MEDDELELSER OM GRØNLAND
UDGIVNE AF
KOMMISSIONEN FOR VIDENSKABELIGE UNDERSØGELSER I GRØNLAND
Bd. 149 · Nr. 5

DEN DANSKE EKSPEDITION TIL ØSTGRØNLAND 1947
Under Ledelse af Lauge Koch

OBSERVATIONS ON THE MESOZOIC ROCKS OF GEOGRAPHICAL SOCIETY Ø, EAST GREENLAND

BY

DESMOND T. DONOVAN

WITH 7 FIGURES IN THE TEXT

KØBENHAVN
C. A. REITZELS FORLAG
BIANCO LUNOS BOGTRYKKERI
1949

Introduction.

The present report is the result of just under a month spent on the south coast of Geographical Society Ø, East Greenland, as a member of LAUGE KOCH's Expedition of 1947. The object of the visit was to establish detailed palaeontological successions in the Mesozoic rocks. While this aim was not achieved, a search for fossils was made and the results are here recorded.

I am indebted to Dr. LAUGE KOCH for the opportunity of studying the Mesozoic rocks of the area in question. My assistant and companion on the expedition was Mr. I. H. FORD, to whose patience in collecting many of the fossils recorded are due. My thanks are also due to Dr. L. F. SPATH and Dr. L. R. COX for discussing some of the ammonites and lamellibranchs respectively. Dr. H. DIGHTON THOMAS has kindly identified the two corals, and Prof. H. L. HAWKINS has undertaken the study of the echinoids found.

General Account.

The Jurassic beds of the area to the north of STAUBER's locality 7 (STAUBER, 1942, pl. 1.) were thoroughly searched for fossils, but without success. Some time was spent collecting from the Cretaceous rocks lying to the east, but the results were small, as good fossils are not numerous. Finally, a trip was made to the southern part of the Laplace Bjærg section, in the east of the island. As this visit was delayed by bad weather, and had to be made overland on foot, the time available at Laplace Bjærg was insufficient for a systematic study of the section, and no fossils were recovered.

The Jurassic Rocks.

In the central part of Geographical Society Ø, beds of Triassic and Jurassic age occur in a belt about 6 km wide, separated from the Carboniferous rocks to the west, and the Cretaceous to the east, by

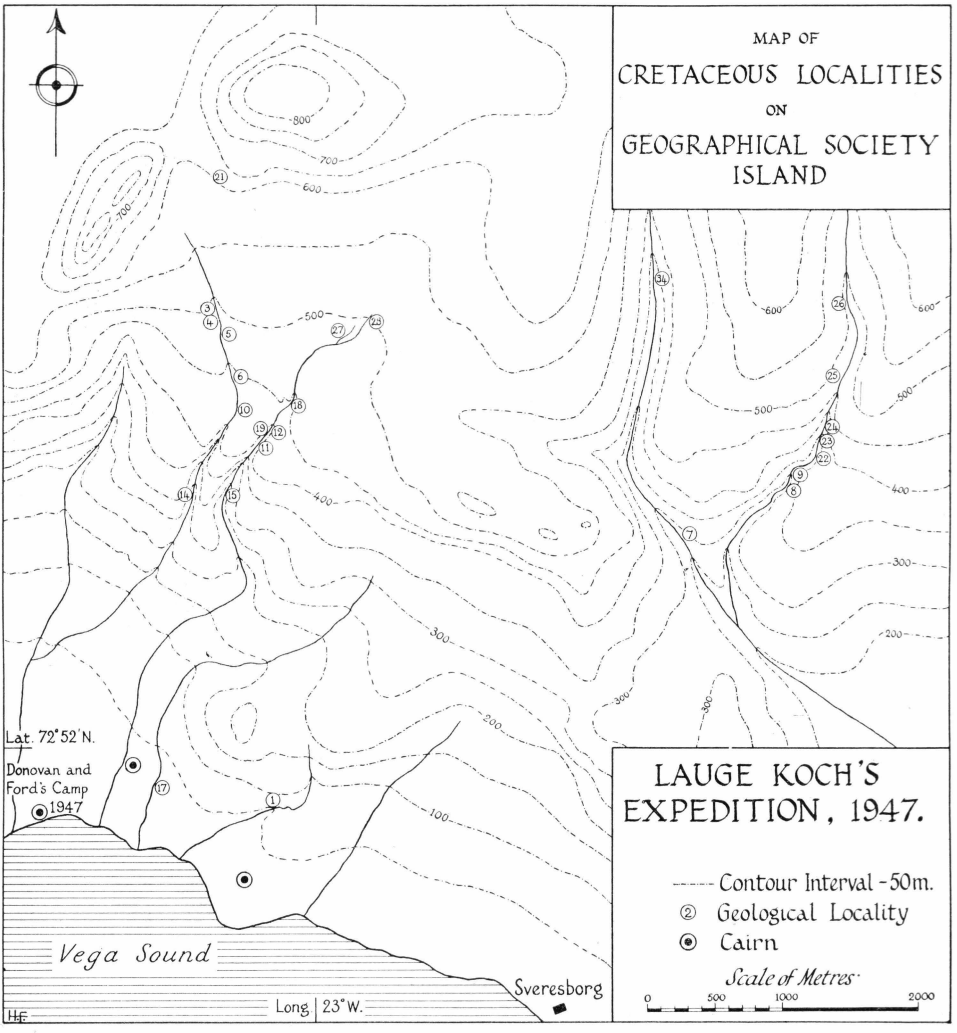

Fig. 1.

major fault lines trending north-north-east. In this area the Rhaetic-Lias appears to succeed conformably the highest Triassic beds, the Bunte Serie, which have been described in detail by STAUBER (1942, p. 46). The earliest Jurassic sediments consist of thinly-bedded red and green sandstones, with ripple marks and other signs of a shallow-water origin. No fossils have been found in Geographical Society Ø, but on grounds of lithological similarity the beds are assigned to the Kap Stewart Series, which in Jameson Land is shown by fossil plants to be of Rhaetic-Lower Lias age (HARRIS, 1935, p. 70). According to STAUBER's map (1940, pl. 1) the outcrop of this formation can be traced northwards from Jameson Land into the area in question.

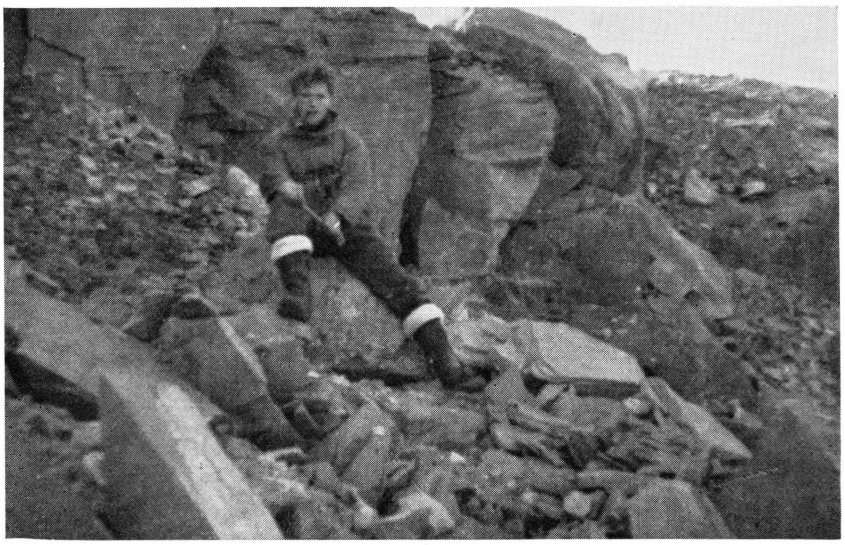

Fig. 2. Jurassic sandstones about 5 km south of Laplace Bjærg.

The next rocks in succession are yellow, somewhat clayey sands, exposed on the western side of the main valley which traverses the Island in a north-north-easterly direction. Dark green sands with bands of chloritic micaceous sandstone were seen at one point. Above these poorly consolidated beds is a series of yellow to brown, barren, fine and coarse sandstones, with strongly developed conglomerates at many horizons. They are of considerable thickness, and also well exposed, though difficult of access, on the eastern side of the valley. All the sandstones examined were calcareous, some strongly so; one example showed lustre mottling caused by the reflection of light from cleavage planes in optically continuous calcite in which the quartz grains were embedded.

The total thickness of this rudaceous-arenaceous series overlying the Rhaetic-Lias is at least 300 m. No fossils have been recovered from the beds, but their lithology is similar to that of the Yellow Series (Gelbe Serie) of the Wollaston Forland region, which is of Upper Bathonian-Oxfordian age (Maync, 1947, p. 126).

At the southern end of the Laplace Bjærg inlier, about 18 km to the east, the Rhaetic-Lias is again present and succeeded by sandstones and conglomerates (Figs. 2, 3). Our impression was that conglomerates were here less frequent than in the central part of the island. Overlying the sandstones and conglomerates are red to yellow marly beds, with bands of calcareous siltstone. Their age is unknown.

Fig. 3. False-bedded Jurassic sandstones about 5 km south of Laplace Bjærg.

Cretaceous Localities Examined.

A. Albian.

All the exposures examined showed soft, black micaceous shales, or their more or less metamorphosed representatives (Fig. 4), including good examples of "spotted rocks." Intrusions of dolerite are abundant throughout the area and the sediments in the immediate neighbourhood of the igneous rocks are too much altered for fossils to be recognisable. The intrusions also prevented the measurement of any continuous sections.

Ironstone nodules, up to a diameter of about 20 cm, occur at Locality 1 and neighbourhood, and also to the south of Laplace Bjærg, where they become concentrated in the stream beds in a striking manner. Since lower beds outcrop at Laplace Bjærg, the shales with ironstone are presumably near the local base of the Cretaceous (?Lower Albian).

The fossiliferous localities in the Cretaceous are shown in the accompanying map (Fig. 1), and yielded the following faunas:

Locality 1. *Puzosia* sp.
Placunopsis sp.
— 3. ?*Puzosia* sp.
Inoceramus anglicus Woods (abundant)
Gyrodes gentii (J. Sow.)
— 4. *Inoceramus anglicus* Woods

Locality 5. ?*Arcthoplites* sp.
Inoceramus anglicus Woods
— 8. *Arcthoplites* sp.
Puzosia sp.
Aucellina gryphaeoides (J. de C. Sow.)
Cucullaea nana Leymerie
Entolium cf. *orbicularis* (J. Sow.)
Pholadomya decussata (Mantell)
Variamussium sp.
Indeterminate brachiopods
Indeterminate spatangids
— 9. Indeterminates belemnites
— 10. ?*Caryophyllia* sp.
— 14. *Lingula* sp.
— 15. *Arcthoplites* sp.
Inoceramus sp.
Aporrhaid gastropod
— 17. *Arcthoplites* cf. *jachromensis* (Nikitin)
Puzosia sp.
Hemiaster (*s. l.*) sp.
Caryophyllid coral
— 18. Tuberculate hoplitid ammonite
— 19. *Dimorphoplites* sp.
Hoplites sp.
Puzosia sp.
Gyrodes gentii (J. Sow.)
"*Phasianella*" ?*ervyna* d'Orb.
— 22. Indeterminate gastropod
— 23. *Aucellina* sp.
— 24. *Inoceramus anglicus* Woods
Indeterminate belemnites
— 26. *Aucellina gryphaeoides* (J. de C. Sow.)
Inoceramus ?*anglicus* Woods
— 27. *Beudanticeras* sp.
Lingula subovalis T. Davidson
?*Variamussium* sp.
— 34. Ovate lamellibranch, cf. *Cyprimeria* (*Cyclorisma*) *faba* (J. de C. Sow.)

The following exposures yielded no fossils: 6, 11, 12, 25.

Both lower and Middle Albian are proved by the ammonites found in Geographical Society Ø, as already concluded by Spath (1946, p. 9), but the presence of Upper Albian beds is not yet established.

Inoceramus anglicus is confined to the higher part of the succession, probably mainly of Middle Albian age.

The majority of the fossils are known from the corresponding deposits of north-west Europe, but there are several forms which cannot be matched in that province, notably *Dimorphoplites* with simple ribs, *Variamussium* sp., and *Arcthoplites* which is already well-known as a boreal genus.

The fossils are invariably crushed, as elsewhere in the Albian of East Greenland, and this fact, together with their rarity, renders detailed comparison with faunas from other provinces unprofitable. If a well-preserved Albian fauna could be found in East Greenland, the results of such a study would doubtless be of considerable interest.

B. Cenomanian.

The two exposures of proved Cenomanian age were both in metamorphosed sediments. The original lithology appears to have been argillaceous, and probably similar to that of the Albian beds already described. The following fossils were recovered:

Locality 21. *Schloenbachia subtuberculata* (Sharpe)
Nuculana sp.
Indeterminate spatangid
— 28. *Schloenbachia* aff. *subvarians* Spath
Inoceramus crippsii Mantell (abundant)
Hemiaster sp.
Macraster sp.

The echinoids from Locality 28 occurred in an "echinoid bed" crowded with the crushed tests of *Hemiaster*. Several fragments of the bed were found on a small scree which apparently concealed its outcrop.

Both the exposures belong to the Lower Cenomanian, and to the zone of *Schloenbachia varians*. Large *Inoceramus* have been noted, but not specifically named, by STAUBER (1938, p. 27) from the Upper Cretaceous elsewhere in Geographical Society Ø.

Palaeontological Notes.

The material collected does not warrant a complete systematic treatment. A few notes are given, however, in those instances where amplification of the fossil records is considered desirable.

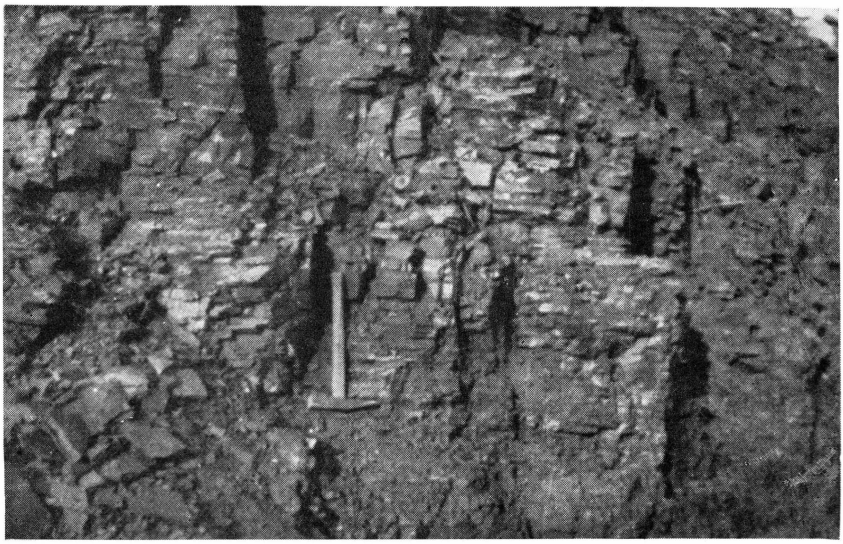

Fig. 4. Slightly metamorphosed Albian shales at Locality 17.

Dimorphoplites sp.

The specimen recorded from locality 19 is distorted. It has simple ribs and belongs therefore to a species unknown from north-west Europe, where bifurcation is the rule in this genus.

Aucellina gryphaeoides (J. de C. Sow.) Fig. 5.

The form recorded under this name agrees fairly well with the figures of Woods (1905, pl. 10, f. 6—8), but some of the specimens are larger than any on Woods' plate. According to this author (1905, pp. 73—74), the species ranges in England from the Upper Gault to the Lower Chalk. A typical specimen from locality 22 is shown in fig. 5.

Inoceramus anglicus Woods

All the specimens found in East Greenland are crushed, but appear to agree very closely with Woods' species. The largest example collected has a maximum (dorso-ventral) dimension of 10 cm. The specimens figured by Frebold (1932, p. 33, f. 14—16) from Clavering Ø as *I.* cf. *anglicus* reach a size of 19 cm.

Inoceramus crippsii Mantell

The examples of this species are indistinguishable from the European form, so far as one can judge from crushed specimens. Similar species are also found in North America (e. g. Meek, 1876, p. 49).

Nuculana sp. Fig. 6.

The specimens, found associated with *Schloenbachia* but at a higher topographical level than *Inoceramus crippsii*, are all small, the largest being 5 mm long. The shell outline is oval, almost equilateral,

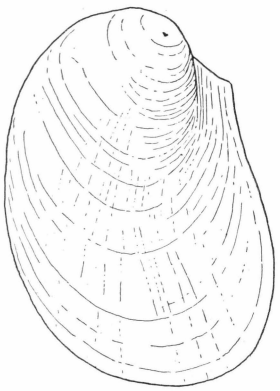

Fig. 5. Left valve of *Aucellina gryphaeoides* (J. de C. Sow.) from Locality 26. × 2.

and traces of taxodont hinge structure may be seen in a few specimens. On account of the indifferent preservation it has not been thought desirable to quote a specific name, but a drawing of the shell outline is here given in fig. 6.

Variamussium sp. Fig. 7.

A nearly symmetrical shell with thirteen narrow ribs which appear to be on the interior surface of the valve, but the preservation is not

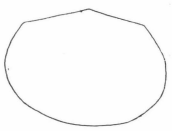

Fig. 6. Shell outline of *Nuculana* sp. from Locality 21. × 4.

good enough for this fact to be established beyond doubt. The species has not so far been matched from European faunas.

Lingula subovalis T. Davidson

Two specimens comparable in shell outline with this species are both small, the larger example, from locality 27, being only 3 mm long. Identity with DAVIDSON'S species is not certain.

Gyrodes gentii (J. Sow.)

The specimens collected are close to the forms figured from the Albian of Europe. Described by MANTELL (1822, p. 87, pl. 19, f. 3) as *Ampullaria canaliculata*, the fossil was renamed *Natica gaultina* by d'ORBIGNY (1843, p. 156, pl. 173, f. 3, 4), who was apparently unaware of SOWERBY's valid name. D'ORBIGNY's name has been used by some European authors.

Macraster[1]) sp.

Fragments of a large specimen of *Macraster*, a genus familiar in the North American Cenomanian, which may prove specifically determinable on further study.

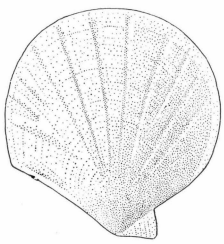

Fig. 7. *Variamussium* sp. from Locality 8.
Inner surface of shell. × 2.

Hemiaster[1]) sp. (Locality 28)

Abundant remains of a small *Hemiaster*, with well-defined peripetalous fasciole. It would be dangerous to compare them with any of the numerous described species from the Cenomanian, for the full characters are nowhere revealed.

Caryophyllia?[2]) sp. (Locality 10)

The specimen is poorly preserved as a mould of, apparently part of the calice. The diameter is 9 mm. The wall is probably solid. The septa are straight and are 48 in number, the longer reaching well towards the axis. There is a suggestion of a fasciculate or papillary columella.

Caryophyllid coral[2]) (Locality 17)

The specimen is poorly preserved as a natural transverse section, apparently through the calice. The diameter is 12.5 mm. The wall is solid. The septa are straight and numerous, over 40 being present in three-quarters of the calice; the longer reach well towards the axis. No endotheca is present, and the axial part of the corallite is not seen in the specimen.

---

[1]) Notes contributed by Prof. H. L. HAWKINS.
[2]) Notes contributed by Dr. H. DIGHTON THOMAS.

The Mesozoic of Geographical Society Ø and Traill Ø.

A. Jurassic.

The Jurassic rocks of these islands have recently been reviewed in detail by MAYNC (1947, pp. 153—156). The stratigraphy is incompletely known, the main obstacles to an adequate interpretation being the limited extent of the outcrops and the fact that their relation to the overlying Cretaceous is often faulted, as is the case with the outcrop in central Geographical Society Ø.

The arenaceous facies of Bathonian—Callovian age (the Yellow Series) extends across the islands from north to south. No fossils have been found in Geographical Society Ø, but on the south coast of Traill Ø the Upper Bathonian *Cranocephalites* cf. *furcatus* Spath was found by FREBOLD and NOE-NYGAARD (1938, pp. 14, 25), and the same authors report Bathonian—Callovian ammonites on the north coast.

During Bathonian—Callovian times, the area was one of deltaic deposition on a large scale, marine conditions being occasionally established. The conditions were essentially similar further north in the Wollaston Forland area (MAYNC, 1947, p. 122) at this time. These two areas of deposition were separated by MAYNC's Neo-Eskimonia (1947, fig. 38), which appears to have been a region of emergence during the period in question; it corresponds to the modern Hold-with-Hope Peninsula, where Jurassic sediments are unknown.

The relation of the Yellow Series of the islands to the Jurassic rocks further south is less clear. The thick (400 m) development of sandstones recorded from Antarctic Harbour by PARKINSON and WHITTARD (1931, p. 653), at the base of which, in beds of different lithology, Bathonian fossils were found (SPATH, 1932, p. 136), is again suggestive of the Yellow Series. In SPATH's view (1932, p. 124) the deposits of Bathonian—Callovian age, argillaceous at the well-known locality of Vardekløft near Scoresby Sund, are already becoming more sandy in central Jameson Land. It is too early, however, to do more than point out the general synchronism of the sandy deposits in the present area with the better known arenaceous developments to the south and to the north.

Evidence for higher Jurassic beds is meagre, but black shales of Upper Jurassic (?Kimmeridgian) age are probably present. The records are summarised by MAYNC (1947, p. 155), but no profitable comparisons can be made until more evidence is available.

B. Cretaceous.

The Cretaceous deposits of the region consist principally of Albian and Cenomanian sediments. The only evidence for earlier beds is the

isolated record of the Aptian *Lytoceras sammartino* from the south-eastern corner of Geographical Society Ø (STAUBER, 1938, p. 27), but the stage is not proved in any of the measured sections of the same author. Rocks of Turonian age occur (SPATH, 1946, pp. 10, 11), but nothing is known as to their extent.

Previous authors have referred to an Aptian-Albian transgression, but the two stages must be separated if our knowledge of the East Greenland Cretaceous is to advance. The Aptian, an essentially sandy series with well-preserved fossils, has not been detected south of the northern part of Hold-with-Hope Peninsula, with the exception of the record already mentioned and a doubtful report from northern Traill Ø (STAUBER, 1942, p. 61). The Aptian must have been preceded by a period not only of non-deposition but of denudation; the Hauterivian and Barremian stages are unknown, and, in the Wollaston Forland area, the Aptian rests on restricted remnants of Middle Valanginian, or on older, rocks (MAYNC, 1940, p. 28).

The Albian, on the other hand, is represented by a predominantly argillaceous series with poorly preserved fossils, which is well-developed in Geographical Society Ø and Traill Ø and therefore overlaps the Aptian southwards. There was deepening of the sea accompanying this southwards transgression, and also extension westwards, since the shore-line in Albian times must have lain a considerable distance west of the present limit of the deposits. There is as yet no evidence as to whether the transgression reached Jameson Land, or whether Kong Oscars Fjord is as important a boundary line as would appear from a casual inspection of the geological map.

The general sequence of events in the Lower Cretaceous therefore parallels that in the Anglo-Paris area where, after emergence in Neocomian times, sandy deposits of Aptian age are followed by clays of the Middle and Upper Albian.

References to Literature.

FREBOLD, H. (1932). Die Lagerungsverhältnisse der Unterkreide im Nördlichen Teil von Ostgrönland und die Frage der Prätertiären Fjordanlage. Medd. om Gr. Bd. 84, no. 6.

FREBOLD, H. & NOE-NYGAARD, A. (1938). Marines Jungpalaeozoikum und Mesozoikum von der Traill-Insel (Ostgrönland). Medd. om Gr. Bd. 119, no. 2.

HARRIS, T. M. (1935). The Fossil Flora of Scoresby Sound, East Greenland: Part 5: Stratigraphic Relations of the Plant Beds. Medd. om Gr. Bd. 112, no. 2.

MANTELL, G. (1822). The Fossils of the South Downs, or Illustrations of the Geology of Sussex. London.

MAYNC, W. (1940). Stratigraphie des Küstengebietes von Ostgrönland zwischen 73—75° N. Lat. Medd. om Gr. Bd. 114, no. 5.

— (1947). Stratigraphie der Jurabildungen Ostgrönlands zwischen Hochstetterbugten (75° N.) und dem Kejser Franz Joseph Fjord (73° N.). Medd. om Gr. Bd. 132, no. 2.

MEEK, F. B. (1876). A Report on the Invertebrate Cretaceous and Tertiary Fossils of the Upper Missouri Country. U. S. Geol. Surv. Terr. Rep. vol. 9.

d'ORBIGNY, A. (1843). Paléontologie Française. Terrains Crétacés. Tome 2.

PARKINSON, M. M. L., & WHITTARD, W. F. (1931). The Geological Work of the Cambridge Expedition to East Greenland in 1929. Quart. Jour. Geol. Soc. vol. 87, pp. 650—674.

SPATH, L. F. (1932). The Invertebrate Faunas of the Bathonian—Callovian Deposits of Jameson Land (East Greenland). Medd. om Gr. Bd. 87, no. 7.

— (1946). Preliminary Notes on the Cretaceous Ammonite Faunas of East Greenland. Medd. om Gr. Bd. 132, no. 4.

STAUBER, H. (1938). Stratigraphische Untersuchungen postdevonischer Sedimente auf den Inseln Traill und Geographical Society. Medd. om Gr. Bd. 114, no. 1, pp. 21—28.

— (1940). Stratigraphisch-Geologische Untersuchungen in der Ostgrönländischen Senkungszone des nördlichen Jameson-Landes. Medd. om Gr. Bd. 114, no. 7.

— (1942). Die Triasablagerungen von Ostgrönland. Medd. om Gr. Bd. 132, no. 1.

WOODS, H. (1905). A Monograph of the Cretaceous Lamellibranchia of England, vol. 2, part 2. Pal. Soc.

Færdig fra trykkeriet den 1. oktober 1949.