Mindre Meddelelser.

Evidence of the Occurrence of Ascothoracica (Parasitic Cirripeds) in Upper Cretaceous

By

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In 1963 a fossil echinoid was found on the beach of the Limfjord in North Jutland, Denmark, by Mr. Frøkjær Andersen, who sent it to the Zoological Museum for identification and further information.

The fossil is the internal mould of the dorsal half of the test of a full-grown (about 4.5 cm) *Echinocorys*, an irregular echinoid common in the Danish Upper Cretaceous. The mould is formed by the test cavity being partly filled with calcedony and appears as an amber-like, hollow hemisphere with an 8 mm thick shell (Pl. I, 1, 3). It is evident that the filling has to some extent taken place through two small holes in the upper ambulacral region of the now non-existent test. By the accumulation of the calcedony and the gradual thickening of the mould, the presence of these two holes has been greatly emphasized, though at the same time, their original diameter has been somewhat diminished.

The ambulacral pores, the larger of which measured about $^1/_2$ mm, appear on the surface of the mould as slightly raised spots, the calcedony here having a rather translucent appearance. Elsewhere on the mould the calcedony has a rough surface, due to its union with the inner layer of the calcareous test.

From the appearance of the mould it can be deduced that the two holes were present in the test before fossilation, and probably found in the animal when alive rather than being the result of later damage. By a stroke of luck these holes, which now appear as narrow canals in the wall of the mould, were not completely obliterated before the accumulation of the calcedony was discontinued, perhaps by the fossil being removed from its original site.

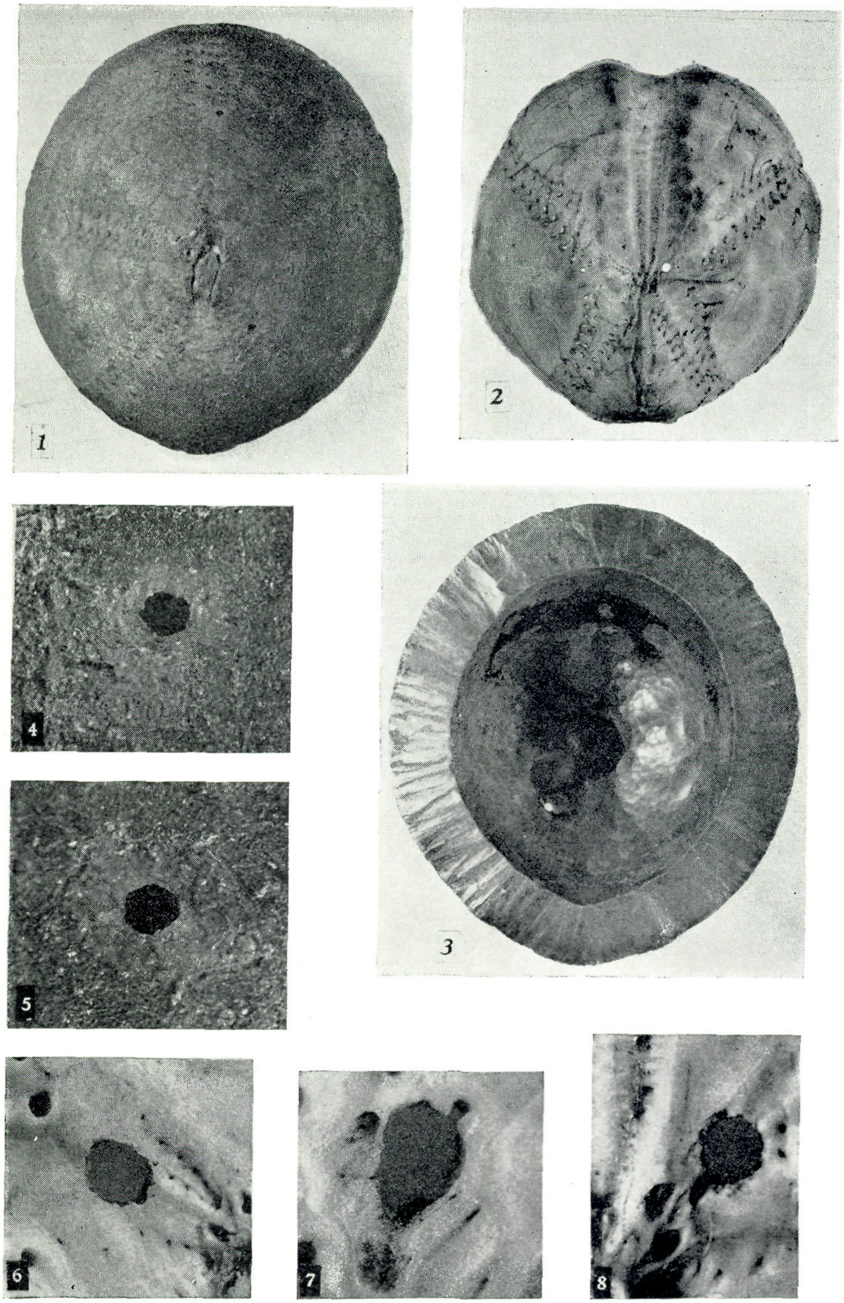
Both holes appear somewhat conical now. The outer diameter of the anterior one is 0.76–0.8 mm, the inner about 4 mm. The outer diameter of the posterior hole is 0.84–0.91 mm, the maximum inner diameter about 5 mm. However, it is evident that the outer diameter was considerably larger originally, measuring 1.8–1.9 mm and 2.2–2.67 mm respectively (Pl. I, 4–5).

These two holes give the present fossil a special interest as similar holes are found in tests of recent irregular echinoids infected by the ascothoracid cirriped crustacean *Ulophysema*, described by Brattström (1936).

The parasite is, when adult, a sac-like organism which usually hangs in the dorsal part of the echinoid between the gonads, attached to the inside of the test by a small projection. The holes in question were made by the parasites at the place of attachment in order for their larvae to escape.

Ulophysema is the only ascothoracian genus known to infect echinoids. Two species are described, viz. *U. pourtalesiae* found in *Pourtalesia jeffreysi* in the North Atlantic and the Arctic Oceans at great depths (325–2465 m) (Brattström 1937, Wagin 1964), and *U. öresundense*. The hosts, distribution, depth, and percentage of infection of *U. öresundense* is as follows (Brattström 1947):—

Plate I



1, internal mould of *Echinocorys*, seen exteriorly. The holes under discussion are seen, as black spots, in the frontal and in the right posterior ambulacrum. 2, test of *Echinocardium cordatum*, seen interiorly, with a hole made by *Ulophysema öresundense*. 3, the *Echinocorys* mould seen interiorly. 4–5, the two holes in the *Echinocorys* mould. 6–8, *Ulophysema* holes in *Echinocardium*.

1–3, slightly enlarged.
4–7, about 7 ×.

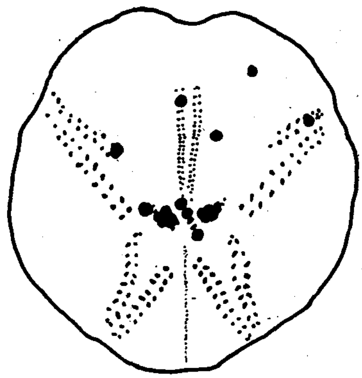


Fig. 1. The distribution of *Ulophysema* holes on *Echinocardium cordatum*, compiled from 12 infected specimens.

In *Echinocardium cordatum*: Trondheim area, Norway, 20–30 (? 100) m (3.7 % infected); Skagerrak and S.W. Kattegat, 26–30 m (1 % infected); S.E. Kattegat and Øresund (the Sound), 17–45 m (17.6 % infected).

In *Echinocardium flavescens*: Of 788 examined specimens from Norwegian, Swedish and Danish waters, one specimen only from Skagerrak was found to be infected.

In *Brissopsis lyrifera*: Gullmar Fjord, West Sweden, 30–110 m (0.7 % infected).

A collection of *Echinocardium cordatum* from Hornbæk Bay, North Sealand (kindly furnished by Mr. AAGE MØLLER-CHRISTENSEN, the Marine Biological Laboratory, Helsingør) has been examined. No less than 50 % of the echinoids were infected. One hole produced by *U. öresundense* is seen in the complete test shown in Pl. I, 2. The size of the holes varies according to age of parasites (Pl. I, 6–8). The maximum diameter of undamaged holes was found to be 1.9 mm, corresponding to the original diameter of the smaller hole in the fossil. The distribution of the holes in the examined *Echinocardium* is indicated in Fig. 1.

According to BRATTSTRÖM (1947), 66 % of the infected *Echinocardium* in Øresund had one parasite each, 21 % had two each and the remaining 13 % were found to have from 3–9 parasites each.

When considering the size, shape and occurrence of the holes in the fossil we feel certain that it was once the host of two Ascothoracica. As far as we have been able to ascertain, this is the first fossil record of these crustaceans. *Echinocorys* is known only from Upper Cretaceous (Turonian—Danian). There are no fossil records of *Pourtalesia*, while *Brissopsis* dates back to Eocene and *Echinocardium* to Oligocene.

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The Oldest Trilobite Remains from Denmark

By

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Abstract

Spine-bearing axial rings from the Kalby clay on Bornholm are referred to *Holmia sp. indet.*

The content of reworked Lower Cambrian non-trilobite fossils in the Middle Cambrian Kalby clay on Bornholm is remarkable. The stratigraphical position of the clay has been discussed in a previous paper (V. POULSEN, 1963). Trilobite remains are scarce, but a few cranidia from the zones B1 and B2 of the *Paradoxides paradoxissimus* Stage have been identified. However, about a dozen spine-bearing thoracic fragments undoubtedly belong to an olenellid form.

Lower Cambrian trilobites were hitherto unknown from Denmark, but their presence has been deduced from *Cruziana* in the Rispebjerg sandstone. The underlying siltstone ("Green Shales") does not show many signs of trilobite activity.

Description of the olenellid fragments

The material, which is in the collections of the Mineralogical and Geological Museum of the University of Copenhagen, consists of about a dozen spine-bearing thoracic axial rings. The fragments are internal moulds, more or less worn, consisting of a fine-grained, grayish-black siltstone.

In three instances do the fragments represent two successive segments. One fragment shows an axial ring with a prominent spine followed by the gently convex, spine-less telson (text-fig. 1a).

The long, well-developed spines rise steeply from the gently convex axial rings; they are curved, moderately tapering, circular in cross section except at base (text-fig. 1b–c).

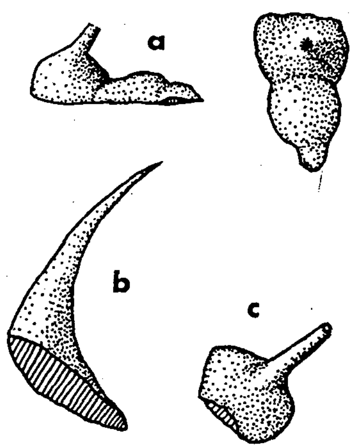

Fig. 1. Fragments of *Holmia sp. indet.* ×6.
a: Lateral and dorsal view of posterior thoracic axial ring with adjoining telson.
b: Isolated spine, oblique lateral view.
c: Axial ring with spine.
Kalby clay; Læsaa, Bornholm.

Discussion.—The scarce material is clearly of olenellid origin, and considering the morphology of the spines the fragments must belong to either *Holmia* or *Kjerulfia.*

All the fragments possess well-developed, long spines, and the writer believes that they belong to *Holmia. Kjerulfia* is a large genus, and long thoracic spines are restricted to the five *posterior* tergites of the thorax; in front of these the spines are short and stubby, and quite unlike the spines from the Kalby clay with regard to shape and size. The difference in spine morphology will appear from text-fig. 2.

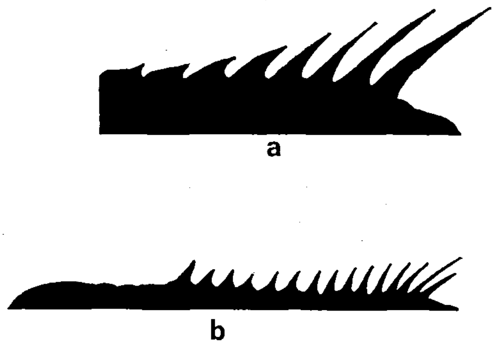

Fig. 2. Lateral views of *Kjerulfia* and *Holmia*. After KIÆR, 1916.
a: Posterior part of *Kjerulfia lata* KIÆR. x 1.
b: *Holmia kjerulfi* (LINNARSSON). x 2.

The fragments resemble the spine-bearing axial rings of *Holmia torelli* figured by MOBERG (1899, pl. 15, figs. 15–17), but the material does not permit an assignment to species.

The Rispebjerg sandstone and the Lower Cambrian siltstone on Bornholm both belong to the *Holmia torelli—Kjerulfia lundgreni* Zone, and the fragments of *Holmia sp. indet.* in the Kalby clay probably originated from the upper part of this zone.

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DANSK SAMMENDRAG

I udslemmet nedrekambrisk materiale fra det mellemkambriske Kalby-ler (V. POULSEN, 1963) findes pig-bærende trilobitfragmenter stammende fra den axiale del af kropsleddene (fig. 1). Disse rester må stamme fra en olenellid slægt — enten *Holmia* eller *Kjerulfia.* Da alle fragmenterne har lange pigge, må det dreje sig om *Holmia* (sml. fig. 2). Fragmenterne tænkes at stamme fra øvre del af *Holmia torelli — Kjerulfia lundgreni* Zonen (Rispebjerg-sandsten).

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The Composition »Gap« in the Basalt-Rhyolite Association as Elucidated by an Example of Eocene Volcanic Ash in Denmark

By

ARNE NOE-NYGAARD

In the Oceanic volcanic association the apparent scarcity of rock members intermediate between basalt and trachyte has been noted long ago by a number of geologists, see for instance BARTH (1962, p. 65).

In a recent paper CHAYES (1961–62) on table 11 illustrates this composition "gap" by giving the frequency of silica values in sixths of group ranges for larger groups of Oceanic basalt-trachyte suites based on chemical analyses from the Pacific, the Indian and the South Atlantic oceans.

No data are given from the Brito-Arctic basalt province, which belongs to a different suite; it is however clear from existing literature that also in this suite the rarity of intermediate rock types is striking.

Few volcanic areas within this region are preserved to such an extent, or are yet mapped in such detail, that the volume taken up by any single rock type can be estimated with reasonable certainty, but I think that conditions are favourable for such an estimation in the marine Eocene deposits in Denmark, where admittedly no lavas are found, but where about 200 ash layers occur, testifying to a period of former volcanic activity somewhere in the periphery of the North Atlantic province; their total thickness is about 4 metres.

Marine clays of Eocene age are widespread in Denmark. On islands and peninsulas in the western part of the Limfjord in north-west Jutland a special facies is developed, viz. an almost white diatomaceous earth, the so-called Mo-ler (Mo clay), which is likewise marine. The white Mo-ler is seen in the coast cliffs and has been known for centuries, it contains the series of volcanic ash layers referred to, which are here very conspicuous against the whitish Mo-ler. Ash layers of the same age are found elsewhere in Denmark in contemporaneous marine clays.

The ashes have been described petrographically by the late Professor BØGGILD (1918). It is not known from where they came, but it has been stated that in some ash layers the grain size diminishes from north to south-southeast (BØGGILD (1918), ANDERSEN (1937), NORIN (1940)). This observation indicates that the volcanic area was situated north or northwest of Denmark. A location somewhere in the Norwegian deep has been suggested (BØGGILD (1918), NORIN (1940)). Its age is definitely Eocene i. e. of the same age as part of the Scottish, Icelandic and Greenlandic volcanic activity.

In some cases where one and the same ash layer has been met with in a number of localities lying far apart, a minimum ash volume per eruption can be calculated. Many single eruptions have produced more than one cubic kilometre of ash; one eruption has produced an ash layer with an average thickness of 12 centimetres and an estimated volume of 5 cubic kilometres. Consequently, it is safe to conclude that the volcanic area which produced the Eocene ashes in Denmark has been one of considerable activity, and in all probability not of negligible size.

On microscopical data BØGGILD divided the ashes into six petrographic groups: (1) normal basaltic—150 layers, (2) almost normal basaltic—15 layers, (3) basalto-andesitic—5 layers, (4) andesitic—1 layer, (5) dacitic—3 layers and (6) rhyolitic—3 layers. These data alone show that rocks with an intermediate composition are represented only scarcely.

The volume of each of the six petrographical groups, as indicated by their ashes, is easily obtained if one takes the total number of ash layers and the average thickness of each. The following percentages of the total, in round figures, were found:

Normal basaltic	85 %
Almost normal basaltic	6 %
Basalto-andesitic	1 %
Andesitic	1 %
Dacitic	4 %
Rhyolitic	3 %

The Eocene volcanic province registred in Denmark, but of unknown site, shows a very marked preponderance of rocks with basaltic composition—91 %, the acid members amount to 7 %, whereas the intermediate groups, basalto-andesitic and andesitic are as low as 2 %.

It is remarkable that dacite is equal to or even exceeds rhyolite, since in Iceland also, where true rhyolites were thought to dominate completely, THORODDSEN (1925), dacitic rocks have been recorded from several places of late, see for instance RITTMANN (1939).

The example given may be fairly representative for the volcanism in early Tertiary in parts of the Brito-Arctic basalt province.

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Axinite from Greenland

By

ERLING BONDESEN and OLE VALDEMAR PETERSEN

Abstract

Axinite as vein material from pillow-laves in the southern Frederikshaab District is described and optical, chemical and x-ray data is presented. The geological occurrence of the mineral is discussed.

Introduction

During the geological mapping in the Ivigtut area, southern Frederikshaab District, by the Geological Survey of Greenland the comparatively rare boron-bearing calc-silicate axinite was found.

The mineralogy and geological setting is briefly described in this paper as it is the first time axinite has been found in Greenland (BØGGILD 1953). The occurrence is also of interest as both the composition and geological setting are abnormal (DEER, HOWIE and ZUSSMAN 1962).

Mr. BJØRN BORGEN made the chemical analysis and D. BRIDGWATER kindly corrected the manuscript. H. MICHEELSEN is thanked for valuable help and assistance.

The geological occurence

The axinite was found in a series of Precambrian pillow-lavas belonging to the Foselv formation of the Sortis group (Bondesen 1963). The location (61°28'56" N. lat.—47°58'07" W. long) of the occurrence is 1 km northeast of the Frynsesø lake, near the margin of the ice cap between Arsuk fjord and Sermiligarssuk fjord. The pillow-lavas are regarded as part of the Ketilidian supracrustal series (Wegmann 1938, Berthelsen 1960). They here form extensive sheets interbanded with gabbro sills. Numerous younger dykes cut the formations. No sediments or acid rocks are found in the vicinity of the axinite occurrence. The pillow-lavas have been subsequently metamorphosed in low greenschists facies. Their original composition seems to have been basaltic probably with spilitic affinities.

The mineral was found in a 3-5 cm wide fissure-vein in a single underformed pillow 40 by 60 cm in exposed section. The fissures form a slightly fan-shaped pattern crossed by one fissure parallel to the upper crust of the pillow. The fissure are restricted to the pillow and do not cross the glassy crust. This commonly observed pattern seems to be caused by tension in the cooling lava of the pillow. Most of the fissures contain veins of calcite and quartz. Some fissures are unfilled. Axinite was only observed in the one case.

Mineralogy

The axinite is found as aggregates of poorly developed crystals, together with calcite and quartz (see fig. 1). It is grey-brown, with a glassy lustre, and has one direction of perfect cleavage; probably (100). The hardness is $6\frac{1}{2}$.

Only a few fragments of crystals were available for goniometrical measurements. As these measurements failed to identify the faces, two fragments were sectioned parallel to a face. The orientation of the refractive index ellipsoid was determined for each fragment on the universal stage and the results plotted on separate stereograms. The remaining three possible positions for the normal to the section, were constructed in each of the two stereographic projections. After rotating each of the stereographic projections to a position which allowed comparison with the projection of axinite (Peacock 1937), those normals were selected which coinsided with the normals to crystal faces. Peacock's projection of axinite was rotated so each of the selected normals occupied the centre in turn. The goniometrical measurements were plotted on stereograms with the normals to the faces parallel to which the sections were cut at the centre. It was then possible to give the correct indices

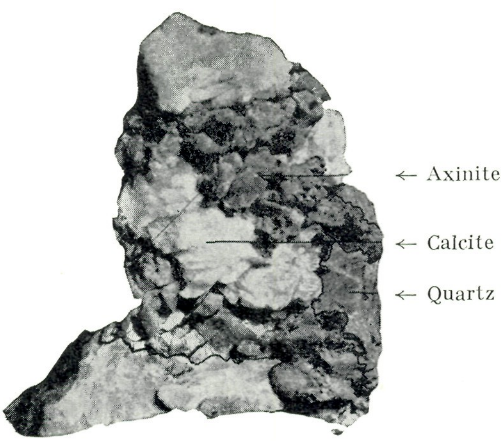

Fig. 1. Purely developed crystals of axinite together with calcite and quartz. Natural size. G.G.U. 52963.

to all the faces developed, including those parallel to the planes of the sections. For control, the angles were calculated in the reciprocal lattice (PEACOCK 1937) and compared with those calculated on the basis of the goniometrical measurements.

The following faces were identified:

Fragment no. 1 (fig. 2)
Thin section cut parallel to $(\bar{1}21)$.
(010)
(011)
$(\bar{1}10)$
$(\bar{1}11)$
$(\bar{1}21)$

Fragment no. 2 (fig. 3)
Thin section cut parallel to $(\bar{4}14)$.
$(\bar{1}\bar{1}3)$
$(\bar{2}11)$
$(\bar{4}14)$
$(32\bar{5})$

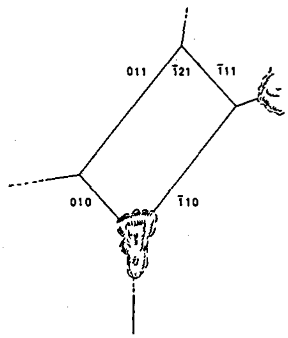

Fig. 2. Fragment no. 1. 10×natural size

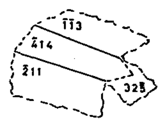

Fig. 3. Fragment no. 2. 2×natural size

Fig. 2 and 3, $\theta = 90°00'$ and $\theta = 9°28'$, using PEACOCKS stereographic orientation. Fragment 2, shows well developed pyramids with relative high indices.

The specific gravity as determined by hydrostatic weighing is 3.176 ± 0.001.

The optical examination was made on a powder preparation (−150+200 mesh). The mineral is colourless and without pleochroism. There is well developed cleavage in one direction and a subconchoidal fracture. In sections perpendicular to an optical axis, which are fairly common, a strong axial dispersion was seen $r \ll v$. Furthermore the orientation of the refractive index ellipsoid showed dispersion. The mineral is optically negative.

The principal indices of refraction were determined on a universal stage using the λ—T variation method with optical glass as internal standard (MICHEELSEN 1957).

Principal indices of refraction, for $\lambda = 5893$ Å

$$n\alpha = 1.674 \pm 0.001$$
$$n\beta = 1.680 \pm 0.001$$
$$n\gamma = 1.684 \pm 0.001$$
$$n\gamma - n\alpha = 0.010 \pm 0.001$$

$$2V\alpha \text{ measured} = 79° \pm 1°$$
$$2V\alpha \text{ calculated} = 80° \pm 5°$$

Chemistry

As the relationship between the principal indices of refraction and the relative proportion of Ca, Mg, Fe, and Mn given in the literature is variable a wet chemical analysis of these elements was carried out by B. I. BORGEN (Geological Survey of Greenland, Chemical Laboratory).

An X-ray fluorescence analysis was carried out by I. SØRENSEN (Mineralogical Museum of the University of Copenhagen). In the order of 1 % BaO, K_2O, and La_2O_3, approximately 0.1 % TiO_2, and traces of Zn, Sr, and Zr were found.
Results are given in table I.

Table I

	Wet chemical analysis	X-ray fluorescence analysis
CaO	19.70	
MgO	1.05	
FeO	7.58	
MnO	1.98	
Fe_2O_3	0.00	
BaO		~1
K_2O		~1
La_2O_3		~1
TiO_2		ca. 0.1
Zn		tr.
Sr		tr.
Zr		tr.

According to C. MILTON, F. A. HILDEBRAND and A. M. SHERWOOD 1953, the formula of axinite can be written:

$$H(Me)_3BAl_2Si_4O_{16}, \quad Z = 2$$

where $(Me)_3$ is a combination of Ca^{++}, Mg^{++}, Fe^{++}, Mn^{++}, Ba^{++}, K^+. The content of the unit cell for the Me_3 group was calculated from the chemical analysis, the specific gravity, and the volume of the unit cell (ITO and TAKEUCHI 1952). La and Ti are thought to substitute for Al and Si.
The results are given in table II.

Table II

	Content of the unit cell
Ca^{++}	3.80
Mg^{++}	0.28
Fe^{++}	1.14
Mn^{++}	0.30
Ba^{++}	0.07
K^+	0.39
total	5.98

The chemical and optical examinations shows that this particular axinite is fairly similar to those described from Jokioinen (SIMONEN and WIIK 1952), the main difference being that the Grænseland axinite has Mn $\geqq$ Mg.

X-ray

Guinier (Cu_{K_α}) photographs were taken by M. DANØ (Mineralogical Museum of the University of Copenhagen) of the Grænseland axinite and of a specimen from Bourg d'Oisans.
Sin_2 and d_{hkl} for the 5 strongest lines, in the range $d_{hkl} = 54.47$ Å to $d_{hkl} = 1.077$ Å are given in table III.

Table III

Axinite Grænseland Greenland			Axinite Bourg d'Oisans (the collection of Min. Mus., Copenhagen, no. 45)		
Int.	$\sin^2\theta$	d_{hkl}	Int.	$\sin^2\theta$	d_{hkl}
7	0.01469	6.35	7	0.01479	6.33
8	0.04967	3.46	8	0.04972	3.45
8	0.05967	3.15	8	0.05976	3.15
7	0.07111	2.888	9	0.07106	2.889
10	0.07536	2.806	10	0.07536	2.806

The intensity is given in a subjective scale from 1–10, 10 is the strongest line on the film, and 1 corresponds to the weakest observable. $d_{hkl} = 2.889$ is not found in axinite from Bourg d'Oisans but in manganoan axinite from Tinzens, Switzerland according to C. MILTON, F. A. HILDEBRAND, and A. M. SHERWOOD 1953 who used Debye-Scherrer powder cameras.

Petrological significance

Most occurrences of axinite have been described from contact metamorphosed calcareous sediments and contact aureoles of intrusive granites, where calcareous material has been involved. Axinite is rare in areas of regional metamorphism and where it is found it is in veins cutting amphibolitic rocks. Axinite has also been reported as vein material in spilites (KASPAR 1942 quoted in DEER, HOWIE and ZUSSMAN 1962).

The axinite described in this paper can not be a result of contact metamorphism of calcareous veins, as no younger dykes or other younger intrusives are present in the immediate neighbourhood. Contact metamorphism near the margins of the younger dykes and the interbanded gabbro sills is feeble. The axinite must therefore have been formed either immediately following the original solidification of the pillow-lavas or during a later regional metamorphism. In the first case it could be a result of metasomatic vein filling. The fact that no other pillows seem to contain axinite bearing fissures might suggest that the pillow in question was enriched in calcium, for example because of enclosed calcareous xenoliths, although no trace of these have been seen. If the axinite is a result of regional metamorphism it is hard to explain the extremely limited occurrence, unless the chemical conditions in this specific pillow were unusual.

Judging from the geological environment of axinites described from other localities this mineral is normally found under higher thermal conditions than those thought to have been present during the low grade greenschist facies metamorphism of the pillow-lavas.

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Omkring 70-året for Mineralogisk Museums opførelse på Østervold i København

Et lille tilbageblik ved et vejskel

Af

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Da professor G. FORCHHAMMER døde natten mellem den 14. og 15. december 1865 og den daværende overlærer ved akademiet i Sorø, Forchhammers tidligere assistent geologen FR. JOHNSTRUP (f. 1818) den 10. februar 1866 efterfulgte ham i professoratet, overtog den nye, snart midaldrende professor foruden andre vigtige og krævende opgaver det brydsomme arbejde med at skaffe Universitetets geologiske og mineralogiske samlinger en ny og tidssvarende bygning til erstatning for de gamle snævre lokaler i Kommunitetsbygningen på Nørregade over for Sankt Petri Kirke, hvor de havde haft til huse siden 1772, da professor M. TH. BRÜNNICH her fik indrettet Københavns Universitets »Naturaltheater«. Professor FORCHHAMMER havde i sin lange embedstid båret sin del af den voksende byrde ved at arbejde under utilfredsstillende ydre forhold og havde gjort et stort arbejde for at bane vej for et nyt museum. Selv oplevede FORCHHAMMER ikke disse planers virkeliggørelse. Hans efterfølger JOHNSTRUP, der i endnu højere grad kom til at føle det voksende tryk af de snævre og ligefrem arbejdshæmmende forhold i det gamle mineralogiske museum, skulle først som 70-årig opleve — efter 16–20 års ihærdige anstrængelser (Doktorselvbiografien 1894) — at der i 1888 bevilgedes de nødvendige pengemidler til opførelse af et nyt mineralogisk-geologisk museum i forbindelse med et kemisk universitetslaboratorium, den to-fløjede bygning Østervoldgade 5–7. Professor JONSTRUP havde håbet, at det nye museum kunne blive taget i brug i 1892; men af forskellige grunde forsinkedes arbejdet, og overførelsen af samlingerne fra Nørregade til Østervold kunne ikke foretages førend i vinteren 1892–93. Man forstår JOHNSTRUP's glæde ved omsider at have nået dette mål. Nu var der efter hans og datidens opfattelse tilvejebragt en museumsbygning af en sådan størrelse og rummelighed, at den — som professor JOHNSTRUP skriver — »for lange tider ville kunne tilfredsstille alle billige (d. v. s. rimelige) Krav«. Foruden plads til samlingerne, der nu kunne udstilles i store, lyse sale, var der i bygningen plads til nogle arbejdsværelser og laboratorier, omend målt med nutidens målestok i meget beskedent omfang, og der var i kælderetagen plads til geologerne, som arbejdede i den i 1888 oprettede »*Danske geologiske Undersøgelse*«, som man dengang sagde, der stod i nær tilknytning til Universitetet og havde professor JOHNSTRUP til øverste chef. Nu kunne »Undersøgelsen« (D.G.U.) flytte sin virksomhed fra den lejede 4-værelsers lejlighed i Sankt Pederstræde, hvis køkken var indrettet til et lille kemisk laboratorium. Derimod var der ikke tale om, at »*Dansk Geologisk Forening*«, der var blevet stiftet i januar 1893, kunne holde sine møder i det nye museum — hvad man i begyndelsen måske heller ikke har ønsket, da de unge, der sluttede sig sammen i »Foreningen«, jo netop ville stå frit over for den officielle geologi og frigøre sig fra ethvert uønsket formynderskab fra geologi-professorens side. Nu holdt »Foreningen« sine møder forskellige steder ude i byen, hvor det kunne foregå under kammeratlige og frie, selskabelige former. Netop medens det nye museum blev taget i brug, begyndte foreningen tillige sine ekskursioner. I pinsen 1894 blev den første længere ekskursion foretaget til Møn, der indtog en central plads i daværende museumsassistent V. Hintze's interesse. Nogle fotografier af Klinten, der blev taget på denne ekskursion, er nu, 70 år efter, indgået i Museets billedsamling fra Hintze's efterladenskaber, der var blevet henlagt i et skab i museets bibliotek sammen med Hintze's dagbøger fra hans Møn-undersøgelser og adskilligt andet arkivstof vedrørende Møn. Uafhængigt af universitetsgeologien i det nye museum begyndte Dansk geologisk Forening i 1894 udgivelsen af sine »*Meddelelser*«, der som nr. 1 bragte K. V. J. Steenstrup's afhandling »Om Klitternes Vandring«. Også dette skridt er et karakteristisk og betydningsfuldt træk i datidens danske geologiske »billede«.

Medens alt dette nye udfoldede sig, var professor Johnstrup en syg, ja dødsmærket mand, der måtte overlade ledelsen af indflytningen i det nye museum til yngre kræfter, især den unge polytekniker og mineralog N. V. Ussing, der skulle blive Johnstrup's efterfølger i professoratet. I sommeren 1893 lå Johnstrup længe syg, en tid på hospital. Om sygdommens art foreligger der, så vidt vides, ingen direkte oplysninger. Hvor svag og lidende professor Johnstrup var, medens det nye museum indrettedes, og han flyttede fra Nørregade til den nye, lyse embedsbolig på Østervold, får man et indtryk af ved at læse et brev, som han den 31. maj 1894 skrev til sin søster, fru Elisabeth Ammitzbøll på Klaks Mølle ved Horsens, og som bevares i privateje hos en slægtning, hr. Lars Ammitzbøll, der velvilligt har stillet det til rådighed. Johnstrup skriver:

Kjære Søster! Jeg har aldrig været stærk i Brevskrivning således som Du, og endnu mindre er det Tilfældet under min nuværende Sygdom, hvor jeg i Reglen enten ligger i Sengen eller på Sofaen og forlader denne kun, naar jeg skal møde ved Maaltiderne. Dette er Grunden til, at Marie [d. v. s. Johnstrup's frue] har paataget sig at bringe dig min Tak for alt, hvad du har sendt mig. Først og fremmest for dit mageløse Tilbud, at vi alle Mand skulde tilbringe nogen tid hos Eder. Du maa tro, at jeg inderlig gjerne vilde gaae ind paa et saadant Ophold i den frie Natur, som sikkert vilde bekomme mig vel, men Huslægen maa endnu bestandig i Forening med Marie hver Aften foretage en Udtømmelse og Udskylling, saa at jeg foreløbig ikke øiner nogen Mulighed for at kunne forlade Hjemmet. Naar Veiret er godt, varmt og ikke blæsende, kjøre vi i en Time til Toldboden langs Søerne eller ud paa Christianshavn [hvor Johnstrup's barndomshjem var], men mere end en Time kan jeg ikke være borte. ..... Mit Helbred gaar jo nok lidt fremad, men dog en Del op og ned. Det sidste er Tilfældet, når der støder den mindste Forkjølelse til. Kræfterne gaar ikke meget fremad, og Appetiten er omtrent ligesaa slet bevendt som, da Du besøgte mig paa Hospitalet. Kun behøver jeg nu ikke at mades, men kan spise selv......

..... Din hengivne Broder
Frederik.

Det blev ikke bedre med professor Johnstrup's helbred. Han nåede lige i sommeren 1894 at modtage æresdoktorgraden ved Københavns Universitet, og interesseret fulgte han omtrent lige til det sidste de forskellige arbejders gang, også museets indretning. Johnstrup oplevede ikke, at dette for første gang åbnedes for publikum den 29. december 1895, idet han døde den 31. december året før. Da var et nyt afsnit af Mineralogisk Museums historie i fuld udvikling.

At følge dette i enkeltheder er ikke på sin plads her. Kun skal der peges på, at den tidligt mærkbare pladsmangel har gjort sig mere og mere gældende, også — og ikke mindst på grund af den stærke udvikling, geologien har gennemløbet i Danmark siden Johnstrup's død. Ved det 5. Nordiske Geologmøde, der i 1951 afholdtes i København, kom professor Noe-Nygaard ind på dette og udtalte: »Universitetets Mineralogisk-Geologiske Institut, Mineralogisk Museum, blev indviet for ca. 60 år siden og er ikke noget særlig stort hus, men »hvor der er hjerterum, er der også husrum«, siger man. En gang tidligere har Østervoldgade ynglet ved knopskydning; dengang fødtes D.G.U., nu må G.G.U. startes«. Der tænktes her på den udvikling, der tog fart allerede straks efter professor Johnstrup's død, hvor N. V. Ussing ved sin tiltræden som professor redegjorde for sin opfattelse af »Danmarks Geologiske Undersøgelse« i dens stilling til Universitetet og geologien og til den virksomhed, som museet skulle være rammen om. Hver havde, efter Ussing's opfattelse, sine opgaver at varetage; men i museet var de 4 arbejdsrum, som Johnstrup indrømmede

Fig. 1. Fra udgravningen i Mineralogisk Museums gård i sommeren 1964. (PREBEN NIELSEN foto).

»Undersøgelsen« langtfra nok, og flere kunne ikke afgives. Så skiltes efterhånden D.G.U. og museet bygningsmæssigt.

Da »Grønlands Geologiske Undersøgelse«, som begyndte så småt med forarbejder i JOHNSTRUP's tid, tog fastere form og voksede sig større og større, blev det nødvendigt at skaffe plads til de mange medarbejdere ved en bedre udnyttelse af museets kapacitet. Det førte bl. a. til, at man blev klar over, at museets dårligt udnyttede tagetage kunne anvendes til indretning af arbejdsværelser; samtidig kunne der skaffes plads i kælderetagen til laboratorier, når folk, der arbejdede her, blev flyttet op i de nye loftsværelser, udtalte professor NOE-NYGAARD i 1951. I loftsetagen indrettedes bl. a. 15 arbejdsværelser, (taget i brug 1950) og i kælderen indrettedes en række laboratorier, ligesom pladsen udnyttedes på anden måde.

Men udviklingen gik videre. Når der ikke kunne skaffes plads inden for museet over jorden, blev der gået i dybden. Underkælderen blev i NOE-NYGAARD's tid udvidet ved et større udgravningsarbejde (færdig ca. 1959) og det hjalp foreløbig noget. Men det var ikke nok med disse nødforanstaltninger, og museets årsberetninger fra de senere år taler et tydeligt sprog om situationens uholdbarhed. I museumsgården måtte der opstilles en lidet flatterende træbarak med nogle få arbejdsværelser og undervisningsrum, og medens det af Undervisningsministeriet (januar 1960) nedsatte »Museumsudvalg« arbejdede med planer om den mulige virkeliggørelse af en bygningsmæssig fælles ramme om »Universitetets geologisk-mineralogiske Institut og Museum«, »Danmarks geologiske Undersøgelse« og »Grønlands geologiske Undersøgelse«, blev det muligt som en foreløbig løsning at inddrage den ledigblevne kemikerfløj til geologisk-mineralogisk brug for Universitetet ligesom også den hidtidige professorbolig, der blev ledig ved professor NOE-NYGAARD's flytning til æresboligen »Lundehave« ved Helsingør, inddroges i museumskomplekset. Indretning af kemikerfløjen med de nødvendige ændringer er nu i fuld gang. Og i sommeren 1964 — halvfjersåret for Østervoldmuseets åbning for offentligheden — bliver der desuden arbejdet »i dybden« i museumsgården, hvor barakken er fjernet, for at skaffe plads. Et foreløbigt sidste led i udviklingen inden for det museum, som den dødssyge professor JOHNSTRUP oplevede at se rejse sig i begyndelsen af 1890'erne, virkeliggøres for øjnene af de mange yngre og ældre geologer, danske såvel som til »Grønlands geologiske Undersøgelse« knyttede udlændinge, der har afløst de meget få, der for 70 år siden arbejdede med geologi i datidens museum. Dette var dengang et meget stille sted, sammenlignet med nutidens »Geologisk-mineralogiske Institut, Mineralogisk Museum«. Som et kontinuiteten bevarende minde om MOLTKE'rnes store donation i 1810 betegnes Museet endnu officielt som »Grev MOLTKE's, Universitetet tilhørende Museum«.