely by a low, narrow headland of blocks, against which huge icebergs had stranded and coarse bay ice was pressed. On the north side, the southern cape of Nathorsts Land, in particular, is a morphologically rather prominent large-blocked and dominating massive wall, while east and especially west of the cape the brown, rusty, highly tectonised mica-gneisses exhibit entirely different, hillocky, morphologically variable outlines with lower absolute heights. No anchorage was found along the shore, and hardly any suitable place for pitching the tent. At the pillar-shaped northeastern cape of Hinks Land (= Kap Basel) we had a surprising view of the extensive innermost basin of Nordvestfjord, bounded on the northeast by Nathorsts Land, on the northwest by Charcots Land, in the south by Hinks Land, and between the former two the huge, but little active, F. Graaes Gl., between the latter two the broad and extraordinarily active (evident from the uneven surface differing greatly in level near the margin) Daugaard-Jensens Gl., which advances convexly from the west and occupies the whole width of the fjord and is possibly an offshoot of the inland ice. The whole basin was filled with calf-ice, i. a. several large irregularly distributed floes up to a kilometre in length of wintered bay ice. The apparently smooth, hillocky ice surface was frequently broken by huge, in the

west closely packed plateau icebergs, often a kilometre long and up to 100 m high, their surfaces often showing distinct traces of having been connected with the mother glacier in the west. No ice-free water was visible, in the southwest the winter ice was still landfast with the southern margin of Daugaard-Jensens Gl. Midway on the north side of Hinks Land there was a broad valley occupied by a small, hardly visible glacier(?). Evidently Daugaard-Jensens Gl. had just calved and broken up the winter ice along its northern margin and in the middle. Now the current changed, and the ice, which seemed to be in constant motion, began to scatter in the eastern part of the basin. Across the icy expanse appeared in the northwest the capes west and east of the deep bay in which F. Graaes Gl. emptied; the dark eastern cape (with Reinhard Bjerg) was steep and inaccessible and consisted apparently of crystalline granodioritic migmatitic rocks; the western cape showed red and white colours in a mixture indicating the presence of sediments, and as this shore was less steep and apparently with small sheltered bays and coves, BACKLUND decided to push with the motorboat to the foot of Reinhard Bjerg in order to gain, from this mountain, a better view of the ice conditions in the basin and of the geology of the western cape. This did not seem risky, as a calving had evidently just taken place, so the next calving would hardly take place till a couple of days or perhaps a week afterwards.

After working hard in the scattered ice the boat reached the cape at the foot of Reinhard Bjerg (= Kap Ursus Minor); the grey, somewhat monzonitic granodiorite with amphibolite bands was studied, and a Tertiary basalt dyke with the traces of its contact influence was observed. Relatively scattered ice with large spaces of open water glittered in the bright sunshine. The deep red, slightly tilted rocks on the opposite western shore (= Kap Ursus Major) were distinctly of sedimentary origin and alternated(?) with dark bands, which formed sharply projecting capes and rocky spits of land along the coast, while the intermediate lighter-coloured rocks seemed to have weathered so as to form deep bays, large enough for providing good anchorages at suitable distances from the glacier fronts both towards the west and north (c. 18 km in both directions). Some of these coves would seem to afford a fairly satisfactory protection against direct calving waves, if an unexpected early calving should set in. The motorboat therefore headed towards Kap Ursus Major and cast anchor in a cove with steep amphibolite walls on either side and with a smooth and soft, but highly sloping sandy beach at the head of the cove. On this beach a horizontal series of ice-blocks almost a metre long were evenly distributed at an altitude of about 12 m above the highest water level, more than fifty metres from the shoreline indicating the elevation of the sea at the last

calving of the glacier. The tent was pitched about fifty metres above the level of the sea farther inland, at the margin of a small meadow, which probably marked a (casual?) Eskimo settlement, for a distinct meat cache was found close by, and a number of stones raised on end marked the middle of the meadow. A half prepared reindeer horn was also found, but no undoubted traces of musk-oxen. As a precautionary measure we decided to have our meals on board the motorboat, and the night watch was increased.

Aug. 10th.—In the night the tent was visited by a bear, but it was frightened away by a shot of hail. Started out early. WENK went in the motorboat eastward across the bay to a point slightly north of Reinhard Bjerg, where, along the c. 30 km long and 1200 m high uninterrupted section he studied the peculiar alternation of granites, amphibolites, shales, and limestones; LUPANDER walked westward to study basites, while BACKLUND studied the alternation and tectonic position of the limestones in the northwest. The members left at the tent and the motorboat were instructed to watch the ice and those out on excursions. It was a long working day, and WENK came in a difficult position, as a large pressure ridge owing to the inward current concealed his way of descent.

Aug. 11th.—In the morning, as the party was turning out, a female bear with a half-grown cub approached the camp. Both of them were killed. After the bear hunt, an excursion was made northward in order to gain a view of the ice-free area in central Charcots Land from the highest top: a markedly eroded and open relief without steep slopes or deep erosion grooves were visible towards the north and northwest, with a comparatively abundant vegetation and numerous small exposures of white limestone(?) at the foot of and on top of the hillocks. The lack of large lakes within a morphology which was, as it were, made for such, seemed to confirm the supposition as to the predominance of limestones within the northern terrain. In the east, on the other side of Graah Bugt, north of Reinhard Bjerg, a large lake occurred about 1400 m above sea-level in the western marginal area of Nathorsts Land, that is to say, on crystalline ground.

Aug. 12th.—The night was calm and clear, by midnight dark. In the morning an excursion in the motorboat was made by H. BACKLUND and WENK along the steep, nearly vertical wall of the western margin of Graah Bugt (east coast of Charcots Land), while LUPANDER made supplementary observations in the west. It was intended to establish a vertical section to link with the observations in the horizontal plan of the previous two days, and moreover to obtain connection with WENK's observations on the east coast (Nathorsts Land), for it looked as if the two fjord sides formed the sides of a huge arch, whose culmination almost

coincided with the N.—S. direction of the bay, and which dived abruptly down towards the north. Only in a few places was it possible to go ashore. At the top (light) limestones were predominant, alternating with (garnet-) amphibolites; below followed an amphibolite bed several hundred metres thick, with a band of light-coloured limestone, which was replaced from below by a grey, much varied granite containing large flakes of a grey massive limestone without any visible contact minerals, but with gradual transitions to the granite. In many cases the transition was so gradual that even by strokes with the hammer it could hardly be decided where the limestone ended and the granite began. In the evening the ice in Graah Bugt grew more close-packed, so the motorboat was removed to another anchorage about 100 m away, just off the sandy beach of the cove.

Aug. 13th.—Shortly after midnight H. BACKLUND was waked by a crash not unlike the acoustic phenomena of an earthquake. Some few minutes afterwards the sound of violent breakers reached the tent. An inspection towards the beach confirmed the sound; the bodies of the bears had been washed away, but it was entirely calm. Ice and icebergs drifted at a violent rate and amidst loud cracks past the coast, near the coast westward, farther out eastward, which in the faint light gave the impression of a great (doubled) speed, especially because the large icebergs drifted along at a much more rapid rate than the ice floes between them. HASSELBALCH arrived from the cape, where he had hauled the jolly-boat farther up the shore, and reported that the motorboat had been washed ashore and that various articles were lost. An inspection in the bay confirmed this. The boat lay 10 m above the high-water-mark, about 50 m from the level of the sea, deeply buried in the loose sand, but entirely undamaged and apparently without any great loss. The anchorage had fortunately been chosen off the middle of the bay, otherwise the boat would have been crushed against the rocks. All men were immediately called, though they had only slept for a few hours. A hasty inspection showed that not very much had been lost: a case with rock samples from Reinhard Bjerg, some spare equipment, clothes and boots, the cooking utensils, some cases with tinned goods, and a petrol tin, all of them articles that were used every day and had been left on board the motorboat after our last meal in the evening. The next question that presented itself was how to get the motorboat launched, though it looked hopeless. However, there was no choice: under the prevalent ice conditions the party could not be rescued either from the land, the sea, or from the air for a long time ahead (till the winter set in?) or for ever(?). All hands set to work feverishly, unloading the goods (collections, provisions, spare tins, etc.) and depositing them some distance higher up the shore in order to lighten

the boat. This being done, the boat had to be emptied for her ballast. Suddenly, however, the work was interrupted by a cry of warning: a second wave of the swell, forming a vertical wall about 10 m high and filled with ice lumps, came roaring into the cove. In a panicky flight the small party rushed towards the steeper part of the shore, but they were reached by the wave and flung about among each other, fortunately without being seriously hurt. Owing to the funnel-shaped configuration of the cove, after the first wave the water rose slowly at the head of the cove, the motorboat was raised and set afloat and was carried out towards the sea with the suction of the wave. However, the water moved more rapidly back, the keel again touched the bottom, the boat turned on to the side, but this time with the keel in the right position towards the sea halfway down towards the normal coast line. However, a new wave was approaching, with the same effect: the boat was set afloat, was washed some distance up the shore and then sucked seawards. Now the question arose: would the boat be sucked out into the deep water before it was reached by the third wave? And would it make this trip without crew on board and thus be lost for the party in the violent ice pressure outside the cove. The question now was to utilise the seconds between the last suction of the second wave and the arrival of the third wave and in danger of our lives to rush across the nearly twenty metres of icy slush, but HASSELBALCH succeeded in getting hold of the port gunnel. For a moment things looked critical, the boat heeled towards the port side, would he have to release his hold? But then the boat got right, and HASSELBALCH managed to climb across the gunwale at the very moment the boat got afloat on the rising water and with the retiring third wave drifted swift like an arrow towards the steep cliffs that formed the eastern corner bluff of the cove. At the very last moment he succeeded in keeping clear of the cliffs, before the boat, with a strong list to starboard, disappeared behind an iceberg out into the maelstrom which was still active out to sea. For more than the next two hours we saw nothing of the motorboat, the violence of the swell increased and decreased according as the newly discharged ice plateaus divided into smaller ones. Gradually it got so light that it was possible to get a view of the large basin: the whole southern portion of Daugaard-Jensens Gl. had become detached and in the form of plateau icebergs had broken up the remainder of the winter ice. The distribution of icebergs the day before had entirely altered, a large plateau berg had pushed towards Kap Basel, where it had caused great disturbance among the smaller bergs already stranded there. All the small icebergs were constantly drifting past Kap Ursus Minor into the eastern bay and back towards the western corner of the basin in several concentric circles; the resultant cracking and booming reminded us of

a violent gale, though it was entirely calm. A flock of narwhals tumbled panting about among the icebergs.

Immediately after the motorboat had disappeared, the saving of the goods left on the shore was commenced. The greater number of the unloaded goods had been carried out to sea by the waves, among other things the oars for the jolly-boat. The heavier articles had not been removed very far from the shore, so they could be fished out of the water, while the less heavy things, sacks, provision boxes, etc. whirled about in the maelstrom; but as the various members of the party were placed on different capes provided with boat hooks, sticks, and ropes, the greater part of the lost goods were saved, thus even the oars for the jolly-boat. At 5 o'clock the motorboat came into sight: HASSELBALCH had even succeeded in starting the motor, so that he could get round the worst ice pressures but still had to go with the current and along the way tried to secure the articles that could not be hit from the shore. At 9 o'clock the sea calmed down, and the motorboat could return to her old anchorage off the tent site. A well-earned meal was prepared — crisp rye-bread and tea, which they had to drink of old tins, as all the cooking utensils and cups and plates were lost, but fortunately the Primus stove had been left. Subsequently the collections were labelled and packed, the tent was broken down, and shortly after noon the motorboat, in which only the gunwale of the port side was slightly damaged, left the westernmost and innermost camp site in Scoresby Sund, for an inspection of the front of Daugaard-Jensens Gl. in the telescope showed that a repetition of the catastrophe might take place shortly. A planned visit to the north side of Hinks Land was therefore given up, for long rows of icebergs had accumulated there as far as Kap Basel. It was not without difficulty that we reached the east side of Lumskebugten, where a short visit was paid ashore to gain a view of the situation; subsequently the boat turned into Flyverfjord. Inside the mouth the shore bends sharply towards the north, forming the large Garagebugten, a churchyard, as it were, for hundreds of larger or smaller bergs that had drifted in from Lumskebugten. They had all grounded there and gradually broke down in the "brilliant summer heat". Tenting was attempted at the head of the bay above the delta and the swampy areas, but owing to the shallow water the motorboat had often to change anchorage, and communication between the boat and the tent was difficult.

Aug. 14th.—In the forenoon H. BACKLUND, WENK, and LUPANDER made a short excursion to the impressive eastern valley side of the bay, towards the NE., E., and S., for a study of the relation of the amphibolites and basites to quartzites and phyllitic clay shales and granitic cross-dykes and sills, and the relation of the pegmatites to the sedi-

mentary complex and mineralisations if any. In the meantime HASSELBALCH and V. BACKLUND were occupied in making eating gear of old tins, oil cans, drift-wood and the willows growing in the neighbourhood. In the afternoon the tent was removed from the head of the bay to the middle of the western shore, where the depth of the water was more suitable for the motorboat, and the risk of swell waves was less imminent. The depth at low water forced the boat to make her way through part of the iceberg churchyard, in the bright sunshine an impressive, though not entirely undangerous voyage. Immediately after going ashore the geologists made a reconnaissance towards the NW., S., and SW. in order to link up the observations made on the east and the west side of the fjord; however, a much more marked granitisation of the sediments rendered it difficult to connect the observations, notably since the direction of the bay almost coincides with the direction of the strike. Foggy in the evening.

Aug. 15th.—Started early in the morning, when the fog was less dense, towards the head of Flyverfjord. The sides of the fjord formed plateaus, steep, narrow, apparently unproductive glacier tongues with pancake ice foets ending in moraines about a hundred metres above sea-level; however, in the innermost part of the fjord, in the northwest, about a dozen bergs had stranded in the delta mud of the rivers coming from the N. and NW. The steep slopes of the southwest side contained a few Tertiary basalt dykes. The tent was pitched on the northern shore about 5 km from the head of the fjord. In the north the landscape was more open, and excursions were made towards the NW. (WENK), N. and NE. (H. BACKLUND), and E. and SE. for a study of the basalt dykes (LUPANDER). Large occurrences of ultra basites “alternating” with limestones were observed, resembling to some extent the limestone associations on Charcots Land, but with a more intensive tectonisation and in part more marked traces of granitisation. Numerous comparatively fresh musk-ox skulls just above the shore cliffs showed that not long ago the fjord had been visited by hunters. In the evening the collections were labelled and packed.

Aug. 16th.—Fine and sunny weather. Not very much fuel for the motor was left, especially since a can of fuel was lost during the catastrophe in Lumskebugten the other day. It was therefore necessary to go to the depot at Sydkap. The camp was broken, and the motorboat, now loaded to the brim with collections of rock samples, sailed out of Flyverfjord. At the mouth of the fjord, towards Garagebugten, a herd of musk-oxen was observed, the only one met with so far inland. The numerous icebergs in Nordvestfjord indicated that a fresh calving had taken place from Daugaard-Jensens Gl., and navigation had to be very careful. Late in the evening we reached Sydkap and the Eskimo house.

The remainder of the fuel deposited there was taken on board, and the cases with collections were deposited there; they were numbered and secured against wind and sea.

Aug. 17th.—Sailed westward past Bjørnøer, where a short visit ashore to search for some things forgotten there, was without result. The "Polyphen" then turned into Øfjord under magnificent sunshine from the east. By noon a halt was made at the northern shore within the first third of the fjord, where a slightly projecting cape with several generations of basites in highly tectonised areas within the micaceous felspar-quartzites, were studied. The fine illumination was utilised for photography, also of the magnificent, phantastically isolated, high granite pillars in the north. The boat then continued westward, with a short halt at the southwestern curve of Renland before, when darkness fell, turning into Rypefjord, where a fairly sheltered anchorage was found at the north side. The tent was pitched on a rock surface covered by a rich vegetation.

Aug. 18th.—Excursions were made towards the NE. (eastern margin of Renland, WENK), N. (west side of the glacier at the head of the fjord, LUPANDER), and NW., about the middle of Rypefjord (H. BACKLUND). The respective geologists sailed in the motorboat to their starting points and were fetched again late in the evening except H. BACKLUND, who returned over land on foot. Red sediments, their substratum and contents of boulders, and garnet gneisses were studied. The late return of the geologists to the camp was due to the following causes: On the east side of the glacier WENK had gone far inland (towards Renland) studying the morphology of the old (pre-Triassic?) erosion and weathering surface within the garnet gneiss area; on ascending the crest in the west from the right (western) lateral moraine of the glacier, LUPANDER had encountered steep, unclimbable slopes and had come down far from the appointed place; and BACKLUND in the boundary area between the immense red sediments in the west and the crystalline around the camp on the outermost part of Rype peninsula had struck extensive swamps (with numerous reindeer horns) cut across by deep, broad water ditches and rivulets which he had to pass though the water reached him to the breast. The sun rose, before the geologists turned in.

Aug. 19th.—After a short rest we set to label and pack the collections. After a short excursion in the nearest surroundings with studies of their terrace and peat formations and the erosion forms of the substratum (garnet gneisses and granites), the camp was broken, and we sailed out of Rypefjord and across Harefjord, which is bounded on the N. by Rype peninsula and in the S. by Rødepynt. On both shores horizontally bedded red sediments with steep bases of scree were found, of the same type as those studied the previous day NW. of the camp-site.

The motorboat cast anchor off Rødepynt, by the rounding of the cape, for the glacier at the head of the fjord showed strong tendencies to calving and newly-detached icebergs constantly passed by, out of the fjord. Excursions were made: northwestward along the shore, towards the interior of the fjord, for studying the superposition of the red sediments (mostly coarse sandstones) on the crystalline (BACKLUND), and to the sediment plateau in the south to gain a view of the morphology and the upper horizons of the sediments (WENK, LUPANDER). The substratum of the sediments, a red, fine-grained granite, was encountered on the shore about 3 km N. of the camp-site. The sediments seemed to have been lowered eastward by a series of synthetic step-faults. In the rivulet along the marginal fault numerous blocks of Scolithus quartzites, grey limestone, and yellow dolomite were found; the crystalline in the west also consists of beds of red quartzites and limestone bands. The unconformable younger sediments are fairly loose, including numerous conglomerates, among these also blocks of an older red conglomerate; they alternate with fine-grained arkose sandstones, red and greyish-blue. Rounded rock knolls and bastion-like coarse pillars characterise the morphology of the sandstone formation, valleys and ravines are narrow and steep with markedly convex sides. A good view of the large island in the E. with its three problematic sediment remnants was gained from the top of the sediment plateau. No basalt dykes were observed here, in contrast to the sediments on the west side of Rypefjord. Camped on the shore near the cape.

Aug. 20th.—In the morning packing of collections. In the afternoon the camp was broken, and the "Polypen" headed towards the north-western point of Storø. The three red spots on the west side of the island which were observed during the air reconnaissance on July 26th and identified the previous day, and which were supposed to represent unconformable sediment remnants, were visited and investigated. In the northern locality no undoubted remnants of sediment superposition could be demonstrated, only a small number of boulders transported short distances by the ice might suggest such a superposition; the substratum, resting alternately on granitic and gneissic rocks, proved to be secularly weathered and deeply red-coloured locally. The investigation of locality No. 2 gave no great results either; occasional blocks of sandstone were observed. The southern locality, however, on the west side of the island, exhibited well preserved red and green sediments, partly fine-grained arkose sandstones and a quartz conglomerate with balls of the size of a hazelnut (i. a. wind-polished faceted stones), partly fine-grained clay stones and red shales alternating with red calcareous shales. Their superposition immediately on the crystalline substratum could not be observed, as young glacial formations and soli-

fluction soil concealed the contacts. In spite of intensive reconnoitring with the whole party ashore, along water streams and ravines, no unmistakable fossils could be ascertained. The sedimentary series, which with a high degree of unconformity rests on the substratum, shows horizontal bedding and occupies an area of a couple of square kilometres; its fine-grained portions and its quick alternation and facies development differ from that of the mainland just opposite, resembling more closely the sediments north of Kap Leslie on the east side of Milne Land (Oxfordian?) than the coarse sediments of the Lower Mesozoic, for instance in Fame Øer; they were surrounded on all sides by crystalline rocks. In the ravines we got an idea of the character and alternation of the sediments, but numerous step-faults and slidings towards the NW. defied all attempts at measuring their total thickness, which, however, cannot be very great.—After a halt for about five hours, the motorboat went to the southern cape of Storø, where a suitable camping site, and a rivulet with fresh water, was found on the east side of the southern point of the island. A hunting trip for wild geese on the lakelets with broad swampy meadows west of the camp was unsuccessful, as the geese were already about to leave and consequently very shy. On a long excursion across the highly broken terrain north- and northwestward an impression was gained of the arched, N.—S. striking structure of the garnet gneiss.

Aug. 21st.—Half the supply of fuel for the motorboat had now been used up, the only depot of fuel left was that at Kap Leslie. The distance to this point from our present camp was about the same whether we sailed through Øfjord past Bjørneøer (our inward route) or we sailed south of Milne Land through Fønffjord and eastward past Danmarks Ø. The last time we passed Bjørneøer (August 17th), drift ice had been visible south of the islands, and a wireless message from the "Gustav Holm" had informed us that the mouth of Scoresby Sund was blocked by close-packed drift-ice. In order not to run too great risks, we decided to go by way of Øfjord to Kap Leslie. All the more so since a reconnaissance from the nearest hill-top on the south side of Storø showed that landfast winter ice was still found at the mouth of Vestffjord; however, it could not be seen whether it extended across the sound to Rødeø, or whether the sound was blocked by drifting winter ice. The motorboat therefore first went northward along the east coast of Storø, in the middle of which a "red spot" was observed during the air reconnaissance on July 27th. In the coast cliffs here occurred a number of N.—S. and E.—W. striking brecciations, and on climbing a ledge higher up the cliff intensive faulting in the crystalline (garnet gneiss) in almost the same directions was observed, owing to which the breccias, ravines, and salbands were highly impregnated with

iron oxide.—The boat then headed towards the ENE. into Øfjord. As a number of ice floes were moved to and fro by the tide water, and our supply of fuel was sparse, we gave up our plan to go ashore and proceeded towards Bjørneøer, where the sound between the NE. cape of Milne Land and Bjørneø IX was highly blocked by ice, while the sounds between the islands in the west were free of ice. A reconnaissance ashore of Bjørneø VI, during which the articles left there were found, revealed a channel of open water between Bjørneøer X and VI towards Lerbugten (= clay bay). This bay was reached in thick fog; it proved to answer to its name, being filled with clay almost to the surface of the water, so it was impossible to go ashore or to cast anchor. Similar conditions, though somewhat better, were encountered in Charcots Havn (north of Lerbugten), but there a good anchorage was found off the north coast behind some skerries. The tent was pitched for the night on the shore above the high-water mark.

Aug. 22nd.—A reconnaissance was made towards the W. and NW. to study the substratum of the (Oxfordian) sediments, a red granite of the Hangö type. Charcots Gl. had receded very much, its granitic erosion bed with fine roches moutonnées was exposed and devoid of vegetation. The reconnaissance showed that Kap Leslie was free of ice, so the camp was immediately broken, and the motorboat proceeded southward at full speed and soon anchored off the depot, where the motorboat was supplied with fuel, and the cases with rock samples were deposited. Subsequently the boat proceeded towards Danmarks Ø, where large ice floes forced the boat to go close to the shore. The weather was hazy, with a dense bank of fog at a height of about 10 m. As the ice masses seemed to increase towards the SW., the motorboat went north of Danmarks Ø, though with some difficulty, through the picturesque sound, which with its steep, isolated rocky cones and narrow capes resembled those between the Bjørneøer. Anchored for the night in the cove of Danmarks Ø inside the sound.

Aug. 23rd.—In the early morning the motorboat sailed into Føn-fjord. The northern coast cliffs of the fjord are steep and inaccessible, the granite walls on either side descend almost perpendicularly into the deep water. Large ice floes drifting out of the fjord were encountered. The lower contact surface of the basalt showed a considerable difference in height between the south and the north side of the fjord. We rounded the western point of Milne Land close to the shore and proceeded up through the sound between Rødeø and Milne Land. The uniform plateau of the south coast of this land is intersected by several broad valleys in the east, separated by isolated rock cones, but the bottom of the valleys at their mouths occurred several metres above sea-level. Numerous ice floes interspersed with bergs still blocked the mouth of

Vestfjord, so the motorboat proceeded northward past the slightly pronounced bay in the west coast of Milne Land, where a short visit ashore was made, and then towards Sorteø, off the east coast of which the boat cast anchor for the night. Fairly large masses of driftwood were found on the shore, which was rather much indented. The island is mainly built up of amphibolitic rocks, interfoliated with dark biotite shales highly transformed into scales. The stay on Sorteø practically linked up with the voyage from the north on August 20th—21st. A strong northerly wind increased the chances for better ice conditions around Rødeø in the next days. Late in the evening there was a heavy rainfall, and our tent and clothes grew wet.

Aug. 24th.—In the early morning the camp was broken, and the motorboat sailed along the north and west coasts of Sorteø, in the shelter of the steep red sediment cliffs, and anchored by noon off the slightly sloping north coast of Rødeø, and the tent was pitched near a rivulet. Some time had to be spent in drying our clothes, several clothes having been lost at the catastrophe on August 13th. Our somewhat reduced supply of provisions was added to by collecting some fungi, notably a *Boletus* species. Subsequently an excursion was made across the island to its highest point on the south coast, which forms a steep cliff several hundred metres high towards the south and southwest. Inside the coast cliffs the sediment series is intersected by two vertical basalt dykes running E.—W., while a third, much thicker dyke strikes in the direction N.—S. almost along the east side of the island; parallelly with the last-mentioned dyke the sediments are cut through by a number of parallel faults of relatively inconsiderable throws, subsiding towards the E. and dragging towards the W. The sediment series otherwise slopes 5—8° towards the N. and NW.; the rocks show a rapid alternation of a continental character, with local and apparently irrelevant conglomerates. They resemble to a fairly great degree the sediments at Rødepynt (August 19th) and on the west side of Rypefjord (August 18th). No fossils were found in this place either. A cairn was built at the highest point, with a view to a possible triangulation in Vestfjord. Near the northeastern point of the island some N.—S. running faults have given rise to the formation of a couple of deep bays with parallel sides, but unsuitable as harbours.

Aug. 25th.—In the early morning a trip was made in motorboat across the sound to the southern entrance bluff of Vestfjord (called Kap Carita by the members of the excursion) for geological reconnoitring and to gain a view of the ice conditions in the interior of the fjord. At the place where we went ashore immediately south of the cape a number of Eskimo graves, several large winter houses with partially preserved roofs, and numerous paths in the rocks along the shore were observed;

fresh bear tracks likewise occurred; the paths were not covered with lichens, though both lichens and moss were abundant on either side of the paths, so they could not be of very old date. Towards the outermost level part of the cape several large tent rings and remnants of narwhal, seal, and bear skeletons were discovered.—An intricate system of basic dykes cuts across the granitic rock bottom in all directions, giving rise to aggregations of magnetic pyrites here and there. The ice was landfast almost as far as the cape, but floes are constantly detached, and the party therefore returned to Rødeø for the night.

Aug. 26th.—It was a restless night. Several calvings took place from the “Rolige” (quiet) glacier. By midnight the motorboat had to change her anchorage, and in the tent we were repeatedly awakened by the swell waves. As soon as it grew light, we decided to move the camp into Vestfjord to be sheltered against further calvings and the resulting swell. A short distance into the fjord we found, on the north side, in the shelter of a projecting boss of rock, a good anchorage in a small bay west of the outermost cape, where the Eskimo tent rings were discovered the previous day. Here, too, there were abundant traces of Eskimo settlement, among other things several graves and a winter house; the fungal flora was very rich. An excursion on foot along the shore, which was now steep and rocky, now level, showed that the winter ice was unbroken only a few kilometres inside the camp site; consequently it was impossible to investigate this fjord, which extends farther westward than any other of Scoresby Sund’s ramifications and much farther westward than indicated on the map of the AMDRUP-HARTZ Expedition 1898—1900 (possibly the glaciers at the head of the fjord are receding). However, the reconnaissance of the geology around the camp site was continued. The cape is of interest in so far as several generations of basic rocks, beginning with deformed amphibolite inclusions in the local granite and ending with linear basaltic dykes of a very young appearance, pierce the granitic-gneissic rocks mostly in a northwesterly direction. The area around the cape itself forms a hilly landscape, the highest tops rising only some few hundred metres above sea-level, compared with the plateaus in the north, south (c. 1600 m), and east. The varying nature of the rocks gives rise to a peculiar morphology of which it is difficult to gain a general view, and the rich vegetation in the partly undrained depressions does not render the reconnaissance easier. The rocks are brecciated by the basic dykes, which are themselves disrupted and brecciated, and consequently the adjacent rocks, often slightly metamorphosed sediments of the Petermann-Series type, have been squeezed out into gigantic level flakes, which have been largely utilised by the Eskimos for their houses and graves. Another point of interest is that ultrabasites with magnetic

pyrite occur among the basic dykes, and ramified apophyses of them lend to the rock and the level faces of the flakes a striated and sometimes variegated appearance. In the west, some metres (20—30?) above sea-level, large level rock surfaces were found, on which the details of intrusion and transformation of the rocks could be observed with much greater certainty than in the Fennoscandic coastal tracts.

Aug. 27th.—In the course of the night the motorboat was repeatedly forced to change place owing to ice pressures, and in the morning things began to look critical for the boat. With great difficulties the camp was shipped, and the boat sailed eastward close to the shore. The water was full of skerries here, but the boat reached safely the cape and then went southward to the innermost point of Føn fjord. Here Dr. KRUISE (on RYDER's expedition 1891—92) measured a series of terraces in the broad valley that forms the western continuation of Føn fjord. The motorboat cast anchor off the southeastern side of the broad river delta which barred the valley, and H. BACKLUND, LUPANDER, and WENK went up the valley, climbing one terrace after the other. Several lakelets were observed on the terraces, but traces of the rich bird-life of the summer were sparse. The bottom of the valley was filled with young river sediments, overlying a thick and underlying a much reduced moraine. The sides of the valley consist of coarse debris, into which both moraines taper finger-like. Both the bottom and the sides of the valley are covered by a dense vegetation, which leaves only occasional large granite blocks of glacial-erratic type free. No glacier remnant or ice cap was visible in the western continuation of the valley, and garnet-bearing gneiss, grey but weathering brown, occurred *in situ* higher up the slopes and then only in small furrows made by thaw-water streams. The valley was very broad, of a shallow U-shape with several thresholds and terraces. A couple of cairns were built, and a triangulation was commenced in order to gain a view of the terrace sequence, but it had to be interrupted when the darkness came on.

Aug. 28th.—Dense fog in the morning, so the reconnaissance inland could not be continued. Some ice-floes in the immediate neighbourhood of the anchorage of the motorboat made us break the camp and go eastward; the season was much advanced, and the new-ice formed in the night often made communication between the shore and the motorboat by means of the jolly-boat rather difficult; moreover the wireless messages from the "Gustav Holm" about the ice conditions off Scoresby Sund were not very optimistic. The camp was broken and taken on board the "Polypen", which headed slowly and cautiously eastward out of the fjord. The fog gradually lifted, and at 2 p.m. it had grown so clear that the motorboat could go at its normal speed along the south

coast. The fjord was now almost free of ice, westward it was clear but eastward it was still hazy with banks of fog. The southern side of the fjord has, at about 200 m, a broad shelf carved out in the cliff, and on this ledge two or three long lakelets occur in depressions in the granitic rock. The lakelets are parallel with the direction of the fjord, and the whole resembles, and shows all indications of, a remnant of an eroded (!) fjord bottom on a higher level. Since the depth of the water immediately outside the shore (cf. G. THORSON' bathymetrical chart of Scoresby Sund) is 980 m, and if the present fjord has on the whole been formed by river erosion prior to the glaciation, the shelf visited must have been formed before, and is a precursor of, the present main fjord, and the difference in time between the formation of both fjord bottoms, the present one and the shelf at 200 m, the remnant of the earlier one, is reflected in the nearly 1200 m of vertical erosion which separates the two levels. The whole preglacial erosion (the shelf exhibits excellent glacial structures), considering that the highest edge of the plateau including the basalt beds occurs at an altitude of 1800 m immediately south of the fjord (Gaaseland) and north of it (Milne Land) at 1800 m, would then amount to at least 3000 m and be postbasaltic. Since the erosion—provided fluvial activity has been in progress, which is indicated as the only plausible erosion factor—acted linearly, it must have taken place above the level of the sea at that time, and the land must have been elevated about 1000 m above its present level, or the level of the sea has been correspondingly lower. In both cases isolated, very steep or nearly vertical walls more than 3000 m high must have developed through supposed erosion along a relatively narrow area on both sides. On the other hand, a glacial erosion of a previously formed (tectonically or through river erosion), entirely linear valley can hardly come into consideration, the morphological gradient required for such active glacial work being entirely absent: Gaaseland as well as Milne Land and Renland represent plateaus of unusually similar heights, and inside these plateaus the land is more intersected morphologically, probably also with lower average heights, than in the marginal areas represented by these islands. These considerations present themselves to the visitor's mind, especially in Føn fjord with its entirely close depression, while other fjords exhibit branch valleys, which, it is true, are associated with other (higher) erosion bases than the present one, but are still of preglacial age and show the preglacial age of these fjords, also. Moreover Føn fjord is the narrowest of all the fjord depressions visited in the Scoresby Sund area. A breccial formation at the inner side of the aforementioned shelf possibly indicates that disturbances of the trough-fault type in connection with the formation of the fjords cannot be entirely rejected. Some further points of view

regarding the general problems in connection with the formation of this peculiar fjord complex will be given below.

The motorboat continued westward. It was rather hazy when Danmarks Ø came into sight. In the north and along the northern part of the northwest coast the island was blocked by a number of ice floes, the sound in the N. seemed to be barred by ice, and the motorboat therefore went southeastward. Here, too, the ice floes moved along the coast and forced the boat to go nearer to the island, where navigation had to be very careful owing to the numerous skerries. Owing to the fog and the increasing darkness we passed the cairn at the mouth of Hekla Havn, where we intended to spend the night, without discovering it. At last the "Polypen" cast anchor in a small bay midway on the south coast, where the tent was pitched for the night. A cape in the NE. and some skerries in the SW. protected the boat against the ice floes, but a sharp lookout had to be held, and the anchorage had often to be changed during the days of our stay on Danmarks Ø.

Aug. 29th.—Camp on Danmarks Ø. Fog and thick weather prevented any long excursions, and the drift ice and the meteorological factors did not invite, or even permit, a removal of the camp. Excursions were made along the coast towards the NE. and across the island along the banks of the lakes which occupied the depressions between the rounded rock knolls. Hunting was not very successful: the geese were very shy, the ptarmigans were small and scarce, the foxes were very shy, and only a single track of bear was seen. The formation of new ice here caused less trouble owing to the higher salinity of the water.

Aug. 30th.—Danmarks Ø. The weather had improved somewhat. An excursion was made in the motorboat to Hekla Havn, where RYDER's wintering camp and cairn were studied, and the new cairn built by the Frenchmen from Scoresby Sund (ROTHÉ and collaborators) was found as also some kitchen utensils left by them, which were very welcome to us. The "leptite"-like rocks were veined by granite-aplitic rocks, and their relations to a younger grey granite were studied. The other members returned to the camp in the motorboat in the afternoon, while H. BACKLUND walked back over land, partly to make geological studies, partly to hunt; only two ptarmigans were secured. The march was difficult, as the route went across the strike of the beds, and deep, water-filled ditches repeatedly had to be passed. Shortly before midnight BACKLUND reached the tent, in darkness and wet to the skin.

Aug. 31st.—Danmarks Ø. A radio message from the "Gustav Holm" the previous day reported that the ice conditions off the coast were so difficult that the ship would not, probably, be able to go to the interior of Scoresby Sund. The party therefore had to economise with the fuel supply so that the motorboat might be able to proceed at any rate to

Jameson Land. Excursions were made towards the SW. to link up with the observations of the previous day and to find the gun which BACKLUND had lost during his march. These tasks were successfully completed without the members being essentially troubled by the fog.

Sept. 1st.—Clear weather, visibility good. Snow had fallen during the last few days, which now covered the mountain sides down to a height of c. 500—600 m. The basalt beds from Kap Stevenson towards the Gaasepynt in the south, but also in the north towards Milne Land appeared with sharp horizontal lines even towards lower levels, due to the powdering with fresh snow. In the early morning the motorboat weighed anchor with all men on board, called at Hekla Havn in order that some photographs might be taken, and sailed then towards Gaasepynt in scattered ice. The coast here is steep and inaccessible, much ravined and intersected up to a height of 100 m. In such a ravine the motorboat could go in between vertical walls and moor at the rock wall as in a dock. However, it was a hard job to work our way up the ravine. A short excursion, partly to the contact surface of the basalt and partly westward along a plateau-like shelf made up of garnet-bearing rocks with a general strike in N.—S. (across the direction of the fjord) and rather slightly inclined towards the E. (35°). A number of lakelets and abundant accumulations of boulders were observed on the plateau. Many ice floes were visible in the interior of Gaasefjord, both shores (in the N. and S.) are highly intersected and steep. An outlook was held for the Italian Milano expedition, which according to wireless messages should have gone to Gaasefjord to be fetched there by its Icelandic ship; however, neither the expedition nor the ship was observed. In the evening the motorboat returned to the camp on Danmarks Ø in clear and calm weather and almost ice-free water.

Sept. 2nd.—In the morning snowfall, which gradually passed into a snowstorm from the NW. The motorboat set double moorings, and the tent, too, had extra moorings. The gale and the snowfall increased in the night.

Sept. 3rd.—Danmarks Ø. Rain mixed with snow indicated that the wind was changing via W. to S. and SE. It was impossible to dry the tent and clothes. The greater part of the day was spent in the cabin of the motorboat.

Sept. 4th.—Danmarks Ø. The weather had improved, only high-lying fog occurred. The tents were taken down, as we regarded it as impossible to dry them in the place. Collections, goods, and clothes were provisionally loaded into the boat, which started towards the shore of Milne Land east of Mudderbugt, where the snow had melted owing to the porosity of the sedimentary rocks, while in sheltered places on Danmarks Ø it was more than half a metre deep. However, as the ice

floes pressed against the shore, the motorboat had to cast anchor some distance from the shore, and we had to go ashore in the jolly-boat, and the tents were dried and pitched for the night.

Sept. 5th.—Milne Land E. of Mudderbugt. Fine weather in the morning; excursions were made towards the N. and NE. to get a view of the character of the landscape, especially the lakelets and their drainage, occurring in the topography entirely dominated morphologically by the horizontal Mesozoic strata. The possibilities for hunting were examined, too. Large masses of drift-wood lay scattered on the shore.

Sept. 6th.—HASSELBALCH took a careful view of our supply of fuel and lubricating oil, which was now running short. On the chart we measured the distances to Kap Leslie, the west coast of Jameson Land just opposite this cape, the Eskimo house at Sydkap, to Kap Stewart and to Scoresbysund. The distances from the camp to Sydkap and to Scoresbysund were about the same, and by sailing with the engines working half-speed it would be possible to reach one of these two points, provided the ice did not present any great obstacles, but the fuel would not suffice to fetch the collections at Sydkap before going to the colony. In case of ice obstacles, Jameson Land could be reached; and possibilities for hunting were good there.

Sept. 7th.—In the early morning the camp was broken, and the motorboat soon cast anchor off Kap Leslie without having encountered any difficulties. From the top of the cape (where a cairn was built, since that built by ALDINGER the previous year had collapsed) the whole western part of Hall Bredning was ice-free both to the north and south as far as the eye could reach, while along the west coast of Jameson Land the ice was more close-packed, but still the waterway seemed to be passable. Towards Kap Stevenson, also, there was ice-free water; the gale of the first days of September had swept the south side of Scoresby Sund free of ice. Some tinned goods, which had fallen overboard here on August 22nd, were fished out of the water; they meant a welcome addition to our scanty supply of food. The collections deposited at the cape on earlier occasions were taken on board, and the motorboat proceeded eastward at half speed. Midway in the sound the first ice floes were encountered, but the new ice that connected them meant no obstacles to the motorboat. A couple of eiderducks were shot. On approaching the coast of Jameson Land we made a short halt at an ice floe to have coffee. During this halt a wireless communication was established with the "Gustav Holm", which had now got free of the ice and was lying off Kap Hope. It was reported that the seaplane would be sent to meet the motorboat, and it was inquired whether the motorboat party wanted anything. The reply was that first of all the party wanted petrol and kerosene. About an hour afterwards the seaplane was sighted

flying at a low altitude; it passed the motorboat twice without discovering it, but the third time the party was discovered from the seaplane, which then landed by the ice floe and unloaded two cans of petrol and some sugar. The pilot brought a request to H. BACKLUND to return in the seaplane to the "Gustav Holm". An agreement was made that the remainder of the party should proceed westward as long as the daylight permitted, then the members were to pass the night near the shore inside the drift-ice belt, to proceed next morning eastward along the shore, as far as they were able to go.

Sept. 8th.—In the morning the seaplane fetched WENK and V. BACKLUND and subsequently HASSELBALCH and LUPANDER, after they had been ordered over the wireless to run the motorboat into a lagoon, haul it ashore and deposit the collections as safely as possible. The "Gustav Holm" then left Kap Hope, and late in the evening reached open water outside Scoresby Sund.
