is the presence of 120 m of pure dolomite in the lower part of the Kap Weber Formation. A very small occurrence of Devonian conglomerates was found unconformably overlying the Cambro–Ordovician sequence.

A number of Lower Cambrian clastic sequences were investigated especially with regard to trace-fossils. The best collections originated from the lower part of the Bastion Formation in Albert Heim Bjerge and on Ella Ø. The trace-fossils in the Bastion Formation are especially abundant in thinly bedded glauconitic, micaceous sandstone and siltstone. A diverse association occurs consisting of horizontal epifaunal and infaunal constructions as well as thin vertical tubes. Somewhat higher in the Lower Cambrian, in the Ella Ø Formation, specimens of *Cruziana* are frequently found on the lower surface of silty laminae intercalated at particular horizons in the mainly carbonate sequence (fig. 36).

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Field investigations of Tertiary basic igneous rocks between 72° and 73°30′N, northern East Greenland

Niels Hald

Investigations of Lower Tertiary igneous rocks of basaltic composition were undertaken in the region between Kong Oscars Fjord and Moskusoksefjord during the summer 1977. The greater part of the field season was spent in Giesecke Bjerge while shorter visits were paid to Geologfjord, Traill Ø and the eastern part of Geographical Society Ø (fig. 37).

Giesecke Bjerge

The pre-volcanic basement in Giesecke Bjerge is formed of extrusive and intrusive igneous, mainly acid rocks of Devonian age and by an incomplete sequence of Devonian to Cretaceous sediments (Maync, 1940, 1942, 1949; Bütler, 1954; Graeter, 1957; Koch & Haller, 1971). The field work in 1977 has shown that quartzite conglomerates alternating with coarse-grained micaceous sandstones form the youngest member of the sedimentary sequence. These deposits have not been dated. Maync (1940) and Vischer (1943) assumed that similar material underlying the Tertiary lavas on Wollaston Forland and Hold with

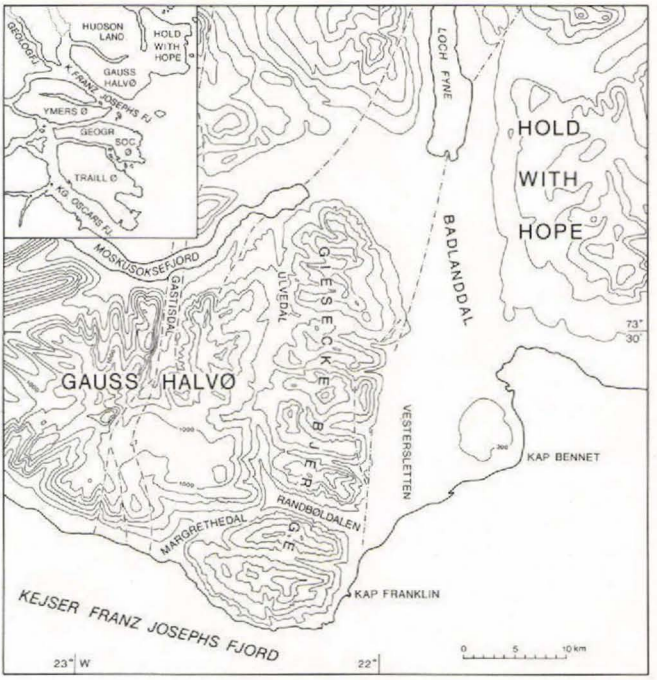

Fig. 37. Sketch map of Giesecke Bjerge and surrounding areas. Faults are according to the geological map scale 1:250 000 of Koch & Haller, 1971.

Hope is of Lower Tertiary age. However, recent investigations by Finn Surlyk (personal communication) have proved that the conglomerates on central Wollaston Forland were deposited during the Lower Cretaceous.

Hyaloclastic breccias

Basaltic, plagioclase porphyritic hyaloclastic breccias form the basal part of the volcanic series in the northern and western parts of Giesecke Bjerge, where the thickness may exceed 300 m. Towards the east and south-east the breccias gradually become thinner and they are absent along the slopes facing Badlanddal and Vestersletten. The fragments in the breccias are equant, angular to subangular and usually less than 2 cm across, although larger lithic blocks up to 0.5 m in size may occur. Fragments of non-igneous rock types (clastic sediments) are rare. Sorting is generally poor; slight variations in grain size may, however, produce an indistinct layering on a metre scale. A few thin coal seams have been observed. The presence of the hyaloclastites, and of pillow breccias which occur locally in the basal part of the overlying lava sequence, show that the Giesecke Bjerge area was at least partially covered by water during the initial phases of volcanic activity.

Lavas

The Mesozoic sediments and the volcanic breccias are covered by a lava sequence. The oldest lavas are found on the western slopes of Badlanddal and may be contemporaneous

with the breccias further west. The sequence has been divided into a lower series characterised by plagioclase porphyritic basalts (maximum thickness 450 m) and an upper series characterised by ankaramites and pyroxene porphyritic basalts almost without plagioclase phenocrysts (thickness preserved 350 m). Apparently the lavas in Giesecke Bjerge form a westward continuation of the lava sequence on Hold with Hope described by Upton & Emeleus (1977).

The reddish-brown weathering lavas of the lower series are typically less than 10 m thick, but a few flows reach a thickness of more than 50 m. Groups of several thin, highly vesicular flow units are common. Usually the lavas are of the pahoehoe type, but thin scoriaceous top layers are occasionally present. The lavas of the upper series, characterised by a darker brown weathering colour and by scoriaceous top layers, have an average thickness of 10 m. Red boles between the flows are common. Gabbroic and ultramafic inclusions have been observed in a few ankaramitic flows.

No indications of major pauses in the volcanic activity have been found. Angular unconformities within the lava sequence are absent; and interbasaltic sediments have not been observed with the exception of the red boles and a thin layer of quartz-feldspar sandstone in the lower series west of Ulvedal.

Sills

Sills are common in the rock units underlying the Tertiary lava sequence, especially in the micaceous sandstones and shales of Mesozoic age and in the loosely consolidated hyaloclastic breccias. The sills are generally less than 50 m thick but a few reach 150 m. On average, the total sill thickness, above present sea level, is about 200 m in the eastern and southern part of Giesecke Bjerge. With few exceptions the sills consist of dolerite with plagioclase porphyritic chilled margins. The grain size (plagioclase and pyroxene) is usually less than 5 mm, but reach 1–2 cm in pegmatitic schlieren. The presence of doleritic sills in the hyaloclastic breccias indicate that the main intrusive event took place during or after the formation of the preserved part of the volcanic sequence. The latter possibility was suggested by Upton & Emeleus (1977) for the bulk of doleritic sills occurring on Hold with Hope.

Dykes

Scattered WNW-trending basaltic dykes are present in most parts of Giesecke Bjerge. Most are aphyric in hand sample but a few show abundant plagioclase phenocrysts. They cut the doleritic sills and the plagioclase porphyritic lavas of the lower series while the age relationship to the upper series is unknown.

A swarm of NNE-trending dykes is found north of Kap Franklin and in the area west of Kap Bennet. Most are basaltic, aphyric or plagioclase micro-porphyritic in hand sample. North of Kap Franklin a few ankaramitic dykes occur in the swarm. Phenocrysts of olivine and clinopyroxene are concentrated in the central zone and in the chills while broad outer zones next to the chills are almost aphyric.

One example is known where a WNW-trending dyke is cut by a dyke from the NNE-trending swarm. West of Kap Bennet the NNE-trending dykes cut a lava sequence which have tentatively been correlated with the upper lava series in Giesecke Bjerge (see below). It is therefore assumed that the swarm includes the youngest igneous rocks west of Badlanddal.

Post-volcanic tectonics

Giesecke Bjerge is delimited to the west by the 'post-Devonian main fault' established in the Upper Palaeozoic (Vischer, 1943) and to the east by 'Gieseckes fault' which was active in the Mesozoic (Maync, 1949). After the formation of the lava sequence the two faults were reactivated and a stepwise lowering towards the east took place; Giesecke Bjerge was faulted down relative to the central Gauss Halvø and the area west of Kap Bennet was faulted down relative to Giesecke Bjerge. The Mesozoic sediments and the overlying lavas were tilted. In the eastern part of Giesecke Bjerge they now dip 6° towards the WNW. In the western part dips are generally 0°–5° to the ESE; the main exception is the area around Margrethedal where dips are 5°–10° to the N. The boundary between the easterly dipping and the westerly dipping layers is formed by a third major N–S trending fault. To the north the eastern side of the fault has been lowered by 300–500 m. Southwards the displacement diminishes and south of Randbøldal and Margrethedal the fault is replaced by a flexure.

A number of N–S trending faults with displacements less than 50 m were also mapped in Giesecke Bjerge. No faulting parallel to Kejser Franz Josephs Fjord and to the WNW-trending dykes has been noted.

Loch Fyne and Kap Bennet

Two minor areas in the vicinity of Giesecke Bjerge exposing lower Tertiary basalts were briefly examined. West of Loch Fyne a sequence of reddish-brown weathering, plagioclase porphyritic lavas is exposed between 300 and 700 m above sea level. The sequence may be correlated with the lower series in Giesecke Bjerge. Pyroxene porphyritic basalts, which according to Backlund & Malmqvist (1932) are also present in the area west of Loch Fyne, were not located during the present field work.

A sequence of ankaramites and plagioclase-pyroxene-olivine porphyritic basalts outcrop west of Kap Bennet. This sequence, with a total thickness of at least 150 m is tentatively correlated with the upper lava series in Giesecke Bjerge. Scoriaceous and vesicular horizons in the flows gradually become green-coloured towards the north-east, probably because this part of the outcrop has been within the thermal aureole of the Myggebugten Central Complex (Upton & Emeleus, 1977).

Lavas and sills between Kong Oscars Fjord and Kejser Franz Josephs Fjord

A sequence of aphyric or plagioclase porphyritic basaltic lavas occurs at Kap Mackenzie, the north-eastern peninsula of Geographical Society Ø. On Koch & Haller's (1971) map the lavas are shown as breccia. The exposed thickness of the westward dipping sequence is 150 m, but neither the lower nor the upper boundaries are exposed. The lavas are generally of the pahoehoe type. They should probably be correlated with the plagioclase porphyritic lavas in Giesecke Bjerge.

The basic sills, which are widespread on Traill Ø and Geographical Society Ø (Noe-Nygaard, 1976), appear to be very similar to the sills in Giesecke Bjerge. They are dolerites with plagioclase microporphyritic chill zones. Pegmatitic schlieren of gabbroic composition are present in the upper half of the thicker sills while more differentiated rock types have not

been found. A few sills near Vælddal at the south coast of Traill Ø consisting of ankaramite or pyroxene porphyritic dolerite are possibly related to the younger Kap Simpson intrusion.

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Project EASTMAR: a new aeromagnetic survey of the continental shelf of eastern Greenland

Leif Thorning

GGU has been working for some years with plans for investigation of the continental shelf of eastern Greenland. The first detailed suggestion for a systematic, regional aeromagnetic survey of most of the shelf area was worked out by the writer in 1975, and this project has been accepted by the Energy Commission of the Danish Ministry of Commerce as an energy research project to be carried out by GGU in the period from September 1977 to September