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By
Ole Bruun Christensen

Dansk sammendrag

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fra øvre jura og nedre kridt

With 2 Plates

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

The present paper has been prompted by the discovery in Danish beds of the monotypical ostracod genus *Dicrorygma* POAG 1962 of North America. An immediate comparison with North American material was possible, when Dr. C. W. POAG JR. generously forwarded me a topotypical collection of the genospecies. For this I am much obliged to Dr. POAG.

Most of the material in this paper originates from Danish deep-borings, under current study at the GEOLOGICAL SURVEY OF DENMARK. The English material has been collected by SIGURD HANSEN, Ph. D. and by the author in the summer of 1964 during a visit to Dr. JOHN W. NEALE, the University of Hull, for purposes of study. For the use of Dr. SIGURD HANSEN's material and for the kind guidance by Dr. JOHN W. NEALE I am very grateful. Furthermore I am indebted to Dr. FRITZ BROTZEN, the Geological Survey of Sweden, Stockholm, for getting an opportunity to examine Swedish ostracod material. Finally, I offer my best thanks to Mrs. RIGMOR BORG for the drawing of the scattergram and to Mr. CHR. WESTERGAARD for the most valuable co-operation at the photographic work.

Geological Survey of Denmark.
Copenhagen, 13. August 1964. OLE BRUUN CHRISTENSEN

CONTENTS

ABSTRACT

Representatives of the subgenus *Dicrorygma* POAG are found in Lower Cretaceous beds in Texas, England, and Denmark.

Two new Lower Cretaceous species have been described from England and Denmark, respectively. Besides, an ostracod closely related to the English species has been described from Danish beds.

Species of *Dicrorygma* (*Orthorygma*) nov. subgen. occur in beds of the Kimmeridgian, Portlandian, and Purbeckian Ages from Denmark. Frequent occurrences of the species in the Purbeckian beds indicate marine ingressions in these otherwise brackish deposits. A number of formerly described Upper Jurassic species from NW. Europe are considered to belong to the genus *Dicrorygma*. Three new Upper Jurassic species are described.

I. GENERAL PART

By searching the more fine-grained portion of washed samples from the Kiamichi Formation in Northern Texas (uppermost section of the Fredericksburg Group, Lower Cretaceous) POAG discovered a small ostracod, which, although it was common in the samples, had so far been overlooked. POAG (1962) used the ostracod as type species of a monotypical new genus and named it *Dicrorygma mullinsi* POAG 1962.

D. (*Dicrorygma*) *mullinsi* POAG 1962 is known only from black shales in the lower section of the Kiamichi Formation (Pl. 1 figs. 1 a–b, Pl. 2 figs. 7 a–b). The rich ostracod faunas from this formation have been described by C. I. ALEXANDER (1929), who also listed the following commonest species from the lower section of the formation (nomenclatural corrections according to HOWE & LAURENCICH 1958): *Cytheridea amygdaloides* var. *brevis* (CORNUEL) ALEXANDER (? = *Asciocythere rotunda* (VANDERPOOL)), *Cythereis fredericksburgensis* ALEXANDER, *Dolocytheridea* sp., *Eocytheropteron tumidum* (ALEXANDER), *Pontocyprella? roundyi* (ALEXANDER), *Schuleridea bairdioides* (ALEXANDER), and *Schuleridea? oliverensis* (ALEXANDER).

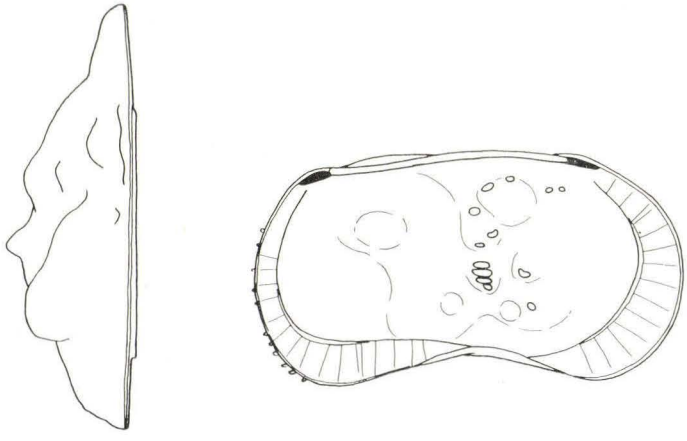
In washed samples which, by their contents of small ostracods as well as ostracods with thin valves (for instance from larvae), indicate that the samples were prepared with care, the author has found species of *Dicrorygma*. Species closely related to *Dicrorygma mullinsi* POAG have been found in beds of Hauterivian from England and from Denmark, *D.* (*Dicrorygma*) *speetonensis* nov. sp. and *D.* aff. *D.* (*Dicrorygma*) *speetonensis* nov. sp. respectively, and *D.* (*Dicrorygma*) *muelleri* nov. sp. from Barremian of Denmark. Distant related species, such as *D.* (*Orthorygma*) *reticulata* nov. sp., and *D.* (*Orthorygma*) *maior* nov. sp. from the Kimmeridgian of Denmark are representatives of a new subgenus.

D. (*Orthorygma*) *groenwalli* BRUUN CHRISTENSEN 1963 (pro *Limnocythere? groenwalli* BRUUN CHRISTENSEN 1963 according to footnote) has been found associated with marine ostracods as well as with brackish water ostracods. After my opinion the presence of freshwater ostracods can hardly be shown in the Purbeck-Wealden beds. In borings into the Jydegaard Formation in Bornholm *D.* (*Orthorygma*) *groenwalli* BR. CHR. (Pl. 2 figs. 6 a–b) has been found in samples, taken at rather large intervals, among species of *Cypridea*, *Darwinula*,

and *Pachycytheridea*, and among *Fabanella bolonensis* (JONES) (nomen correctum ex *Neocytheridea bononiensis* (JONES) BR. CHR. 1963), *Clinocypris* sp. and *Metacytheropteron* sp. Of these species the first mentioned ostracods originate from brackish water and the last ones have a marine connexion. From the exposure Jydegaard, samples with *D.* (*Orthorygma*) *groenwalli* BR. CHR. versus samples with species of *Cypridea* and *Darwinula* have been collected, i.e. the species do not occur together in the samples. In a sample from Habbedam *D.* (*Orthorygma*) *groenwalli* BR. CHR. was found together with *Fabanella bolonensis* (JONES), *Galliaecytheridea* sp., *Orthonotacythere* sp. and other more or less marine ostracods. These relations in combination with the fact that the other species of *Dicrorygma* have only been found in marine deposits, suggest that *D.* (*Orthorygma*) *groenwalli* BR. CHR. indicates marine environments. As the species occurs in a number of samples throughout the lower part of the Jydegaard Formation, together with the above-mentioned fauna of brackish water ostracods, it is reasonable to conclude that marine ingressions in the brackish Upper Purbeckian beds was a frequent phenomenon during the time of sedimentation.

A number of ostracods from the Upper Jurassic and the Lower Cretaceous generally described as belonging to the limnic, maybe Cenozoic, genus *Limnocythere* (Pl. 1 fig. 2 and text fig. 1 show the genospecies *Limnocythere inopinata* (BAIRD)) could presumably be referred to *Dicrorygma*, on the basis of a study of interior morphological features.

Cytherideinarum gen. sp. 2 OERTLI, BROTZEN & BARTENSTEIN 1961 described from Upper Jurassic beds in Scania and collected in a large number of specimens from a Danish borehole (Øresund No. 1A, D.G.U. File No. 188.345), has been classified as *Dicrorygma* (*Orthorygma*) *brotzeni* nov. sp. The species has been



Text fig. 1. *Limnocythere inopinata* (BAIRD 1843). Left valve in dorsal and interior aspect. Lake Tystrup Sø, Zealand, 21.9.1963. 100 ×.

extracted from shales collected in Scania together with species of *Amphicythere*, *Eocytheropteron*, *Macrodentina* and *Schuleridea*.

The following species can be classified as belonging to the genus *Dicrorygma* POAG 1962:

D. (*Dicrorygma*) *mullinsi* POAG 1962
D. (*Dicrorygma*) *muelleri* nov. sp.
D. (*Dicrorygma*) *speetonensis* nov. sp.
D. aff. *D.* (*Dicrorygma*) *speetonensis* nov. sp.
D. (*Orthorygma*) *brotzeni* nov. sp.
D. (*Orthorygma*) *groenwalli* BRUUN CHRISTENSEN 1963[1])
D. (*Orthorygma*) *maior* nov. sp.
D. (*Orthorygma*) *reticulata* nov. sp.
Cytherideinarum gen. ? sp. 1 OERTLI 1957
Limnocythere cf. *fragilis* MARTIN 1961
? *Limnocythere inflata* STEGHAUS 1951
? *Limnocythere inflata* STEGHAUS 1951 (teilweiß skulptiert) KLINGLER 1955
? *Limnocythere* ? sp. (netzskulptiert) KLINGLER, MALZ & MARTIN 1962.

[1]) For subspecies, notice the footnote to the table p. 13.

II. SYSTEMATIC PART

FAMILIA CYTHERIDEIDAE SARS 1925
SUBFAMILIA CUNEOCYTHERINAE MANDELSTAM 1960
GENUS DICRORYGMA POAG 1962

Diagnosis.

A genus of small, thin-valved ostracods belonging to the family *Cytherideidae*. The hinge of the left valve consists of an elongate furrow, parallel to and below the dorsal margin. The furrow widens and deepens anteriorly, where it is open, forming an elongate socket, which corresponds to a narrow, smooth bar rising from the dorsal margin of the right valve. The marginal area is broad, with vestibules along the posteroventral margin and along the anterior margin, where there are 10–15 radial pore canals. The left valve is larger than the right valve along the whole periphery on the carapace, except along the posteroventral margin. There the margins of the valves are laterally depressed, equally large, and stand out like a keel along the posterior part of the ventral margin. Along the anterior margin of the carapace there is also a lateral depression, but there it is considerably more strongly developed.

Affinities.

Species of *Dicrorygma* seem to have many features in common with *Archaeocythere reniformis* MANDELSTAM 1947 from Middle Jurassic beds in Kazakhstan, but differ from it, for instance by the fact that the ventral margin is less convex or concave near the middle, by the presence of distinct vestibules, and by the hinge bar of the right valve being constituted by the dorsal margin. Besides, the species of *Dicrorygma* are considerably smaller. Furthermore *Dicrorygma* sensu strictu differs by the development of the radial pore canals.

Remarks.

By examination of well-preserved specimens of *D. mullinsi* POAG has found that there is a tendency towards development of a small toothlike projection on the posterior part of the hinge on the right valve (personal communication). In some right valves of new species, I, too, could observe a faint element on the posterior part of the hinge edge. It may be due to the fact that the posterior

Exterior morphological features among species of *Dicrorygma* POAG

	LATERAL SURFACE	DORSAL MARGIN	POSTERIOR CARDINAL ANGLE	POSTERODORSAL MARGIN	VENTRAL MARGIN	DISTRIBUTION
D. (*Dicrorygma*) *mullinsi* POAG	smooth-punctate	almost straight	rounded	long, steep, usually convex	almost straight	Lower Cretaceous, U.S.A.
D. (*Dicrorygma*) *muelleri* n. sp.	smooth	flatly convex	very slightly developed	short, slightly sloping, slightly convex	straight-slightly convex	Barremian, Denmark
D. aff. *D. speetonensis* n. sp.	smooth	slightly convex	rounded, slightly developed	fairly short, sloping, slightly convex	straight-slightly convex	Hauterivian, Denmark
D. (*Dicrorygma*) *speetonensis* n. sp.	smooth	slightly convex	fairly slight developed	fairly long, fairly steep, slightly convex	almost straight	Hauterivian, England
D. (*Orthorygma*) *groenwalli* BRUUN CHRISTENSEN[1])	delicately reticulate	almost straight	very well developed	very long, steep, almost straight	almost straight	Purbeckian, Denmark
D. (*Orthorygma*) *brotzeni* n. sp.	densely punctate	slightly convex	rounded	fairly short, sloping, convex	straight	Portlandian, Denmark
D. (*Orthorygma*) *reticulata* n. sp.	reticulate	slightly concave	well developed	long, sloping, almost straight	slightly concave	Kimmeridgian, Denmark
D. (*Orthorygma*) *maior* n. sp.	smooth	slightly concave	well developed	long, sloping, slightly convex	straight-slightly concave	Kimmeridgian, Denmark

[1]) A new subspecies of *D.* (*Orthorygma*) *groenwalli* has recently been found in Lower Purbeckian beds from SE. Scania (Vitabäck fauna). It mainly diverges from *D.* (*Orthorygma*) *groenwalli groenwalli* (of Upper Purbeckian) by the slightly convex posterodorsal margin.

part of the hinge furrow of the left valve does not only disappear posteriorly, but stretches so far towards the middle of the valve that the apical bar of the hinge stands out more or less isolatedly (Plate 2 figs. 2a and 3a).

SUBGENUS DICRORYGMA (DICRORYGMA) POAG 1962

Type Species. Dicrorygma mullinsi POAG 1962.

Diagnosis.

Species of the genus *Dicrorygma* with predominant smooth lateral surfaces and almost straight to convex dorsal margins. The zones of concrescence are relatively broad with more or less bifurcating and somewhat irregular, radial pore canals.

Distribution. Marine beds from Lower Cretaceous in Texas and NW. Europe.

Dicrorygma (Dicrorygma) muelleri nov. sp.

Plate 1 figs. 3a–b, Plate 2 figs. 1a–e.

Derivation of the Name. In honour of the Danish zoologist O. F. MÜLLER (1730–1784).
Holotype. A right valve; Plate 1 fig. 36, Plate 2 figs. 1a–c; D.G.U.
Type Locality. Borehole Haldager No. 1, D.G.U. File No. 26.171.
Type Stratum. Dark silty clay; 664–669 m., 71–76 cm. below the top of the core; Lower Barremian.

Material.

Haldager No. 1, D.G.U. File No. 26.171, 664–669 m., 71–76 cm., (M. 118): Two valves and one carapace. (Børglum No. 1, D.G.U. File No. 9.58, 615–621 m., 90–95 cm., (M. 26): Six valves and one carapace?).

Diagnosis.

A lengthy species of *Dicrorygma* s.s. with a slightly developed posterior cardinal angle and the somewhat pointed posterior end situated in the median longitudinal axis of the valve.

Affinities.

The species differs from the other species of *Dicrorygma* by the lengthy shape and the somewhat pointed posterior end.

Description.

The left valve is oblong oval with the pointed posterior end situated in the median longitudinal axis. The greatest height is in the anterior fourth of the valve. In the dorsal aspect the valve is pointed posteriorly and has a laterally depressed zone along the anterior margin. The greatest breadth is in the middle of the valve. The lateral surface is smooth. The adductor scars consist of four spots situated vertically below each other, the uppermost one apparently being the smallest. The normal pore canals are regularly dispersed on the surface. An eye spot is very slightly developed. The structures of the hinge and the marginal areas as described under the subgenus. Dichotomic radial pore canals are common in the present species.

Distribution and Remarks.

The type specimens were found in dark, silty clay of the Lower Barremian in an ostracod-fauna with *Acrocythere hauteriviana* aff. *anomala* (NEALE), *Cytherelloidea anomala* KAYE, *Dolocytheridea intermedia* OERTLI, *Eucytherina nuda* KAYE, *Orthonotacythere inversa inversa* (CORNUEL), *O. ramulosa* (SHARAPOVA) ?, and *Protocythere triplicata* (ROEMER), and by species of *Cytherura*, *Cytheropteron*, *Macrocypris*, and *Paracypris*.

From Upper Barremian beds in another borehole (Børglum No. 1, D.G.U. File No. 9.58) some material has been collected which provisionally may be classified under the present species. The material does not allow satisfactory examinations of the interior features of the valves. The exterior features do not diverge from the type material except for the fact that the posterior ends of the valves are not situated in the median longitudinal axis, but immediately below the axis.

Dicrorygma (Dicrorygma) speetonensis nov. sp.

Plate 1 figs. 5a–d, Plate 2 figs. 3a–c.

Derivation of the Name. From the area near Speeton, Yorkshire, England.
Holotype. A right valve; Plate 1 fig. 5b; D.G.U.
Type Locality. Black Cliff Ridge south of Filey, Speeton, Yorkshire, England.
Type Stratum. Dark grey clay; Hauterivian C. 8 (*Radiatus* Zone); Speeton Clay.
Material. Nine more or less complete valves and larvae from the sample L. C. 19 (English collection) collected 10.9.1948 by SIGURD HANSEN, Ph. D.

In a highly glauconitic sample of dark grey clay collected 10.VII.1964 from Hauterivian C. 8 in the type locality the species has not been found, while seven valves of the species were found in a sample of dark grey clay from Hauterivian C. 6 (prospective upper part of C. 7).

Diagnosis.

A species of *Dicrorygma* s.s. with slightly convex dorsal margin and almost straight ventral margin. The fairly slightly developed posterior dorsal angle is situated far posteriorly, and the posterior margin is long, fairly steep and slightly convex, at least that of the left valve.

Affinities.

The species may be distinguisted from *D. mullinsi* particularly by the fact that the dorsal margin is more convex and not so strongly built as in *D. mullinsi.* The posterior cardinal angle is less distinctly developed.

Description.

The shape of the valves appears from the illustrations. The surfaces are smooth. The marginal zones are broad and distinct vestibules are developed along the anterior and the posteroventral marginal areas. The radial pore canals are somewhat irregularly distributed in the zone of concrescence; they are usually straight, but may be bifurcated. The hinge of the left valve as described in the diagnosis of the genus. The posterior element in the hinge of the right valve, as mentioned in remarks to the diagnosis of genus, can be observed in the local holotype. The normal pore canals are rather widely dispersed in the surface of the valve. Presence of an eye is suggested by a very slight spot. The adductor scars consist of four scars situated oblique below each other, the uppermost of them being the smallest and placed somewhat anterodorsally to the others. Anteriorly to the second adductor scar from the top there is an antennal (?) scar, and between the latter and the ventral marginal area a mandibular (?) scar is situated.

Distribution.

Hauterivian C. 6. (prospective upper part of C. 7) and C. 8 in the Speeton Clay, Yorkshire, England.

Dicrorygma aff. D. (Dicrorygma) speetonensis nov. sp.

Plate 1 fig. 4, Plate 2 figs. 2a–c.

Material. Deep-boring Haldager No. 1, D.G.U. File No. 26.171; 724–730 m.; 51–54 cm. below the top of the core, (M. 133): A left valve and a fragment; 54–58 cm. below the top of the core: A fragmentary right valve and a fragment.

Affinities and Remarks.

This ostracod seems to be closely related to *D.* (*Dicrorygma*) *speetonensis* nov. sp., but the material is in such a condition that the relationship cannot be

verified so far. Especially the posterior end is smoothly rounded and the ventral margin is more convex.

Distribution.

The valves have been found in dark, silty shale of Hauterivian age from North Jutland in an ostracod fauna alomst identical with the fauna in which *D.* (*Dicrorygma*) *speetonensis* nov. sp. from Speeton Clay has been found. The former fauna is mainly composed of *Acrocythere hauteriviana laeva* (NEALE), *Paracypris* sp., *Pontocyprella*? sp., *Protocythere hechti* TRIEBEL, *P. triplicata* (ROEMER) and *Schuleridea* aff. *thoerenensis* TRIEBEL.

SUBGENUS DICRORYGMA (ORTHORYGMA) NOV.

Derivation of the Name. Orthorygma from Greek *orthos*, straight, and *orygma*, tunnel.
Type Species. Dicrorygma (*Orthorygma*) *reticulata* nov. sp.

Diagnosis.

Mainly oblong species of the genus *Dicrorygma* with almost straight to concave, rarely convex, and only slightly sloping dorsal margins, together with straight radial pore canals regularly distributed in the zone of concrescence.

Distribution. Marine Upper Jurassic beds in NW. Europe.

Dicrorygma (Orthorygma) reticulata nov. sp.

Plate 1 figs. 6a–f, Plate 2 figs. 5a–f, text fig. 2.

Derivation of the Name. From Latin *reticulum*, small net.
Holotype. A carapace; Plate 1, figs. 6b–c; D.G.U.
Type Locality. Borehole Fjerritslev No. 1, D.G.U. File No. 24.216.
Type Stratum. Dark claystone; 474–480 m., 147 cm. below the top of the core; Kimmeridgian.
Material. 29 carapaces and 44 valves in two samples from the mentioned core, respectively 0 cm. and 147 cm. below the top of the core.

Diagnosis.

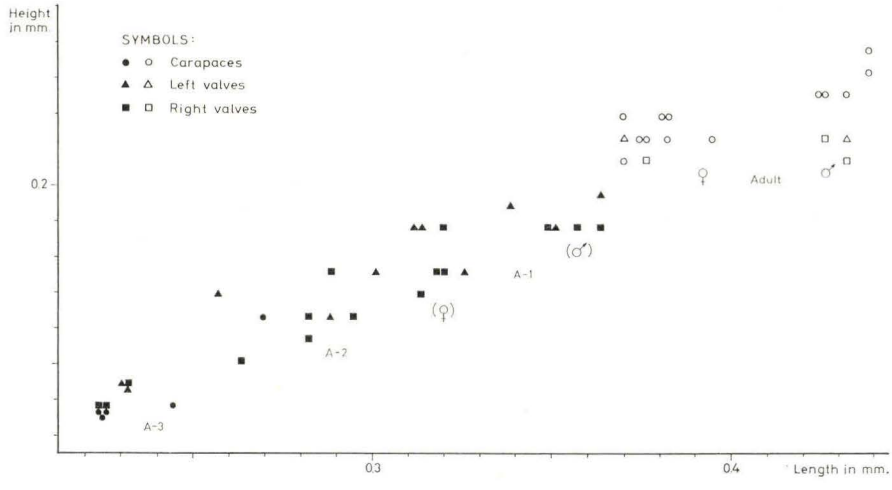
A reticulate species of *Dicrorygma* (*Orthorygma*) with almost straight posterodorsal margin. The posterior cardinal angle is rounded and situated in one fourth of the length of the valve from the posterior end.

Affinities.

D. (Orthorygma) reticulata is separated from *D. (Orthorygma) groenwalli* BRUUN CHRISTENSEN by having more rough and irregular reticulation, and also by the posterodorsal margin being less steep.

Description.

The carapace is suboval with a pointed posterior end situated below the median longitudinal axis. The ventral and dorsal margins are almost parallel, but both of them are often slightly concave. The anterior margin is smoothly rounded. The dorsal margin is relatively short and enclosed by rounded cardinal angles. In the dorsal aspect the lateral surfaces are normally to flatly arched with a pronounced lateral depression along the anterior margin and a considerably smaller one at the posterior end and along the posteroventral margin. The lateral surfaces are covered by a more or less dense reticulation, which particularly is rough anterodorsally to the central parts of the valves. There are four adductor scars almost vertically below one another, the upper one of which seems to be the smallest. The normal pore canals are rather scattered on the surface. The eye spot is slightly developed. In the marginal area there are well-developed vestibules along the anterior as well as the posteroventral margin. The radial pore canals are simple, almost straight, 12–15 along the anterior margin and 5–6 along the posteroventral margin. The hinge of the left valve is relatively long and is described above. Sexual dimorphism is distinct, and the sex ratio is about 1. The males are longer than the females and



Text fig. 2. Scattergram showing relations between numbers, lengths, and heights of *Dicrorygma (Orthorygma) reticulata* nov. sp. from borehole Fjerritslev No. 1, D.G.U. File No. 24.216, 474–480 m., 147 cm. below the top of the core. The configuration of the last larva stage (A-1) suggests sexual dimorphism of this stage.

have a more swollen posterior half of the valves, the greatest height of which is similar to the graetest height of the anterior part of the valves. The larvae are indicated by unfinished development of the marginal area and the length-height ratio of the last larva stage assumes sexual dimorphism like the adult specimens.

Distributions.

This species has been found together with *D.* (*Orthorygma*) *maior* nov. sp. in dark claystone, which by the content of ostracods can be correlated with the *Aulocostephanus pseudomutabilis* zone of Kimmeridgian. The faunas consist for instance of *Galliaecytheridea* sp. sp., *Macrodentina* (*Polydentina*) *rudis* MALZ, *M.* (*Polydentina*) *wicheri* (STEGHAUS), *Mandelstamia rectilinea* MALZ s. l., *M.* sp. sp., *Orthonotacythere* sp. sp., *Paracypris* sp. sp., *Protocythere sigmoidea* STEGHAUS, and *Schuleridea* sp.

Dicrorygma (Orthorygma) brotzeni nov. sp.

Plate 1, figs. 8a–d; Plate 2, figs. 4a–d.

1961. *Cytherideinarum* gen. sp. 2 OERTLI, BROTZEN & BARTENSTEIN, p. 13, Pl. 1, figs. 3a–b.

Derivation of the Name. In honour of FRITZ BROTZEN, Dr. sc. nat., Stockholm.
Holotype. A right valve, Pl. 1 fig. 8a, pl. 2 figs. 4d–e; D.G.U.
Type Locality. Borehole Øresund (The Sound) No. 1A near Elsinore, D.G.U. File No. 188.345.
Type Stratum. Dark, silty clay; 48,5–48,9 m., 10–12,5 cm. below the top of the core; Kimmeridgian – Lower Portlandian.
Material. Thirteen carapaces and thirteen valves from three samples of borehole Øresund No. 1A.

Diagnosis.

A dense punctate species of *Dicrorygma* (*Orthorygma*) with slightly convex dorsal margin, slightly developed posterior cardinal angle and approximately rounded posterior termination.

Affinities.

The species differs from the other species of *Orthorygma* nov. subgen. by its convex dorsal margin and rounded posterior cardinal angle.

Description.

The carapace is oval with the posterior end situated immediately ventrally to the median longitudinal axis. The greatest height is generally in the posterior

half of the valve. The ventral margin is straight and the dorsal margin slightly convex, but they are mutually parallel. In the dorsal aspect the lateral surfaces are flatly arched with the greatest breadth in the middle of the posterior half of the valve. Along the anterior margin there is a lateral depressed zone with smooth passage to the other parts of the surfaces of the valve. The muscle scars are difficult to observe and perhaps therefore seem to vary only a little. Generally there are four adductor scars below one another, the uppermost one of which is the smallest and the second from the top perhaps consists of two small co-ordinated scars. Anteriorly to these a strong antennal (?) scar and – anteroventrally to the adductor scars – a mandibular (?) scar have been found. The normal pore canals are regularly distributed on the surface. No eye spot has been found. There are deep vestibules in the marginal areas, and a distinct, flatly convex curve is observed in the course of the posteroventral inner margin. The relatively narrow zone of concrescence along the anterior margin contains 10–12 regularly distributed, straight and simple radial pore canals. The hinge is shaped like that of the other species of the genus.

Distribution. Kimmeridgian – Lower Portlandian in S. Sweden and Denmark.

Dicrorygma (Orthorygma) maior nov. sp.

Plate 1, figs. 7a–c.

Derivation of the Name. From Latin *maior*, larger, elder.
Holotype. A carapace, Plate 1 fig. 6b; D.G.U.
Type Locality. Borehole Fjerritslev No. 1, D.G.U. File No. 24.216.
Type Stratum. Dark claystone; 474–480 m., 147 cm. below the top of the core; Kimmeridgian.
Material. Four carapace and two right valves in two samples from the above-mentioned core, respectively 0 cm. and 147 cm. below the top of the core.

Diagnosis.

A large species of *Dicrorygma* (*Orthorygma*) with smooth surface. The rather sloping posterodorsal margin is almost straight, and the posterior cardinal angle is often rounded.

Affinities.

At least in the exterior features the species differs from *Limnocythere inflata* STEGHAUS as regards the shape of the posterior end is more pointed.

Description.

The carapace is suboval with pointed posterior end immediately below the median longitudinal axis. The ventral and dorsal margins are almost parallel and both of them are often slightly concave. The anterior margin is smoothly rounded. The dorsal margin is short and enclosed by slightly developed and rounded cardinal angles. In the dorsal aspect the surface of the valves are smoothly arched with a pronounced lateral depression along the anterior margin. The lateral surfaces are smooth with the normal pore canals rather scattered. The marginal area can not be studied in detail in the present material. The shape of the hinge is like that of the other species of the genus.

Distribution.

The species has been found together with *D.* (*Orthorygma*) *reticulata* nov. sp.

DANSK SAMMENDRAG

Ved at undersøge den mere finkornede del af slæmmede prøver fra den nedre cretasiske Kiamichi formation fra Texas fandt POAG mange eksemplarer af en hidtil overset lille ostracodart. POAG (1962) anvendte ostracoden som typeart for en monotypisk, ny slægt og kaldte den *Dicrorygma mullinsi* POAG 1962.

I danske og engelske aflejringer er der ligeledes fundet nye, små og tynd-skallede arter af *Dicrorygma* i bjergarter, hvor de efter forsigtig slæmning er blevet bevaret. Arter nært beslægtet med *Dicrorygma mullinsi* POAG er fundet i nedre cretasiske aflejringer fra Danmark og England. Således beskrives fra hauterivien aflejringer i Speeton Clay fra Yorkshire i England *Dicrorygma* (*Dicrorygma*) *speetonensis* nov. sp., og fra den danske dybdeboring Haldager nr. 1, D.G.U.'s arkiv nr. 26.171, beskrives arterne *D.* (*Dicrorygma*) *muelleri* nov. sp. fra barremien og *D.* aff. *D.* (*Dicrorygma*) *speetonensis* nov. sp. fra hauterivien.

Arter fra øvre jurassiske aflejringer er beskrevet som tilhørende underslægten *Dicrorygma* (*Orthorygma*) nov. subgen. I Jydegaard formationen på Bornholm har man fundet arten *D.* (*Orthorygma*) *groenwalli* BRUUN CHRISTENSEN 1963 på en sådan måde, at den indicerer, at marine invasioner må have været et hyppigt tilbagevendende fænomen i øvre purbeckien. En ny underart af *D.* (*Orthorygma*) *groenwalli* BR. CHR. af nedre purbeckien alder er fundet i Vitabäck faunaerne i Sydøstskåne. *D.* (*Orthorygma*) *brotzeni* nov. sp. er fundet i kimmeridgien-portlandien aflejringer i boringen Øresund nr. 1A, D.G.U.'s arkiv nr. 188.345, og er tidligere beskrevet fra en boring i Skåne. I dybdeboringen Fjerritslev nr. 1, D.G.U.'s arkiv nr. 24.216, er *D.* (*Orthorygma*) *reticulata* nov. sp. og *D.* (*Orthorygma*) *maior* nov. sp. fundet i samme fauna i kimmeridgien aflejringer.

Flere tidligere beskrevne ostracoder fra Tyskland og Frankrig, overvejende klassificeret som arter af den kænozoiske, limniske slægt *Limnocythere*, formodes at være arter af *Dicrorygma* POAG.

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PLATES

Plate I

Magnifications: 50 ×; fig. 2
75 ×; other figs.

1a–b. *Dicrorygma* (*Dicrorygma*) *mullinsi* POAG 1962;
topo-metatypes; Kiamichi Formation, Texas;
a and b, left and right valve.

2. *Limnocythere inopinata* (BAIRD 1843);
21.9.1963; Lake Tystrup Sø, Zealand;
left valve, text fig. 1.

3a–b. *Dicrorygma* (*Dicrorygma*) *muelleri* nov. sp.;
borehole Haldager No. 1, D.G.U. File No. 26.171, 664–669 m., 71–76 cm. below the top of the core, (M. 118); Lower Barremian;
a, left valve, the anterior margin lacking, Plate 2, figs. 1d–e;
b, right valve, the anterodorsale part lacking, holotype, Plate 2, figs. 1a–c.

4. *Dicrorygma* aff. *D.* (*Dicrorygma*) *speetonensis* nov. sp.;
borehole Haldager No. 1, D.G.U. File No. 26.171, 724–730 m., 51–54 cm. below the top of the core, (M 133); Hauterivian;
left valve, Plate 2, figs. 2a–c.

5a–d. *Dicrorygma* (*Dicrorygma*) *speetonensis* nov. sp.;
Sample L.C. 19 (English collection), Hauterivian C. 8, Speeton Clay;
a, left valve, Plate 2, figs. 3a–c;
b, right valve, the dorsal part of the anterior margin lacking, holotype;
d, right valve of larva, the anterior margin lacking;
10.7.1964, Hauterivian C. 6 (prospective upper part of C. 7), Speeton Clay;
c, right valve, ♂.

6a–f. *Dicrorygma* (*Orthorygma*) *reticulata* nov. sp.;
borehole Fjerritslev No. 1, D.G.U. File No. 24.216, 474–480 m., 0 cm. and 147 cm. below the top of the core (respectively Sample M. 1 and M. 2); Kimmeridgian;
a, carapace, in left aspect, M. 2; b and c, carapace, in right and dorsal aspects, holotype, M. 2; d, right valve, larva, M. 2; e, right valve, ♂, M. 2; f, carapace, in right aspect, ♂, M. 1.

7a–c. *Dicrorygma* (*Orthorygma*) *maior* nov. sp.;
borehole Fjerritslev No. 1, D.G.U. File No. 24.216, 474–480 m., 0 cm. and 147 cm. below the top of the core (respectively Sample M. 1 and M. 2); Kimmeridgian;
a, carapace, in left aspect, M. 1; b, carapace, in right aspect, holotype, M. 2; c, right valve, larva, M. 2.

8a–d. *Dicrorygma* (*Orthorygma*) *brotzeni* nov. sp.;
borehole Øresund No. 1A, D.G.U. File No. 188.345; 46–47 m., 18–21 cm. below the top of the core; 48.5–48.9 m., 10–12,5 cm. b.t.c., and 48,9–50,3 m., 0–10 cm. b.t.c.; (respectively Samples K. 132, K. 138, and K. 139); Kimmeridgian-Lower Portlandian;
a, right valve, Plate 2, figs. 4d–e, holotype, K. 138; b. and c, carapace, in right and dorsal aspects, K. 139; d, carapace, right valve, ♂, K. 132.

Phot. CHR. WESTERGAARD

Plate I

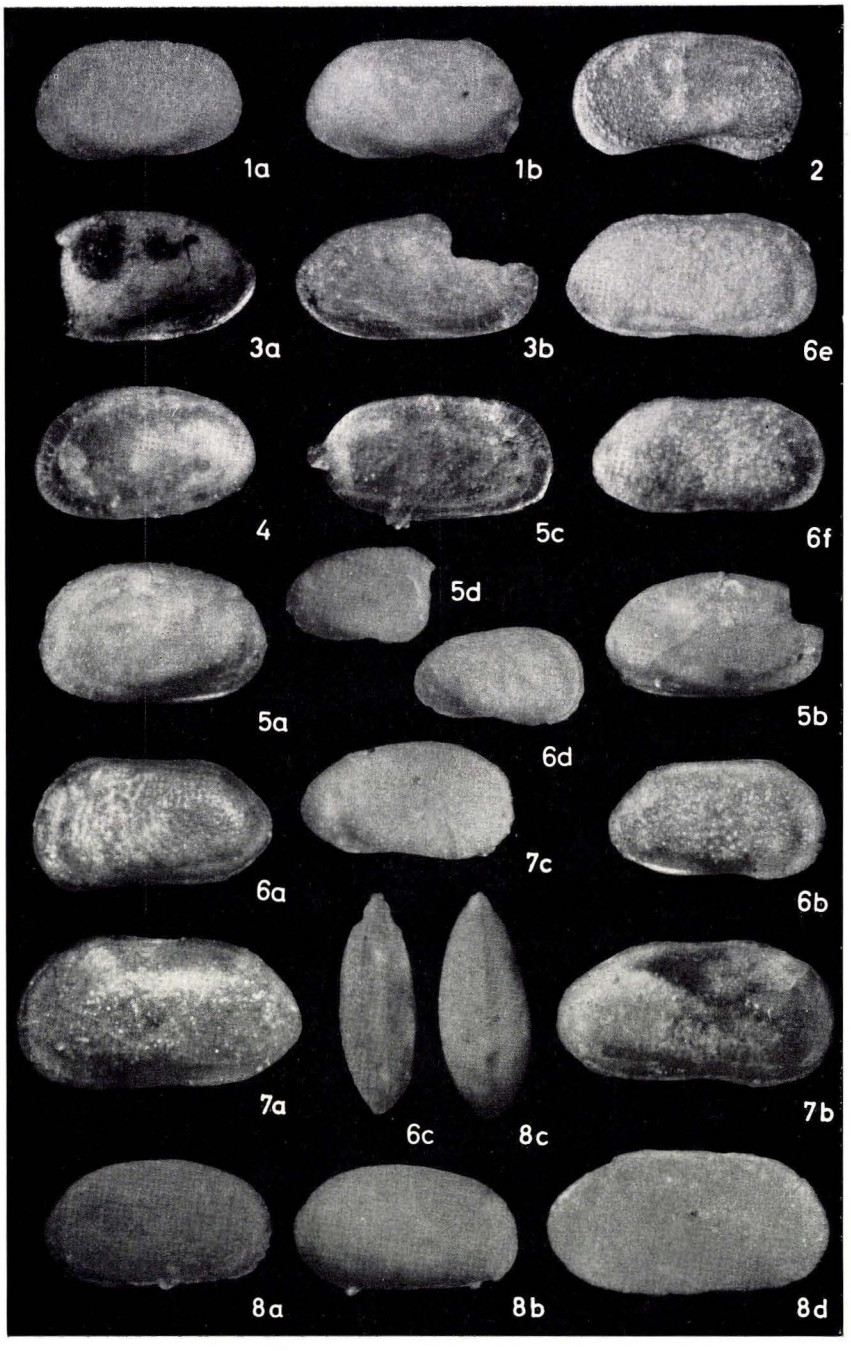


Plate II

Magnifications: 75 ×; figs. 5e–7b
100 ×; all the sketches.

1a–e. *Dicrorygma* (*Dicrorygma*) *muelleri* nov. sp.;
borehole Haldager No. 1, D.G.U. File No. 26.171, 664–669 m., 71–76 cm. below the top of the core, (M. 118); Lower Barremian;
a–c, right valve in interior, dorsal, and frontal aspects, holotype, Plate 1, fig. 3b; d–e, left valve in interior and dorsal aspects, Plate 1, fig. 3a.

2a–c. *Dicrorygma* aff. *D.* (*Dicrorygma*) *speetonensis* nov. sp.;
borehole Haldager No. 1, D.G.U. File No. 26.171, 724–730 m., 51–54 cm. below the top of the core, (M. 133); Hauterivian;
a–c, left valve in interior, dorsal, and frontal aspects, Plate 1, fig. 4.

3a–c. *Dicrorygma* (*Dicrorygma*) *speetonensis* nov. sp.;
Sample L.C. 19 (English collection), Hauterivian C. 8,: Speeton Clay;
a–c, left valve in interior, dorsal, and frontal aspects, Plate 1, fig. 5a.

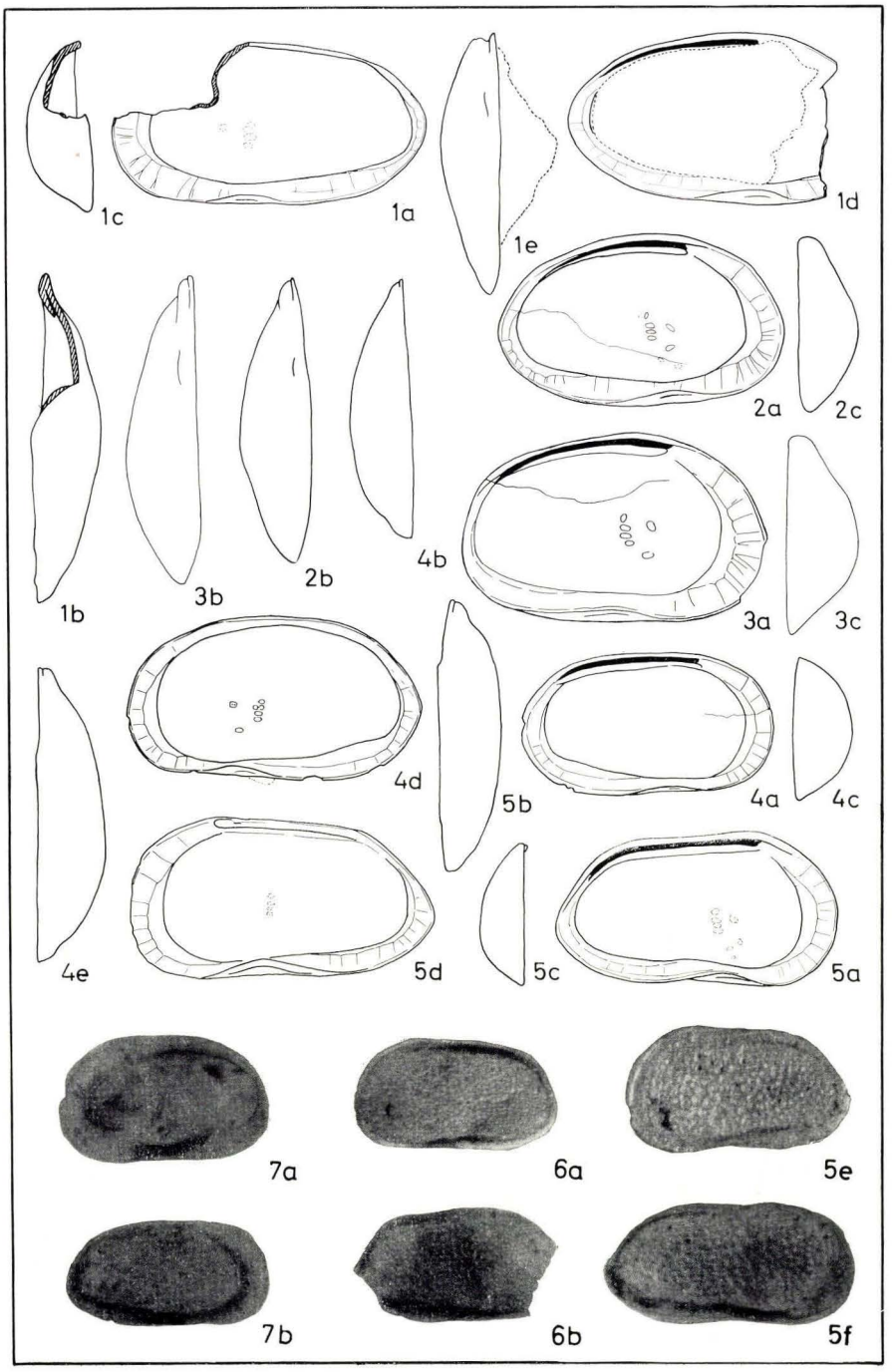
4a–e. *Dicrorygma* (*Orthorygma*) *brotzeni* nov. sp.;
borehole Øresund No. 1A, D.G.U. File No. 188.345, 48,5–48,9 m., 10–12,5 cm. below the top of the core, and 48,9–50,3 m., 0–10 cm. b.t.c. (respectively Sample K. 138 and K. 139); Kimmeridgian-Lower Portlandian;
a–c, left valve in interior, dorsal, and frontal aspects, K. 139;
d–e, right valve in interior and dorsal aspects, K. 138, holotype, Plate 1, fig. 8a.

5a–f. *Dicrorygma* (*Orthorygma*) *reticulata* nov. sp.;
borehole Fjerritslev No. 1, D.G.U. File No. 24.216, 474–480 m., 147 cm. below the top of the core, (M. 2); Kimmeridgian;
a, left valve in interior aspect; b–c, right valve in dorsal and frontal aspects; d, right valve in interior aspect; e, left valve in exterior aspect in transparent light; f, right valve in exterior aspect in transparent light, ♂.

6a–b. *Dicrorygma* (*Orthorygma*) *groenwalli* BRUUN CHRISTENSEN 1963;
Jydegaard Formation; Bornholm; Upper Purbeckian;
a, left valve in transparent light, larva, holotype;
b, right valve in transparent light, the ventral parts of the anterior and posterior margins lacking, paratype.

7a–b. *Dicrorygma* (*Dicrorygma*) *mullinsi* POAG 1962;
topo-metatypes, Kiamichi Formation, Texas;
a–b, left and right valves in transparent light.

Phot. CHR. WESTERGAARD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