Summary

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Summary.

The present paper contains the geological results obtained by the writer on Traill Island on several motorboat and sledge journeys during the first year (1936—1937) of Dr. LAUGE KOCH's Two Years Expedition to northeastern Greenland. Fig. 1 (page 3) shows the routes travelled and the areas investigated. Fig. 2 (page 8) gives the main structural features of Traill Island and Geographical Society Island.

Traill Island may be divided into three geological provinces: firstly, a northeastern area of Devonian sandstones, secondly, a central area of post-devonian sediments, and thirdly, a southeastern region of acid igneous rocks, the latter being divided by Mountnorris Fjord into the Cape Parry-complex and the Cape Simpson-complex (see fig. 2, page 8).

The devonian area was studied by H. BÜTLER in 1934 (lit. 4, 5). The writer's fieldwork therefore was confined to the central and southeastern parts of the island, most of it having been done in the two igneous complexes.

Stratigraphy and Petrography.

(See chapter 1.)

Stratigraphical and paleontological studies of the sedimentary area were made by another member of the expedition, H. STAUBER, while the writer was working in the igneous areas. H. STAUBER published three preliminary reports on the sedimentary formations and the fossils found by him (lit. 23—25). The post-devonian sediments can be divided roughly into a lower series of predominant sandstones, which as H. STAUBER says, includes rocks of Carboniferous, Permian, Trias, Lias and Dogger age, and a younger series composed predominantly of calcareous marls belonging to the upper Jurassic and the Cretaceous.

The igneous rocks may be divided into intrusive and extrusive types, the former represented by plutons, sills and dikes, the latter by volcanic breccias and perhaps lavas.

During the field work a collection comprising about 800 samples of the different igneous and metamorphic rocks was brought together. It has been deposited at the Institute of Mineralogy and Petrography of the University of Basle. An extensive petrological study has not yet been undertaken, but Prof. M. REINHARD has investigated the slides of nearly one hundred rocksamples. A brief account of his microscopic study is appended to this paper.

The rocks of the major and minor intrusions comprise alkali-syenites, alkali-syenite-porphyries, alkali-granites and red quartzporphyry. They all belong to the local acid magmatic cycle, during which the two igneous complexes were created.

Almost all important sills consist of dolerite. They are spread over the whole coastal area of northeastern Greenland, where post-caledonian sediments are found. Two other kinds of

basalt occur equally as sills, but are less common. Sills of a white alkali-syenite-porphyry, found in the neighbourhood of the syenite are considered to be older than the latter, but related to it.

Various kinds of dykes are described in the two igneous complexes and a few in the surrounding sedimentary area comprising alkali-syenite-phorphyries, rhomb-porphyries, alkali-granophyres, alkali-rhyolites, rockallite-porphyries, aplites, dolerites and doubtfull lamprophyres.

The only definitely known extrusives are volcanic breccias, which occur on wide areas in the Cape Simpson complex and on a small one in the Cape Parry complex. They probably belong to various series of eruptions. Lavas have not been observed with certainty.

In chapter 1 some metamorphic rocks are mentioned. In several places the sediments have been strongly metamorphosed by the intrusives, but in general the contact influence has been rather small. Metamorphosed igneous rocks helped to establish the succession of local acid and widespread basaltic igneous activity. A dolerite, cut and partly assimilated by the syenite was found at Mount Forchhammer, thus showing the basalt to be the older rock. Signs of fumarolic activity found in the Cape Simpson complex (see fig. 8, page 20) are described.

In chapter 2, the age of the magmatic rocks is discussed. As sediments contemporaneous with or younger than the intrusions and extrusions could not be found on Traill Island, stratigraphical correlation only gives a lower limit for the age of the igneous rocks. In several parts of northeastern Greenland the widespread dolerites are known to be in contact with tertiary sediments containing fossils. This makes it possible to determine the age of the basalts within narrow limits. As basalts occur also in the igneous complexes of Traill Island and are in contact with some of the acid rocks, the period of the local magmatic manifestations could be approximately established. They took place between upper Cretaceous and younger Tertiary.

Structure.

(See chapter 3.)

In two sections, one along Kong Oscar Fjord and the other along the Vegasund, the main structural features of the post-devonian area can be studied. Several big faults were observed, all younger than the dolerites and running more or less in a N-S direction. The downthrown limbs are always on the eastern side of the faults, i.e. towards the atlantic coast of Greenland. Folding is unimportant and seems to be caused by faulting where it occurs (Holmsvik syncline). Over the whole post-devonian area, with the exception of the igneous complexes and their surroundings, the beds dip slightly to the N and NW.

The structure of the igneous complexes is determined by the intrusions and extrusions of the acid magmas.

In the Cape Simpson complex two parts are distinguished by the writer, the Three Bay Zone and the syenite intrusives. The cup-shaped „Dreibuchtenzone", which contains nearly all the different igneous rocks known on Traill Island and two blocks of sediments, is surrounded by the syenite which forms an almost complete ring around it (see fig. 2, page 8). The „Dreibuchtenzone" is the result of a long sequence of intrusions and extrusions. It shows a very intricate structure. It formed the roof of the volcanic center before the intrusion of the syenite. When the syenite magma advanced, the direct way from the magmatic center upwards was barred by the older intrusives. This seems to be the reason, why the syenite body forms a funnel around the „Dreibuchtenzone".

The intrusion of the syenite was one of the youngest and certainly the strongest manifestation of the acid igneous activity in the Cape Simpson complex. Therefore the structures in and around the complex are caused or strongly influenced by it. During this event the former roof of the magmatic center was lifted up. Later a subsidence took place along the faults, some of which can be observed to the east of Drømmebugt. At the outer contact of the main syenite body the sedimentary beds are dragged up. On the western side of the Cape Simpson complex occurs a thick body of triassic and jurassic layers thrusted over upon beds of younger (Jurassic and Cretaceous) age. Several facts indicate that this overthrust was caused by the intrusion of the syenite which pushed the whole block of sediments out of its former position.

Similar facts were observed in the Cape Parry complex. Here the syenite was likewise intruded around the former roof of the magmatic center, but in the form of several telescoped funnels. Jurassic and Cretaceous beds were lifted up by the outermost intrusion.

The two igneous complexes are separated by Mountnorris Fjord, but similar structure and rocks in both suggest a connection between the two centers of volcanism.

Possibly the faults in the post-caledonian area are connected with the local igneous activity and accentuated by it. This is suggested by the fact that the faults and the intrusion of the syenite are both younger than the dolerites.

Morphology.

(See chapter 4.)

The landformations observed on Traill Island are the result of several cycles of erosion. Changes of climate and sea-level have had a strong influence. The valleys, the more important of which are fjords today follow such structural lines as faults, synclines and contacts of the igneous complexes.

Remarks concerning the geological map.

The map is based on an enlargement of the aerophotogrammetrical map 1:250000 of north-eastern Greenland, issued by the Danish Government. Many parts of this map had to be changed with the help of sketches and photos made in the field, and the topography is by no means correct but gives only a general idea of the landformation.

Einleitung.

Die Traill Insel gehört zu dem schmalen Streifen längs der Küste NE-Grönlands, der von devonischen und jüngeren Sedimenten gebildet wird. Im folgenden soll eine kurze Übersicht über die Lage dieses Gebietes gegeben werden.

Durch die kaledonische Faltung wurde die breite kaledonische Geosynklinale, die von sehr mächtigen praekambrischen und kambrosilurischen Schichtfolgen ausgefüllt war, der E-Seite des alten grönländischen Schildes angegliedert. Die NE-grönländische Küstenzone verlor damit ihren Geosynklinalcharakter und wurde zum Semikratogen. Dies geschah in verschiedenen Phasen und in mehreren, durch starke Granitisation gekennzeichneten Wölbungszonen. Das Resultat der Faltung und der auf sie folgenden, tiefgreifenden Erosion war eine akzentuierte Landschaft mit hochliegenden Gebieten in den Wölbungszonen, zwischen denen sich mehr oder weniger tiefe Senken befanden.

Die postkaledonischen, uns in Form junger Ablagerungen (Devon bis Tertiär) überlieferten geologischen Ereignisse spielten sich alle in den Senken im Bereich der verfestigten kaledonischen Geosynklinale ab. Eine gute Zusammenstellung der verschiedenen Bewegungen und Ablagerungen in dieser Zeitspanne hat Lauge Koch gegeben (lit. 12).

Die tiefste und grösste der besprochenen Senken ist die von Lauge Koch Königsbucht genannte, die im N und W von den Wölbungszonen Miko, Mito und Vela begrenzt ist und sich im S weit zwischen die Zonen Vela und Mifa fortsetzt (lit. 12, Fig. 10, S. 136). Die Verbindung der Bucht mit dem Meer befand sich im E, zeitweise wohl auch im S zwischen den Zonen Vela und Mifa. Im Zentrum der Königsbucht liegen die Inseln Traill und Geographical Society.

Nachdem Dr. Lauge Koch auf seinen Reisen in den Jahren 1926/27 die grossen Züge der NE-grönländischen Geologie richtig erkannt hatte, untersuchten er und seine Mitarbeiter in jahrelanger Forschung die Einzelheiten der Tektonik und der Stratigraphie. So bearbeitete Prof. Dr. C. E. Wegmann die Velazone im W der Königsbucht (lit. 31), während Dr. H. Bütler dem Devon am W-Rand der Bucht eingehende Studien widmete (lit. 4, 5, 6). Es war deshalb von grossem