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By
Ole Bruun Christensen

Dansk sammendrag

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fra purbeck-wealden aflejringerne
på Bornholm

I kommission hos
C. A. REITZELS FORLAG (JØRGEN SANDAL)
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PREFACE

It was originally indicated by HELGE GRY (1956, p. 139) that a closer examination of the ostracods and their stratigraphical relations in the Purbeck-Wealden beds of Bornholm perhaps might aid in solving some of the stratigraphical problems of these beds.

For use during my studies at Geologiska Institutet of the University of Stockholm in the spring of 1961 State Geologist HELGE GRY Ph.D. kindly left me his ostracod material from Bornholm. For this and for kind advice and guidance I am much obliged to Dr. GRY.

In this connection I also want to express my gratitude to Professor IVAR HESSLAND Ph.D., and Docent RICHARD A. REYMENT Ph.D. Stockholm, for their arrangement and instructions during my stay at Geologiska Institutet and for instructive excursions. My sojourn in Stockholm for purposes of study was made possible by a grant from CARLSEN-LANGES LEGATSTIFTELSE, Gammel Kjøgegaard, Køge.

I have been allowed to carry out part of the work white on duty at the Geological Survey of Denmark. For this I thank Dr. HILMAR ØDUM, Director of the Geological Survey.

Last but not least I thank Mr. CHR. WESTERGAARD for producing the photographs, Mrs. RIGMOR BORG for the drawing of maps and diagrams, Mr. NIELS HAISLUND, M.A. and professor TH. SORGENFREI Ph.D. for perusing and correcting my English manuscript.

Copenhagen, December 17, 1962. OLE BRUUN CHRISTENSEN

CONTENTS

ABSTRACT

An account of the Purbeck-Wealden beds in Bornholm and a brief summary of similar beds in the Scanian-Pomeranian area are given.

Two faunas are described from the Jydegaard Formation. A *Cypridea*-fauna is correlated with Wealden 3 in Northwest Germany. It is followed by an ostracod-assemblage, known from Northwest Germany, indicating brackish-marine environments corresponding to Wealden 3 or 4 of the German subdivision. Two new ostracod species are described.

Two other faunas have moreover been identified, a brackish one in the Rabekke Formation and a brackish-marine one in the inlier at Salene. The former contains elements suggesting a Middle Purbeck age.

I. INTRODUCTION

In a paper of 1956 H. GRY has given an account of his investigations of the Purbeck-Wealden deposits on Bornholm, which will be briefly summarized below. Later the group of deposits has been divided into the following three formations (GRY 1960, p. 7):

(Top) The Jydegaard Formation,
The Robbedale Formation and
(Base) The Rabekke Formation.

Because of faulting after Lower Senonian time and subsequent erosion the Purbeck-Wealden beds occur in various disconnected areas (text fig. 1).

The Nyker area is formed by a major block with a dip of 7–7½° SW., and various small blocks. Exposures are found at Kyndegaard and Jydegaard.

Immediately south of the Nyker area the block of Knudsker is situated. The Purbeck-Wealden beds on it have a dip of 5–7°.

The Purbeck-Wealden beds of the block of Robbedale – Sose are underlain by Lower Jurassic beds. The dip of the beds is 8½–10° SW. Minimum dip is found on the southeastern part of the block.

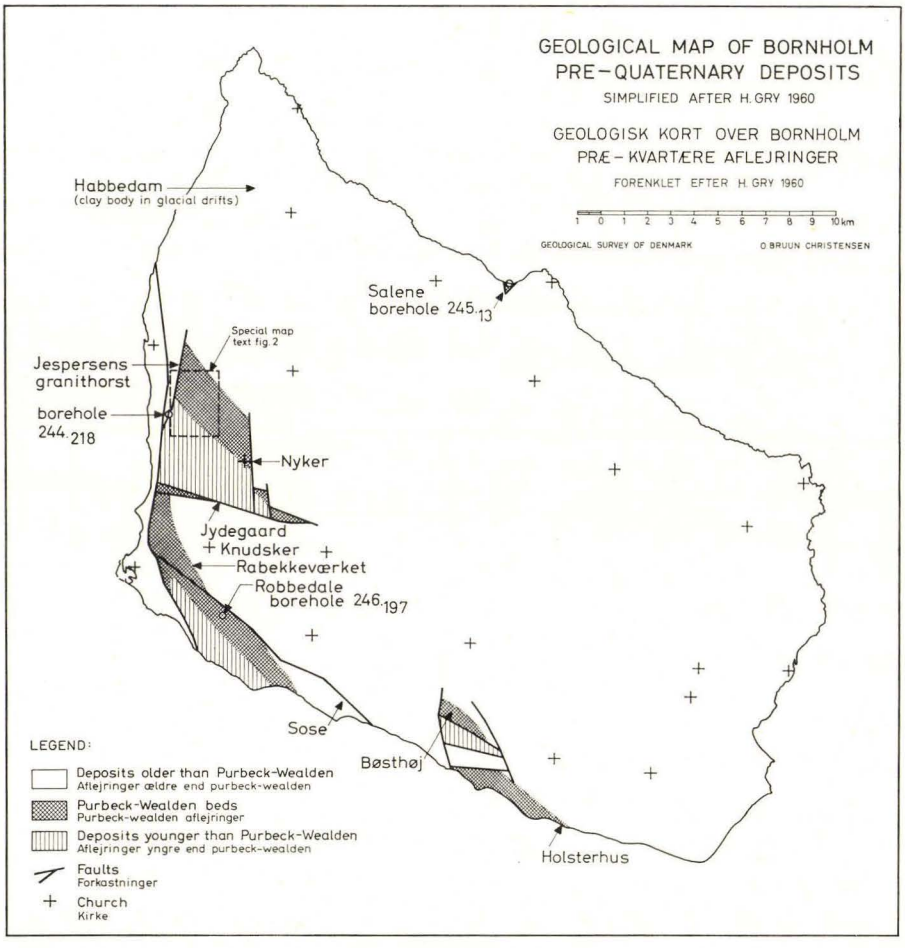
Other areas with Purbeck-Wealden beds are the area of Bøsthøj, where the Jydegaard Formation seems to be absent, and the area of Holsterhus. At Salene on the northeast coast of Bornholm there is a small inlier with Purbeck-Wealden beds.

Sediments.

The Rabekke Formation (GRY 1956, 1960).

The Rabekke Formation is unconformably deposited on partly kaolinized bedrock and older sediments. The formation is characteristic by its content of spherosiderite. It is subdivided into two members.

The basal member is fluviatile and consists of gravelly sand and sandstone. It is badly sorted, contains kaolin, and is derived from coarse detritus of a granitic bedrock surface. The thickness of the member varies rather much in accordance with the morphology of the surface of the accumulation. It may increase to about 30 metres towards the south-west. In some places dark,



Text fig. 1.

carbonaceous clay, and soil sections with fossil rootlets have developed in the upper part.

The upper member of the Rabekke Formation is 10–80 metres thick. It consists of sticky, green, and dark-grey limnic clays with soil sections and 1 or 2 beds of red variegated clay, which have been interpreted as weathering layers by GRY.

The Robbedale Formation (GRY 1956, 1960).

The Robbedale Formation consists of rather pure quartz sand and fine gravel. On the type locality in the Robbedale-Sose block (Robbedale Gravel Pit) the Robbedale Formation may be subdivided into two members. In other areas boreholes display another lithological development.

The lower member is the so-called "Ormesand" ("Worm sand"). It is light-coloured, fine sand with vertical, irregular tubes with dark walls (worm? tubes). Maximum thickness is about 12 m.

The upper member has been named "Robbedalegrus" ("Robbedale gravel"). Its thickness is about 28 m. It is a coarse grained, littoral sand occasionally with worm? tubes.

The Jydegaard Formation (GRY 1956, 1960).

This formation is the uppermost one in the Purbeck-Wealden sequence, and is defined as stratified clays and sands, partly coarse grained, with chamosite-oolite.

The formation may attain a thickness of 100 metres and chiefly consists of grey clay with beds of silt, sand, gravel, and clay-ironstone.

The Purbeck-Wealden beds are unconformably overlain by the basal conglomerate of the Arnager greensand from the Cenomanian.

Salene (GRY 1956).

In this small inlier there are steeply dipping beds of sandstone with kaolin-like clay, together with darkish grey and greenish clays. The latter are very similar to the other clays from the Purbeck-Wealden beds.

Fossils.

Macrofossils.

In 1910 BARTHOLIN demonstrated the presence of elements of a Wealden flora in Bornholm. The conclusive demonstration of Wealden was undertaken by MALLING (1920, p. 57) on the basis of his large collections of fossils from Bornholm. On the basis of MALLING's determinations and his own investigations GRY (1956, p. 138) stated the presence of *Dreissensia membranacea* DUNKER and *Unio planus* ROEMER in the Jydegaard Formation, and *Estheria* sp., *Cyclas media* FITTON and *Cyrena* sp. sp. in the Rabekke Formation.

Ostracods.

In the paper from 1956 GRY mentions the presence of ostracods in the Jydegaard Formation, the Rabekke Formation, and the sediments at Salene. GRY identified the following ostracods:

Darwinula leguminella FORBES
Cyprione oblonga JONES
Cyprideis polita MARTIN
Cypridea parallela MARTIN
Klieana alata MARTIN
Cypridea sp.

The four first-mentioned ostracods were found in the Jydegaard Formation, *Cyprideis polita* MARTIN, 1940 (= *Fabanella polita* (MARTIN, 1961) = *Neocytheridea bononiensis* (JONES, 1882)) was furthermore found in the sediments at Salene, while the two last-mentioned ostracods are from the Rabekke Formation. In consequence of the presence of *Cypridea parallela* MARTIN, GRY correlated the sediments from the Jydegaard Formation biostratigraphically with Wealden 4 and 5 as defined in Northwest Germany. It was furthermore stated by GRY that the Rabekke Formation containing *Klieana alata* MARTIN might correspond to Wealden 3, but might be older as well. Since no unconformity had been found, GRY was of the opinion (1956, p. 138) that there was hardly any reason to suppose a great interval of time between the depositions of the Jydegaard Formation and the Rabekke Formation.

On the basis of recent literature and not least in consequence of extensive sortings providing more well preserved material, it can be demonstrated that the *Cypridea*-material from the Jydegaard Formation identified by GRY does not belong to *Cypridea parallela* MARTIN but to *Cypridea alta formosa* WOLBURG.

II. PURBECK-WEALDEN BEDS OUTSIDE BORNHOLM

Apart from having been correlated biostratigraphically with the two classic Purbeck-Wealden sedimentation-areas in South England-Northern France and Northwest Germany-the Netherlands, the Purbeck-Wealden beds on Bornholm have also been compared with the surrounding sedimentation-areas with related beds. Such areas are present in Scania and in Northern Poland. Particularly the beds in Pomerania seem to be of importance for the understanding of the development of Purbeck-Wealden in the Scanian-Pomeranian area.

Northern Poland.

The Upper Jurassic of Pomerania is of great significance in subdividing the Malm of the Baltic regions. The usually very calcareous sediments are particularly well known from Western Pomerania in the Danish-Polish trough, and may be found as erratics in Bornholm (GRÖNWALL & MILTHERS, 1916, pp. 190–191). In Kimmeridge time there may have been a marine connection with the basin in Northern Jutland (GREGERSEN & SORGENFREI, 1951). At the end of Upper Kimmeridgian time slight orogenic movements took place, and the sediments in Northwestern Pomerania suggest that the sea became shallow, and that several islands were formed (WILCZYNSKI, 1962). The sediments from Kimmeridgian age are superposed by Bononian beds, which gradually came to contain Volgian ammonites. After a slight dredging the sea became shallower again in Western Pomerania during Upper Bononian time, and small isolated shallow basins were formed during the Purbeckian. They gradually developed into freshwater areas (WILCZYNSKI, 1962).

Wealden beds are found in the northwestern part of Poland in the Danish-Polish depression. The beds are of subordinate thickness and are preserved only locally. The superposed Valanginian beds like the Purbeck beds in Northwestern Poland are considerably thinner than farther southward in Central Poland (BIELECKA, 1960; POZARYSKI, 1960; JASKOWIAK, 1962).

The ostracod fauna from the Purbeck-Wealden beds in Northwestern Poland reminds very much of faunas from similar beds in Northwestern Europe. WICHER, who had an opportunity to study Wealden ostracods from Eastern

Germany (Stettin) and Poland did not recognize significant deviations from the ostracod fauna of Northwestern Germany (WICHER, 1957).

After the war a number of stratigraphical papers on Purbeck-Wealden microfossils from deep borings in Northwestern and Central Poland have been published (BIELECKA & POZARYSKA, 1954; BIELECKA & DABROWSKA, 1958; BIELECKA, 1959, 1960; SZTEJN, 1957, 1960). In Northern Poland the following microfossils are known from Purbeck beds (BIELECKA, 1960): *Cypris purbeckensis* FORBES, *Metacypris forbesii* JONES, *Klieana alata* MARTIN, *Cypridea inversa* MARTIN, *C. sowerbyi* MARTIN, *Ilyocypris jurassica* MARTIN, *Eoguttulina liassica* (STRICKL.), *Lenticulina* ex. gr. *münsteri* (ROEMER), *L. varians* (BORN.), and *Spirillina orbicula* (TERQ. & BERTH.).

From Northwestern Poland a number of microfaunules are known from Wealden (Infravalanginian) deposits, which, according to SZTEJN (1960) contain *Klieana alata* MARTIN, *Klieana? polonica* SZTEJN, *Cypridea nitidula* PECK, *Cyprideis polita* MARTIN and several species of *Ammobaculites*, and *Haplocytheridea kummi* (TRIEBEL). The Infravalanginian fauna grades into the Valanginian fauna without any distinct boundary. It appears from the fossil table of SZTEJN that *Klieana alata* MARTIN and *Klieana? polonica* SZTEJN alone compose an independent association in the lower part of the Infravalanginian of Northwestern Poland.

Scania.

Sediments of Upper Jurassic Age have been described from a number of boreholes and from the exposure at Fyleverken in South Scania. H.-J. OERTLI, F. BROTZEN, and H. BARTENSTEIN have recently (1961) contributed to our knowledge of these sediments and described a microfauna from the beds in question. Steeply dipping Upper and Middle Jurassic beds have been described from the pit of Fyleverken (OERTLI, BROTZEN & BARTENSTEIN, 1961, p. 7):

"(vom hangenden ins Liegende)

1. Grüne und bunte Tone..... etwa 80 m mächtig
2. Glassand..... – 100 m –
3. Dunkle Sande mit Ton und Kohle-Lagen – 85 m –
4. Kohle-Lagen und dunkle Tone..... – 3 m –
5. Graue Basalsande..... – 5 m ? – "

From stratum No. 1 and from corresponding strata in a borehole near Landskrona a brackish-marine Upper Jurassic microfauna has been described. It contains *Ilyocypris jurassica spinosa* MARTIN, *Klieana* sp. sp. *1*, *2*, and *3*, *Cytherideinarum* sp., *Amphicythere* sp., *Schuleridea* sp., *Eocytheropteron* sp., *Macrodentina* sp., *Polydentina?* sp. and representatives of the foraminiferal genera *Ammodiscus* and *Eoguttulina*. On the basis of this fauna the green clay was correlated with the "Serpulit" in Northwestern Germany (approximately

Middle Purbeckian according to the English classification) (OERTLI, BROTZEN & BARTENSTEIN, 1961).

I take this opportunity to state, that in a sample of the green clay from the pit of Fyleverken close to strata containing the above mentioned microfauna, I have collected a great number of charophyte gyrogonites. This find corroborates the assumption that parts of this sediment are deposited in limnic or slightly brackish environments.

III. STRATIGRAPHICAL INVESTIGATIONS

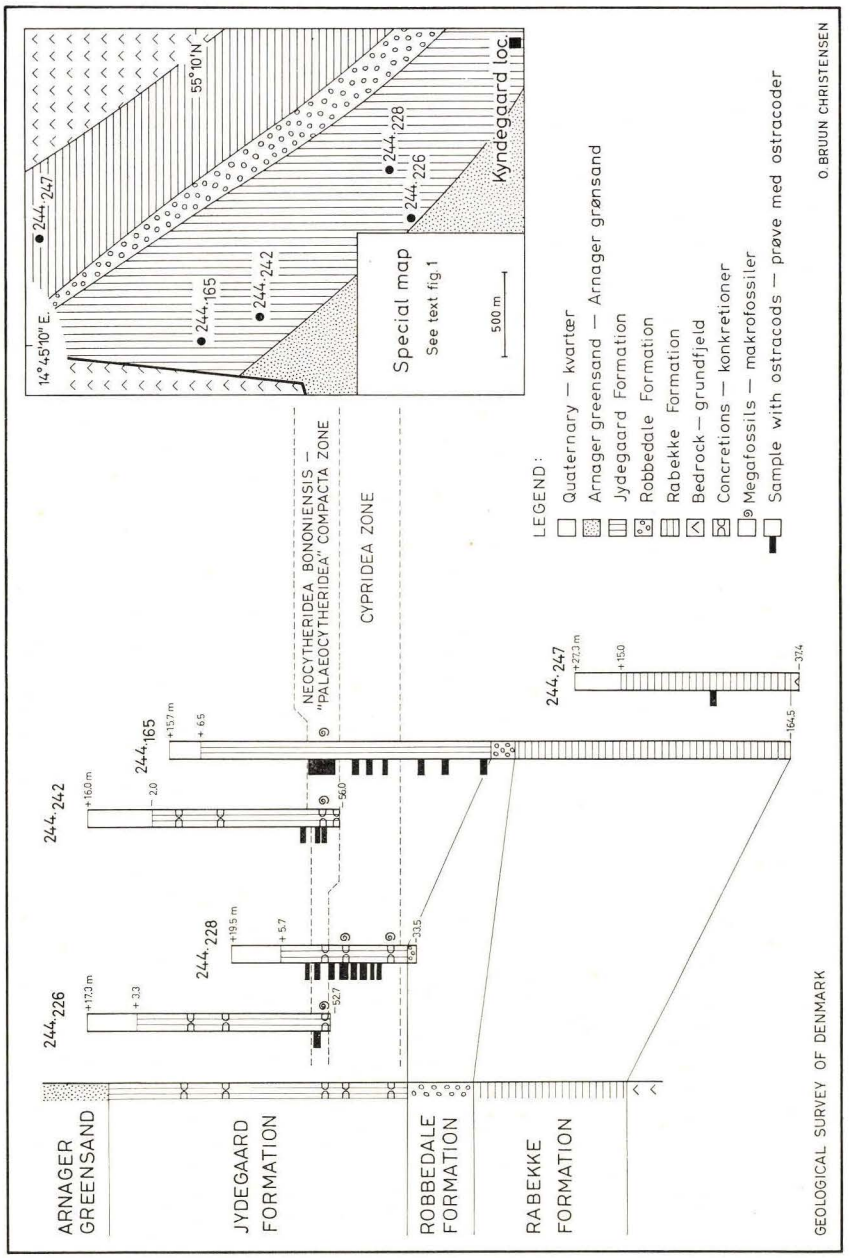
Material.

The ostracod material investigated mainly originates from boreholes and exposures in the Nyker area. Furthermore, there are materials from a borehole in the Robbedale-Sose area and from a borehole at Salene. The location of the borings and exposures are shown on text figs. 1 and 2, where the borings are indicated by D.G.U. File Nos. Descriptions of the exposures Jydegaard and Kyndegaard are found in GRY, 1956 (pp. 134–136) and in GRÖNWALL & MILTHERS, 1916, (pp. 120–121) respectively.

A statement of the quantitative analysis of the ostracod material will only be profitable in a few cases. Counting is complicated because the valve material usually is much broken, and in some cases there are traces of phenomena of disintegration. Many samples are ditch samples, but they are collected in such a way that contamination from other levels is negligible. From Borings Nos. 244.165 and 244.247 exclusively core samples are examined.

The fossiliferous horizons with ostracods, vertebrate remains, and, possibly, foraminifera, from which the samples originate, are rather thin and often marked by the presence of molluscan fragments. The horizons are not present in particularly large numbers, but they are generally accumulated in special intervals, while other parts of the sediments seem to be barren of the above-mentioned microfossils.

Not only do the fossiliferous horizons apparently be thin, but they often lie so closely that several "populations" can be observed in one and the same sample. This appears not only from the relations between the condition of preservation of the valves and their ontogenesis in the individual samples (see remarks under *Darwinula leguminella* (FORBES) in the descriptive text, p. 23), but also from comparisons between the single faunal elements some of which having marine affinities can be found together with elements of limnic affinities. Some deviations of the fauna compositions between bore samples and samples from the Jydegaard exposure (see following description of the Jydegaard Formation) may be due to mixing in some bore samples of ostracod assemblages from relative closely lying horizons with different ostracod assemblages developed during oscillations of different environments.



Text fig. 2. Some borings from the Nyker block. The drilled sections are correlated on the basis of H. GRY's lithological subdivision. The graphic logs do not indicate any lithological details except for some pronounced horizons of clay-ironstone.

The Rabekke Formation.

Only three samples with ostracods were found in the Rabekke Formation. They originate from two borings: D.G.U. File No. 246.197 from the block of Robbedale – Sose and No. 244.247 from the area of Nyker.

Boring No. 244.247, core sample from 39.55–39.76 m. contains a very rich fauna of *Klieana alata* MARTIN besides fragments of *Cypridea* (*Ulwellia*) aff. *inversa inversa* MARTIN and a few unidentified fragments of ostracods. Samples from 19 m. and 19.5 m. from borings No. 246.197 contain some valves of *Klieana alata* MARTIN, *Cypridea* (*Cypridea?*) sp. (*148*) and a few unidentified fragments.

A correlation with the classic Purbeck-Wealden regions is very uncertain, but the discovery of *Cypridea* (*Ulwellia*) aff. *inversa inversa* MARTIN suggests relationships with the "Serpulit" (Middle Purbeck according to the English classification) rather than with the Wealden sensu stricto.

It should be noted, that *Klieana alata* MARTIN occurs in such large quantities, that it nearly forms a monotypical faunal-association comparable with the association of the Lower Infravalanginian in Northern Poland (p. 14 and SZTEJN, 1960).

The Jydegaard Formation.

Ostracod-bearing horizons are to be found in the lower parts of the Jydegaard Formation and are only known from the Nyker area.

In the lowermost horizons *Darwinula leguminella* (FORBES) has been found. Above this stratum follows a 10–12 metres thick zone with numerous fossiliferous horizons, which as a whole are characterized by containing *Cypridea* (*Cypridea*) *alta formosa* WOLBURG, *C.* (*Cypridea*) cf. *propunctata* SYLV-BRADL., *Darwinula leguminella* (FORBES), *D. oblonga* (ROEMER), *Neocytheridea bononiensis bononiensis* (JONES), *Limnocythere? groenwalli* n.sp., *Paracyprideis subparallela* WOLBURG, and *P. jydegaardensis* n.sp. Furthermore single specimens of *Clinocypris* sp. (*126*), *Metacytheropteron* sp. (*132b.*), indet. gen. et sp. (*153*), and *Cypridea* (*Ulwellia*) cf. *menevensis* ANDERSON were found.

Few metres above this zone two or more horizons follow, in which as a rule there are only two species of ostracods, viz. *Neocytheridea bononiensis bononiensis* (JONES) and *Palaeocytheridea? compacta* WOLBURG. *Neocytheridea bononiensis bononiensis* (JONES) is present in large quantities and entirely dominates over *P.? compacta* WOLBURG. In a single sample immediately above this ditypical fauna, a single specimen of *Darwinula* sp. (*144*) was found.

The above-mentioned faunistic development with a lower 10–12 metres thick *Cypridea* Zone, superposed by the less thick *Neocytheridea bononiensis* – "*Palaeocytheridea*" *compacta* Zone, has been identified in borings Nos. 244.165 and 244.228. In borings Nos. 244.226 and 244.242 on the other hand, there

exist only samples from the *Neocytheridea bononiensis* – "*Palaeocytheridea*" *compacta* Zone, as these borings either stopped in this zone or barely penetrated it.

From collections carried out by GRÖNWALL in 1899 in the exposure at Kyndegaard only *Neocytheridea bononiensis bononiensis* (JONES) is present, and it can accordingly be assumed that the sample has been collected in the *Neocytheridea bononiensis* – "*Palaeocytheridea*" *compacta* Zone.

In the Jydegaard exposure assemblages with *C.* (*Cypridea*) *alta formosa* WOLBURG, *Darwinula leguminella* (FORBES), and *D. oblonga* (ROEMER) are found in samples from sediments of different composition. In one sample only *Limnocythere? groenwalli* n.sp. occurred.

From green sticky clay with shell remains and without ostracods at 17.1 m. in boring No. 244.218 I have collected a foraminiferal fauna composed of *Haplophragmoides*? sp. sp. and *Eoguttulina* sp., which indicate brackish-marine environments. The 18 m. deep boring is drilled close to or perhaps within the western fault zone of the Nyker block in the vicinity of Jespersen's Granithorst. The situation in a dislocated area implies that the reference of this fauna to the Jydegaard Formation is rather uncertain.

The *Neocytheridea bononiensis* – "*Palaeocytheridea*" *compacta* – assemblage is also known from the Wealden areas in Northwestern Germany and the Netherlands (Tafel 13 Fauna B, MARTIN, 1961b: "Ziemlich monotypische Fauna mit *Fabanella polita polita* (MARTIN) und *Ostracode* WOLBURG *G 31*"). (*F. polita* (MARTIN) = *N. bononiensis* (JONES) and *Ostracode* WOLBURG *G 31* = *P.? compacta* WOLBURG). It constitutes one of "drei verschiedenen Lagen aus dem marinen Wealden 4", and some of the other faunas in this strata show that *P.? compacta* WOLBURG is associated with more or less brackish water also in this fauna. The faunistic development from the *Cypridea* Zone to the *Neocytheridea bononiensis* – "*Palaeocytheridea*" *compacta* Zone thus suggest a change from a limnic or slightly brackish to a more brackish (brackish-marine?) environment.

Because of the presence of *Cypridea* (*Cypridea*) *alta formosa* WOLBURG, *C.* (*Cypridea*) cf. *propunctata* SYLV.-BRADL. *Palaeocytheridea*? *compacta* WOLBURG and *Paracyprideis subparellela* WOLBURG a comparison with the Wealden area in Northwestern Germany may result in the conclusion that at least the lower part of the Jydegaard Formation biostratigraphically must be correlated with Wealden 3 (including the passage between Upper Purbeck and Wealden Beds according to the English classification). *C.* (*Cypridea*) *propunctata* SYLV.-BRADL. does usually not occur in Northwestern Germany (see the description of species p. 30), but closely related species do. These have in lateral aspects a triangular outline and distinctly marked anterior cardinal angles. Species with these features occur almost solely in the lower Wealden 3 in Northwestern Germany (WOLBURG 1959, S. 234).

It is remarkable that the development of the sulcus (notch) in the *Cypridea*

species from Bornholm is mostly accompanied by a circular depression into the valve behind the rostrum (beak). The development of the sulcus in the Northwest German *Cypridea*-species, on the other hand, seems generally to be followed by an elongated depression.

The Salene Area.

The ostracod fauna from boring No. 245.13 in the area of Salene differs from the above-mentioned faunas of the Jydegaard Formation as well as those of the Rabekke Formation.

On the basis of three samples from the boring mentioned above it can be stated that the fauna consists of *Neocytheridea bononiensis bononiensis* (JONES), *Galliaecytheridea* sp. (*152*) and *Orthonotacythere* sp. (*133*). Moreover a few specimens of *Scabriculocypris?* sp. (*127*), *Klieana* sp. (*145*), *Eucypris* sp. (*146*), and *Palaeocytheridella* sp. (*151*) have been found. Various fragments are interpreted as remains of "*Gomphocythere*" sp. (= ? *Bisulcocypris*). The ostracod fauna indicates a clearly brackish-marine environment, and specimens of foraminifera such as *Haplophragmoides* sp. confirm this. The collected fish remains include bones, teeth, and a few otoliths.

In a sample from a large erratic clay body from Habbedam I have found the fauna with *Neocytheridea bononiensis bononiensis* (JONES), *Galliaecytheridea* sp. (*152*), and *Orthonotacythere* sp. (*133*), and in addition a valve of *Limnocythere*? *groenwalli* n.sp.

The ostracod material from these beds is very sparse and fragmentary in spite of extensive search in the samples, but on the basis of the collected fragments the fauna seems to be fairly rich in species. There is no doubt that the faunas originates from Purbeck-Wealden beds.

IV. DESCRIPTION OF SPECIES

FAMILIA DARWINULIDAE BRADY & NORMAN, 1889
GENUS DARWINULA BRADY & ROBERTSON, 1885

Darwinula leguminella (Forbes, 1855)

Text figs. 3, 4b; Plate II figs. 2a–c.

1855 *Cypris leguminella* FORBES in LYELL, p. 294, fig. 334c.
1885 *Darwinula leguminella* (FORBES) – JONES, pp. 346–347, pl. 8 figs. 30, 31.
1886 *Darwinula leguminella* (FORBES) – JONES, p. 147, pl. 4 figs. 4a–c.
1888 *Darwinula leguminella* (FORBES) – JONES, p. 538.
1940 *Darwinula (450) leguminella* (FORBES) – WICHER, pp. 268 ff., pl. 2 fig. 8.
1940 *Darwinula leguminella* (FORBES) – MARTIN, p. 317, pl. 4, figs. 58–61.
1949 *Darwinula leguminella* (FORBES) – WOLBURG, p. 352.
1956 *Darwinula leguminella* (FORBES) – GRY, pp. 136, 138.
1959 [?] *Darwinula leguminella* (FORBES) – ZALÁNYI, pp. 425–428, text figs. 12a–d, 12/a, 13a–c.
1961 *Darwinula leguminella* (FORBES) – MARTIN, p. 119, pl. 14, fig. 19.
1962 *Darwinula leguminella* (FORBES) – KLINGLER, MALZ & MARTIN, pp. 187–188, pl. 25, fig. 14.

Material.

At least 300 specimens, most of which are present as half carapaces. In addition there are uncounted fragments under the size of half a valve. Occurs in the Jydegaard Formation.

Description.

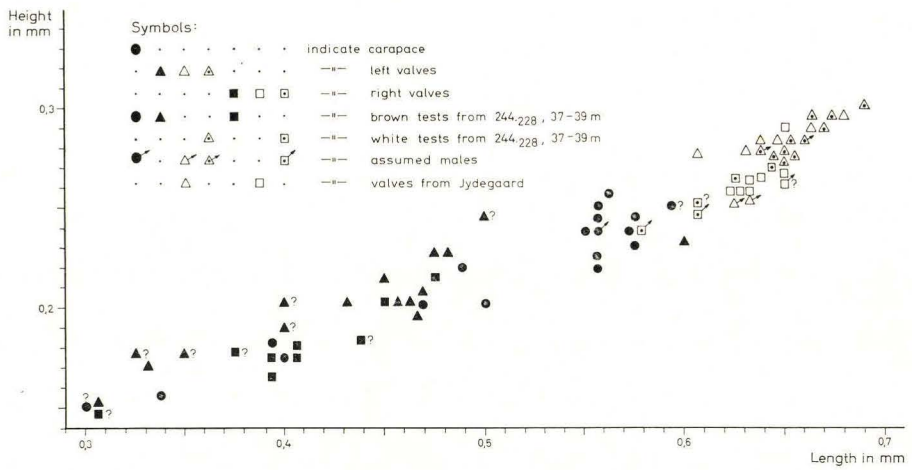
In lateral view the carapace is small and elongated with round ends. The dorsal margin forms a smooth, flat curve, which in its anterior part bends strongly towards the round anterior end. The almost straight ventral margin has a slight concavity in front of the medial line, and passes gradually into the anterior and posterior margins. The posterior end is hemispherical. In dorsal aspect the surfaces are strongly flattened from about one fourth of the test-length from the anterior end to a little behind the mid-point of the valves. The left valve along the anterior, the ventral, and the posterior margins is larger than the right valve, while along the dorsal margin there seems to be no overlapping.

The lateral surface is smooth and may be more or less nacreous. The internal surface is in some specimens scarcely as smooth as the external surface owing to rather close punctations (normal pore canals?).

The adductor muscle scars situated anteriodorsally to the middle of the valve are arranged in a rosette, of varying shape consisting of 7–9 scars. In front of the adductor scars there is an antennal? scar and posteroventrally to this there is an elongated mandibular? scar. The duplicature is very narrow and only a few radial pore canals may be observed in some specimens.

In the right valve the hinge consists of a ridge along the anterior third of the dorsal margin. Behind the ridge there is a rather wide groove, which follows the dorsal margin in its whole straight part. The anterior hinge bar of the right valve is adapted to the inside of the left valve, while the hinge groove is adapted to a slight bar on the hindmost, and largest, hinge element of the left valve.

Individual specimens are less inflated behind the medial line of the test than other adult specimens. The difference is difficult to observe, and appears most distinctly in the case of the left valves. These specimens are here described as males. Larvae may morphologically differ from adult specimens by having a relatively smaller posterior end.



Text fig. 3. Scattergram showing relations between numbers, lengths, and heights for *Darwinula leguminella* (FORBES, 1855) in at least three populations.

Distribution.

D. leguminella (FORBES) was rather cosmopolitan in the Upper Jurassic and Lower Cretaceous (cf. GREKOFF 1953 and 1959). In Northwestern Germany and Northeastern Holland it has been reported from Serpulit to Wealden 6 and from Southeast England and Northern France it has been reported from Middle Purbeckian through Wealden beds. In Poland it is present in the Purbeckian.

Remarks.

As appears from the scattergram (text fig. 3) the material in the sample from 244.228, 37–39 m. seems to be derived from at least two populations. The brown specimens are covered by a ferruginous coat and are derived from one or more strata in which iron has been precipitated (presumable primarily). The rest of the valves from the sample which are devoid of the brown cover are certainly derived from other strata in the interval 37–39 m. Between the populations there are ecological differences. The brown specimens seem to be smaller, and larval tests are found in this population. In other samples with brown and white specimens, individual larvae may be present among the white material, too, but only the latest larval stages are found.

Darwinula oblonga (Roemer, 1839)

Text fig. 4a; Plate II figs. 5a–c.

1839 *Cypris oblonga* ROEMER, p. 52, pl. 20, fig. 21.
1843 *Cypris oblonga* ROEMER – DUNKER, p. 39.
1846 *Cypris oblonga* ROEMER – DUNKER, p. 60, pl. 13, figs. 26a–b.
1862 *Cypridea oblonga* (ROEMER) [*partim*?] – JONES, p. 128, pl. 5.
1940 *Cyprione (628) bistovii* JONES – WICHER, pp. 268 ff., pl. 2, fig. 7.
1940 *Cyprione oblonga* (ROEMER) – MARTIN, pp. 319–322, pl. 4, figs. 62–63, pl. 11, fig. 164, pl. 12, fig. 173.
1949 *Cyprione oblonga* (ROEMER) – WOLBURG, p. 352.
1951 *Cyprione oblonga* (ROEMER) – STEGHAUS, p. 209, p. 14, fig. 8.
1955 *Cyprione oblonga* (ROEMER) – SCHMIDT, p. 53.
1956 *Cyprione oblonga* (ROEMER) – GRY, pp. 136, 138.
1960 [*non*] *Cyprione* cf. *C. oblonga* (ROEMER) – NEALE, p. 214, pl. 1 figs. 6, 8, pl. 3 figs. 1 9a–b, 11a–b, pl. 4 figs. 1–4.
1962 *Darwinula oblonga* (ROEMER) – KLINGLER, MALZ & MARTIN, p. 188, pl. 27 fig. 18.

Material.

At least 50 specimens, and, besides, fragments below the size of half a valve. Present in the Jydegaard Formation.

Description.

In lateral aspect the test is lengthy with round ends. The dorsal margin is slightly curved and grades smoothly into the nearly semicircular posterior end. The greatest length is measured dorsally of the medial length-axis at the posterior end. The anterior end is smoothly rounded and in adult specimens it is more distinctly pointed than the posterior end. In dorsal aspect the posterior end is almost hemispherical, while the lateral faces are curving slightly towards the pointed anterior end. The greatest breadth as well as the greatest height are found one third in the posterior of the test.

The left valve is larger than the right one, at least at the ends of the valves and along the ventral margin. The ventral free margin of the valve forms a characteristic curve at about one fourth of the length of the test from the anterior end, the anterior end and the ventral free margin thus seeming to be situated more laterally than the rest of the free margins of the valve.

The lateral surface of the valve is smooth, while the inner surface may be granular in some specimens.

The about 11–12 adductor muscle scars are arranged in rosette form. Anterodorsally to these scars there is one or two large antennal? scars, and below there is a smaller mandibular? scar.

The pore-canal zone is rather narrow and without free inner lamellae. The zone of concrescence is largest along the anterior margin and along its whole extension it is penetrated by 20–30 simple, straight radial pore canals.

The hinge on the left valve consists of a fine, narrow groove in almost the whole extension of the dorsal margin. The hinge groove ends where the inner hinge bar disappears. As to separate elements of the hinge on the right valve only a lengthy projection of the anterior part of the free dorsal margin has been observed.

Two larval valves, which can be determined with certainty, presumably belong to the last instar (length 0.76 mm., height 0.33 mm.). These valves are extremely weak on account of very thin valve material. Undetermined strongly encrusted specimens might perhaps be determined as larvae of this species.

Measurements (in mm.).

Jydegaard clay-sample:

Valves:	L.(left)	L.	L.	L.	R.(right)	R.	R.	R.	R.	R.	R.	R.
Length:	1.01	1.04			0.99	1.02	0.93					
Height:	0.47		0.49	0.47	0.44	0.45	0.40	0.44	0.44	0.45	0.43	0.44

244.228: 37–39 m.:

Valves:	L.	L.	R.	R.	R.	1/1 (cast)
Length:	0.99					0.91?
Height:	0.47	0.49	0.43?	0.44	0.44	0.43?
Breadth:						0.37

Distribution.

Darwinula oblonga (ROEMER) is known from beds in Equatorial Africa and Europe. In Northwestern Germany it occurs in the Lower Kimeridgian, Serpulit to Wealden 5 and in Northeastern Holland and Southeast England it is reported from Middle Purbeck through Wealden Beds. In Poland it has not been found.

Remarks.

In agreement with recent literature (e.g. ANDERSON 1952 in accordance with GREKOFF 1953, 1956, and SWAIN in MOORE (ed. 1961)) *Cyprione* JONES, 1885 is here considered as synonymous with *Darwinula* BRANDY & NORMAN 1889.

Text fig. 4. Muscle scars in right valves. 150×. – a. *Darwinula oblonga* (ROEMER, 1839) from 244.228, 34–36 m. – b. *D. leguminella* (FORBES, 1855) from 244.228, 27.6–29.5 m.

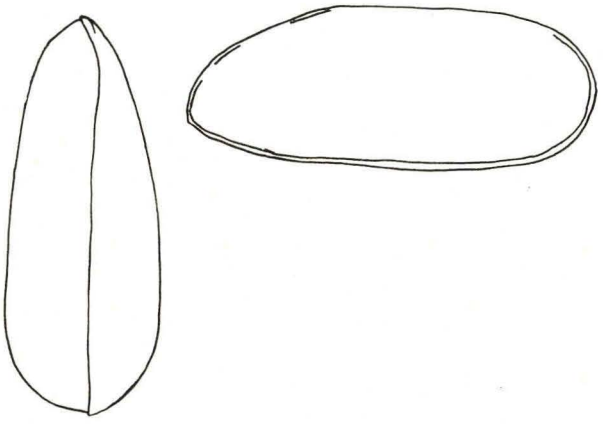
Darwinula sp. (144)

Text fig. 5.

Material. 244.228, 21.3 m.: One carapace from the Jydegaard Formation.

Remarks.

The specimen principally differs from *D. leguminella* (FORBES) by its form and because the right valve is the largest one. Length 0.55 mm., height 0.23 mm., and breadth 0.22 mm.



Text fig. 5. *Darwinula* sp. (*144*). In dorsal and lateral aspect. 100×.

FAMILIA CYPRIDIDAE BAIRD, 1845
SUBFAMILIA CYPRIDINAE BAIRD, 1845
GENUS EUCYPRIS VAVRA, 1891

Eucypris sp. (146)

Plate V fig. 5.

Material.

One carapace from Salene 245.13, 25 m.; length 1.24 mm., height 0.68, and breadth 0.51 mm.

Description.

The left valve along the whole periphery is larger than the right valve. The overlapping is particularly large along the ventral margin and the more central parts of the dorsal margin. The surface is nacreous. In dorsal view the surface is evenly curved and more pointed at the anterior than at the posterior end. Anteroventrally of the area with the 5–6 adductor muscle scars there are two mandibular? spots and dorsally of these and in front of the uppermost adductor spot there is a small antennal muscle scar.

Remarks.

The test reminds very much of *Ostracode* (*581*) WICHER, 1940 and of *Eucypris* sp. MARTIN, 1940, from the Serpulit and the Münder Mergel in Northwestern Germany. In the deep test Tønder No. 1 (D.G.U. File No. 166.230) in South Jutland I have found this species, too, in a sample (3125′–3130′) together with only *Scabriculocypris trapezoides* ANDERSON in strata immediately above strata with *Macrodentina* (*Dictyocythere*) *mediostricta* cf. *transfuga* MALZ (3132′–3152′). *Eucypris*-forms from Purbeck-Wealden frequently occur together with species of *Scabriculocypris*. In the sample with the local *Eucypris* sp. (*146*), *Scabriculocypris*? sp. (*127*) occurs.

SUBFAMILIA CYPRIDEINAE MARTIN, 1940
SUBGENUS CYPRIDEA (CYPRIDEA) BOSQUET, 1852

Cypridea (Cypridea) alta Wolburg, 1959

Diagnosis.

"Deutlich punktierte *Cypridea*, im Bereich des vorderen Dorsalwinkels hochgewachsen, mit konvexer Ventrallinie und nach hinten konvex abfallender Dorsallinie, die fast ohne Winkel in den Hinterrand übergeht, sowie mit kurzem, aber kräftigem Rostrum." (WOLBURG 1959, p. 263).

Cypridea (Cypridea) alta formosa Wolburg, 1959

Text fig. 6; Plate I figs. 1a–d.

1956 *Cypridea parallela* MARTIN – GRY, *pp.* 136 ff.
1959 *Cypridea alta formosa* WOLBURG, pp. 264–265, pl. 3 figs. 2, 11, 12.
1962 *Cypridea alta formosa* WOLBURG, p. 208, tab. 15, pl. 31a fig. 17.

Material.

At least 70 adult specimens and 50 larvae, mostly as fragments, derived from the Jydegaard Formation.

Diagnosis.

"Eine *C. alta* von schlankerem Wuchs, mit stärker betonter hinterer Ecke und mit wulstartigen Erhöhungen der Vorderhälften der Dorsalränder." (WOLBURG 1959, p. 265).

Description.

The exterior as described by WOLBURG, 1959, p. 265, the interior features appear as in WOLBURG, 1959, pl. 3 fig. 11, and text fig. 6 in the present paper. It should be noticed that the anterior vestibule is very deep, and that the radial pore canals are present in probably large numbers. An elongate tubercle or ridge situated on the duplicature in the left valve for keeping the margin of the opposite valves close together (compare *C.* cf. *propunctata*) has not been observed.

In the material I have observed six larval stages, and it is characteristic that the larvae of this species have a very week rostrum. The duplicature is badly developed and the thin valves have not the swelling form as the adults.

Measurements (in mm.).

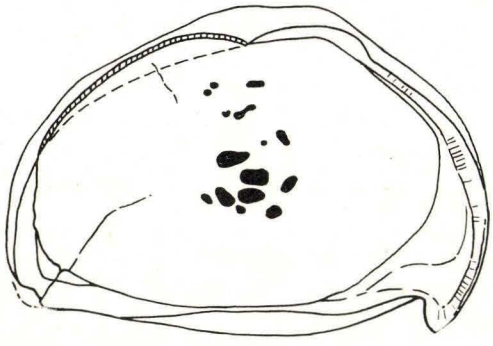
Borehole 244.228.

Depth	Valve	Instar	Length	Height	Breadth
34–36 m.	Cast	A (Adult)	1.00	0.68	0.52
–	R. (Right)	A	1.08	0.72	.
–	R.	A	1.13?	0.74	.
–	R.	A	1.06	.	.
–	R.	A	.	0.74	.
–	L. (Left)	A ÷ 1	.	0.60	.
–	L.	A ÷ 1	.	0.58	.
–	R.	A ÷ 1	.	0.58	.
–	R.	A ÷ 1	.	0.58	.
–	Cast	A ÷ 2	0.68	0.46	0.33
–	R.	A ÷ 5	.	0.23	.

37–39 m.	L.	A	1.20	0.86	.
–	L.	A	.	0.83	.
–	L.	A	1.08?	0.78	.
–	R.	A	1.08	0.70	.
–	L.	A ÷ 2	0.67	0.42?	.
–	R.	A ÷ 3	.	0.35?	.
–	R.	A ÷ 3	.	0.39	.
–	Cast	A ÷ 4	0.44	0.27	0.19
–	C. (Carapace)	A ÷ 4	0.46	0.29	0.19
–	L.	A ÷ 4	0.46	0.27	.
–	C.	A ÷ 6	0.30	0.19	0.14
40.5 m	C.	A	1.11	0.81	0.63
–	R.	A	.	0.65	.
–	L.	A ÷ 1	.	0.60	.
–	R.	A ÷ 1	.	0.59	.
–	L.	A ÷ 2	.	0.50	.
–	C.	A ÷ 3	0.59	0.35	.

Distribution.

Northwestern Germany: "Im mittleren Teil des Wealden 3, nicht selten, stellenweise häufig; gute Leitform" (WOLBURG, 1959, p. 265)[1]).



Text fig. 6. *Cypridea* (*Cypridea*) *alta formosa* WOLBURG, 1959. Internal view of a fragmentary left valve (pl. I, fig. 1a). 244.228, 37–39 m. 50×.

Cypridea (Cypridea) cf. propunctata Sylvester-Bradley, 1949

Text fig. 7; plate I figs. 3a–d.

Compare to:

1885 *Cypridea punctata* JONES, p. 337, pl. 8 figs. 4, 5.

1949 *Cypridea (Cypridea) propunctata* SYLVESTER-BRADLEY, pp. 141–144, text figs. 17a–b, 22; pl. 4 figs. 1–3.

1961 *Cypridea propunctata* SYLVESTER-BRADLEY – MAGNÉ & ESTPITALIE, pl. 3 fig. 1.

[1]) The species occurs also in Upper Purbeck Beds in England which are correlated with Wealden 3 and 4 in Northwestern Germany (F. W. ANDERSON, 1962, in Lpool. Manchr. Geol. J., Vol. 3, Pt. 1, pp. 21–32).

Material.

At least 20 specimens, exclusively represented by valves and fragments from the Jydegaard Formation.

Description.

The left valve is larger than the right one. In a lateral aspect the very prominent anterior dorsal angle that contain the greatest height of the valve is situated one third of the test length from the anterior end. The dorsal margin on the left valve is almost straight and sloping to the posterior dorsal angle. The posterior margin is smoothly curved down to a distinct posteroventral projection, which mostly constitutes the posterior extremity. The ventral margin is almost straight with a strong notch, and the strong anteroventral rostrum extends until below the margin. The anterior margin forms a uniform curve from the tip of the rostrum until a small concavity in front of the dorsal angle. In a dorsal aspect the ends are round. The greatest breadth is a little behind the middle, and in front of this there is a slight convexity.

The lateral surface is covered by dense punctations. The muscle scars are practically similar to those in *C. alta formosa* WOLBURG (text fig. 6), but the anterior scars (mandibular? and antennal? scars) seem to be stronger. Normal pore canals have not been observed.

A strong vestibule is present along the anterior margin, and a smaller one is found in the posteroventral projection. By the line of concrescence in the ventral part of the left valve there is a slight, elongate bar, which has been used for keeping the right valve against the margin of the larger left valve. The duplicature with the radial pore canals is elaborated as described and illustrated by SYLVESTER-BRADLEY, 1949 (pp. 131–132, figs. 17 and 19). Just below the middle of the anterior margin on the left valve, the most distal part of the margin is very weak and does not seem to include radial pore canals, but this selvage is striated.

The hinge in the right valve is composed of terminal, slight hingebars combined by a median ridge. At least the anterior bar is smooth.

Mesaurements (in mm.).

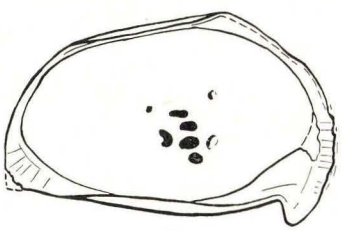
Borings	Depth in m.	Valves	Length	Height
244.228	27.6–29.5	L. (Left)	0.85	0.53?
–	–	L.	0.85	0.51
–	–	L.	.	0.53
–	–	R. (Right)	.	0.53?
–	32–34	L.	.	0.52
–	–	R.	.	0.53
–	–	R.	0.84	.
–	34–36	R.	0.83	0.49

–	37–39	R.	.	0.49
–	–	R.	.	0.50
–	–	R.	.	0.54
–	40.5	L.	0.88	.
–	–	L.	.	0.60
–	–	L.	.	0.55
–	–	R.	.	0.55
–	–	R.	.	0.52
244.165	53.3–53.5	L.	.	0.58?

Remarks.

The name of *Cypridea propunctata* has been applied to a new species and a revised description of "*Cypridea punctata* (FORBES)" by SYLVESTER-BRADLEY in 1949. *C. propunctata* SYLV.-BRADL. has been reported from the Upper and Middle Purbeck in England. The type horizon has been assumed to be the lower part of Upper Purbeck (rectidorsata sub-zone) (SYLVESTER-BRADLEY, 1949). *C. propunctata* SYLV.-BRADL. does not seem to occur in the corresponding horizon in Northwestern Germany (unterer Wealden 3), and species identified in the past as "*Cypridea punctata*" in Obermalm may belong to other species according to WOLBURG (1959, p. 252). WIENHOLZ (1959, p. 99 etc.) indicates that *C. propunctata* SYLVESTER-BRADLEY with *Cyprideis? polita ornata* STEGHAUS, *C.? polita polita* MARTIN and *Klieana alata* MARTIN, etc., has been identified from Portland 5–6 (Mittel-(Ober) Purbeck according to DÖRING, 1961, p. 110) in the boring Werle (in West Mecklenburg).

The specimens from Bornholm are closely related to *C. propunctata* SYLV.-BRAD., but they differ a little in shape and are scarcely as large. These specimens must be classed among "die lata-Gruppe" established by WOLBURG (1959, p. 252), differing from *C. andersoni* WOLBURG from Wealden 3 by being smaller and by having a relatively lower height and a strong rostrum. The posteroventral angle on the right valve is rounded.



Text fig. 7. *Cypridea* (*Cypridea*) cf. *propunctata* SYLVESTER-BRADLEY, 1949. Internal view of a fragmentary left valve (Pl. I, fig. 3a). 244.228, 27.6–29.5 m. 50×.

Cypridea (Cypridea?) sp. (148)

Material.

Fragments of at least four specimens from the Rabekke formation.

Description.

The lateral surface is covered by fine punctations. Rostrum and rostral sulcus nearly smooth. Anterior margin and rostrum of the left edged by a wide, finely striated selvage.

SUBGENUS CYPRIDEA (ULWELLIA) ANDERSON, 1939

Cypridea (Ulwellia) cf. menevensis Anderson, 1939

Text fig. 8; Plate I fig. 2.

Compare to:

1939 *Ulwellia menevensis* ANDERSON, p. 301, pl. 13 figs. 2a–b, 6a–b.
1959 *Cypridea menevensis* (ANDERSON) – WOLBURG, p. 303, pl. 5 figs. 7, 8, 18, text fig. 16.
1962 *Cypridea menevensis* (ANDERSON) – WOLBURG, p. 213, tab. 15, pl. 31b figs. 17–18.

Material.

One left valve (length 0.96 mm., height 0.59 mm.) and two posteroventral fragments of left valves. The Jydegaard Formation.

Diagnosis.

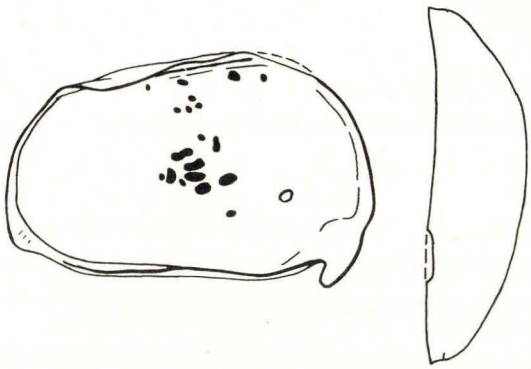
"Valves ovate-oblong. Surface covered with small circular punctations. Beak and notch distinct. Hinge-line slightly curved and strongly knurled anteriorly." (ANDERSON, 1939, p. 301, original description).

Remarks.

The shape and the lateral reticulation are closer to the *C. paralla*-forms than *U. menevensis* as depicted by ANDERSON, 1939, fig. 2. It is more closely related to "*C. menevensis, punktiert*" from the lower half of Wealden 3 in Northwestern Germany (WOLBURG, 1959, p. 5, fig. 7.)

The left valves from the Jydegaard Formation are smaller than the corresponding right valves, and must consequently be referred to the subgenus *Ulwellia*. The ratio mentioned appears from the fact that the interior side of the rostrum is plane and there is no impression for a smaller valve inside on the duplicature. The ventral exterior surface near the margin displays a fine transverse striation. All features compared to the subgenus *Cypridea* can only be found on the smallest valve.

Cypridea (*Ulwellia*) *menevensis* ANDERSON is very abundant in the lower Wealden Beds in Sussex, England. In Northwestern Germany it occurs in Wealden 2 and 3 where it is often abundant.



Text fig. 8. *Cypridea* (*Ulwellia*) cf. *menevensis* ANDERSON, 1939. Left valve, interior and dorsal aspect (Pl. I, fig. 2). 244.288, 40.5 m. 50×

Cypridea (Ulwellia) aff. inversa inversa Martin, 1940

Plate II figs. 1a–c.

Affinity with:

1940 *Cypridea inversa* MARTIN, pp. 297–298, pl. 2 figs. 22–26, pl. 9 fig. 139.
1962 *Cypridea inversa* MARTIN – KLINGLER, MALZ & MARTIN, p. 170, tab. 10, pl. 27 fig. 2.

Material.

At least three specimens, but as fragments. The Rabekke Formation.

Description.

The right valve is larger than the left valve, and there is a strong, posteroventral projection on the right valve. The anterior dorsal angle is distinct, while the posterior dorsal angle seems poorly developed. The posterior end is round, at least on the left valve. The lateral surface is covered with small, dense, somewhat varied punctations. Along the margin and in the rostral sulcus (notch) there are no punctations. The rostra are relatively weak and the rostral sulci are relatively strong, particularly in the case of the right valve where the sulcus is separated from the rostral sulcus by a sharp edge. The vestibule into the rostrum in the left valve is separated from a small vestibule behind the rostral sulcus on account of the strong development of the latter. The radial pore canals are fairly numerous and have a fairly irregular course. They are radially arranged around the little vestibule posterior to the rostral sulcus.

Distribution.

Cypridea inversa MARTIN is found in beds from Oberer Münder Mergel – Serpulit in Northwestern Germany (KLINGLER, 1956) and Purbeck in borings in West Pomerania.

SUBFAMILIA PONTOCYPRIDINAE G. W. MÜLLER, 1894
GENUS CLINOCYPRIS MANDELSTAM, 1956

Clinocypris sp. (126)

Plate II fig. 6

Material.

One fragmentary left valve and one fragmentary carapace from two samples in the Jydegaard Formation.

Description.

The anterior end much pointed. The dorsal margin straight between two strong cardinal angles. The posterior margin smoothly rounded and the ventral margin convex. In a dorsal aspect the valve is regularly arched and the ends are pointed. The surface is smooth and nacreous. A small inner lamella is present at the anterior end.

SUBFAMILIA INDETERMINATA
GENUS SCABRICULOCYPRIS ANDERSON, 1940

Scabriculocypris? sp. (127)

Plate V figs. 2a–b.

Material.

One carapace, one fragmentary carapace, and one fragment in one sample. Salene area.

Description.

In lateral aspect the anterior margin is smoothly rounded and dorsally terminated by a cardinal angle at a distance of one third of the length from the anterior end. The straight dorsal margin slopes gradually to the almost hemispherical posterior end. The ventral margin is straight to slightly convex. In a dorsal view the lateral surfaces are slightly flattened and subparallel. Along the whole periphery the left valve is a little larger than the right valve. The surface is covered with a dense, usually regular, and level reticulation.

Measurements. Length 0.53 mm., height 0.33 mm. and breadth 0.26 mm.

Affinities.

This species shows affinities to forms in Northwestern Germany. (*Ostracode* MARTIN, 1940 fig. 121 = WICHER, 1940 fig. 18 according to WOLBURG, 1949 (? = *Scabriculocypris trapezoides* ANDERSON, 1940)). It differs from *S. trapezoides* ANDERSON by being smaller and by having a rounded posterior margin.

FAMILIA CYTHERIDAE BAIRD, 1850
SUBFAMILIA CYTHERINAE SARS, 1925
GENUS KLIEANA MARTIN, 1940

Klieana alata Martin, 1940

Text figs. 9–10; Plate V figs. 1a–g.

1940 *Ostracode (602)* WICHER, pl. 3 fig. 19.
1940 *Klieana alata* MARTIN, pp. 323–325, pl. 5 figs. 64–73, pl. II figs. 158–161.
1949 *Klieana alata* MARTIN – WOLBURG, fig. 3.
1956 *Klieana alata* MARTIN – GRY, p. 138.
1962 *Klieana alata* MARTIN – KLINGLER, MALZ & MARTIN, p. 178, pl. 25 fig. 24.

Material.

4 carapaces, 920 complete and uncounted incomplete valves from the Rabekke Formation.

Description.

MARTIN, 1940, pp. 323–325.

In front of the adductor muscle scars there is a large, V-shaped antennal muscle scar and below that there is a mandibular? muscle scar. Another mandibular? muscle scar is present on the ventral margin and many indistinct spots are located above the area of the adductor muscle scars.

Distribution.

In Northwestern Germany *K. alata* MARTIN is known from Münder Mergel to Wealden 1 and from Wealden 3. In Northern Poland it is found in Purbeck and Wealden beds.

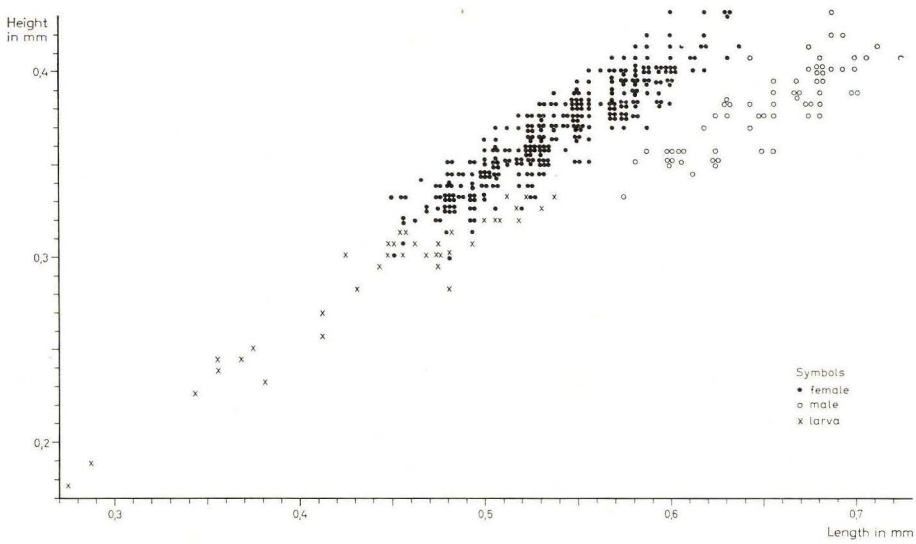
Remarks.

The present material indicates a great variation of species, as also seems to have been the case in the type material of MARTIN (1940). The variation of species is so great, that in a smaller material there might have been a risk of spliting the species up in several morphological species.

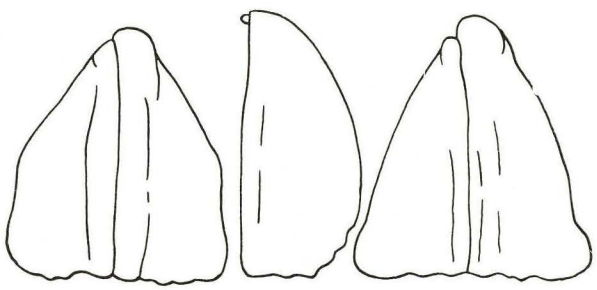
The size of the valves, reticulation, the shape and dimensions of the dorsal margin and the lateral excrescence are the most important varying fea-

tures. As these features are mutually independent, and as there exist gradual transitions between different morphological types, I have interpreted the whole *Klieana*-material from the Rabekke Formation as belonging to one species. A little less than 3000 measurings show that the variation of size in the different ontogenetic stages is often so great that a distinction between these stages is not possible. Together with other varying features this might indicate that the population has existed under different environments.

While analyzing the material, it being considered that the larvae have a considerably narrower duplicature than the adults, it appears that some of the larvae are larger than the smallest females (text fig. 9). Furthermore, the larvae are more similar to the adult males than to the adult females. The same seems to be the case among some younger larvae. It suggests that the sexual differentiation has taken place rather early during ontogenetic development.



Text fig. 9. Scattergram showing relations between numbers, lengths, and heights for left valves (the largest ones, both in heights and lengths) of *Klieana alata* MARTIN, 1940 from 244.247, 39.55–39.76 m. (core sample).



Text fig. 10. *Klieana alata* MARTIN, 1940. Two carapaces and one left valve in frontal aspect. The carapaces from 244.247, 39.55–39.76 m. and the valve from 246.197, 19.0–19.5 m. 50×

Klieana sp. (145)

Plate V fig. 4

Material.

One carapace, ? larva. Length about 0.31 mm., height 0.20 mm., breadth 0.19 mm. Salene.

Affinities.

As distinct from larvae of the corresponding size of *K. alata* MARTIN *K.* sp. (*145*) has stronger ventrolateral processes.

GENUS NEOCYTHERIDEA ANDERSON, 1953

Neocytheridea bononiensis (Jones, 1882)

Diagnosis.

A smooth to coarsely granular species with comparatively wide anterior duplicature and numerous radial pore canals. (According to the diagnosis of *Fabanella polita* of MARTIN, 1961, p. 185).

Neocytheridea bononiensis bononiensis (Jones, 1882)

Text fig. 11; Plate III figs. 2a–e.

1882 *Cythere boloniensis* JONES, pp. 615, 616.
1885 *Candona bononiensis* (JONES) [*nomen correctum*], pp. 348–349, pl. 9 figs. 7, 8.
1940 *Cyprideis polita* MARTIN, pp. 352–353, pl. 7 figs. 110–113, pl. 9 figs. 149–151.
1951 "*Candona*" *bononiensis* JONES – ANDERSON, pp. 209–211.
1953 *Neocytheridea bononiensis* JONES – ANDERSON (1952, publ. sous presse) according to GREKOFF 1953, p. 377.
1955 *Cyprideis polita* MARTIN & *Cyprideis ansata* (JONES) – BARTENSTEIN & BURRI, pl. 29.
1956 *Cyprideis polita* MARTIN – GRY, p. 138.
1961 *Fabanella polita polita* (MARTIN) – MARTIN, pp. 186, pl. 1 figs. 1–4, 10–12.
1961 *Fabanella polita polita* (MARTIN) – WOLBURG, pp. 199 ff., text figs. 1–2, pl. 1 fig. 3.
1961 *Fabanella polita polita* (MARTIN) – MARTIN, p. 113, pl. 14 fig. 9.
1962 *Neocytheridea bononiensis bononiensis* (JONES) – WOLBURG, pp. 218–219, tab. 16, pl. 32b figs. 1–2.

Material.

At least 360 specimens and furthermore numerous fragments below the size of half a valve. Present in the Jydegaard Formation and in smaller quantities in the sediments from the area of Salene.

Diagnosis.

A subspecies of *Neocytheridea bononiensis* with a smooth valve-surface. (According to the diagnosis of *Fabanella polita polita* MARTIN 1961, p. 186).

Description.

MARTIN, 1961, pp. 186–188 and 1940, pp. 352–353.

Statistics.

Material from Kyndegaard (GRÖNWALL collection of 12/9 1899) of 158 carapaces, 117 of which are statistically applicable, while the others are larvae or biometrically useless specimens:

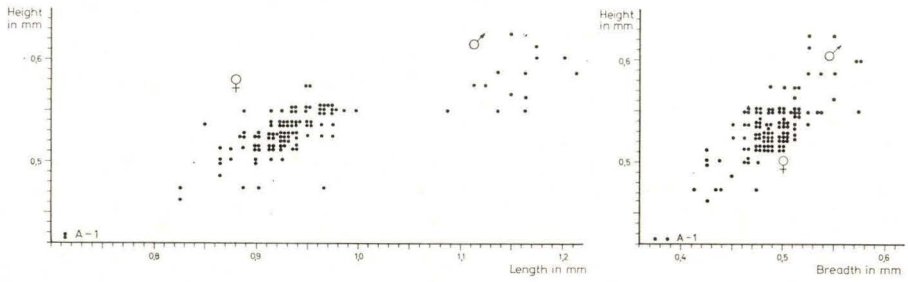
Measurements (in mm.)[1]	$\bar{x}$	s	V	O.R.
Females: N = 102				
Length:	0.926 ± 0.003	0.033 ± 0.002	3.56 ± 0.25	0.82–1.00
Height:	0.528 ± 0.002	0.020 ± 0.001	3.79 ± 0.27	0.48–0.58
Breadth:	0.484 ± 0.002	0.023 ± 0.002	4.65 ± 0.33	0.41–0.54
Males: N = 15				
Length:	1.155 ± 0.006	0.023 ± 0.004	1.95 ± 0.35	1.09–1.21
Height:	0.583 ± 0.002	0.095 ± 0.017	1.63 ± 0.30	0.55–0.63
Breadth:	0.535 ± 0.006	0.022 ± 0.004	0.43 ± 0.08	0.48–0.57

Distribution. Common in Upper Malm and Wealden in Northwest Europe.

Remarks.

In the material from Bornholm $\bar{x}$ for the length is a little greater than in the material from Wealden in Northwestern Germany (WOLBURG, 1961, text fig. 1). The component specimens also appear to have the characteristic kidney shape described and illustrated by MARTIN, 1961 (p. 187; Pl. 1 figs. 10–11). These features may be found among the stratigraphically oldest form of *N. bononiensis bononiensis* (JONES) by MARTIN (1961, p. 187) from Northwestern Germany. A possible biostratigraphical correlation on the basis of the above does not seem applicable for the time being as regards the material from Bornholm.

[1]) Arithmetical mean $\bar{x} = \frac{\Sigma x}{N}$, where x = any individual value of the variate and N = numbers of specimens. Standard deviation of the population-selection $S = \sqrt{\frac{\Sigma (x - \bar{x})^2}{N - 1}}$. Coefficient of variation $V = \frac{100 \cdot s}{\bar{x}}$. O.R. = Observed range.



Text fig. 11. Scattergrams showing relations between numbers, lengths, heights, and numbers, heights, breadths for *Neocytheridea bononiensis bononiensis* (JONES, 1882) from Kyndegaard (GRÖNWALL coll.). A — 1 indicates the last larval stage.

SUBFAMILIA CYTHERIDEINAE SARS, 1925
GENUS GALLIAECYTHERIDEA OERTLI, 1957

Galliaecytheridea sp. (152)

Text fig. 12; Plate IV figs. 3a–d.

Material.

At least 14 more or less fragmentary valves and numerous fragments from four samples from the Salene area and Habbedam.

Description.

In a lateral view the anterior margin is round and separated from the straight dorsal margin by a round cardinal angle, by which the largest height can be measured. Between the dorsal and the posterior margins the posterior hinge element forms a distinct bulge, at least on the left valve. The posterior margin is steep, generally round, and it gradually passes into the ventral margin.

In a dorsal aspect the valves are slightly arched, but in the foremost part there is a pronounced lateral depression along and parallel to the anterior margin. The depression is, however, slightly developed in the dorsal part of the anterior margin. The largest breadth is found a little ventrally of the middle of the valve.

The left valve is larger than the right one. The lateral surfaces are covered by dense, fine punctations.

The muscle scars consist of an almost vertical row of four distinct adductor scars, the uppermost one of which is clearly isolated from the others. In front of the uppermost adductor scars there is a marked V-shaped antennal scar.

The 6–7 radial pore canals along the ventral part of the anterior margin are simple, straight, and equally distributed. The inner margin and the line of concrescence coincide. Just below the middle of the anterior margin there is a

series of fine marginal denticles, and on the right valve there is usually a slight posteroventral spine.

The median element of the hinge on the left valve consists of a long, smooth bar. The terminal elements consist of crenulated sockets.

In the larvae the posteroventral spine on the right valve is very strong and often hollow, and the steep posterior margin shows one or two slight denticles at its lowermost part. On the posterior part the left valve has scattered granules where the normal pore canals end, particularly in the youngest larval stages. Here, too, a posteroventral hollow spine may be developed.

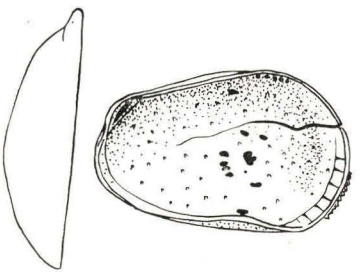
Affinities.

The species described above is closely related to *Galliaecytheridea postsinuata* WOLBURG, 1962, from Wealden 3 in Northwestern Germany, but differs by having denticles along the anterior margin and by having a posteroventral spine.

Remarks.

The smooth hinge bar in *G.* sp. (*152*) ought to place this form and *G. postsinuata* WOLBURG as species of *Palaeocytheridea* MANDELSTAM, 1947, but the general outline is more closely related to *Galliaecytheridea* OERTLI, 1957, although this genus has a crenulated hinge bar.

In samples with *G.* sp. (*152*) there are fragments of one or more species, which are so closely related to *G.* sp. (*152*), that in some cases it is impossible to distinguish them.



Text fig. 12. *Galliaecytheridea* sp. (*152*). Left valve of larva, dorsal and interior aspect (Pl. IV, fig. 3c). 245.13, 25 m. 50×.

GENUS PALAEOCYTHERIDEA MANDELSTAM, 1947

Palaeocytheridea? compacta Wolburg, 1962

Plate III figs. 4a–d.

1949 *Ostracode G 31 & G 34* WOLBURG, p. 353, text fig. 2 figs. 18, 19.
1961 *Ostracode G 31* WOLBURG – MARTIN, pp. 114–115, pl. 14 figs. 3–5.
1962 *Palaeocytheridea compacta* WOLBURG, p. 214, tab. 16, pl. 32a figs. 1–3. note p. 224.

Material.

Three carapaces and several fragments from four samples from the Jydegaard Formation.

Description.

Ostracod with strong valves and with trapezoid outline in a lateral aspect. The round anterior margin is flat in the dorsal half. It has a distinct anterior cardinal angle at about one third of the length of the test from the anterior end. The dorsal margin rectilinear and parallel to the ventral margin. The posterior cardinal angle is very distinct, and the posterior margin is rectilinear and steep in the upper part. The posterior end is round. The ventral margin is straight or slightly convex and gradually proceeds into the anterior and posterior margins. In a dorsal aspect the carapace is oval with tapering ends. The greatest breadth immediately behind the centre of the test.

Along the whole periphery the left valve is distinctly larger than the right valve. In a short zone, anterodorsally, the overlapping of the left valve is slight.

The whole lateral surface is covered with two systems of punctations. Both systems are remarkably equally distributed on the surface. One of the systems consists of dense and clear outlets of the normal pore canals. Between these the second system appears as two or three times as dense fine punctations.

Just anterior of the centre of the valve there is a vertical line of four adductor muscle scars. Slightly in front of the uppermost scar but one there is a blurred mandibular? scar and in front of this an antennal scar. Vertically below the antennal scar at half the distance to the ventral margin there is a smaller mandibular? scar. Between the adductor muscle scars and the dorsal margin there are finally two circular scars.

The zone of concrescence is not wide, and the line of concrescence and the inner margin nearly coincide. The normal pore canals are arranged in tiers near the margin and parallel to this. The distances between the rows of the normal pore canals become gradually shorter near the margin. The radial pore canals are rather to be considered false and exist to the number of more than 20 along the anterior margin.

The hinge of the right valve consists of two strong, elongate and terminal sockets, each with space for 6–8 teeth. The median hinge element is a rather slender, smooth bar.

Sexual dimorphism is prominent. The male has a strong, posteroventral spine on the right valve and a steeper posterior margin than the female. The male is longer than the female.

Measurements (in mm.).

Strata:	244.242;	67.2 m.	244.228; 37.0–38.0 m.
Sex:	♀	♂	♀
Length:	1.06	1.14	1.01
Height:	0.66	0.66	0.66
Breadth:	0.53	0.57	0.55

Distribution.

P.? compacta WOLBURG is known from Wealden 3 and 4 in Northwestern Germany and corresponding beds in the Northeastern Netherlands (SUNG, 1955, fig. 1).

Remarks.

Dr. J. WOLBURG has kindly in a letter (of 17.10.1962) confirmed my determination, on the basis of my photos (pl. III figs. 4a–d). It appears from the letter that the species presumably may be classed as a new genus[1]).

GENUS PALAEOCYTHERIDELLA MANDELSTAM, 1958

Palaeocytheridella sp. (151)

Plate III fig. 3.

Material. One left valve, larva. The area of Salene.

Description.

In a dorsal view the valve is evenly arched. The lateral surface is smooth and only the outlets of the scattered normal pore canals are marked. At both ends of the ventral margin there is a spine.

The hinge consists of a median smooth bar and two terminal grooves. Along the anterior margin there is a slight vestibule. 10–12 radial pore canals in the anterior duplicature seem to be simple.

GENUS PARACYPRIDEIS KLIE, 1929

Paracyprideis subparallela Wolburg, 1962

Plate IV figs. 1a–e.

1949 *Ostracode G 48 & G 43* WOLBURG, p. 353, text fig. 2 figs. 12, 13, tab. 3, 5.
1962 *Paracyprideis subparallela* WOLBURG, pp. 220–221, tab. 16, pl. 32b figs. 6–9.

Material.

Eleven complete valves, one carapace, and numerous fragments from seven samples from the Jydegaard Formation.

[1]) The species must be named *Pachycytheridea compacta* (WOLBURG 1962) i. a. with a recently etablished genus by WOLBURG (Senck. leth., 43, 6, p. 531).

Description.

In a lateral aspect the anterior margin is smoothly rounded in the lower part. The upper part is usually more or less straight in front of the anterior cardinal angle, which in adult specimens is distinct and situated rather posteriorly. The dorsal margin is generally linear and in the males almost parallel to the ventral margin. The posterior cardinal angle is distinct, and the posterior margin is steep in the females and almost circular in the males. The ventral margin is straight, but it often has a slight concavity in its middle part. The greatest length is a little ventrally to the median longitudinal axis, the greatest height through the anterior cardinal angle being at a distance of one third of the valve-length from the anterior end.

In a dorsal view the lateral surface is almost regularly arched with the greatest breadth in or just behind the middle of the valve in the females. The arch of the valve surface in the males differs from that of the females by having a globular posterior end.

The left valves are considerably larger than the right valves and are overlapping the latter distinctly along the dorsal and the ventral margins.

The surfaces are covered by a dense system of fine punctations. The lateral surface in the middle of the ventral margin overlaps the free edge, especially in larvae and females.

The muscle scars are rather large and situated immediately in front of the middle of the valve. The adductor scars form an almost vertical row of four spots, of which the two central ones seem to be the largest. The uppermost spot is often bipartite and usually displaced a little forwards in relation to the ones below. At some distance in front of the uppermost adductor scar but one there is a large, round, possibly bipartite antennal muscle scar, and at the same distance vertically below this scar there is a smaller elongate spot. Vertically below the adductor scars near the ventral margin there is a large muscle scar.

The normal pore canals are sieve-shaped and can usually be clearly observed, but are not numerously present. They are evenly distributed on the surface of the test.

The inner margin and line of concrescence do not coincide along the whole margin, but a narrow and deep vestibule is developed along the middle of the anterior margin, and there is a vestibule along the posterior part of the ventral margin. The radial pore canals are simple, almost straight and occur along the anterior margin in a number of 10–12 and 4–5 along the posterior margin. Along the anterior margin the inner side of the flange is developed as a plane, which forms a contact margin.

In females and larvae there is a distinct spine partly pointing backwards in the posteroventral corner of the right valve and sometimes on the left one, too. There is an indication of a posteroventral spine in some males.

The hinge of the right valve is composed of two terminal teeth. The anterior tooth is the stronger. The median hinge element has a deep, oblong, and smooth

socket just behind the anterior tooth which passes into a delicate, smooth groove at the back.

The larvae are characteristic by having a narrower duplicature than the adults.

The males are longer than the females and have almost globularly swollen posterior ends. Usually they have no posteroventral spines.

Measurements (in mm.).

Borehole	Depth in m.	Valves	Length	Height	Breadth
244.165	53.3–53.5	L. (left) , larva	.	0.36	.
–	–	R. (right), ♂	0.76	0.40	.
–	62.0–62.2	R. , ♂	0.74	0.40	.
244.228	27.6–29.5	L. , ♂	0.74	0.40	.
–	–	R. , ♀	0.64	0.36	.
–	–	R. , ♀	0.69	.	.
–	–	R. , ♂	0.72	0.38	.
–	–	R. , ♂	0.69	0.36	.
–	32–34	L. , ♂	0.70	0.40	.
–	–	R. , larva	0.53	0.33	.
–	–	R. , –	0.56	0.33	.
–	37–39	Carapace, –	0.50	0.30	0.25
–	–	R. , –	0.55	0.33	.
–	40.5	L. , –	0.58	0.35	.
–	–	L. , ♂	0.72	.	.
–	–	L. , ♂	0.71	.	.

Remarks.

As noticed by WOLBURG, 1962 there is a great variation in the occurrence and the placing of the posteroventral spine. In my material, on the other hand, there are none of the rarer spines on the anterior margin.

On a number of specimens the terminal hinge elements can be seen to be slightly dentate. It seems unlikely that this should be due to corrosion or similar secondary phenomena. The material, however, is too small and too badly preserved for a final classification in consequences the presence of an amphidont hinge.

Paracyprideis jydegaardensis n.sp.

Text fig. 13, Plate IV figs. 2a–d.

Derivation of the Name.

From the farm Jydegaard from which the name of the Jydegaard Formation is derived.

Holotype. A right valve, Pl. IV fig. 2d; D.G.U.
Type Locality. Borehole 244.165, 53.3–53.5 m.
Type Stratum. Jydegaard Formation, Purbeck-Wealden.

Material.

Two complete valves and numerous fragments in five samples from the Jydegaard Formation.

Diagnosis.

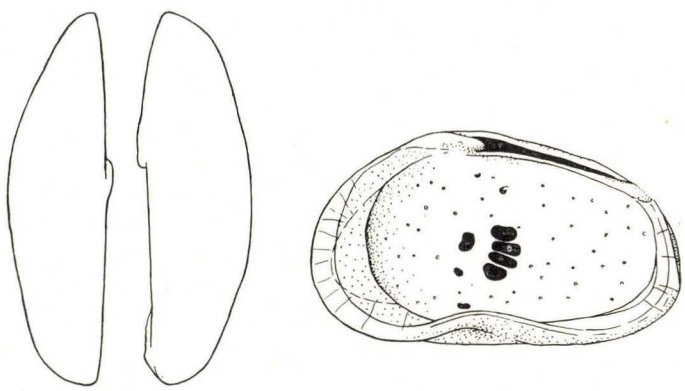
A subtrapezoidal *Paracyprideis* with an elongate tooth at the anterior end of the mediate hinge bar. The central surface is covered by round or ovate, plane depressions in a reticulation of flattened ribs, on which the outlets of the normal pore canals are situated. Towards the margin of the valve the plane depressions may be smaller and may pass into punctations.

Measurements (in mm.).

	Length	Height
Left valve, ♂, Pl. IV, fig. 2a:.....	0.73	0.39
Right valve, ♀, Pl. IV, fig. 2d:	0.73	0.41

Affinities.

The species is closely related to *P. subparallela* WOLBURG, but diverges in the pattern of the reticulation.



Text fig. 13. *Paracyprideis jydegaardensis* n.sp. Left valve of ♂ in a dorsal aspect and right valve of ♀ in a dorsal and interior aspect. The left valve (Pl. IV, fig. 2a) from 244.228, 27.6–29.5 m. and the right valve (Pl. IV, fig. 2d) from 244.165, 53.3–53.5 m. 67 ×.

SUBFAMILIA CYTHERURINAE G. W. MÜLLER, 1894
GENUS METACYTHEROPTERON OERTLI, 1957

Metacytheropteron sp. (132 b)

Plate II fig. 3.

Material.

One carapace and three valves of larvae in two samples from the Jydegaard Formation.

Description.

In a dorsal view the valves are smoothly arched. The greatest breadth is at about the middle of the valve. The hinge on the right valve consists of two terminal smooth? teeth and a slight, median groove. The longitudinal ribs are particularly conspicuous on the ventral part of the surface. The adductor muscle scars are placed rather close to the ventral margin. The duplicature is very slight, for which reason the valves may be considered as belonging to larvae.

Measurements (in mm.).

Strata:	244.228; 32–34 m.			244.242; 67.2 m.
Valves:	Right	Left	Left	Carapace
Length:	0.34	0.35	0.33	0.43
Height:	0.18	0.19	0.19	0.23
Breadth:	.	.	.	0.19

GENUS ORTHONOTACYTHERE ALEXANDER, 1933

Orthonotacythere sp. (133)

Text fig. 14; Plate V figs. 3a–b.

Material.

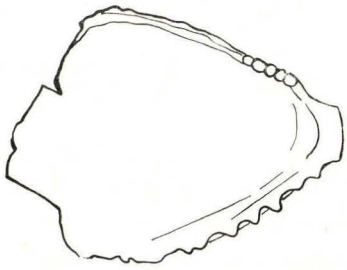
Fragments of at least two left and two right valves from Habbedam and from three samples from Salene.

Affinities.

The lateral surface ornamentation coincides, where it can be observed, with descriptions and pictures of *O. rimosa* MARTIN in MARTIN, 1940 and TRIEBEL, 1941 and with *O.* cf. *rimosa* at MARTIN, 1961 b. It differs by being larger and by having a more pointed and stronger posterior end. The posterior end is of a characteristic angular shape. Along the posteroventral margin there are 9–10 almost equal marginal denticles, of which there are slight indications in the duplicature of the larger left valve. *O.* sp. (*133*) has this feature in common with *O. diglypta* TRIEBEL of MALECKI, 1960.

Remarks.

The above-mentioned and other strongly reticulated *Orthonotacythere*-species are characteristic of Upper Jurassic and Lower Cretaceous beds. The different shades of ornamentation among these species are perhaps ecologically controlled (SCHMIDT, 1955, p. 60).



Text fig. 14. *Orthonotacythere* sp. (*133*). Posterior half of a right valve (Pl. V fig. 3a). 245.13, 45 m. 100×.

SUBFAMILIA LIMNOCYTHERINAE KLIE, 1938
GENUS LIMNOCYTHERE BRADY, 1868

Limnocythere? groenwalli n.sp.

Plate III figs. 1a–g.

Derivation of the Name.

To the memory of the late professor, K. A. GRÖNWALL Ph.D., (1869–1944), whose collection of ostracods from Kyndegaard I have utilized in this paper.

Holotype. A left valve, larva, Pl. III, figs. 1b–c; D.G.U.
Type Locality. Borehole 244.228, 27.6–29.5 m.
Type Stratum. The Jydegaard Formation, Purbeck-Wealden.

Material.

At least 27 specimens from six samples from the Jydegaard Formation and one half valve from the sample from Habbedam.

Diagnosis.

A small *Limnocythere*? with thin, somewhat compressed and densely punctate valves. Along the anterior margin the carapace is highly compressed in rather a wide zone. The dorsal and ventral margins are almost straight and usually parallel.

Description.

The small, thin valve has an oblong trapezoid outline in a lateral aspect. The anterior margin is smoothly rounded. The distinct cardinal angles enclose the rather short and straight dorsal margin, which is approximately parallel to the ventral margin. As the posterior cardinal angle is developed far behind, the

posterior margin becomes steep and straight. The ventral part of the posterior margin is slightly projecting, but rounded. The ventral margin is almost rectilinear. A slight convexity is situated in the middle of the ventral margin.

In a dorsal view the lateral surface is formed as a flat curve. The anterior as well as the posterior end of the valve has lateral depressions along the margins. At the posterior end the depression is inconspicuous and may only be observed on the slightly projecting part of the posterior margin. Along the anterior margin the depression appears laterally as a wide and level terrace and is especially distinctly developed along the ventral part of the anterior margin. The left valve seems along the whole periphery larger than the right one. The greatest length of the valve is found ventrally to the median longitudinal axis and is parallel to the ventral margin.

The lateral surface is covered by fine, dense, but distinct punctations, which, however, are partly or completely lacking in and around the lateral depression along the anterior margin. The punctations may occur along the ventral margin in more or less clear longitudinal rows.

The adductor scars consist of four small spots situated below each other. The normal pore canals are distinct and are scattered on the surface. The zone of concrescence is very narrow. The line of concrescence and the inner margin do not coincide, but there is a vestibule along the whole anterior duplicature. The free inner lamella is also present in the ventral part of the posterior margin and along the posterior part of the ventral margin.

The radial pore canals are straight and simple and occur in a number of 8–10, evenly distributed along the anterior margin, and 5–6 along the posterior margin and the posterior part of the ventral margin.

A long, fine groove, perhaps with slight, dentate? terminal expansions constitutes the hinge of the left valve. The potential terminal hinge elements are situated below the cardinal angles.

The material indicates a distinct sexual dimorphism, with the sex ratio near 1. The longest form (♂?) has a strong, round, and partly globular posterior end. The greatest height in this sex occur behind the middle, in the other specimens in the anterior third of the valve.

Vestibules are not developed in the larvae, and the duplicature is moreover, rather narrow.

Measurements (in mm.).

Boreholes (locality)	Depth in m.	Valves	Length	Height	Breadth
244.165	62.0–62.2	L. (left)	.	0.23	.
244.228	27.6–29.5	L.	0.36	0.19	.
–	–	L.	.	0.20	.
–	–	R. (right)	.	0.20	.
–	–	R.	.	0.18	.
–	–	R.	0.36	0.20	.
–	–	R.	0.36	0.20	.

–	32.0–34.0	L.	0.39	0.20	.
–	–	L.	.	0.20	.
–	–	L.	0.35	0.20	.
–	–	L.	0.35	0.20	.
–	–	L.	0.35	.	.
–	–	L.	.	0.20	.
–	–	R.	.	0.19	.
–	–	R.	.	0.19	.
–	–	R.	.	0.20	.
–	–	R.	.	0.20	.
–	–	R.	0.38	.	.
–	–	R.	.	0.21	.
–	37.0–39.0	C. (carapace)	0.48	0.24	0.18
–	–	C.	0.40	0.24	.
–	40.5	R.	.	0.18	.
–	–	R.	.	0.19	.
Jydegaard		C.	0.39	0.20	0.15
–		C.	0.43	0.23	0.15
–		C.	0.40	0.20	0.14
–		C	0.38	0.20	0.13

Affinities.

Limnocythere cf. *fragilis* MARTIN (1961, p. 112, Pl. 14 fig. 18) diverges in the lateral development by being considerably larger than *L.? groenwalli* n.sp.

Remarks.

The development of the hinge makes the determination of the genus questionable and seems to refer the species to the subfamily *Cuneocytherinae* MANDELSTAM, where some marine genera (*Dicrorygma* POAG, 1962 and *Archaeocuneocythere* MANDELSTAM, 1947) seem to have great affinities with the species described above[1]).

SUBFAMILIA INDETERMINATA

Genus indeterminatum sp. (153)

Plate II fig. 4.

Material.

One cast, one left valve, one right valve, and one fragment from two samples. Larvae?. The Jydegaard Formation.

Description.

The anterior margin is round and the anterior cardinal angle is distinct. The ventral and dorsal margins are almost straight and parallel. The posterior

[1]) After this paper has been sent to press, examination of well preserved material of *Dicrorygma* – species from beds of Kimmeridgian age from Northern Jutland has indicated that the present species belongs to the genus *Dicrorygma* POAG.

margin is symmetrically rounded at the posterior end. In a dorsal aspect the lateral surfaces are smoothly arched with the greatest breadth behind the middle of the valve. The opposite valve seems to be of the same size.

A slight sulcus immediately in front of the middle of the valve extends from the dorsal margin to the middle of the valve. The lateral surface has a distinct reticulation of which the strongest threads are longitudinal, at least as regards the ventral part of the valve. The adductor muscle scars form a vertical row of four spots.

The line of concrescence divides the well developed anterior duplicature and marks the vestibule and the concrescence zone. There are 10–12 straight and simple radial pore canals on the anterior margin and 4–5 on the posterior one. The hinge on the right valve consists of two terminal, smooth teeth, above which there is a median groove.

Measurements (in mm.).

Borehole 244.228; 37–39 m.

	Length	Height
Left valve:	0.41	0.23
Right valve:	0.43	0.23

DANSK SAMMENDRAG

Indledning.

I indledningen gives på grundlag af GRY's arbejder fra 1956 og 1960 en kort oversigt over purbeck-wealden aflejringerne på Bornholm. Disse udgøres af tre formationer:

(yngst)	Jydegaard formationen
	Robbedale formationen
(ældst)	Rabekke formationen

og nogle sedimenter, der som erosionsrester findes i et nedsænket område ved Salene. Der gives ligeledes en kort oversigt over tidligere fossilfund i aflejringerne med speciel hensyn til de af GRY bestemte ostracoder (GRY, 1956).

Purbeck-wealden aflejringer udenfor Bornholm.

Bortset fra biostratigrafiske sammenligninger med de to klassiske purbeck-wealden sedimentationsområder i S. England – N. Frankrig og NW. Tyskland – Holland bør de bornholmske purbeck-wealden aflejringer ses i relation til omgivende sedimentationsområder med nærstående aflejringer. Disse findes i Skåne og i det nordlige Polen. Især synes lagserierne i Pommeren at være af betydning for forståelsen af purbeck-wealden udviklingen i det skånsk-polske område.

Nordlige Polen.

Øvre jura aflejringerne i Pommeren er af stor vigtighed for underdelingen af malm i det baltiske område. De gennemgående kalkrige sedimenter er især velkendt fra Pommeren i det dansk-polske sænkningsområde og kan findes som blokke på Bornholm (GRÖNWALL & MILTHERS, 1916, pp. 190–191). I kimmeridge kan der måske have været havforbindelse med det nordjyske bassin (GREGERSEN & SORGENFREI, 1951). I slutningen af øvre kimmeridge finder der svage orogene bevægelser sted, og sedimenterne i W. Pommeren viser, at havet blev lavvandet, hvorved der blev dannet talrige øer (WILCZYNSKI, 1962). På sedimenterne fra kimmeridge aflejres bononien sedimenter, der efterhånden kom til at indeholde ammonitter af volgien-typen. Efter en svagere uddybning blev havet i W. Pommeren i løbet af øvre bononien pany mere lavvandet, og i purbeck blev der

dannet små isolerede bassiner, der efterhånden fyldes med fersk vand (WILCZYNSKI, 1962).

Wealden-aflejringer er fundet i NW. Polen i det dansk-polske sænkningsområde. Aflejringerne er af ringe mægtighed og kun bevaret nogle steder. De overlejrede valanginien-aflejringer er ligesom purbeck-aflejringerne i det nordvestlige Polen af betydelig mindre mægtighed end længere mod syd i det centrale Polen (BIELECKA, 1960; POZARYSKI, 1960; JASKOWIAK, 1962).

Ostracodfaunaer fra purbeck-wealden aflejringerne i NW. Polen viser stor lighed med faunaer fra lignende aflejringer i NW. Europa. WICHER havde lejlighed til at bearbejde wealden ostracoder fra Ø. Tyskland (Stettin) og Polen. Han fandt ingen nævneværdige afvigelser fra ostracod faunaer i NW. Tyskland (WICHER, 1957).

Efter krigen er der i forbindelse med dybdeboringer publiceret en række stratigrafiske afhandlinger om purbeck-wealden mikrofossiler i det nordvestlige og centrale Polen (BIELECKA & POZARYSKI, 1954; BIELECKA & DABROWSKA, 1958; BIELECKA, 1959, 1960; SZTEJN, 1957, 1960). I det nordlige Polen er følgende mikrofossiler kendt fra purbeck-aflejringer (BIELECKA, 1960): *Cypris purbeckensis* (FORBES), *Metacypris forbesii* JONES, *Klieana alata* MARTIN, *Cypridea inversa* (MARTIN), *C. sowerbyi* MARTIN, *Ilyocypris jurassica* MARTIN, *Eoguttulina liassica* (STRICKL.) *Lenticulina* ex. gr. *münsteri* (ROEMER), *L. varians* (BORN.) og *Spirillina orbicula* (TERQ. & BERTH.).

Fra det nordlige Polen kendes en række mikrofaunuler fra wealden (infravalanginien), der ifølge SZTEJN (1960) indeholder: *Klieana alata* MARTIN, *Klieana? polonica* SZTEJN, *Cypridea nitidula* PECK, *Cyprideis polita* MARTIN og flere indslag af en række *Ammobaculites*-arter, samt *Haplocytheridea kummi* (TRIEBEL). Infravalanginien-faunaen går uden skarpe grænser over i valanginienfaunaen. Det fremgår af SZTEJNS fossiltavle, at *Klieana alata* MARTIN og *Klieana? polonica* SZTEJN alene udgør en selvstændig fauna i den nederste del af infravalanginien i det nordlige Polen.

Skåne.

Fra en række boringer samt fra Fyleverkens grav i S. Skåne er der beskrevet sedimenter af øvre jurassisk alder. H.-J. OERTLI, F. BROTZEN og H. BARTENSTEIN har nyligt (1961) uddybet kendskabet til disse sedimenter og beskrevet en mikrofauna herfra. Fra Fyleverkens grav er stejlstående øvre- og mellemjurassiske lag beskrevet (OERTLI, BROTZEN & BARTENSTEIN 1961, p. 7):

"(vom Hangenden ins Liegende)

1. Grüne und bunte Tone	etwa	80 m	mächtig
2. Glassand	–	100 m	–
3. Dunkle Sande mit Ton und Kohle – Lagen	–	85 m	–
4. Kohle – Lagen und dunkle Tone	–	3 m	–
5. Graue Basalsande	–	5 m?	– "

Fra lag nr. 1 og fra tilsvarende lag i en boring ved Landskrona blev en brakmarin øvre jurassisk mikrofauna beskrevet. Den indeholder *Ilyocypris jurassica spinosa* MARTIN, *Klieana* sp.sp. *1, 2 og 3*, *Cytheredeinarum* sp., *Amphicythere* sp., *Schuleridea* sp., *Eocytheropteron* sp., *Macrodentina* sp., og *Polydentina?* sp., samt repræsentanter for foraminiferslægterne *Ammodiscus* og *Eoguttulina*. På grundlag af denne fauna kunne det grønne ler korreleres med "Serpulit" i NW. Tyskland (tilnærmelsesvis Middle Purbeckian efter engelsk klassification) (OERTLI, BROTZEN & BARTENSTEIN, 1961).

I en prøve med grønt ler fra Fyleverkets grav har jeg i nærheden af lag med ovennævnte mikrofauna fundet store mængder charophyt – gyrogoniter. Dette støtter den antagelse, at dele af dette sediment må være aflejret i limniske eller svagt brakke omgivelser.

Stratigrafiske undersøgelser.

Materialer.

Det undersøgte ostracodmateriale stammer hovedsageligt fra boringer og daglokaliteter i Nykerområdet. Hertil kommer materiale fra en boring i Robbedale-Sose området og fra en boring ved Salene. Lokalisering af boringerne og daglokaliteterne Jydegaard og Kyndegaard fremgår af tekstfigur 1 og 2, hvor boringerne er angivet ved D.G.U.s arkiv nr., Beskrivelser af de to daglokaliteter findes henholdsvis hos GRY, 1956, pp. 134–136 og hos GRÖNWALL & MILTHERS, 1916, pp. 120–121.

En redegørelse for den kvantitative analyse af ostracodmaterialet vil kun være nyttig i enkelte tilfælde. Optællingen vanskeliggøres fordi skalmaterialet i reglen er stærkt knust, og ved at der i nogle tilfælde er spor efter opløsningsfænomener. Mange prøver stammer fra skylleboringer, men er taget på en sådan måde, at forurening fra andre niveauer er minimale. Fra boringerne nr. 244.165 og 244.247 er der udelukkende undersøgt kærneprøver.

De fossilholdige horisonter med ostracoder, vertebratrester og eventuelle foraminiferer, hvorfra prøverne hidrører, er ret tynde og ofte markeret ved tilstedeværelsen af molluskfragmenter. Horisonterne optræder ikke særligt talrigt, men er almindeligvis samlet i særlige intervaller, mens andre dele af sedimenterne synes sterile med hensyn til ovennævnte mikrofossiler.

Ikke blot synes de fossilholdige horisonter at være tynde, men ofte ligger de så tæt, at flere "populationer" er til stede i samme boreprøve. Dette fremgår ikke blot af forholdet mellem ostracodskallernes bevaringstilstand og ontogenesen i den enkelte prøve (se bemærkninger til *Darwinula leguminella* (FORBES) i den beskrivende tekst, p. 23), men også af sammenligninger mellem de enkelte faunaelementer, hvor nogle former med marin affinitet findes blandt former med limnisk affinitet. Nogle afvigelser mellem boreprøver og prøver fra daglokaliteten Jydegaard af faunasammensætningen (se efterfølgende afsnit om

Jydegaard formationen) må ligeledes tolkes som et resultat af en blanding af ostracodselskaber i nogle af boreprøverne fra relativt tætliggende horisonter med forskellige ostracodselskaber, dannet ved oscillation af forskellige milieuer.

Rabekke formationen.

Kun tre prøver med ostracoder er fundet i Rabekke formationen, og de hidrører fra to boringer: D.G.U. arkiv nr. 246.197 fra Robbedale-Sose blokken og nr. 244.247 fra Nyker området.

Boring nr. 244.247, kærneprøve fra 39.55–39,76 m indeholder en meget individrig fauna af *Klieana alata* MARTIN, desuden fragmenter af *Cypridea* (*Ulwellia*) aff. *inversa inversa* MARTIN og enkelte uidentificerede ostracodfragmenter. Prøver fra dybder 19 m og 19,5 m i boring nr. 246.197 indeholder enkelte skaller af *Klieana alata* MARTIN og *Cypridea* (*Cypridea?*) sp. (*148*) samt enkelte uidentificerede fragmenter.

En korrelation med de klassiske purbeck-wealden områder er overordentlig usikker, men fund af *Cypridea* (*Ulwellia*) aff. *inversa inversa* MARTIN synes snarere at formode "Serpulit" (~ Middle Purbeck efter engelsk inddeling) end Wealden sensu stricto.

Det må bemærkes, at *Klieana alata* MARTIN forekommer i så store mængder, at de næsten udgør et monotypisk faunaselskab i lighed med det, der synes at være til stede i nedre infravalanginien i det nordlige Polen (p. 51 og SZTEJN, 1960).

Jydegaard formationen.

Ostracodførende horisonter findes i Jydegaard formationens nedre dele og er kun kendt fra Nyker-området.

Nederst i lagserien er der fundet *Darwinula leguminella* (FORBES), herover følger en 10–12 m mægtig zone med talrige horisonter, der under et er karakteristisk ved at indeholde: *Cypridea* (*Cypridea*) *alta formosa* WOLBURG, *C.* (*Cypridea*) cf. *propunctata* SYLV.-BRADL., *Darwinula leguminella* (FORBES), *D. oblonga* (ROEMER), *Neocytheridea bononiensis bononiensis* (JONES), *Limnocythere? groenwalli* n.sp., *Paracyprideis subparallela* WOLBURG og *P. jydegaardensis* n.sp. Hertil kommer enkelte fund af *Clinocypris* sp. (*126*), *Metacytheropteron* sp. (*132b*), indet. gen. et sp. (*153*) og *Cypridea* (*Ulwellia*) cf. *menevensis* ANDERSON.

Få meter over denne zone følger to eller flere horizonter, hvori der i reglen kun optræder to ostracodarter: *Neocytheridea bononiensis bononiensis* (JONES) og *Palaeocytheridea? compacta* WOLBURG. *N. bononiensis bononiensis* (JONES) er til stede i stor mængde og dominerer helt over *P.? compacta* WOLBURG. I en enkelt prøve umiddelbart over denne ditypiske ostracodfauna er der fundet et enkelt eksemplar af *Darwinula* sp. (*144*).

Den overnævnte faunistiske udvikling med en nedre 10–12 m mægtig *Cypridea* zone overlejret af den mindre mægtige *Neocytheridea bononiensis* –

"*Palaeocytheridea*" *compacta* zone er fundet i boringerne nr. 244.165 og 244.228. I boringerne nr. 244.226 og 244.242 er der kun prøver fra *Neocytheridea bononiensis* – "*Palaeocytheridea*" *compacta* zonen, da disse boringer kun er ført ned til dybder i eller umiddelbart under denne zone.

Fra indsamlinger foretaget af GRÖNWALL i 1899 på daglokaliteten Kyndegaard findes kun *Neocytheridea bononiensis bononiensis* (JONES), og det må derfor antages, at prøveudtagningen er foretaget i *Neocytheridea bononiensis* – "*Palaeocytheridea*" *compacta* zonen.

I daglokaliteten Jydegaard er der fundet selskaber med *C.* (*Cypridea*) *alta formosa* WOLBURG, *Darwinula leguminella* (FORBES) og *D. oblonga* (ROEMER) i prøver fra sedimenter med forskellig sammensætning. I en prøve forekommer udelukkende *Limnocythere? groenwalli* n.sp.

Fra grønt, fedt ler med skaller og uden ostracoder fra 17,1 m dybde i boring nr. 244.218 har jeg udtaget en foraminifer-fauna bestående af *Haplophragmoides?* sp.sp. og *Eoguttulina* sp., hvilket lader formode et brakt-marint milieu. Boringen, der er 18 m dyb, ligger nær op til eller måske i Nyker-blokkens vestlige brudzone mod Jespersens Granithorst. Dette er et af usikkerhedsmomenterne med hensyn til, om denne fauna tilhører Jydegaard formationen.

Fra wealden områderne i NW. Tyskland og Holland kendes *Neocytheridea bononiensis* – "*Palaeocytheridea*" *compacta* selskabet ligeledes; (Tafel 13, Fauna B, MARTIN, 1961 b: "Ziemlich monotypische Fauna mit *Fabanella polita polita* (MARTIN) und *Ostracode* WOLBURG *G 31*") (*F. polita* (MARTIN) = *N. bononiensis* (JONES) og *Ostracode* WOLBURG *G 31* = *P.? compacta* WOLBURG). Det udgør en af "drei verschiedenen Lagen aus dem marinen Wealden 4", og også andre faunaer i disse lag viser, at *P.? compacta* WOLBURG er tilknyttet mere eller mindre stærkt brakvand. Faunabevægelsen fra *Cypridea* zonen til *Neocytheridea bononiensis* – "*Palaeocytheridea*" *compacta* zonen viser således en udvikling fra et limnisk eller svagt brakt milieu til et mere brakt milieu (brakt-marint?).

På grund af tilstedeværelse af *Cypridea* (*Cypridea*) *alta formosa* WOLBURG, *C.* (*Cypridea*) cf. *propunctata* SYLV.-BRADL., *Palaeocytheridea? compacta* WOLBURG og *Paracyprideis subparallela* WOLBURG må en sammenligning med wealden området i NW. Tyskland give det resultat, at i det mindste den nederste del af Jydegaard formationen biostratigrafisk må korreleres med Wealden 3 (indeholder overgangen Upper Purbeck-Wealden efter engelsk inddeling). *C.* (*Cypridea*) *propunctata* SYLV.-BRADL. er ikke almindelig forekommende i NW. Tyskland (se under den systematiske beskrivelse), men derimod nærtstående arter. Disse har lateralt trekantet omrids og tydeligt markerede forreste dorsalvinkler. Arter med disse morfologiske træk findes næsten udelukkende i nedre Wealden 3 i NW. Tyskland (WOLBURG, 1959, p. 234).

Det er bemærkelsesværdigt, at sulcusdannelsen hos de bornholmske *Cypridea*-arter oftest er ledsaget af en cirkulær forsænkning i skalvæggen bag rostrum. Sulcusdannelsen hos de nordvesttyske *Cypridea*-arter synes derimod almindeligvis at være ledsaget af en langstrakt forsænkning.

Salene området.

Ostracodfaunaen fra boring nr. 245.13 i Salene-området afviger både fra de nævnte faunaer i Jydegaard formationen og i Rabekke formationen.

På grundlag af tre prøver fra ovennævnte boring kan det vises, at faunaen består af: *Neocytheridea bononiensis bononiensis* (JONES), *Galliaecytheridea* sp. (*152*) og *Orthonotacythere* sp. (*133*). Hertil enkelte fund af *Scabriculocypris?* sp. (*127*), *Klieana* sp. (*145*), *Eucypris* sp. (*146*) og *Palaeocytheridella* sp. (*151*). Forskellige fragmenter tolkes som rester efter "*Gomphocythere*" sp. (=? *Bisulcocypris*). Ostracodfaunaen viser et tydeligt brakt-marint milieu, og fund af foraminiferer som *Haplophragmoides* sp. bekræfter dette. Af fiskerester er der, foruden knogler og tænder, fundet enkelte otoliter.

I en prøve fra en glacialflage ved Habbedam har jeg fundet faunaen med *Neocytheridea bononiensis bononiensis* (JONES), *Galliaecytheridea* sp. (*152*) og *Orthonotacythere* sp. (*133*), men tillige en skal af *Limnocythere? groenwalli* n.sp.

Ostracodmaterialet fra disse aflejringer er trods omfattende sorteringer meget sparsomt og fragmentarisk, men faunaen synes på grundlag af fragmenter at være ret artsrig. Det er ingen tvivl om, at faunaen hidrører fra purbeck-wealden aflejringer.

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PLATES

Plate I

50×

Figs. 1a–d. *Cypridea* (*Cypridea*) *alta formosa* WOLBURG, 1959; p. 27;
a, left valve, text fig. 6, borehole 244.228, 37–39 m.;
b, right valve, larva, borehole 244.228, 27.6–29.5 m.;
c, right valve, larva, anterior and posterior margins are lacking, borehole 244.228, 40.5 m.;
d, right valve, borehole 244.228, 34–36 m.

Fig. 2. *Cypridea* (*Ulwellia*) cf. *menevensis* ANDERSON, 1939; p. 31;
left valve, text fig. 8, borehole 244.228, 40.5 m.

Figs. 3a–d. *Cypridea* (*Cypridea*) cf. *propunctata* SYLV.-BRADL., 1949; p. 28;
a, left valve, the anterior margin is defective, text fig. 7, borehole 244.228, 27.6–29.5 m.;
b, right valve, posterior margin is lacking, borehole 244.228, 37–39 m.;
c, left valve, the posterior part is lacking, borehole 244.228, 40.5 m.;
d, left valve, the dorsal part is lacking, borehole 244.228, 40.5 m.

Phot. CHR. WESTERGAARD

Plate I

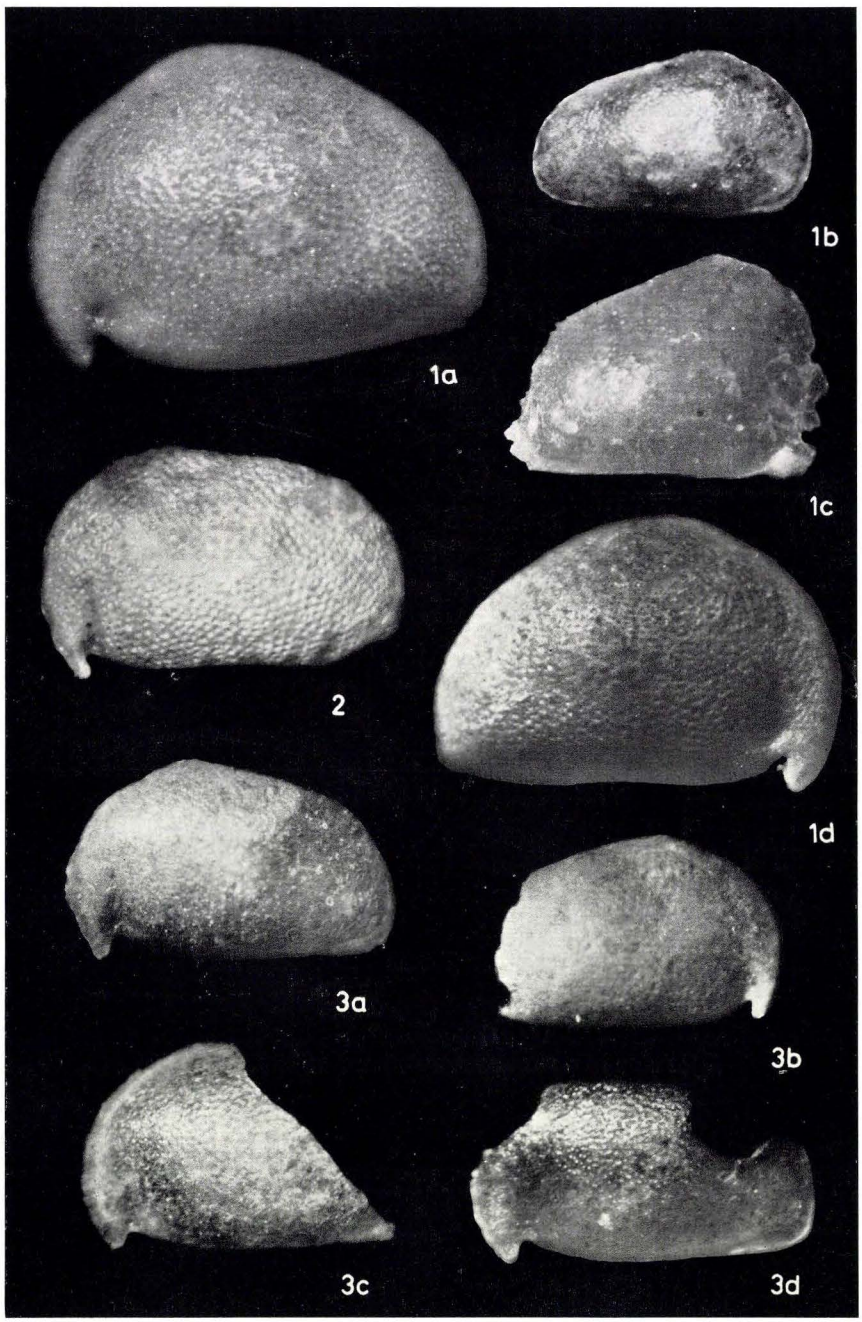

Plate II

50×: Figs. 1a–c, 2a–c, 5a–c, 6.
75×: Figs. 3, 4.

Figs. 1a–c. *Cypridea* (*Ulwellia*) aff. *inversa inversa* MARTIN, 1940; p. 32;
a, fragment of left valve, rostral area;
b, defective posteroventral projection of a fragmentary right valve;
c, fragment of right valve, rostral area.
Borehole 244.247, 39.55–39.76 m.

Figs. 2a–c. *Darwinula leguminella* (FORBES, 1855); p. 21;
a, left valve, borehole 244.228, 40,5 m.;
b, right valve, internal view, borehole 244.228, 34–36 m.;
c, carapace in dorsal aspect, borehole 244.165, 53.3–53.5 m.

Fig. 3. *Metacytheropteron* sp. (*132b*); p. 44;
left valve, larva, borehole 244.228, 32–34 m.

Fig. 4. Indet. gen. et sp. *(153)*; p. 48;
left valve, larva?, borehole 244.228, 37–39 m.

Figs. 5a–c. *Darwinula oblonga* (ROEMER, 1839); p. 23;
a, right valve, internal view, borehole 244.228, 34–36 m.;
b, right valve, borehole 244.228, 40.5 m.;
c, left valve, borehole 244.228, 27.6–29.5 m.

Fig. 6. *Clinocypris* sp. (*126*); p. 33;
right side of a fragmentery carapace, borehole 244.228, 40,5 m.

Phot. CHR. WESTERGAARD

Plate II

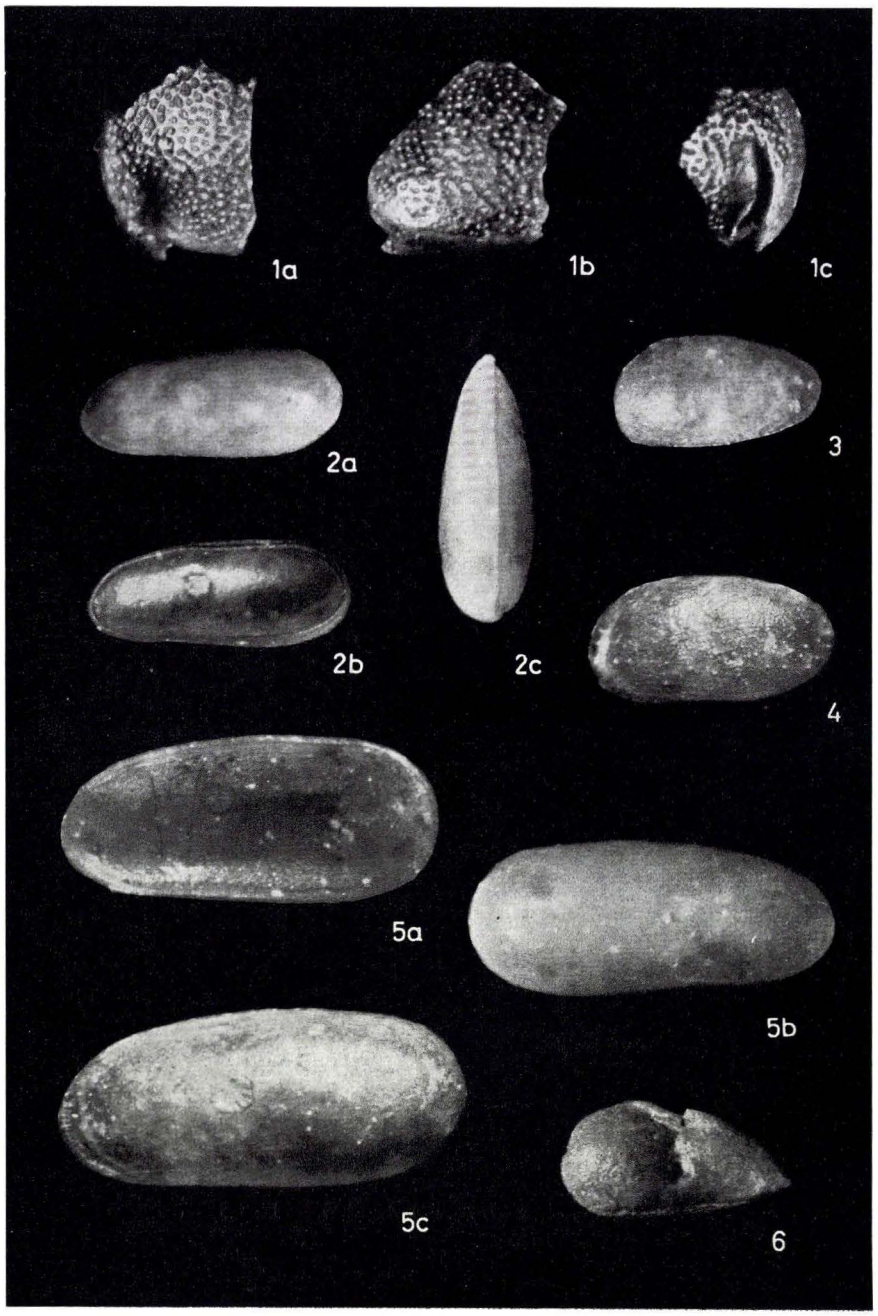

Plate III

30×: Figs. 2b–e, 4a–d.
50×: Figs. 1a–g, 2a, 3.

Figs. 1a–g. *Limnocythere? groenwalli* n.sp.; p. 46;
a, left valve, borehole 244.228, 32–34 m.;
b–c, left valve, holotype, larva, lateral and dorsal aspects, borehole 244.228, 27.6–29.5 m.;
d, left valve, the anterior margin is lacking, borehole 244.165, 62.0–62.2 m.;
e, right valve, the posterior margin is lacking, borehole 244.228, 40.5 m.;
f, right valve, part of the dorsal margin is lacking, borehole 244.228, 32–34 m.;
g, right valve, the anteroventral corner and the posterior end are lacking, borehole 244.228, 32–34 m.

Figs. 2a–e. *Neocytheridea bononiensis bononiensis* (JONES, 1882); p. 36;
a, fragmentary right valve, internal view, ♀, the longitudinal axis of the valve is sloping, borehole 244.228, 40,5 m.;
b; left valve, ♀, borehole 244.228, 40.5 m.;
c, carapace in dorsal view, ♀, borehole 244.165, 40.9–48.8 m.;
d, right valve, ♂, borehole 244.228, 40.5 m.;
e, left valve, ♂, borehole 244.228, 40.5 m.

Fig. 3. *Palaeocytheridella* sp. (*151*); p. 41;
left valve, the posteroventral corner slight defective, larva, borehole 245.13, 40 m.

Figs. 4a–d. *Palaeocytheridea? compacta* WOLBURG, 1962; p. 39;
a–c, carapace, right and left side and in dorsal view, ♀;
d, carapace, right side, ♂;
Borehole 244.242, 67.2 m.

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Plate III

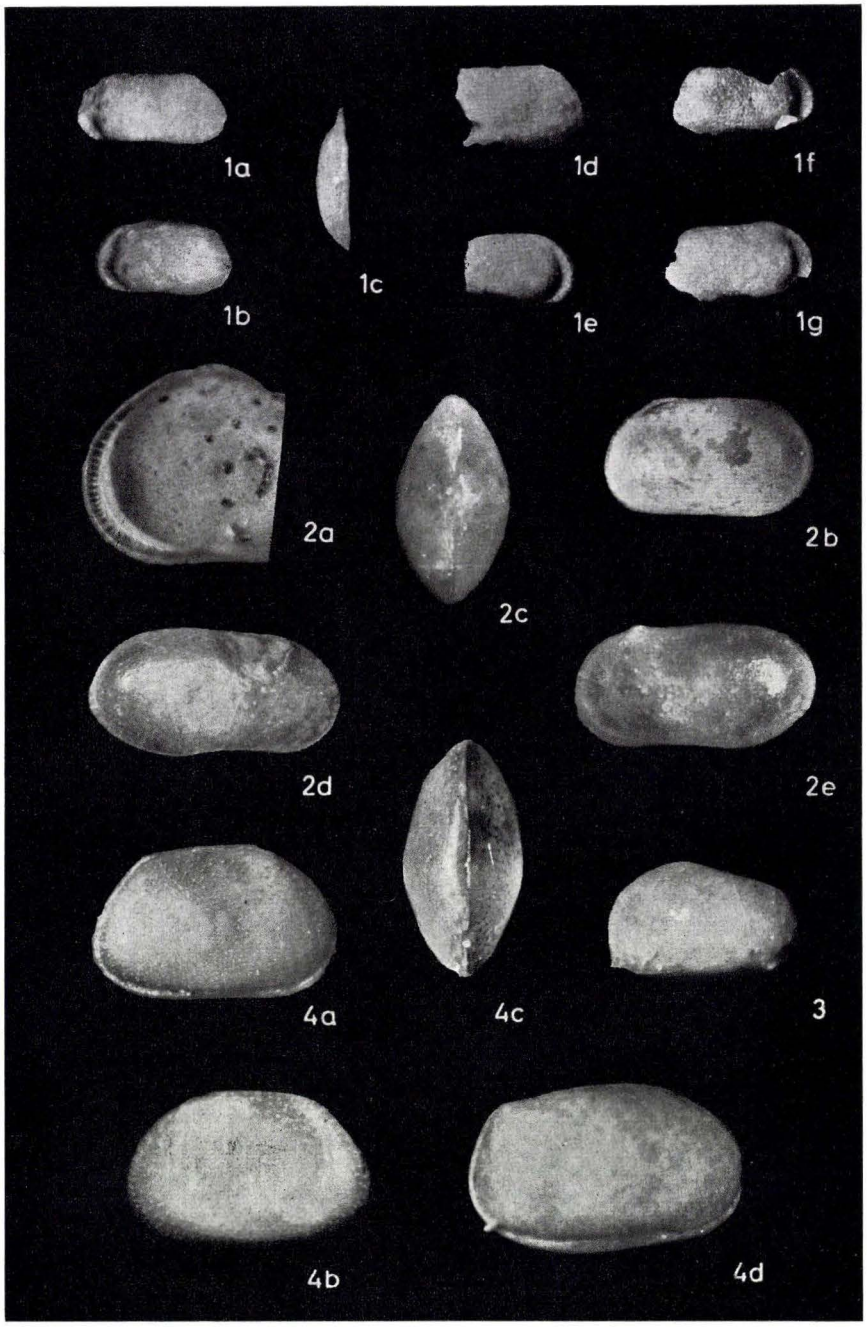

Plate IV

50×

Figs. 1a–e. *Paracyprideis subparallela* WOLBURG, 1962; p. 41;
a, left valve, larva, borehole 244.228, 40.5 m.;
b, right valve, borehole 244.228, 27.6–29.5 m.;
c, left valve, borehole 244.228, 27.6–29.5 m.;
d, right valve, the surface polluted, borehole 244.165, 53.3–53.5 m.;
e, right valve, borehole 244.228, 27.6–29.5 m.

Figs. 2a–d. *Paracyprideis jydegaardensis* n.sp.; p. 43;
a, left valve, borehole 244.228, 27.6–29.5 m.;
b–c, fragments, borehole 244.228, 40.5 m.;
d, right valve, holotype, text fig. 13, borehole 244.165, 53.3–53.5 m.

Figs. 3a–d. *Galliaecytheridea* sp. (*152*); p. 38;
a, left valve, larva, broken and fragmentary, the anterodorsal part is lacking, borehole 245.13, 40 m.;
b, right valve, larva, the ventral part of the anterior margin is lacking, borehole 245.13, 40 m.;
c, left valve, larva, text fig. 12, borehole 245.13, 25 m.;
d, anteroventral half of a right valve, borehole 245.13, 45 m.

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Plate IV

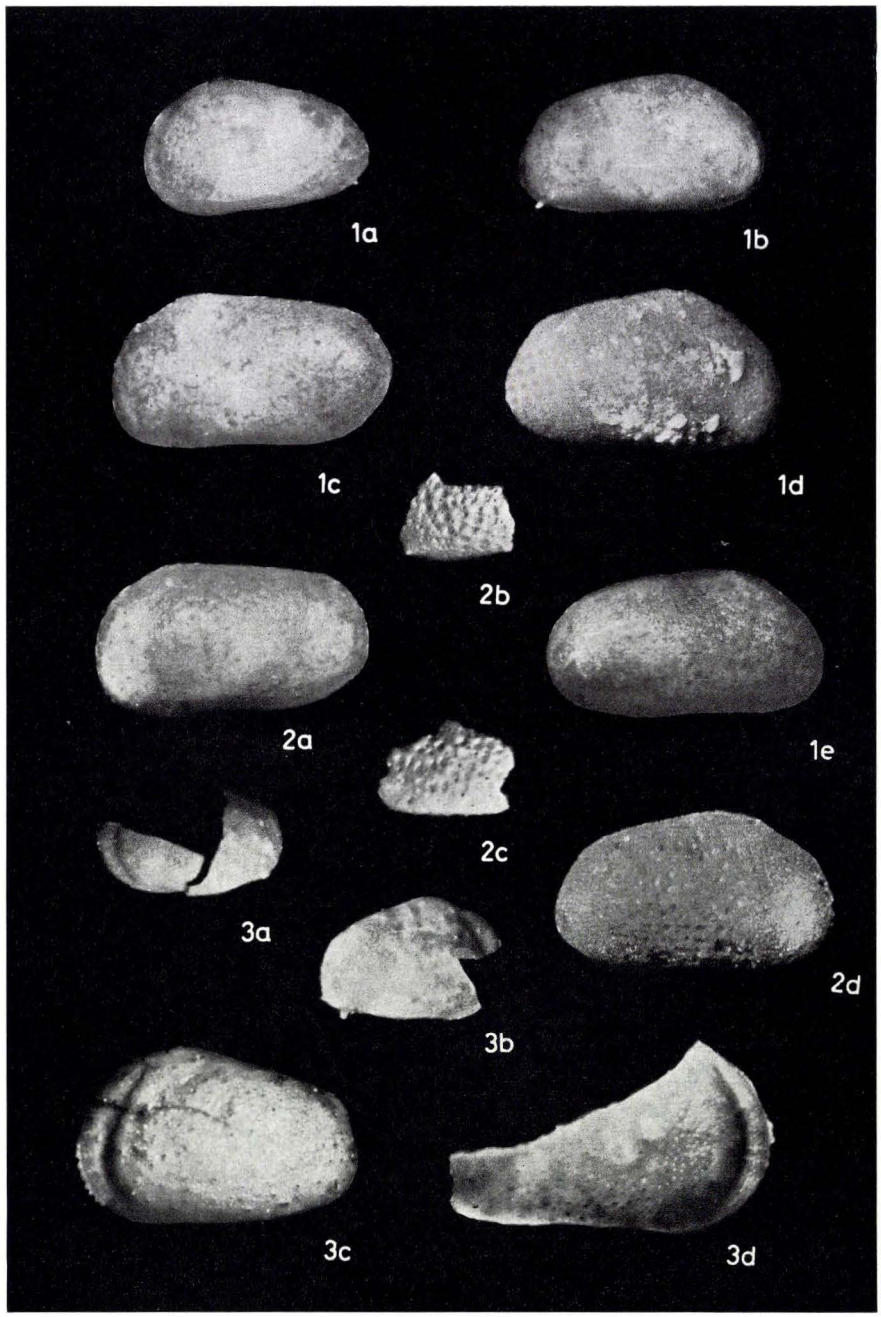


Plate V

30×: Fig. 5.
50×: Figs. 1a–g, 2a–b, 3a–b, 4.

Figs. 1a–g. *Klieana alata* MARTIN, 1940; p. 34;
a–c, left valves, ♀♀;
d, right valve, ♀;
e, left valve, ♂;
f, right valve, ♂;
g, left valve, ♂;
Borehole 244.247, 39.55–39.70 m.

Figs. 2a–b. *Scabriculocypris?* sp. (*127*); p. 33;
a, carapace, right side;
b, highly fragmentary carapace;
Borehole 245.13, 25 m.

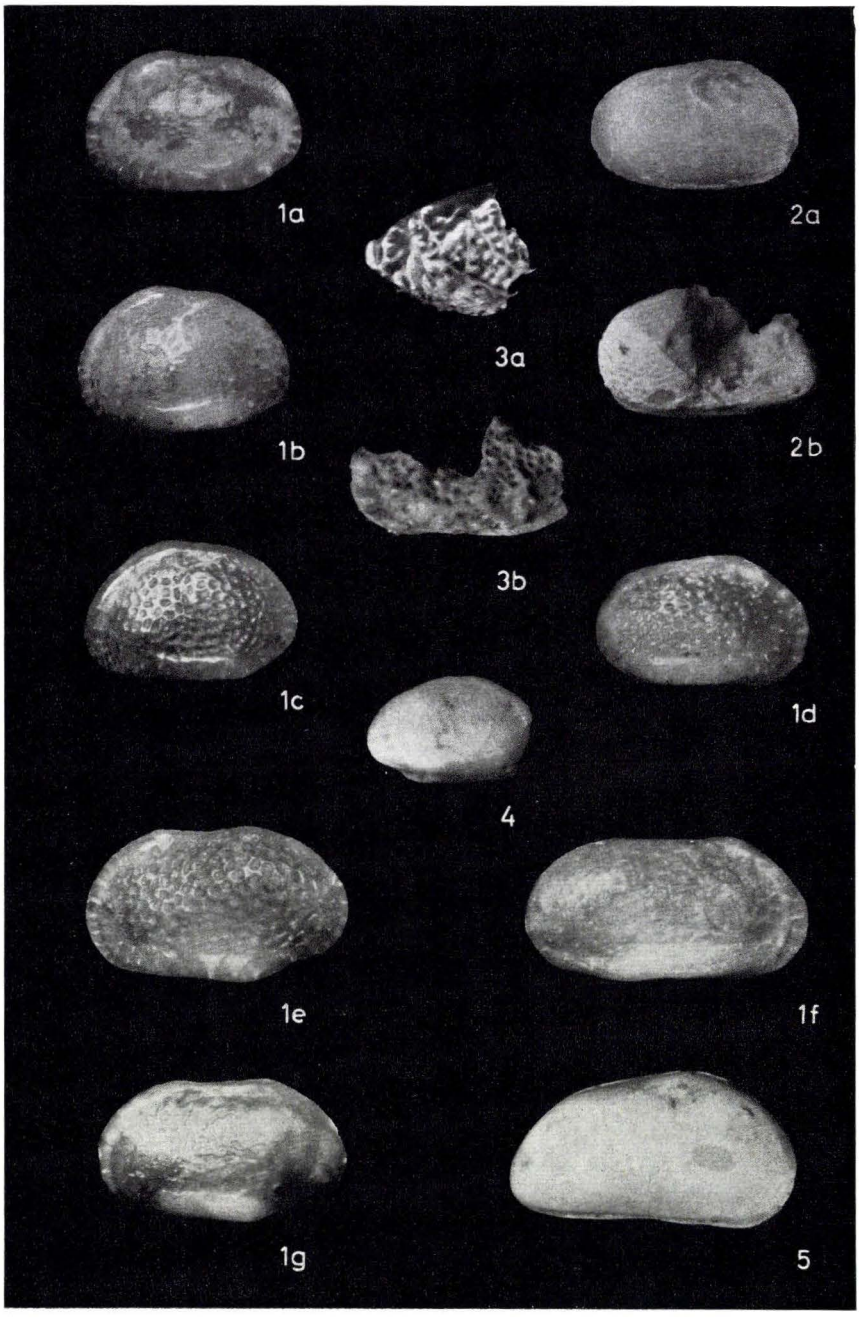
Figs. 3a–b. *Orthonotacythere* sp. (*133*); p. 45;
a, the posterior half of a right valve, text fig. 14, borehole 245,13, 45 m.;
b, the anteroventral half of a left valve, from Habbedam.

Fig. 4. *Klieana* sp. (*145*); p. 36;
carapace, right side, borehole 245.13, 40 m.

Fig. 5. *Eucypris* sp. (*146*); p. 26;
carapace, right side, borehole 245.13, 25 m.

Phot. CHR. WESTERGAARD

Plate V



Denne bog er sat med Monotype Times og trykt i 1500 eksemplarer på Andelsbogtrykkeriet i Odense. Papir: Ekstraglittet 605, 125 g, fra De forenede Papirfabrikker. Plancher: Svensk krideret, 100 g.