GRØNLANDS GEOLOGISKE UNDERSØGELSE
BULLETIN No. 3.

GEOLOGICAL MAP (SCALE, 1 : 50,000) AND DESCRIPTION OF ELLA Ø

BY

CHR. POULSEN AND H. WIENBERG RASMUSSEN

WITH 8 FIGURES IN THE TEXT
AND 2 MAPS

REPRINT FROM "MEDDELELSER OM GRØNLAND" BD. 151. No. 5.

KØBENHAVN
BIANCO LUNOS BOGTRYKKERI
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INTRODUCTION

At the request of the directors of the Geological Survey of Greenland the present map of Ella Ø was made in the summer of 1946 as the first of a series giving an explicit representation of the geological structure of Greenland.

The folded sedimentary formations of the tectonic zone to which Ella Ø belongs, are well represented and moreover easily accessible; accordingly this Island was chosen as a type area and base for further geological mapping within the Fjord-zone.

Owing to bad ice conditions in the fjords the expedition did not succeed in penetrating to Ella Ø until the 15th of August, and, consequently, only eleven days were available for the geological mapping. In addition this work was unfortunately somewhat hampered by bad weather and not least by a considerable cover of snow, which lasted for some days. In spite of these difficulties the geological mapping was accomplished with the aid of some previous works[1]), which proved to be very useful.

[1]) Poulsen, Chr.: "Contributions to the Stratigraphy of the Cambro-Ordovician of East Greenland", Meddelelser om Grønland, vol. 74, p. 299. Copenhagen 1930.

Kulling, O.: "Stratigraphic Studies of East Greenland", ibid., p. 317.

Geodætisk Institut: Kap Oswald, Ella Ø, 1:10000. Copenhagen 1932.

Noe-Nygaard, A.: An unpublished, very acurate geological map of the Kap Oswald region (now published together with the present map of Ella Ø).

— Unpublished notes on the geology of the Kap Oswald area.

Grodætisk Institut: Grønland 1:250000, 72 Ø, 2, Kong Oscars Fjord. Copenhagen 1937.

Bütler, H.: "Erläuterungen zu einigen Bildern der Ellainsel in Ostgrönland", Mitteilungen der naturforschenden Gesellschaft Schaffhausen 1936—37, p. 9. Schauffhausen 1937.

LOCATION AND AREA

Ella Ø is situated between the meridians 24°45′50″ and 25°20′30″, and between the parallels 72°46′30″ and 72°54′40″. It is approximately triangular in outline, bounded to the east by Kong Oscar's Fjord, to the south-west by the Narhval Sund, and to the north-west by Kempe's Fjord. The island occupies an area of about 125 km², the distances from Mt. Bastion to Kap Elisabeth, from Kap Elisabeth to Kap Harry, and from Kap Harry to Mt. Bastion being about 19.7 km, 15 km, and 17.25 km respectively.

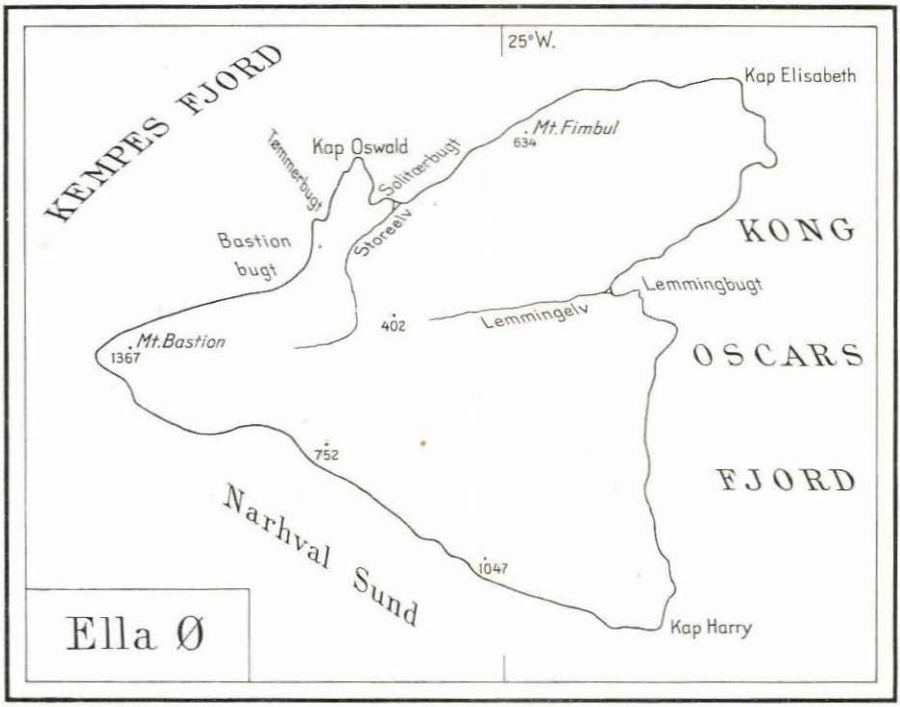

Fig. 1.

TOPOGRAPHY

The small Kap Oswald Peninsula in the middle of the north-west coast, the height of which above sea level does not exceed 88 m, and a very narrow littoral zone along the eastern coast form the only lowland areas.

The other parts of the island are highland. A shallow, slightly marked depression due south of the Kap Oswald Peninsula divides the highland into a western part, which will be referred to in the following as the western Plateau, and an eastern part. A much more conspicuous depression, extending eastwards from the central part of the island, divides the eastern highland into a northern part, the north-eastern plateau, and a southern part, which will be referred to in the following as the south-eastern plateau.

The western plateau rises gradually towards the west, culminating in Mt. Bastion, which forms the westernmost cape and reaches an altitude of 1367 m above sea level; this is the highest point of the island.

Fig. 2. Looking south-west across the western part of the north-eastern plateau to Mt. Bastion (Phot. W. RASMUSSEN).

The north-eastern plateau rises steeply from the sea in the north-west and then slopes off gradually towards the low eastern coastline; its crest, Mt. Fimbul, is a ridge, which extends along the north-west coast, culminating at 634 m above sea level about half-way between Kap Oswald and Kap Elisabeth.

The south-eastern plateau has its culmination at the south-west coast about 5.5 km north-west of Kap Harry; the height of the plateau above sea level is here 1047 m, and from this point it slopes off gently towards the north-west, north, north-east, and east.

The greater part of the surface of the south-eastern plateau is almost even, whereas those of the western plateau and the north-eastern plateau are marked by numerous ridges, formed by outcropping resistant beds of hard limestone. On the north-eastern plateau the spaces between these ridges are occupied by numerous small lakes and swamps.

The north-west coast on both sides of the low Kap Oswald Peninsula and the south-west coast rise steeply to very considerable heights, forming in many places almost vertical rocky cliffs, whereas the east coast is low and gently sloping.

Only two bays of importance are found, the Solitærbugt, between Kap Oswald and the north-eastern plateau, and the Lemming-

bugt on the east coast opposite the depression which separates the north-eastern plateau from the south-eastern plateau.

The western plateau and the western part of the south-eastern plateau are drained northward to the Solitærbugt mainly by the river Storeelv, which rises on the eastern slope of the western plateau, flows east-north-eastward for a distance of about 2 km, then north-west-ward for a distance of about 2 km, and finally north-eastward for a distance of about 2 km. The river Storeelv is the main drainage factor in this part of the island, the tributaries being few and inconsiderable. The northern part of the south-eastern plateau and the south-western half of the north-eastern plateau are drained by insignificant tributaries to the 4.5 km long river Lemmingelv, which rises in the central part of the island and flows with a practically straight course to the Lemmingbugt.

GEOLOGY

Stratigraphy.

Age of the Rocks.

With the exception of an Ordovician diabase intrusion in Mt. Bastion the rocks of Ella Ø are exclusively of sedimentary origin. They range from late Pre-Cambrian to Devonian in age, as shown in the following table (p. 11).

It appears from the below stratigraphical table (p. 11) that a hiatus is supposed to exist between most of the formations. Direct evidence of considerable breaks in sedimentation is known in two cases; the Cape Weber formation was deposited on the deeply eroded surface of the Cass Fjord formation, the hiatus corresponding to the upper part of the Lower Canadian and the Middle Canadian. The other important break is between the folded Ordovician Narwhale Sound formation and the overlapping Devonian, this hiatus corresponding to the Champlainian and Cincinnatian series of the Ordovician, the Silurian, and the Lower Devonian. The supposed existance of hiatuses between the other formations is suggested by abrupt changes of lithological facies in connection with the appearance of different faunas.

Pre-Cambrian.

The Eleonore Bay Formation.

Only the uppermost part of the upper subdivision (the so-called Limestone-Dolomite Series) is exposed on Ella Ø. The oldest outcropping rock is a stromatolite-bearing, partly dolomitic limestone with thin shaly, highly bituminous beds and, in places, oolitic beds. This rock complex (stratum no. 1 of this description) is penetrated by calcite veins. Kap Oswald is formed of this limestone. On the western side of the cape the limestone becomes more dolomitic and very hard. In the adjacent area south and south-west of the Kap Oswald Peninsula the limestone is overlain by shales alternating with limestone and dolomite.

DEVONIAN	Middle?		Conglomerate
SILURIAN	Cayugan		
	Niagaran		
	Alexandrian		
ORDOVICIAN	Cincinnatian		
	Champlainian		
	Canadian	Upper	Narwhale Sound formation
			?//////////?//////////?
			Cape Weber formation
		Middle	
		Lower	
			Cass Fjord formation
CAMBRIAN	? Middle and/or Upper		
			Dolomite Point dolomite
			Hyolithes Creek dolomite
	Lower		
			Ella Island formation
			Bastion formation
PRE-CAMBRIAN	Eocambrian		
			Spiral Creek formation
			Tillite Canyon formation
			Cape Oswald formation
			Eleonore Bay formation

The following section from the small bay, Tømmerbugt, west of Kap Oswald indicates the general character of this part of the Eleonore Bay formation:

8. Hard black shale	about	20 m
7. Unexposed	—	20 -
6. Limestone, partly brecciated	—	5 -
5. Limestone-breccia	—	15 -
4. Shale	—	50 -
3. Dolomite	—	2 -
2. Shale with dolomite beds	—	50 -
1. Hard grey limestone		> 12 -
Total thickness...		> 174 m

The dip of these strata is about 50° W.

KULLING (1930, p. 326) has measured the uppermost strata of the Eleonore Bay formation in sections south of Kap Oswald with the following result:

f. Black limestone-breccia (intraformational breccia)...	about	40 m
e. Green shales with two series of banded, distinctly bedded dolomite	—	100 -
d. Limestone, greyish black, bituminous	—	150 -
c. Dolomite, grey	—	50 -
b. Limestone, greyish black, bituminous	—	100 -
a. Dolomite, light grey, with *Cryptozoon*	—	100 -
Total thickness...	about	540 m

In KULLING's section the strata *a—d* evidently correspond to the rock complex no. *1* of the present description, whereas stratum *e* represents numbers *2—4*, and *f* numbers *5—7* of the Tømmerbugt section.

The Cape Oswald Formation.

The type locality is the coast cliff south-west of Kap Oswald, where the strata of this formation form a direct continuation of the Tømmerbugt section.

On top of the hard black shales (no. 8) of the Eleonore Bay formation follow (beginning with stratum no. 9):

23. Red, arenaceous tillite with relatively small erratics (lower part covered by debris)	> 15 m	
22. Reddish, cross-bedded sandstone (for the most part covered by debris)	about	55 -
21. Red tillite with numerous, in part large, erratics	—	20 -
20. Cross-bedded sandstone with minor beds of shale	—	40 -
19. Red tillite with numerous, in part very large, erratics	—	85 -
18. Sandstone	—	3 -
17. Tillite of the same type as no. 19	—	20 -
16. Greenish, quartzitic sandstone	—	20 -
15. Greyish black shale with thin beds of black limestone	—	20 -
14. Grey shale	—	30 -
13. Grey shale, alternating with thin beds of greyish green, fine-grained, micaceous sandstone	—	40 -
12. Sandstone	—	35 -
11. Greyish black, very hard tillite with numerous, in part very large, erratics	—	35 -
10. Minor beds of glaciofluviatile conglomerate and sandstone	—	5 -
9. Tillite of the same type as no. 11	—	110 -
Total thickness...	> 533 m [1])	

The occurrence of irregularly distributed boulders is a constant feature in the exposures of the above-mentioned strata no. 9, 11, 17, 19, 21, and 23; these stones vary in size, relative number, and, to some extent, in their petrological types, in the different horizons. The erratics are in most cases facetted, polished and striated, and their faces frequently show grooves and scratches in more than one direction; some are very large, measuring up to 40 m in diameter.

The matrix of the tillites is in practically all cases gritty, usually of the nature of arkose.

The sandstone beds, which usually separate the tillite horizons from each other, are, as a rule, beautifully cross-bedded; their thicknesses vary greatly within short distances.

The tillites may be divided into two units characterized by their content of erratics; the lower of these, comprising the strata no. 9 and 11 contains almost exclusively dolomites and limestones from the upper part of the Eleonore Bay formation, whereas the tillites no. 17,

[1]) Professor Noe-Nygaard has informed the writers that, according to his estimate, the total thickness is about 600 m. Several of the beds, however, vary greatly in thickness within short distances.

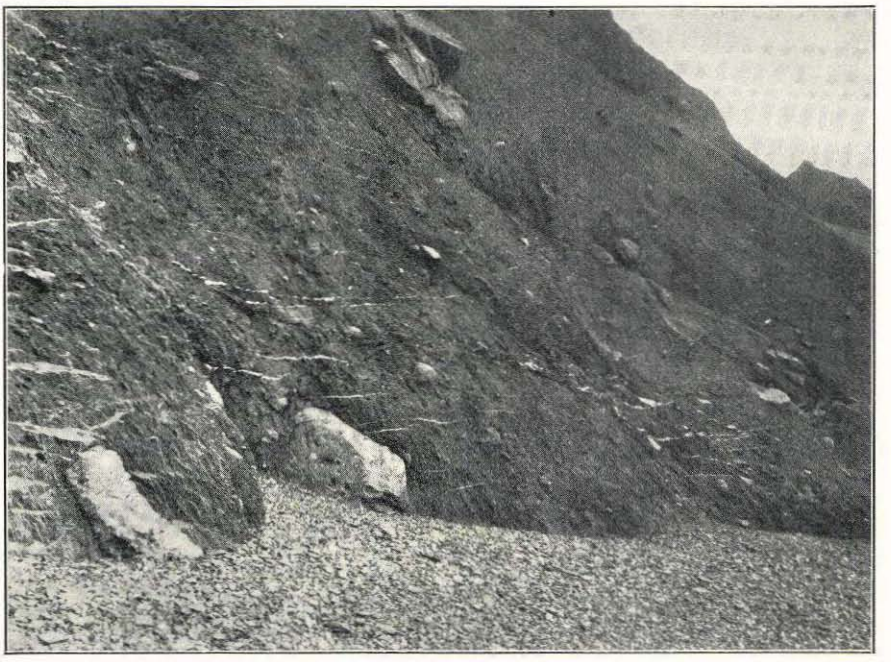

Fig. 3. Coast section south-west of Kap Oswald, showing part of the lower tillite (stratum no. 9) with erratics and horizontal calcite veins (Phot. A. ROSENKRANTZ).

19, 21, and 23 have a great many crystalline rocks, for instance red gneiss, red granite, red quartz-porphyry, greenstones etc., several of which originate from distant, still unknown occurrences, and relatively few sedimentary rocks.

All these features of the Cape Oswald formation indicate the glacial origin of the tillites and the glacio-fluviatile nature of the intervening, cross-bedded sandstones.

The different contents of erratics in the lower and upper tillites suggest two different periods of glaciation; consequently, the sandstone-shale series (no. 12—16) between the lower and upper tillites, which is free from coarse material, and exhibits bedding-planes of sedimentation, may be regarded as interglacial deposits.

In addition to the above-mentioned coast section the Cape Oswald formation is exposed in many places south-west, south, and south-east of the Kap Oswald Peninsula; the lower and upper tillites, being hard and resistant form two projecting, rocky ridges which extend southward from the north-west coast along the eastern border of the western plateau for a distance of about 2 km and then bend sharply, in a north-eastward direction for a distance of about 4 km. The intervening sand-

Fig. 4. Cross-bedded, glacio-fluviatile sandstone (stratum no. 10) south-west of Kap Oswald (Phot. Chr. Poulsen).

stone-shale complex, being less resistant, forms a well marked valley between the ridges, and is more or less veiled by a thin cover of Quaternary deposits and vegetation.

The Tillite Canyon Formation.

On top of the Cape Oswald formation follows the Tillite Canyon formation the outcrops of which form a 200—400 m broad zone along the younger of the above-mentioned tillite ridges. The formation is further exposed in the centre of the anticline on the south coast of the island, just east of the western plateau.

At the north-eastern corner of the western plateau a section shows the formation to be composed as follows:

27. Black, thin-bedded limestone, alternating with black shale in the lower part	about	80 m
26. Brown to black shale	—	125 -
25. Alternately light grey and red shale with thin beds of mudstone	—	20 -
24. Greyish brown mudstone	—	5 -
Total thickness...	about	230 m

The lower beds of the Tillite Canyon formation exhibit a very beautiful series of varves which are quite distinct near the base of the formation and become less marked upwards. These varves do not have the appearance of those of Pleistocene ribbon-clay, the nature of the sediment being altered by subsequent folding.

No fossils are known, except worm tracks in the limestone beds near the top of the formation.

The occurrence of the varve series is strong evidence that the Tillite Canyon formation was deposited in intimate connection with the glaciation of the preceding period.

The Spiral Creek Formation.

This formation (stratum no. 28), which rests upon the black limestone (no. 27) of the Tillite Canyon formation, is 25 m thick and consists of thin-bedded, fine-grained, greyish brown quartzite with ripple marks, alternating with red and green, micaceous shale with mud cracks and numerous salt pseudomorphs.

The outcrops form a very narrow zone, paralleling the exposures of the Tillite Canyon formation. The formation is further exposed in the anticline on the south coast of the island, just east of the western plateau, and in a small downfaulted area on the east coast of the Solitær Bugt.

In the table (p. 11) the Cape Oswald, Tillite Canyon, and Spiral Creek formations are referred to the Eocambrian, their stratigraphic position below the fossiliferous Lower Cambrian being similar to that of the so-called Sparagmite Formation of the Scandinavian Peninsula, which, like the East Greenland series of strata, contains tillite beds.

Cambrian.

The Bastion Formation.

This formation, which rests upon the Spiral Creek formation, is seen in the eastern and western parts of the syncline exposed in the

northern and southern coastal cliffs of the western plateau. The strata are further exposed in the anticline on the south coast of the island, from where they extend northwards, forming the floor in the western part of the depression between the western plateau and the south-eastern plateau, and north-eastwards, forming part of the north-western escarpment of the north-eastern plateau.

The coast section in the above-mentioned anticline shows the formation to be composed as follows:

30.	Arenaceous shale, the lower half of which is brown to purple, micaceous and devoid of fossils, whereas the upper part is greyish green, glauconitic, fossiliferous, with thin beds of light brown to yellow sandstone containing the same fauna	about 150 m
29.	Yellowish white to reddish quartzite	— 50 -
	Total thickness...	about 200 m

The upper part of stratum no. 30 has yielded the following, Lower Cambrian fauna[1]): *Lingulella* (*Lingulepis*) *prisca* POULSEN, *Obolella congesta* POULSEN, *Botsfordia caelata* (HALL), *Hyolithellus micans* BILLINGS, *Fordilla troyensis* BARRANDE, *Hyolithes* (*Orthotheca*) *bayonet groenlandicus* POULSEN, *Hyolithes* (*Hyolithes*) *americanus* BILLINGS, *Hyolithes* (*Hyolithes*) *poulseni* RESSER, and *Olenellus* sp.

The Ella Island Formation.

This formation (stratum no. 31) follows directly on top of stratum no. 30 of the Bastion formation, and it is exposed in the same localities.

The formation is about 50 m thick and consists of relatively thin beds of more or less pure, grey, finely crystalline limestone, some of which are developed as intraformational conglomerates with very small pebbles of dark grey limestone, alternating with thin beds of grey, very fine-grained calcareous sandstone which are beautifully cross-bedded.

The limestone contain the following, Lower Cambrian fauna (collected in the anticline on the south coast of the Island)[1]): *Psammosphaera*? *greenlandensis* HOWELL & DUNN, *Archaeocyathus atlanticus* BILLINGS, *Paterina mediocris* POULSEN, *Kutorgina reticulata* POULSEN, *Billingsella*? sp., *Hyolithellus micans* BILLINGS, *Salterella rugosa* BILLINGS, *Stenothecoides poulseni* RESSER, *Olenellus simplex* POULSEN, *Olenellus*? *curvicornis* POULSEN, *Olenellus*? sp. I, *Olenellus*? sp. II, *Wanneria*

[1]) Descriptions and figures in POULSEN, CHR.: "The Lower Cambrian Faunas of East Greenland", Meddelelser om Grønland, vol. 87, no. 6. Copenhagen 1932.

nathorsti POULSEN, *Wanneria ellae* POULSEN, *Paedeumias hanseni* POULSEN, *Paedeumias tricarinatus* POULSEN, *Proliostracus strenuelliformis* POULSEN, *Proliostracus rosenkrantzi* POULSEN, *Proliostracus noe-nygaardi* POULSEN, *Proliostracus liostracoides* POULSEN, *Bonnia groenlandica* POULSEN, and *Corynexochus* (s. l.) sp. ind.

The Hyolithes Creek Dolomite.

Outcrops of this rock (stratum no. 32) are found in the eastern and western limbs of the syncline forming the western plateau and in the eastern and western flanks of the anticline on the south coast of the island. In the eastern flank of the mentioned anticline the strata extend north-eastwards from the south coast section to the central part of the island; they also form part of the north-western escarpment of the north-eastern plateau including the steep coastal cliffs of Mt. Fimbul. The dolomite is further exposed in the eastern part of the Lemmingelv canyon, where it forms the base of the section on the northern side of the river for a distance of about 1 km.

The Hyolithes Creek dolomite series consists of about 200 m massive-bedded, compact, dark grey to black dolomite which weathers brown. This dolomite contains a great number of scattered, sharp-edged quarts grains measuring up to 0.2 mm in diameter. In certain horizons the amount of quartz is so considerable that the rock has the appearance of finegrained sandstone, although the greater part of it is formed by the dolomitic matrix; such horizons show cross-bedding.

The Hyolithes Creek dolomite is destitute of fossils.

The Dolomite Point Dolomite.

This rock (stratum no. 33) follows directly on top of the Hyolithes Creek dolomite and is exposed along the outcrops of the latter. It further forms the base of steep coastal cliffs between Mt. Fimbul and Kap Elisabeth. In the eastern part of the Lemmingelv canyon the Dolomite Point dolomite is exposed for a distance of about 2 km along the river, the greater part of the outcrop being confined to the southern side.

The Dolomite Point dolomite is about 300 m thick. It presents a finegrained, thinly-bedded character indicating that its original condition was that of fine mud. The colour of the rock varies from light grey to light yellowish; the weathered surfaces of the beds exhibit a great variation of colours, most frequently yellow, red, and violet. Several of the beds have the character of intraformational breccias, indicating an induration of the mud on the sea-floor, after which the solidified layers were broken up, while the deposition of the series was

still going on, the interstices being filled in with matrix of similar composition to the dislocated layers.

Here and there the dolomite contains irregular nodules or (rarely) bands of chert and badly preserved stromatolites.

Ordovician.[1])

The Cass Fjord Formation.

This Formation (stratum no. 34) rests directly upon the Dolomite Point dolomite and is exposed along the outcrops of the latter. In the Lemmingelv canyon the outcrops of the Cass Fjord formation extend west-wards from the mouth of the river, forming part of the rocky wall of the canyon for a distance of about 3 km. About 500 m due north of the mouth of Lemmingelv the Cass Fjord formation is exposed in a "window", the younger strata being removed by erosion.

The Cass Fjord formation is about 300 m thick, and consists of soft greyish-green shales alternating with limestone beds, which are but few metres thick; most of these limestone beds are intraformational conglomerates, characterized by the pebbles being lithologically similar to the matrix.

On the south coast the upper part of the Cass Fjord formation in the western flank of the anticline has yielded the following species: *Ophiograptus inexpectans* POULSEN, *Bryograptus*? sp., *Clonograptus* sp. (cf. *C. tenellus callavei* LAPW.), Genus et sp. ind. (hydrophorid), *Lingulepis tenuilineata* POULSEN, *Eoorthis* sp., *Sinuopea whittardi* POULSEN, Genus et sp. ind. (cf. *Rhacopea*), *Hystricurus armatus* POULSEN, and *Symphysurina* cf. *woosteri* ULR. At the mouth of the Lemmingelv undeterminable fragments of graptolites and an undeterminable species of *Hystricurus* have been found.

The Cape Weber Formation.

This formation (stratum no. 35) was deposited on the deeply eroded surface of the Cass Fjord formation. The upper part of Mt. Bastion is formed by the Cape Weber strata; these beds are further exposed in the sections through the syncline in the coastal cliffs of the western plateau and in ridges across this plateau connecting the northern and southern coast sections. In the eastern flank of the anticline outcrops of the Cape Weber formation extend north-eastwards from the coast section towards the central part of the Island, where the dip decreases

[1]) Several fossils mentioned in this chapter have been described and figured in POULSEN, CHR.: "On the Lower Ordovician Faunas of East Greenland", Meddelelser om Grønland, vol. 119, no. 3. Copenhagen 1937.

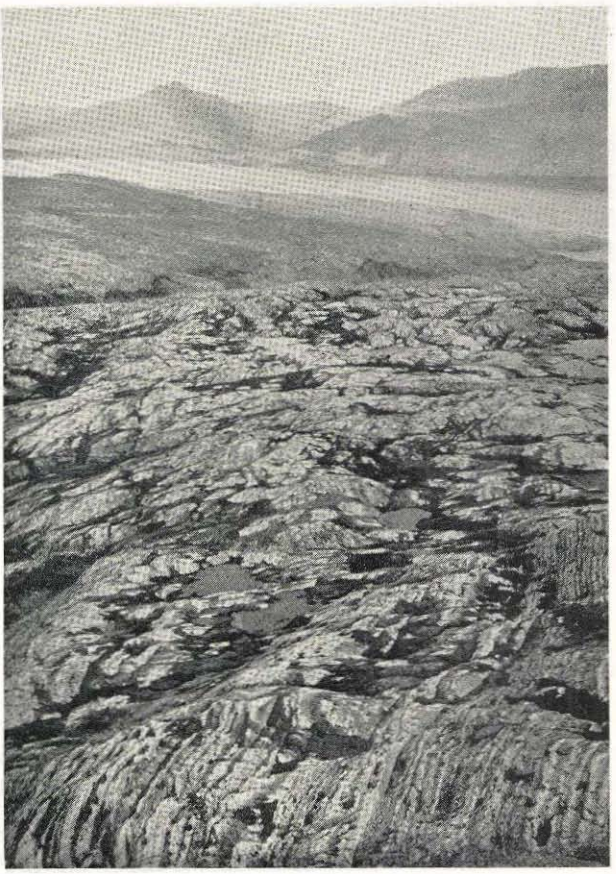

Fig. 5. Looking north-east to Lemmingelv Canyon and Lemmingbugt. In the foreground Cape Weber formation with numerous dark bands of chert (Phot. CHR. POULSEN).

very considerably with the effect that the surface of the north-eastern plateau, which is formed by this formation, slopes gently towards the south-east.

The formation consists of about 600 m massive-bedded hard, compact dark grey, more or less dolomitic limestone, which is penetrated by numerous white calcite veins; a considerable number of intraformational limestone conglomerates and breccias with very small pebbles occur.

The Cape Weber strata of Ella Ø have yielded the following fossils: *Bolbocephalus groenlandicus* POULSEN, *Bathyurellus teicherti* POULSEN, *Bathyurellus? affinis* POULSEN, and undescribed silicfied specimens belonging to the genera *Ectomaria*, *Gyronema*, *Helicotoma*, *Hormotoma*, *Lophospira*, *Maclurites*, *Pagodispira*, *Raphistomina*, *Solenospira*, *Turritoma*, *Proterocameroceras*, *Protocycloceras*, and *Euchasma*.

The Narwhale Sound Formation.

This formation, which follows on top of the Cape Weber formation, is exposed in the centre of the western plateau syncline, partly in the northern and southern coastal cliffs, partly in ridges connecting these sections. Outcrops are also found in the eastern flank of the anticline on the south coast; from this point the strata extend north-eastwards for a distance of about 4.5 km and then eastwards for a distance of about 6 km to the east coast of the island, the outcrops forming a gradually expanding zone on the north-western and northern slopes of the south-eastern plateau.

The formation, which is about 600 m thick, may be divided into three parts. The lower part (stratum no. 36) is about 150 m thick and consists of thin-bedded, light yellowish grey, crystalline dolomite containing an undescribed silicified fauna with representatives of the genera *Eccyliopterus*, *Lophospira*, *Pagodispira*, *Trochonema*, and *Trocholitoceras*.

The middle part of the formation (stratum no. 37), which is at least 200 m thick, consists of thin-bedded, light grey, very hard dolomite. The rock has the character of an intraformational conglomerate; the pebbles, which vary in size between 0.3 mm and a couple of centimetres, are lithologically very similar to stratum no. 36. The matrix, which consists of finely crystalline dolomite contains in addition to the pebbles a considerable number of oolites, and the pebbles have been more or less covered by oolitic incrustation. Stratum no. 37 has yielded the following fossils: *Bathyurellus* sp. and *Heterochilina obliqua* POULSEN.

The upper part of the formation (stratum no. 38) consists of more or less dolomitic limestone, which is compact or finely crystalline and varying in colour from black to greyish brown; the rock is penetrated by numerous white calcite veins. The fossils found in this part of the formation are undescribed trilobites (*Ceraurus* and some bathyurids).

The Narwhale Sound formation was referred to the Chazyan by POULSEN[1]). This view is supported by the find of a species of the genus *Ceraurus* GREEN. The new finds of several different types of bathyurids, however, suggest an Upper Canadian age, and the formation is now believed to belong to the uppermost Canadian.

Devonian.

The Devonian comprises the youngest of the rock formations of the island. It rests upon the folded older strata, the contact being an

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[1]) POULSEN, CHR.: "On the Lower Ordovician Faunas of East Greenland", Meddelelser om Grønland, vol. 119, no. 3, p. 72. Copenhagen 1937.

angular unconformity. The sediment (stratum no. 39), which on Ella Ø is developed as a very coarse conglomerate, forms the coastal cliff of the eastern half of the south coast, and the section continues round Kap Harry and along the east coast for a distance of about 6 km; this Devonian area occupies the greater part of the south-eastern plateau. A much smaller Devonian area forms a narrow zone, which extends northwards from the top of the anticline on the south coast, following the eastern margin of the western plateau. It appears from the southern coast section that the thickness of the Devonian conglomerate exceeds 1000 m. The rock is remarkable for its coarseness. The pebbles vary in size to a considerable extent; some of them being very large. The greater part of the Pre-Devonian rocks of the region has been found as pebbles in the conglomerate. The age of the conglomerate is supposed to be Middle Devonian[1]).

Quaternary.

Morainic deposits of Pleistocene age are only preserved as a very thin cover of erratics, especially on the western plateau and on the south-eastern plateau. In other parts of the island morainic deposits are practically absent.

In the lowlands the streams Storeelv and Lemmingelv are bordered by alluvial material, which consists of sand, gravel, and boulders washed from higher ground and deposited along the valley flood plains as they have been overflowed by the streams.

Structure.

Ella Ø lies upon the eastern margin of a range of folded mountains. As mentioned several times above, the western plateau is formed by a syncline. An adjacent anticline occupies the slightly depressed area between the western plateau and the south-eastern plateau; it has been beautifully exposed by erosion south of Kap Oswald, where its flanks form ridges and valleys with v-shaped strike. The strike of the folding axes varies between NNE-SSW and NE-SW; the axis of the anticline has a slight pitch towards the SW. The dip of the eastern flank of the anticline decreases in an easterly direction so as to give rise to the gently sloping surface of the north-eastern plateau.

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[1]) BÜTLER, H.: "Übersicht der devonischen Bildungen nördlich des Davysundes", Mitteilungen der naturforschenden Gesellschaft Schaffhausen, vol. 16, p. 115. Schauffhausen 1939.

Fig. 6. Looking north-east from Mt. Bastion across the Kap Oswald anticline to the south-eastern plateau (Phot. W. RASMUSSEN).

Fig. 7. Looking north-east from the western plateau to the north-eastern plateau. The strike of the different Cambro-Ordovician beds appears very clearly (Phot. CHR. POULSEN).

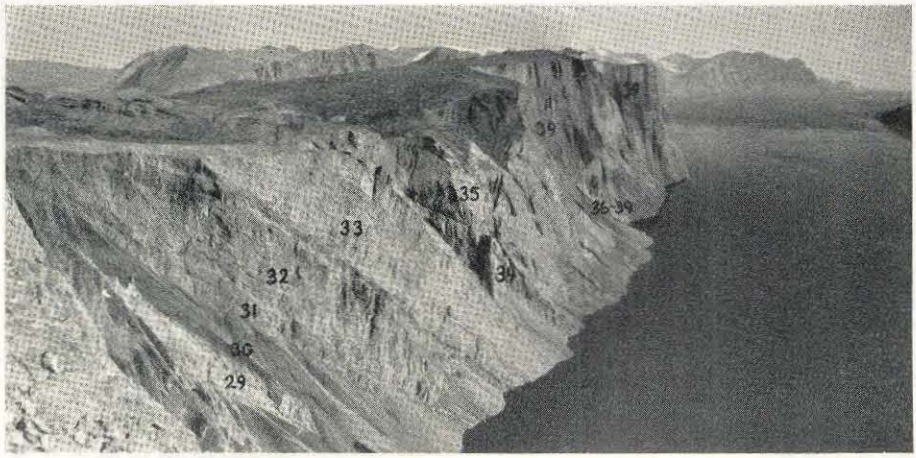


Fig. 8. The southern coast section east of the western plateau, showing the anticline in the foreground. The numbering corresponds with that of the text (Phot. W. RASMUSSEN).

The Caledonian age of the folding appears from the angularly unconformable contact between the folded Ordovician and the overlapping Devonian. Silurian deposits are unknown in the fjord region of East Greenland. If Silurian strata had been deposited and afterwards removed by the intense erosion following upon the folding of the geosyncline, one might expect to find them as pebbles in the Devonian conglomerate; such pebbles are, however, entirely lacking. The evidence at hand thus indicates that the main phase of the folding probably corresponds to the Taconian orogeny.

According to BÜTLER[1]) the coarse detritus forming the Devonian conglomerate suggests that younger Caledonian movements also took place in Devonian time.

The injection of diabase seen in the southern coastal cliffs of Mt. Bastion appears to be a result of the Caledonian movements. The diabase penetrated into fissures in the rocks below the Narwhale Sound formation, expanded along several bedding-planes, and took part in the folding.

Several faults occur in addition to the major structural features. Two systems are found, the one having an average strike about N.-S., the other varying between NW.-SE. and NNW.-SSE.; the former is represented by two faults crossing the north-eastern plateau and one crossing the eastern flank of the anticline in the region south of Kap Oswald, whereas the latter is represented by three faults crossing the north-eastern plateau and four in the region south and south-east of

[1]) Op. cit. 1937, p. 13.

Kap Oswald. Most of these faults are practically vertical. As a rule the vertical dislocations do not exceed 50 m; an exception is the fault which crosses the coast at the mouth of the river Storeelv; here the vertical dislocation amounts to about 250—300 m. Horizontal dislocation has taken place along the fault crossing the coast at the mouth of Storeelv and along that crossing the coast in the bay Tømmerbugt; in both cases the rock formations on the north-eastern side of the faults have been pushed towards the north-west. The faults appear to be obliterated towards the south, the section along the south coast of the island failing to show any traces of them. According to BÜTLER[1]) the fault crossing the coast at the mouth of the river Storeelv is continued towards the south-east so as to cross the coast about 1.5 km north of Kap Harry; the present writers, however, followed this line from the mouth of Storeelv for a distance of about 3 km, but were unable to find any traces of a continuation beyond that distance. On the other hand, the fault crossing the coast in the bay Tømmerbugt, as well as its eastern branch, were seen to penetrate into the Devonian of the south-eastern plateau, and it appears probable that both the above-mentioned fault systems are of Post-Devonian age.

[1]) Op. cit. 1937, fig. 5.

Færdig fra trykkeriet den 13. februar 1951.

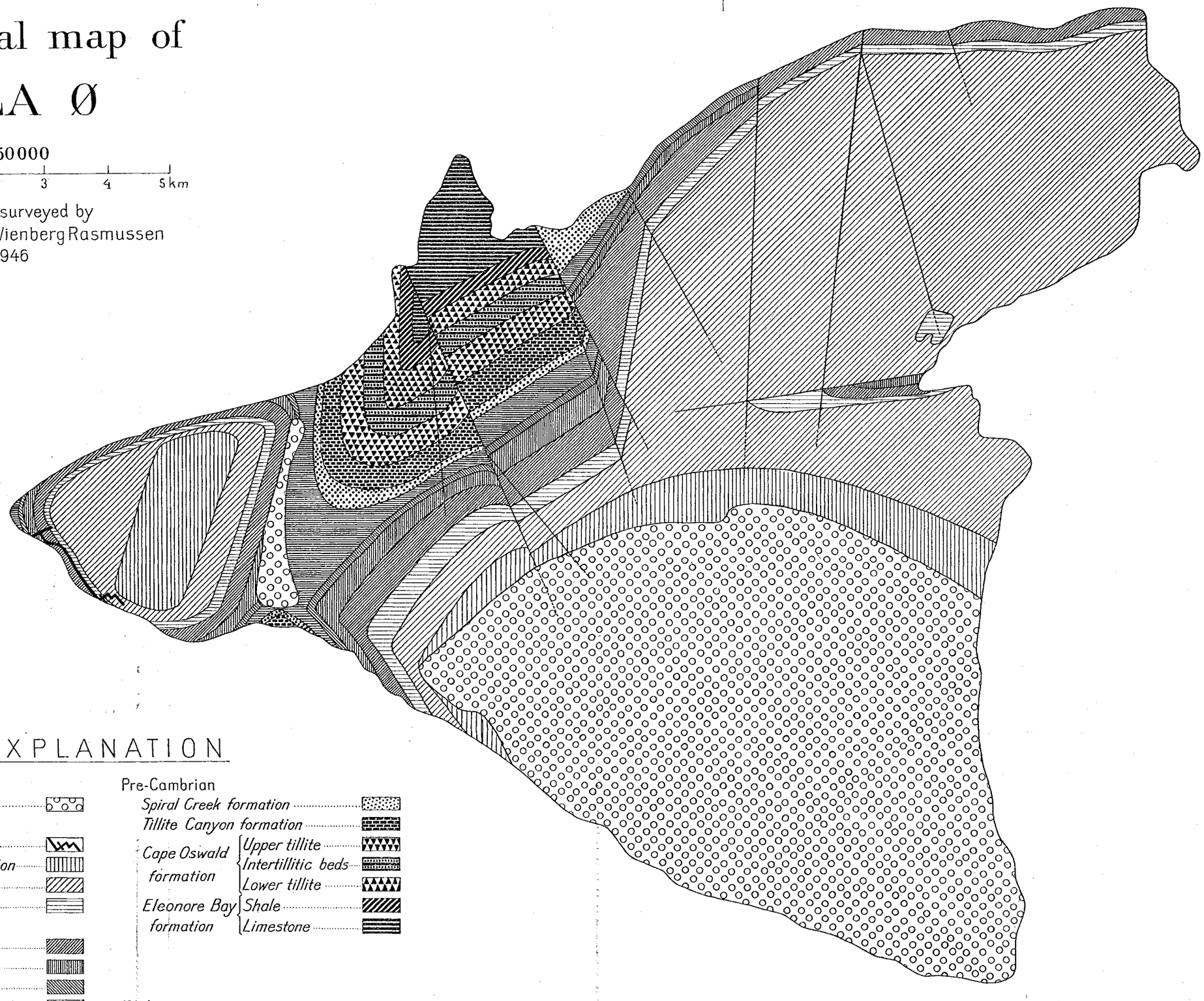
Geological map of ELLA Ø

1 : 50000

0 1 2 3 4 5 km

Geology surveyed by
Chr. Poulsen & H. Wienberg Rasmussen
1946

25° W. 72° 55' N.



EXPLANATION

Devonian
- *Conglomerate*

Ordovician
- *Intrusive diabase*
- *Narwhale Sound formation*
- *Cape Weber formation*
- *Cass Fjord formation*

Cambrian
- *Dolomite Point dolomite*
- *Hyolithes Creek dolomite*
- *Ella Island formation*
- *Bastion formation*

Pre-Cambrian
- *Spiral Creek formation*
- *Tillite Canyon formation*
- *Cape Oswald formation*
  - *Upper tillite*
  - *Intertillitic beds*
  - *Lower tillite*
- *Eleonore Bay formation*
  - *Shale*
  - *Limestone*

Faults

Kap Oswald, Ella Ø

1:10000

100 0 1 2 3 4 500 m

Geologically surveyed by A.Noe-Nygaard 1932
revised by
Chr. Poulsen & H. Wienberg Rasmussen 1946.

North

Tømmerbugt

Bastionbugt

Rundsø

Langsø

Solitærbugt

Dansk Ekspeditions Radiostation

Storeelv

Ulvesø

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