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UNDER LEDELSE AF LAUGE KOCH

PRELIMINARY NOTES ON  
THE CRETACEOUS AMMONITE FAUNAS  
OF EAST GREENLAND

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Cretaceous ammonites have long been known from East Greenland but the list of the few, more or less isolated finds is not impressive. Thus Toula's (1874) widely-quoted *Amn. payeri*, first referred to the genus *Perisphinctes*, was subsequently considered to be a form of *Simbirskites* and was held to demonstrate the presence of marine Hauterivian deposits. This is almost certainly incorrect, as mentioned below. Again one of Ravn's (1912) two ammonites was misidentified as a Neocomian "*Garnieria*", whereas in reality it represents the inner whorls of an Aptian genus (*Sanmartinoceras*). A few additional species were recorded by Koch (1929, 1931), Rosenkrantz (1930, 1934), Frebold (1935) and Maync (1940), again mostly of Aptian age.

The purpose of the present note is not only to amplify these records but to announce the discovery of entirely new ammonite assemblages of Cretaceous age. The new collections were made during the 1936—1938 expedition to East Greenland under the leadership of Dr. Lauge Koch, and the collectors of the material now before me were two competent Swiss geologists. One of them, Dr. Hans Stauber, worked in Traill Island and Geographical Society Island. The other, Dr. Wolf Maync, collected in the northern area, from Clavinging Island up to Kuhn Island.

The ammonites collected by these two geologists reached me in 1939, but like the Jurassic and Triassic material they were packed up and sent away for safety during the war. Consequently I could give but little information to the collectors for their stratigraphical accounts, already published or now in press.

In addition to the ammonites collected by Drs. Stauber and Maync there are various other Aptian forms from east of Cape Stosch (Hold-with-Hope), and from south of Cape Maurer, Kuhn Island, that were sent to me in 1934 by Dr. H. Frebold who himself described only the Aptian ammonites from Koldewey Island. These isolated forms had been collected by Dr. Lauge Koch, Messrs. R. Bøgvad, Noe-Nygård, Eigil Nielsen and David Malmquist between 1930 and 1933.

I propose to discuss the ammonite faunas in stratigraphical order, beginning with the Infra-Valanginian and ending with the Turonian, the youngest Cretaceous stage represented in East Greenland by am-

monitiferous deposits. Under each heading the assemblages are grouped on a geographical basis.

### Infra-Valanginian.

The ammonites now considered to be of Infra-Valanginian age were found to be preserved in several entirely distinct types of rock so that, even before I was informed of their relative stratigraphical position in 1946, I took them to come from different horizons within that stage. Dr. Maync (1940) referred to some of these fossils in his preliminary account, but the ammonites had not then been developed or studied and since, moreover, several assemblages included undescribed or incompletely known forms it was difficult to assess their stratigraphical significance.

The first and earliest assemblage was collected in the south-western part of Kuhn Island, at the Norwegian "Haakonshytta", and on my advice it was compared to forms of the *Laugeites* ("Kochina") horizon of Milne Land. Dr. Maync thus stated that the fauna was really of Portlandian (Volgian) age. The rock is a coarse, gritty conglomerate, with large pebbles, and the massive belemnite fragments which it contains are obviously derived. It now appears, however, that there are four separate beds of conglomerate in a thickness of 320 feet of banded, black shales and yellow sandstone. The two forms which I now take to be Cretaceous namely

*Subcraspedites* aff. *plicomphalus* (Sowerby)  
— cf. *stenomphalus* (Pavlow)

came from the uppermost bed of conglomerate (IV), 33 feet thick and still 30 feet below the top. It is true that the block enclosing a fragment of the first named species also contains what must be a derived Jurassic *Laugeites*. But the same genus, mixed with badly preserved and also clearly derived Portlandian Pavlovids, occurs again in conglomerates I (over 60 feet thick) at the base, and III (40 feet thick) over 140 feet above the base. If the fragments of *Subcraspedites* are also derived, as seems probable, then the uppermost conglomerate must be even younger than the Spilsby Sandstone or the Riasan Beds. Unfortunately the relations between these Infra-Valanginian deposits and the underlying Jurassic remain as obscure as when I wrote in 1936.

A second ammonite assemblage comes from a brown, micaceous shale with but little calcareous matter which is believed by Dr. Maync to overlie directly the basal conglomeratic beds. But this fauna is not from Kuhn Island; it comes from the opposite shore of Lindemann Bay, on the north coast of Wollaston Foreland. The ammonites occur as

impressions of individuals of all sizes and are clearly not derived. They are taken to belong to a single species, with the exception of one individual which is obviously different. Both species, however, belong to an undescribed genus, so that they may be provisionally listed as:—

Gen. nov. I, sp. *a*  
— — I, sp. *b*

They superficially resemble Berriasellids, but their simple, *Tollia*-like suture-line suggests that the new genus is an offshoot of the family Craspeditidae. The shale must be of Infra-Valanginian age, if I have rightly interpreted the *Subcraspedites* of the first assemblage; but it is to be noted that the horizon of the new genus is about 750 feet below the level of the first Valanginian ammonite (*Polyptychites* cf. *euomphalus*, v. Koenen).

A single ammonite impression was found some 40 feet higher than the assemblage just discussed and it is preserved in a rather harder, non-calcareous and less micaceous, dark-gray shale. It is of special interest because it belongs to another undescribed genus known only from Jameson Land. I am figuring this ammonite in a paper now in press<sup>1</sup>), dealing with a new fauna from that part of East Greenland, the ammonites there being in a far better state of preservation. This second new genus

Gen. nov. II, sp. nov.

differs from the first in having blunt primary ribs with a still smaller umbilicus and a smooth venter, also more numerous elements of the suture-line which, however, again resembles that of *Tollia*.

Some 430 feet higher in the Lindemann Bay succession, in a sandy calcareous shale there was found a small ammonite which I take to be an immature example of

*Tollia payeri* (Toula).

In its flexuous ribs with strong peripheral projection and in the presence of constrictions it is much like the typical species of *Tollia* from northern Siberia and Novaya Zemlya, though specifically distinct. Pavlow (1914) thought that *T. payeri* was a link between the two genera *Tollia* and *Simbirskites*, implying direct genetic relationship, but the time-gap is very considerable and the resemblance may be entirely superficial.

### Valanginian.

With a single exception, all the ammonites of this stage belong to well-known genera, unlike the Infra-Valanginian forms above discussed.

<sup>1</sup>) See Spath, 1947, in bibliography at end.

Moreover, the preservation on the whole is far more favourable and in some cases excellent. The two principal localities are eastern Kuhn Island and Albrecht Bay, Wollaston Foreland, and the fairly representative collections indicate the presence of the Middle Valanginian, even if the ammonites should turn out to belong to more than one subzone.

The two assemblages are not quite the same. The Kuhn Island fauna includes not a single example of the four species of *Neocraspedites* known from Albrecht Bay. There is no representative of two other genera (*Lyticeras* and gen. nov.) and even among the Polyptychitids (nine species of *Polyptychites*, one of *Euryptychites*, and four of *Dichotomites*) there are only two species common to the two assemblages.

Two forms from Lindemann Bay are important because they were collected in the same section as the presumed Infra-Valanginian ammonites discussed above. They are taken to represent the Middle and Upper Valanginian and their two horizons are separated by 65 feet of barren deposits. The earlier species is

*Polyptychites* cf. *euomphalus*, v. Koenen.

It is only an impression on a slab of fissile, micaceous sandstone, and has already been referred to as being some 280 feet above the horizon of *Tollia payeri*. The later ammonite is a solid fragment of

*Lyticeras* sp. ind.

preserved in a hard, dark limestone. It shows the characteristic umbilical spines and a typical *Lyticeras* periphery, with the apexes of the ventral chevrons joined up into a median keel. These chevrons are not so fine, close and acute as those of the typical *L. noricum* (Schlotheim) and the umbilical spines are projecting sideways, not downward, as in the latter species. The ribbing also seems less sigmoidal than in *L. noricum*, but it is less rigid than in the earlier group of *L. heteroptychum* (Pavlow). Since the East Greenland form is thus somewhat transitional, it is considered to be of Upper Valanginian age. In any case it would be well below the Simbirskitan, if the original *Amm. payeri* should here have been misinterpreted.

#### Aptian.

Only three species, known from the Aptian of East Greenland, namely:—

*Lyticeras polare*, Ravn

*Deshayesites boegvadi*, Rosenkrantz

*Sanmartinoceras groenlandicum*, Rosenkrantz

are based on well-preserved material. The others are more doubtful while '?*Acanthodiscus*' mentioned by Maync (1940) is clearly out of place in the Aptian. The forms recorded as '*Hamites*' and '*Crioceras*' again are probably identical with some of the heteromorphs listed below under different names.

A typical *Lytoceras polare* fauna comes from Kuhn Pass, central Wollaston Foreland, and it includes about thirty specimens of that species, but only one small *Ancyloceras* and one nautilus (*Cymatoceras* aff. *radiatum*, Sowerby sp.). There are also various pelecypods and some fossil wood. These are the iridescent fossils already mentioned by Maync (1940).

Another Aptian fauna which includes a few examples of *Lytoceras polare* as well as of a less strongly ornamented species (*L.* sp. nov.? aff. *phestum*, Matheron sp.) comes from eastern Kuhn Island. It is rather a different assemblage from the last, for it comprises numerous belemnites (*Neohibolites*), a brachiopod ('*Rhynchonella*' *antidichotoma* Buv.), an impression of an echinoid and the following ammonoids:—

*Deshayesites boegvadi*, Rosenkrantz  
*Ancyloceras* aff. *matheronianum* (d'Orbigny)

These indicate the Lower Aptian, but *Lytoceras polare* may have a long range.

A different assemblage again, though also including a typical example of the species just mentioned, is characterised by the following ammonoids:—

*Sanmartinoceras* spp. (*pusillum*, Ravn = ?*groenlandicum*, Rosenkrantz)  
?*Pascoeites* sp. (?*crassus*, Spath)  
*Ancyloceras* spp.  
?*Tonohamites* spp.

This fauna may come from the same locality as the last, but it is more definitely labelled "1 km south of Cape Maurer". The Upper Aptian (Gargasian) age of the assemblage is not yet established with certainty.

Two fragments from the eastern side of Albrecht Bay, Wollaston Foreland, are doubtfully referred to

*Tropaeum arcticum* (Stolley).

This species has already been recorded by Rosenkrantz (1932) from the same peninsula, but I have not seen his material.

Near the same locality, but labelled "south-east of Albrecht Bay", there was found an extremely well-preserved though small example of

*Phylloceras rouyianum* (d'Orbigny)

associated with fragments of *Neohibolites*. The French species seems to have a long range, being recorded from the Upper Barremian as well as the Gargasian; it is of interest because it shows that conditions in East Greenland were favourable not only to the typically Mediterranean genus *Lytoceras*, but even to *Phylloceras*.

One of the ammonites recorded by Lauge Koch (1931) from east of Cape Stosch, Hold-with-Hope, namely

*Deshayesites* aff. *laeviusculus* (v. Koenen)

was in all probability correctly identified, but the second, poorly preserved specimen is more doubtful. I now believe that the tentative assignation to a more coarsely ribbed form of *Deshayesites* was justified and that the resemblance to the somewhat similar Albian genus *Arthoplites* is superficial. Another impression of a form of *Deshayesites* has since been received from Stensiö-Plateau (Eigil Nielsen Coll.), associated with an example of *Lytoceras polare*, whilst a large individual of the same species (150 mm diameter) was collected by D. Malmquist (1931) at about 490 m in his section iv, east of Cape Stosch.

### Albian.

Clay-ironstone concretions from the *Inoceramus* Beds of the Kronebjærg in the west of Sabine Island have yielded badly preserved impressions of

*Gastrolites* spp. nov.?

which do not seem to be referable to described Canadian species. These are the ammonites mentioned by W. Maync (1940, p. 29) and their age is presumably near the top of the Middle Albian, since the only known English example of that genus came from the *cristatum* zone. Some still more poorly preserved impressions in similar clay-ironstone came from Cape Berlin, Wollaston Foreland.

Two fragmentary sandstone casts from the neighbouring Albrecht Bay may be assigned to

*Hoplites* spp.

They resemble some forms figured by Nikitin and Bogoslowsky as *H. dentatus* (J. Sowerby) and *H. engersi* (Rouillier), but they have a wider periphery than any English species. If correctly identified their age would be basal Middle Albian.

Both earlier and later Albian faunas were collected by Dr. H. Stauer in a different part of East Greenland, namely in the south of

Geographical Society Island. They include the rich *Leymeriella* fauna whose discovery I announced in 1943. Most of the ammonites came from the neighbourhood of the Norwegian Station Sveresborg (or Sveresborg on Stauber's map) and a first fauna is labelled "Valley above Sveresborg Station". It includes:—

- Puzosia* (*Callizoniceras*?) sp.  
*Beudanticeras* cf. *hulenense* Anderson  
*Leymeriella* aff. *tardefurcata* (d'Orbigny)  
— - *rencurelensis* (Jacob)  
*Arcthoplites* cf. *jachromensis* (Nikitin)  
— sp. nov.

Although the ammonites are crushed or mere impressions on thin slabs of fissile sandstone (with an occasional *Inoceramus*), they are well recognisable and there can be no doubt of the Lower Albian age of this fauna.

A second assemblage comes from east of Sveresborg (southern mountains of the Mt. Laplace *massif*). The preservation is very similar, but with the exception of the single, small *Arcthoplites* which must have come from a lower horizon, this fauna is later; the numerous fragments of *Euhoplites* especially are comparable to the forms which abound in the upper part of the Lower Gault (beds v-viii) of England. The fauna includes the following forms:—

- Puzosia* (?*Beudanticeras*) sp. nov.  
*Dipoloceras* sp. (*subdelaruei* group)  
*Euhoplites* spp. (*opalinus* group)  
*Dimorphoplites* sp.  
*Arcthoplites* sp. juv.

The last genus which is not only very common in East Greenland but is often of considerable size (150 mm and more) was also found at two more, isolated localities in the same area (loose in screes and on shore). Unfortunately all the specimens are fragmentary, as they are in Spitsbergen. In Russia, according to Bogoslowsky, *Arcthoplites* occurs together with *Hoplites dentatus*.

A few fragments were collected on the southern side of a mountain (not named on Dr. Stauber's map of Geographical Society Island) which he called (*in lit.*) the 'Kistenstock'. They are:—

- Puzosia* (?*Beudanticeras*) sp.  
*Hamites*? sp. ind.

The latter is very doubtful, as the costae seem unevenly spaced. The normal ribbing of any *Hamites* might be expected to show more regularity, even after crushing or deformation in the rock.

A small fauna from a neighbouring mountain (east of the 'Kistenstock') is also in a very defective state of preservation. The following list therefore is only tentative:—

- Lytoceras* sp.
- Puzosia* sp.
- Beudanticeras* sp.
- ?*Hysterocheras* sp. juv.
- ?*Euhoplites* sp. ind.

The first three genera are represented by fragments of very large individuals. It is probable that this assemblage is of about the same age as the *Gastropilites* fauna of Sabine Island, but they are too dissimilar to be on exactly the same horizon. The doubtful young *Hysterocheras* suggests that the former is the younger assemblage, i. e. basal Upper Albian, though *Hysterocheras* occurs in the *cristatum* zone. There is no evidence from East Greenland of any typical Upper Albian elements.

### Cenomanian.

Undoubted examples of Cenomanian ammonites have been collected on both Geographical Society Island and on Traill Island, but they are mere impressions, referable to:—

- Schloenbachia* spp.

There are at least two species, one of them being *S. subvarians*, Spath, which may be a synonym of *S. tollotiana* (Pictet). This last form came from the same locality on Geographical Society Island as the Albian *Euhoplites* fauna above listed (Mt. Laplace). The six Traill Island specimens were collected on a mountain west of the 'Björnedal' (not named on Dr. Stauber's map).

### Turonian.

There are only four crushed examples and impressions in a fissile sandy shale, perhaps more distinctly laminated than the similar Albian and Cenomanian slabs, and it was only a single *Scaphites* that enabled me to recognise the age of these ammonites. For it could not be earlier

than Turonian and that supplied the clue to two more. The fourth example is too small to be identified. The forms are:—

*Scaphites* aff. *lamberti* (de Grossouvre)  
*Prionotropis* cf. *woolgari* (Mantell) Meek.

They are of about Middle Angoumian (Upper Turonian) age and both species are known from localities in Canada and the U. S. A.

I am greatly indebted to Dr. Lauge Koch for enabling me to examine this interesting new material and I hope it will be possible soon to publish the full description with the necessary illustrations.

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