

Mindre Meddelelser.

Marine Lias in Jutland.

(A preliminary notice).

By

Aksel Nørvang.

Owing to the scarcity of deep test wells in Denmark the subsurface is very little known and sediments of Jurassic age have not hitherto been identified in the Mesozoic of Denmark proper. For that reason the occurrence of marine Lias in one of the salt test wells made by DANISH AMERICAN PROSPECTING Co. is of particular interest. The well is situated near the village of Vejrum, between Holstebro and Struer, about half a kilometer west of the main road between those two towns. Elevation 118' (36 m) above sea level.

The log of the well (DANMARKS GEOLOGISKE UNDERSØGELSE¹) well file No 64.233.) runs as follows:

Quaternary	0'	(0 m)	—	234'	(71,3 m)	Sand and gravel.
Maestrichtian	234'	(71,3 m)	—	642'	(195,7 m)	White chalk.
Campanian	642'	(195,7 m)	—	686'	(209,1 m)	White chalk.
Santonian	686'	(209,1 m)	—	726'	(221,3 m)	White chalk.
Uncertain	726'	(221,3 m)	—	742'	(226,2 m)	Grey shale.
Lias	742'	(226,2 m)	—	776'	(236,5 m)	Grey shale.
Cap rock	776'	(236,5 m)	—	806'	(245,7 m)	Gypsum.
				806'	(245,7 m)	—1517' (462,4 m) Rock salt.

The Glacial deposits are only known from ditch samples and according to these seem to consist only of medium to coarse grained sand with a varying content of gravel.

The Upper Cretaceous beds (Maestrichtian, Campanian and Santonian) consist wholly of white chalk, which is mostly very soft, though harder beds occur. The soft chalk is very friable and becomes plastic when ground up and then appears as a white, sticky clay, rich in lime. Flint was not found in any of the cores, but as a small piece of dark colored flint was observed in the cavings in one of the cores a small amount must be present in the upper part of the chalk. Thin streaks of clay occur sparsely in the chalk.

¹) Geological Survey of Denmark.

According to the foraminiferal content the white chalk can be subdivided into three zones, viz. 1) the zone down to 642' containing *Palmula reticulata* REUSS and *Pseudovalvulineria gracilis* (MARSSON), 2) a zone characterized by the abundant occurrence of *Reussella pseudospinulosa* TROELSEN and 3) a zone characterized by the abundant occurrence of *Globotruncana ventricosa* WHITE and *Globotruncana linneana* d'ORBIGNY. These three zones coincide with the subdivision made by BROTZEN (1945) in the Höllviken wells and for this reason the beds are referred to Maestrichtian, Campanian and Santonian, respectively. No lithologic difference between the various beds has been observed and the subdivision is entirely based on the content of foraminifera.

The beds below the Upper Cretaceous consist of dark grey, very plastic, sticky, slightly calcareous shale. The residue after washing consists of lumps of clay (consolidated by calcite or dolomite), shell fragments, and other fossils (often as casts of pyrite), foraminifera, a little pyrite, and a greater or lesser amount of colorless minerals, mostly calcite and celestite. Sand grains occur sparsely but in the lower part of the shale a little quartz occurs in the form of finely developed euhedra. Furthermore dolomite occurs in this interval in place of calcite.

The foraminiferal fauna in the grey shale above 742' is entirely different from the fauna below this depth. The fauna above 742' needs further study but shows in some respects relationships to Lower Cretaceous faunas.

In the fauna below 742', however, occur *Marginulina prima* d'ORBIGNY and *Fronicularia tenera* (BORNEMANN). The occurrence of these forms shows without any doubt that the beds have to be placed in the Lower or Middle Lias, and the presence of *Astacolus inaequistriata* (TERQUEM) in the lowest part of the beds restrict these to the upper part of Lias *a*. Whether parts of the beds above the *Astacolus inaequistriata* beds can be referred to younger parts of the Lias still needs further study.

The cap rock from 772'—806' consists of light to dark grey gypsum with insignificant beds of anhydrite. Anhydrite is furthermore found as tiny crystals embedded in the gypsum.

The rock salt is medium to coarse grained. The grain size, however, varies much and crystals of several centimeters are occasionally found. The salt is very pure apart from the rare occurrence of thin streaks of anhydrite.

The occurrence of marine Lias above the salt is an interesting fact, although it is not certain whether the beds are in place or were dragged to their present position during the formation of the salt dome. Unfortunately, Lias has not been identified in the other wells drilled, but it is to be hoped that these beds will be found in another well, so more samples can be obtained, especially of the grey shale above 742'.

I want to express my appreciation to Mr. ALBERT GREGERSEN and Mr. C. W. FLAGLER, DANISH AMERICAN PROSPECTING Co. for permission to publish these results.

DANISH AMERICAN PROSPECTING Co.

Geological Laboratory, Viborg.

LITERATURE

- BARTENSTEIN, H. & E. BRAND 1937: Mikro-paläontologische Untersuchungen zur Stratigraphie des nordwest-deutschen Lias und Doggers. Abhandl. Senckenberg. Naturforsch. Gesellschaft Abhandl. 439. Frankfurt a. M.
- BROTZEN, F. 1936: Foraminiferen aus dem schwedischen untersten Senon von Eriksdal in Schonen. Sveriges Geologiska Undersökning, Ser. C, No. 396. Årsbok 30, No. 3. Stockholm.
- 1945: De geologiska resultaten från borringarna vid Höllviken. Sveriges Geologiska Undersökning, Ser. C, No. 465. Årsbok 38, No. 7. Stockholm.
- EGGER, J. G. 1899: Foraminiferen und Ostracoden aus den Kreidemergeln der Oberbayerischen Alpen. Abhandl. königl. bayerischen Akademie d. Wissenschaften. Math-phys. Classe. Bd. XXI, Abth. I, München.
- EICHENBERG, W. 1932: Der stratigraphische Wert der Foraminiferen der Unterkreide im nordwestdeutschen Erdölbecken. 24. Jahresbericht d. Niedersächsischen geologischen Vereins. Hannover.
- FRANKE, A. 1928: Die Foraminiferen der Oberen Kreide Nord- und Mitteldeutschlands. Abhandl. Preuss. Geol. Landesanstalt. Neue Folge, Heft 111. Berlin.
- 1936: Die Foraminiferen des deutschen Lias. Abhandl. Preuss. Geol. Landesanstalt. Neue Folge. Heft 169. Berlin.
- HECHT, F. E. 1938: Standard-Gliederung der Nordwest-deutschen Unterkreide nach Foraminiferen. Abhandl. Senckenberg. Naturforsch. Gesellschaft. Abhandl. 443. Frankfurt a. M.
- MARSSON, TH. 1878: Die Foraminiferen der weissen Schreibkreide der Insel Rügen. 10. Jahrgang. Greifswald.
- TROELSEN, J. 1937: Om den stratigrafiske Inddeling af Skrivekridtet i Danmark. Medd. Dansk Geol. Foren., Bd. 9, Hf. 2. København.
- WICHER, C. A. 1938: Mikrofaunen aus Jura und Kreide. 1. Teil: Lias α — ε . Abhandl. Preuss. Geol. Landesanstalt. Neue Folge, Heft 193. Berlin.
- 1942: Praktikum der angewandten Mikropaläontologie. Verlag von Gebrüder Borntraeger. Berlin — Zehlendorf.