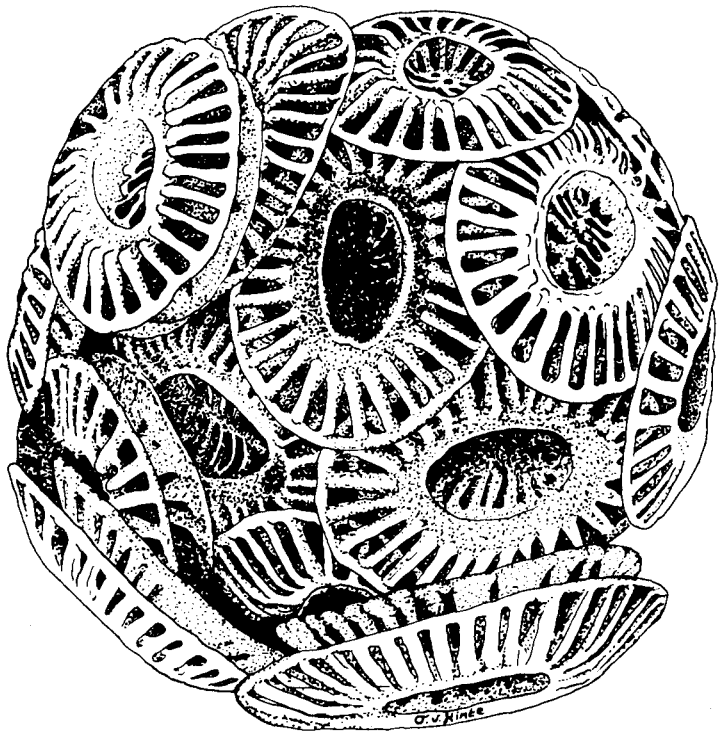
INA NEWSLETTER



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!! NOTE !!

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NEXT ISSUE

Contributions for the next issue of the INA Newsletter should be received before October 1988. Please send your contributions to: The editor of the INA Newsletter, S.E. van Heck (Address : see inside cover).

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EDITORIAL

This, our tenth volume, is a little later than usual due to the fact that we have been very busy working on the proceedings of our London Conference. The manuscripts are now with the publisher, but it will be a few months yet before the book (Nannofossils and their applications) will appear. In the fall issue you should get more news about it. In this issue you will find some more news on future meetings, a review on book 2 of the Handbook on Cenozoic Nannofossils, and some contributions. You will also find our first colour plate. The copies of this colour plate were provided by Shell EXPRO UK, which is why it is not bound in with the rest of the Newsletter. Of course, you can always glue it in if you want.

We further want to draw your attention to a special offer: on the financial page in this issue you will see that of some issues we have quite a few copies in stock. Most issues are available to members for £ 5.- each, but we have decided to offer you several issues at a discount. These are: vol. 3(2), 5(1,2), 6(1,2), 7(1,3), 8(1,2) and 9(1,2,3) which you can now obtain for £ 2.50 each, plus postage and packing. This offer is only valid as long as we have more than 25 copies of these in stock, so you will have to be quick for some of them.

All of you who have not paid they subscription are requested to do so soon, so that we can continue our Newsletter as we have done so far!

SvH

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MEETINGS - MEETINGS - MEETINGS - MEETINGS - MEETINGS - MEETINGS - MEETINGS

INA-Meeting in China in Conjunction with the 1st International Conference on Asian Marine Geology, Shanghai 7/9 to 10/9, 1988

Dear INA Member,

Due to logistics I was unfortunately not able to organise a meeting last year in Asia. Based on the ± 25 questionnaires I received back from you (Europe, U.S.A., China), however, I have the impression that there is still a vivid interest in such a meeting and I have the pleasure to inform you that one of our members, Dr. Wang Pinxian of the Tongji University in Shanghai, is willing to take the responsibility to organise an INA-meeting during the First International Conference on Asian Marine Geology in Shanghai. If you are interested in attending that meeting please complete the enclosed questionnaire and send it to Dr. Wang Pinxian, Tonji University, Dept. of Marine Geology, 3658, Shanghai, Peoples Republic of China before August 1st.

Ton Romein

[As further information was not yet available when this Newsletter went to press, I suggest that anyone who is interested writes to Dr. Wang Pinxian for further information - S.v.H.]

INA MEETING IN FLORENCE, ITALY 1989

As was already mentioned in the previous Newsletter (p.76), the next European INA Meeting is planned to be in Florence, autumn 1989. This will be organised by Simonetta Monechi and her Italian colleagues. It is too early yet for any details, but keep an eye on these pages for further information, and start persuading your boss or sponsors to let you go there.

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INA MEETING 1991

During the last INA Meeting in London there was considerable enthusiasm from members to organise the next meeting. Florence came out first, but as mentioned in the previous Newsletter, Salamanca (Spain) and Copenhagen (Denmark) were also offering to organise a meeting. We have now received a letter from Dr. Hamrsmid in Czechoslovakia: our colleagues in Hodonin offer to organise the INA Meeting in Czechoslovakia (Prag, Brno or Hodonin). It would be the first meeting in an eastern European country, and a good opportunity to meet our colleagues there or to establish new contacts. As usual, the final decision will probably be made at the next meeting (in Florence), but it would help if we would get the opinion of some of the members who can't make it to Florence but might have the opportunity to go to the meeting after that. So please write to us if you favour one of the places mentioned.

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TAXONOMIC NOTE - Reticulofenestra doronicoides

By J.R. Young

The dominant Late Pliocene reticulofenestrid is a small simpe form first described by Black and Barnes (1961) as *Coccolithus doronicoides*. Since it lacks a bridge or other distinctive features, *Reticulofenestra* is the most appropriate generic assignment for this species. This combination has not been validly proposed and so this is done here.

Reticulofenestra doronicoides (Black & Barnes 1961) nov. comb.

Basionym: *Coccolithus doronicoides* Black and Barnes 1961, J. roy. microsc. Soc., *80*, p.142, pl.25, fig.3.

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Validation of the family Parhabdolithaceae Bown, 1987

By P.R. Bown

A new Jurassic family, Parhabdolithaceae, was described by Bown in 1987 (p. 43) but was invalid due to the omission of a stated type genus. The family is validated here:

Description - Bown 1987, p.43
Type genus - *Parhabdolithus* Deflandre, 1952

References:

Bown, P.R., 1987, Abh. Geol. B.-A., Wien, vol.39, pp.33-49
Deflandre, G., 1952, In Piveteau, J. Traité de Paléontologie, 782 pp., Paris.

REVIEW

Aubry,M.-P., 1988, Handbook of Cenozoic Calcareous Nannoplankton.
Book 2: Ortholithae (Catinasters, Ceratoliths, Rhabdoliths).
Published by: Micropaleontology Press, NY. 279 pp.
The current price of this volume was not indicated, but was originally cited as $ 50.- when subscribing to the entire series.

The first thing I noticed when I opened this new book was a letter from the publisher explaining that due to equipment problems some pages in this volume may be duplicated or missing, and the advice to check the book and write to the publishers for missing pages. After a careful check of the book I found one page duplicated, so that was not too bad.

The first impression, while leafing through the book, was that the quality of the pictures could have been better. Apart from poor originals in the case of holotypes, which can't be helped, the pictures were generally rather grey, showing little contrast, and concequently less detail than one might wish. In that respect book 1 looked better.

As might be expected after such a delay (the book was planned for 1985 if I am correct), the contents are no longer up-to-date. I only found 4 references for 1981, 3 for 1982 and 2 for 1983, and none later. It really is a pity the book has been delayed so long, seeing all the work the author has put into it, and it is to be hoped that the next volume comes a bit quicker than this.

The outward appearance and set-up of the book is like book 1 (see review in INA Newsletter vol.8(1). A short preface is given, explaining the organisation of the book, followed by a taxonomic key to book 2. This key leads to the following groups, while most groups are further subdivided:

O Ortholithae
O-I : no or low birefringence
O-I-A: Discoasters (book 1)
O-I-B: Catinaster
O-I-C: Nannotetrina
O-I-D: Imperiaster, Rhomboaster, Tribrachiatus, Trochastrites, Lithostromation, Trochoaster, Martiniaster
O-I-E: Holodiscolithus, Clathrolithus, Corannulus, Peritrachelina, Orthozygus
O-I-F: Amaurolithus
O-II: moderate to high birefringence, wholly extinct or wholly bright
O-II-A: Ceratolithus, Angulolithina, Neoangulolithina, Ceratolithina
O-II-B: Nannotetrina
O-II-C: Minylitha
O-II-D: Orthorhabdus, Triquetrorhabdulus, Pseudotriquetrorhabdulus
O-III: moderate to high birefringence, part bright and part extinct
O-III-A: Zygrhablithus, Semihololithus, Daktylethra, Lanternitus, Isthmolithus, Scapholithus
O-III-B: Lapideacassis, Scampanella

In the main section of the book, individual genera are separated by the same blue dividers that I commented on before (they should have been sticking out slightly). In some cases where genera are more closely related (or morphologically similar) an introduction is given to the group first.

Chapters to individual genera start with an introduction commenting on the general morphological characteristics, phylogenetic relationships and the stratigraphic occurrences of individual species, while ecological data are added in many cases, and the taxonomic history of the genus is recounted where relevant. The taxonomy that follows first gives a description of the genus (original and emended), after which the individual species are described.

The species descriptions are given, as before, on pages which are rotated 90 degrees. Original and additional light microscope pictures are given on the page facing the descriptions, while the next pages generally contain electron micrographs. I have heard some criticism on this lay-out, as it implies that there are empty spaces and indeed empty pages, but I rather like it, as it keeps the species well separated. Aubry claims to have included 'all' validly described species, and as I checked several genera against my card-system (which is far from complete), I did identify several species that were not included, but most of those were introduced in the 1980's. There was no time to check all genera, but in a quick check I could identify only one older species that does not occur in the general index (in the back of the book) either. (Catinaster? umbrellus, Bukry 1971)

One criticism I have is on the nomenclature used. In the species descriptions, names accepted by the author appear in bold print. Names 'suppressed in synonymy' (which means re-combined or interpreted to be junior synonyms of something else) are printed in light-face type. Yet the type-species of Catinaster (C. coalitus) appears in this light-face type. Now this can easily be dismissed as a printing error, but I don't understand why Tribrachiatus nunnii is used, as it is illegitimate (see Newsletter 2(1), p.33) and the correct name, Tribrachiatus bramlettei (Brönnimann & Stradner 1960) Proto-Decima et al. 1975, is available. Tribrachiatus bramlettei has not been used, but a new combination is introduced for a subspecies T. bramlettei ssp. subbramlettei.

On the other hand, forms cited as Discoaster tribrachiatus var. robustus and Discoaster rotans (both by Stradner, 1959) are not re-combined, and only the original drawings are given. This evokes some questions: Are there really no photographs available for these? And if there are not, does that mean these species have not been recognised since their introduction, and if so, should they then not have been omitted? And is that the reason they have not been recombined? The same occurs in other sections, such as Trochastrites, where Discoaster diversus is cited (in bold face) and Imperiaster, where Marthasterites reginus is cited (in light face) without an indication of a reason (such as being a synonym of something else). So I can't quite follow why certain names have been used in this way, but as long as one follows the groups in the book this should not really cause any problems.

As I have stated before, I don't really want to comment on the systematics, as there are probably be as many opinions as there are specialists. Not everybody will be happy with some of the assignments, but I don't think the majority of taxa will meet with much criticism.

All in all I think the book is very useful, and I am eagerly awaiting the next book, which should contain the remainder of the Ortholithae (pentaliths) and the first of the Heliolithae.

SvH

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Compiled by John C. Steinmetz

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For the many members of the INA who have joined the Association after the first issue of the Newsletter in 1979, a clarification is necessary for you to fully understand the variety of ways in which you see 'strat' and 'syst' used in the keywords:

strat. = stratigraphy.
strat = introduction and re-definition of new zones or subzones.
(strat) = correlation between nannofossil zonation and subdivisions based on other techniques.
syst. = systematics.
syst = systematics, with new taxa or new combinations.
(syst) = pictures of nannofossils, without descriptions.

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Chiastozygus leptostauros COOPER 1987; p. 611, fig 1 (1-4). USSR, Volga River Basin, Gorodishche, Kimmeridgian-Middle Volgian; England, Kimmeridgian.	A338-6
Coccosphaerida LAMBERT 1987; p. 54. Type species: Coccosphaerida heteromorpha LAMBERT 1987.	A344-7
Coccosphaerida heteromorpha LAMBERT 1987; p. 54, pl. 9, figs. 1-7; pl. 10, fig. 1, text-fig. 7. South Cameroon, upper Albian. Type species of Coccosphaerida LAMBERT 1987.	A344-7
Cyclagelosphaera tubulata (GRÜN & ZWEILI 1980) COOPER 1987; p. 607; (ex Ellipsagelosphaera).	A338-6
Discorhabdoides LAMBERT 1987; p. 55. Type species: Discorhabdoides filiformis LAMBERT 1987.	A344-7
Discorhabdoides filiformis LAMBERT 1987; p. 55, pl. 12, figs. 1-4; pl. 13, fig. 1. South Cameroon, upper Albian. Type species of Discorhabdoides LAMBERT 1987.	A344-7
Helicorhabdus LAMBERT 1987; pp. 54-55. Type species: Helicorhabdus asymetricus LAMBERT 1987.	A344-7
Helicorhabdus asymetricus LAMBERT 1987; p. 55, pl. 11, figs. 1-2. South Cameroon, upper Albian. Type species of Helicorhabdus LAMBERT 1987.	A344-7
Martiniaster radiatus (LOCKER 1965) AUBRY 1988; p. 63; (ex Trochoaster).	A334-8
Nannotetrina austriaca (STRADNER 1959) AUBRY 1988; p. 153; (ex Trochoaster).	A334-8
Nannotetrina insignita (MARTINI in MARTINI & STRADNER 1960) AUBRY 1988; p. 153; (ex Nannotetraster).	A334-8
Nannotetrina nitida (MARTINI 1961) AUBRY 1988; p. 163; (ex Tetralithus).	A334-8 *C-1
Orthozygus brytika (ROTH 1970) AUBRY 1988; p. 95; (ex Zygosphaera).	A334-8
Paractinozygus COOPER 1987; p. 607. Type species: Paractinozygus gorodishchensis COOPER 1987.	A338-6
Paractinozygus gorodishchensis COOPER 1987; pp. 607-610, fig. 1 (5-8). USSR, Volga River Basin, Gorodishche, Kimmeridgian-middle Volgian. Type species of Paractinozygus COOPER 1987.	A338-6
Parhabdolithus imperfossus (BLACK 1972) LAMBERT 1987; p. 46; (ex Percivalia).	A344-7
Parhabdolithus zweilii CRUX 1987; p. 95, pl. 1, figs. 1-4. England, Dorset Coast, Early Pliensbachian, jamesoni ammonite zone.	A338-7
Rectocorona LAMBERT 1987; p. 55. Type species: Rectocorona brachyrhabda LAMBERT 1987.	A344-7
Rectocorona brachyrhabda LAMBERT 1987; p. 55, pl. 11, figs. 3-5. South Cameroon, upper Albian. Type species of Rectocorona LAMBERT 1987.	A344-7

B144

Rhabdophidites parallelus (WIND & ČEPEK 1979) LAMBERT 1987; p. 42; (ex Rhabdolekiskus).	A344-7
Staurolithites coroniformis (FORCHHEIMER 1972) LAMBERT 1987; p. 40; (ex Vagalapilla).	A344-7 *C-2
Staurolithites eiffellithoides LAMBERT 1987; p. 40, pl. 2, fig. 2, text-fig. 2C. South Cameroon, upper Albian.	A344-7
Staurolithites ellipticus (GARTNER 1968) LAMBERT 1987; p. 40; (ex Vekshinella).	A344-7 *C-3
Staurolithites quadriarcullus (NOEL 1965) LAMBERT 1987; pp. 40, 42; (ex Discolithus).	A344-7 *C-4
Stephanolithion atmetros COOPER 1987; p. 610, fig. 1 (9-12). USSR, Volga River Basin, Gorodishche, mid-Volgian; England, upper Kimmeridgian.	A338-6
Stephanolithion helotatus (WISE & WIND 1977) COOPER 1987; pp. 610-611; (ex Corolithion).	A338-6
Stereorhabdus LAMBERT 1987; p. 57. Type species: Stereorhabdus pentaculum LAMBERT 1987.	A344-7
Stereorhabdus pentaculum LAMBERT 1987; p. 57, pl. 15, figs. 1-2. South Cameroon, upper Albian. Type species of Stereorhabdus LAMBERT 1987.	A344-7

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Species names in alphabetical order.

asymetricus, Helicorhabdus
atmetros, Stephanolithion
austriaca, Nannotetrina
brachyrhabda, Rectocorona
brytika, Orthozygus
coroniformis, Staurolithites
eiffellithoides, Staurolithites
ellipticus, Staurolithites
filiformis, Discorhabdoides
gorodishchensis, Paractinozygus
helotatus, Stephanolithion
heteromorpha, Coccosphaerida
imperfossus, Parhabdolithus
insignita, Nannotetrina
leptostauros, Chiastozygus
nitida, Nannotetrina
parallelus, Rhabdophidites
pentaculum, Stereorhabdus
quadriarcullus, Staurolithites
radiatus, Martiniaster
tubulata, Cyclagelosphaera
zweilii, Parhabdolithus

New genus names.

Coccosphaerida
Discorhabdoides
Helicorhabdus
Paractinozygus
Rectocorona
Stereorhabdus

* = Invalid

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Comments

1 - B143: This combination was introduced by AUBRY 1984 [A215-4] which has priority.

Comments - continued

2 - B144: This combination was introduced by TAYLOR 1982 [A163-3] which has priority.
3 - B144: This combination was invalidly introduced by BLACK 1975 [A99-8]. It is validly introduced here by LAMBERT 1987.
4 - B144: This combination was introduced by WILCOXON 1972 [A159-3] which has priority.

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Corrections

A278-1: Europe.W. should be Europe.E.
A283-3: **SCHAFF** should be spelled **SCHAAF.**
A290-5: add QUAT and TERT to the keywords.
A290-9: **LEHOTAYAVA** should be spelled **LEHOTAYOVA.**
A293-7: add DIAG to the keywords.
A293-8: CRET.U. should be CRET.L.
A294-1, A295-5, A296-4, A301-8, A302-1, A303-3, A306-7: fine-frained should be spelled fine-grained.
A303-3: add 'ser. B' to the reference.
A304-3: delete 'abstr.' from the keywords.
A312-5: clacareous should, of course, be calcareous.
A324-6: add **ET AL.** to the list of authors.
B136: Neolaerhabdus should be spelled Noelaerhabdus.

Notes of interest

With this issue of the INA Newsletter, please notice that the references to the Initial Reports of the Deep Sea Drilling Project (DSDP) are complete. Initial Reports for volume 88 (North Pacific Site 581) and volume 91 (SouthPacific sites 595-596) were based primarily on geophysical investigations; no nannofossil biostratigraphy was performed for either leg and , as a result, no complete references will be given for them here.

In this issue, you will note that the second phase of deep sea drilling, now called the Ocean Drilling Program (ODP), is under way and begins with reference to the first leg of that series, Leg 101 (see **AUSTIN ET AL.** [A334-9]).

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The next issue of the INA Newsletter will include an extensive bibliography and taxa listing of calcispheres. In the recent past, such researchers as H. KEUPP, J. K. LENTIN, J. MUTTERLOSE, and G. L. WILLIAMS have given considerable attention to the taxonomy of this group. In the Fall issue, I will feature their numerous works.

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As always, your reprints, comments, and corrections add to the currency and value of this list of references and taxa. Please continue to send them to me at the following address:

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NEW LOWER CRETACEOUS CALCAREOUS NANNOFOSSIL SPECIES FROM ENGLAND

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During an investigation of calcareous nannofossils from the boreal Lower Cretaceous, several new species and a new genus were found which are described below. The zonal scheme proposed by JAKUBOWSKI (1987) for the Moray Firth area of the North Sea (NLK-Zones) is used for the age-assignment of the samples.

Genus *Ceratolithina* MARTINI, 1967

Since the introduction of the genus *Ceratolithina* from the Middle Albian *minimus* layers in NW Germany by MARTINI (1967), it has hardly been recorded by others. Its generotype, *Ceratolithina hamata*, possesses a well developed apical spur and two horns of different length and curvature (Pl. 1, Figs. 1,2). The light microscope study of samples from Copt Point collected during the INA field-trip in 1987 (GALE et al., 1987) yielded two new species of the genus, *C. bicornuta* and *C. cruxii*. The latter might be considered the ancestor of *C. hamata*.

Ceratolithina bicornuta n. sp.

Pl. 1, Figs. 3,4.

Holotype: Pl. 1, Fig. 3.
Type level: Middle Albian; NLK 4B, *Watznaueria barnesae* Subzone.
Type locality: Copt Point, Folkestone, SE England; Bed VII.
Derivation of name: *bicornuta*, Latin for "with two horns".
Diagnosis: Species of *Ceratolithina* with two apical spurs and horns.
Description: *C. bicornuta* has two apical spurs of varying length and two horns of varying length and curvature. In some specimens, one horn is short and straight and the other longer and curved, in others both spurs and horns are of about equal length, run parallel and are connected by a bridge. Their ends are tapering or blunt.
Remarks: Between crossed nicols, flat lying specimens appear bright when oriented at 0° to the nicols.
Occurrence: Beds VI-VIII at Copt Point ; Middle Albian NLK 4B Subzone.

Ceratolithina cruxii n.sp.

Pl.1 , Figs. 5-7

Holotype: Pl. 1 , Fig.5.
Type level: Middle Albian; *niobe* ammonite Zone; NLK 4B, *Watznaueria barnesae* Subzone.
Type locality: Copt Point, Folkestone, SE England; Bed VII.
Derivation of name: After J.A. CRUX, nannofossil specialist with BP.
Diagnosis: Calcareous nannofossil with a straight to very slightly curved horn and one or several lateral blade(s).
Description: The straight to slightly curved rod has one to several blades. The form of the blades varies greatly from sickle-like to sail-shaped. The rod is yellow when oriented at 0° to the crossed nicols, while the thin blade only reaches grey.
Remarks: This form is tentatively assigned to *Ceratolithina*, since it occurs with and just below *C. hamata* in the Middle Albian at Copt Point and may be the ancestor of that species. Moreover, there is no better suited published genus available. It is unlikely that *C. cruxii* is related to the genus *Lithraphidites* which has a cruciform cross-section.
Occurrence: Beds I-IX at Copt Point; Middle Albian NLK 4B Subzone.

Kokia n. gen.

Generotype: *Kokia borealis*

Derivation of name: After C. P. KOK, micropaleontologist with Shell.

Diagnosis: Flat to thick rosette-shaped body with more than 6 segments or rays and faint to strong birefringence.

Description: The proportion of the free ends of the segments or rays varies from none to ca. 2/3. Their ends are blunt or tapering. The sutures between the segments are straight or curved and there is no central hole. Very flat specimens show only weak birefringence while thicker ones are stronly birefringent.

Remarks: KOK (1985) illustrated and described a flat calcareous nannofossil as UFO 2 from the "Valanginian of the North Sea". This form, here named *Kokia borealis*, was since found by several colleagues in many other wells. The very big specimens of *Kokia* are somewhat similar to *Biantholithus sparsus* from the Danian. The latter is usually smaller and thicker than *Kokia* specimens and the number of segments varies in the same assemblage, while it stays the same in *Kokia*. *Rucinolithus* includes "calcareous nannofossils that have the appearance of a rosette of 5 or more **inclined** segments in plan view". In *Kokia*, the segments are not inclined.

Other species include *Kokia sp.* which occurs in the Hauterivian of Speeton and *Kokia curvata* from the Valanginian of the North Sea.

Kokia borealis

Pl. 1, Figs. 8-10

Holotype: Pl. 1, Fig. 8.

Type level: Upper Berriasian; NLK 19A, Sollasites arcuatus Subzone.

Type locality: Central North Sea; Shell/Esso Well 22/21-2.

Derivation of name: from boreal = northern.

Diagnosis: Flat body with 8 tapering rays which are free for about 1/4 or more of their length.

Description: *K. borealis* has 8 tapering to blunt rays. The free length can vary from about 1/4 to 1/2 of the total length of the rays. The sutures between the rays are more or less radial and straight. *K. borealis* appears in different shades of grey between crossed nicols and the rays become extinct in turn when the slide is rotated.

Remarks: *K. borealis* differs from *K. curvata* which often is thicker, by its longer free rays and the usually straight sutures between them. It differs from *Kokia sp.* by having only 8 rays against the latter's 10.

Occurrence: KOK (1985) had assigned a Valanginian age to the samples containing his UFO 2 from the North Sea. It can now be assumed that the samples including *K. borealis* are of Berriasian age, since they occur with or below *Sollasites arcuatus*, which seems to be restricted to the upper part of the Upper Berriasian (JAKUBOWSKI, 1987; CRUX, 1987). *K. borealis* was found in the Central and in the Northern North Sea.

Kokia curvata

Pl. 1, Figs. 11-13

Holotype: Pl. 1, Fig. 11.

Type level: Lower Valanginian; NLK 18 Zone.

Type locality: Northern North Sea; Shell/Esso Well 211/13-7.

Derivation of name: from *curvata*, Latin for curved.

Diagnosis: Flat body with 8 segments, of which less than 1/4 is free. The sutures between segments are curved and their tips are rounded.

Description: *K. curvata* is grey to yellow between crossed nicols,

depending on its thickness. Overgrowth often fills in the space between the ray-tips and obscures the sutures which, however, may still be recognised by careful focussing and by the overlap of the rays producing an inner rosette-shaped pattern (Pl. 1, Fig. 11).

Remarks: The curved sutures and the short free part of the rays distinguishes this species from the other species in the genus. Large specimens of *Micrantholithus sp.* can look similar but can be distinguished by their 5 instead of 4 or 8 units as in *K. curvata*.

Occurrence: *K. curvata* was found together with and below *M. speetonensis* in the Lower Valanginian (and Upper Berriasian ?) of the North Sea. The "calcite rosettes" of AARHUS et al. (1986) may in part represent *K. curvata*.

Kokia sp. 1

Pl. 1, Fig. 14

Big specimen of *Kokia* consisting of 10 segments with tapering ends and curved sutures. The free ends of the 10 segments are less than 1/2 the total length of the segments and pointed to blunt. The sutures between the segments are strongly curved. *Kokia sp.*1 has more segments and is bigger than *K. borealis* and *K. curvata*. It was only found in a sample from Speeton, labelled "base of bed C2". This bed is generally assumed to be of Late Hauterivian age, but contains calcareous nannofossils of the upper Lower Hauterivian, without *Tegulalithus septentrionalis* and *Eprolithus antiquus*.

Genus ***Micrantholithus*** DEFLANDRE 1954

Micrantholithus hoschulzii and/or M. obtusus are often a common part of the lower Lower Cretaceous assemblages in the North Sea. Besides these forms there occur rare *Braarudosphaera regularis* and *B. africana* and rare to common *M. speetonensis*, *M. brevis* and *M. lambertii*, a new species described below.

Micrantholithus lambertii

Pl. 1, Figs. 17,18

Holotype: Pl. 1, Fig. 17.

Type level: Upper Hauterivian; NLK 16A, *Speetonia colligata* Subzone.

Type locality: Central North Sea; Shell/Esso Well 30/11B-1.

Derivation of name: After **B. LAMBERT**, micropaleontologist with TOTAL, France.

Diagnosis: Species of *Micrantholithus* with long thorns on 4 of the 5 segments.

Description: *M. lambertii* has one segment like *M. hoschulzii* or a *Braarudosphaera regularis*, while the other 4 segments have an elongate thorn each along the sutures. The thorns are arranged in pairs.

Remarks: *M. lambertii* differs from other species of the genus by its unequal development of the segments of the pentaliths. Broken single segments constitute an unusual sight in some samples and can be quite common.

LAMBERT (1986) illustrated beautifully an Upper Albian coccosphere of *Braarudosphaera africana* with pentaliths belonging to different "species". It is possible that also *M. lambertii* should be assigned to *M. obtusus/M. hoschulzii* or *Braarudosphaera regularis*, the species with which it co-occurs. But the occurrence of *M. lambertii* over only a few million years in several wells in the North Sea suggests its spatial and temporal separation from the other species which occur intermittently over most of the Lower Cretaceous in this region.

Occurrence: Upper Valanginian to Upper Hauterivian of the North Sea.

Genus ***Nannoconus*** KAMPTNER, 1931

Well known Tethyan nannoconids such as *N. steinmannii, N. kamptneri, N. globulus, N. truittii* and *N. bermudezii* , but also some new species of *Nannoconus* have been found in the Lower Cretaceous of the North Sea. In their description, the width of the row of wedges (PERCH-NIELSEN, 1985: 377) is mentioned. Thin wedges of about 0.5 µm thickness are found in *N. abundans* and *N. concavus*. Medium-sized wedges measure about 1 µm and are seen in most nannoconids such as *N. steinmannii, N. kamptneri* and here in *N. alvus, N. longus* and *N. dislocatus*. Thick, coarse wedges are thicker than 1.5 µm and are found in *N. oviformis* and in *N. sabinae*. One can also observe different angles of the wedges to the central canal: right angle to flat in *N. abundans, N. concavus, N. sabinae* and *N. alvus*; low angle of about 10 - 30° in most nannoconids and here in *N. longus* and *N. dislocatus*; high angle of about 30 - 60° as here in *N. oviformis*; a steep angle of more than 60° has been observed in very rare nondescribed forms.

Nannoconus alvus

Pl. 1, Figs. 19,20

Holotype: Pl. 1, Figs. 19,20.
Type level: Upper Berriasian; NLK 19A, *Sollasites arcuatus* Subzone.
Type locality: Central North Sea; Shell/Esso Well 29/7-1.
Derivation of name: From *alvus*, Latin for beehive.
Diagnosis: Beehive-shaped species of *Nannoconus* with no or a very narrow central canal and medium size, very low angle, rows of wedges.
Description: *N. alvus* is wider than high in side view. It has a concave base, more or less vertical sides and a dome-shaped apical part. The rows of wedges are of medium width and lie relatively flat.
Remarks: *N. alvus* probably often lies flat and then appears as a thick disc. Separate discs are common and can not be distinguished from separate discs of other species.
Occurrence: Upper Berriasian of the Central North Sea.

Nannoconus concavus

Pl. 1, Figs. 21-24

Holotype: Pl. 1, Fig. 22.
Type level: Upper Berriasian; NLK 19, *Nannoconus steinmannii* Zone.
Type locality: Central North Sea; Shell/Esso Well 29/7-1.
Derivation of name: From *concavus*, Latin for concave.
Diagnosis: Species of *Nannoconus* with concave sides and apex and flat to concave basal part. Central canal about 1/3 or less of the width in the central part. Thin, flat rows of wedges.
Description: The outline of *N. concavus* in side-view is concave at the sides and in the apical part, while the basal part seems flat to slightly concave. The central canal comprises about 1/3 or less of the width of the body at the middle. The height of *N. concavus* ranges from slightly shorter than wide to slightly higher than wide. The species has a crenulate outline in top-view (Pl. 1, Fig. 24). The wedges are thin and relatively flat lying to low-angle to the central canal.
Remarks: *N. concavus* has not as wide a central cavity as *N. quadratus* (Pl. 1, Fig. 25), a similar Tethyan species, which has more ruggedly concave sides and also occurs in the North Sea. *N. abundans* often has larger apical discs and has even thinner wedges than *N. concavus*. It has usually a narrower central canal. In top view it can only be distinguished from *N. concavus* in , when it features remnants of the wider apical discs.

Occurrence: Upper Berriasian and lowermost Valanginian of the North Sea, where it does not overlap with *M. speetonensis*.

Nannoconus dislocatus

Pl. 1, Figs. 26, 27

Holotype: Pl. 1, Figs. 26, 27.
Type level: Lower Hauterivian; NLK 17, upper part of *Corollithion silvaradion* Zone.
Type locality: Northern North Sea; Shell/Esso Well 211/29-8.
Derivation of name: From *dislocatus*, Latin for displaced.
Diagnosis: Elongate species of *Nannoconus* consisting of two parts that are offset relative to one anotherand a relatively wide central canal. Medium-sized, low angle rows of wedges.
Description: This cylindrical species is higher than wide and consists of an oblique basal part and a slightly dislocated apical part. The central canal is about as wide as the walls and has a kink approximately in the middle. The rows of wedges are of medium width and form a low angle to the central canal.
Remarks: *N. dislocatus* differs from *N. kamptneri*, which also has a relatively wide central canal, by its obliqueness and the kink in the middle of the formers central canal.
Occurrence: Hauterivian of the Northern North Sea.

Nannoconus longus

Pl. 1, Figs. 34,35

Holotype: Pl. 1, Fig. 35.
Type level: Upper Barremian; NLK 11, *Nannoconus borealis* Zone.
Type locality: Central North Sea; Shell/Esso Well 22/26A-2.
Derivation of name: From *longus*, Latin for long.
Diagnosis: Very long species of *Nannoconus* with a total length more than two times the maximum width. Bulbous at the apex. Central canal about 1/3 of width. Medium-size, low angle rows of wedges.
Description: *N. longus* has one bulbous and one open end. The thick end is only slightly wider than the long, slightly flaring or parallel-sided body. The central canal is about as wide as the wall, which is built of wedges of medium width. There is no cavity in the bulbous part.
Remarks: *N. longus* is longer than most other species of *Nannoconus* and is the only species with a bulbous apex and a length to width ratio more than two as found in *N. borealis*. *N. boletus* and *N. bonetii* are shorter, *N. dauvillieri* has a flaring rather than bulbous apex, *N. kamptneri* has no distinct bulbous apex and *N. steinmannii* has a very narrow central canal and no bulbous apex.
Occurrrence: Upper Barremian of the North Sea.

Nannoconus oviformis

Pl. 1, Figs. 32, 33

Holotype: Pl. 1, Figs. 32, 33.
Type level: Upper Berriasian; NLK 19A, *Sollasites arcuatus* Subzone.
Type locality: Central North Sea; Shell/Esso Well 29/7-1.
Derivation of name: From *ovum*, Latin for egg, and *forma*, Latin for shape.
Diagnosis: Large, ovoid species of *Nannoconus* with wide central cavity and few, thick rows of wedges at a high angle to the central canal.
Description: *N. oviformis* has an oval outline in side-view and is subcircular in apical view. The wall is of equal thickness over most of the body and built of few rows of wedges surrounding a wide central

cavity.
Remarks: *N. oviformis* is bigger than *N. globulus* and has thicker, steeper rows of wedges than that species.
Occurrence: Upper Berriasian of the North Sea.

Nannoconus sabinae
Pl. 1, Figs. 28-31

Holotype: Pl. 1, Figs. 28,29.
Type level: Upper Berriasian; *Nannoconus sp.* (discs) Zone of CRUX (1987).
Type locality: Central North Sea; Shell/Esso Well 29/7-1.
Derivation of name: After Sabine, my youngest daughter.
Diagnosis: Flat to high species of *Nannoconus* consisting of parallel lying wedges consisting of very thin parallel lying tiers and without a central canal.
Description: The holotype consists of 3 layers of wedges arranged parallel rather than spirally as usual in *Nannoconus*. In side-view, up to 8 layers of wedges have been seen (Pl. 1, Fig. 30), but specimens with fewer tiers are more common. Each wedge, in turn, consists of numerous very thin, slightly undulating tiers. No central canal is visible. Often, *N. sabinae* is seen in apical view and then appears, depending on its thicknes, as faintly to strongly birefringent, large disc. The sutures are arranged radially in the single discs or rows of wedges.
Remarks: The assignment of this species to *Nannoconus* is not totally convincing, since typical representatives of *Nannoconus* have the rows of wedges arranged in a spiral rather than horizontally.

Large nannoconid discs were already mentioned from the Berriasian by JAKUBOWSKI (1987) in his Zone NLK 19 and CRUX (1987) based a zone on their range below the range of *Sollasites arcuatus*. They probably represent the single layers of *N. sabinae*.
Occurrence: Upper Berriasian of the North Sea and Speeton.

Genus ***Triquetrorhabdulus*** MARTINI 1965

The genus *Triquetrorhabdulus* includes calcareous rods with a triradial cross-section and occurs from the late Late Oligocene through the Late Miocene. Similar forms are also in the Lower Cretaceous.

Triquetrorhabdulus? shetlandensis
Pl. 1, Figs. 15, 16

Holotype: Pl. 1, Fig. 16.
Type level: Lower Valanginian; NLK 18, *Micrantholithus speetonensis* Zone.
Type locality: Northern North Sea; Shell/Esso Well 211/13-7.
Derivation of name: From the East Shetland Basin, where the well is situated.
Diagnosis: Elongate to diamond-shaped body with triradiate cross-section.
Description: *T.? shetlandensis* has 3 blades which are usually widest towards about 1/4 to 1/3 of the length from the blunter end of the body. The 3 blades are not always equally well developed. The one standing vertically reaches blue birefringence colours at 45° between crossed nicols. The specimens are dark when oriented parallel to the crossed nicols.
Remarks: Although *T.? shetlandensis* most likely is not related to the Oligocene/Miocene genus *Triquetrorhabdulus*, it is tentatively included in this genus, since it seems even more unlikely that it is related to

the Eocene genus *Pseudotriquetrorhabdulus* which consists of up to eight laths, or the Cretaceous genus *Lithraphidites* which has a cruciform cross-section. The Upper Jurassic *Pseudolithraphidites* consists of 4 or 6 circular rods.

Occurrence: Lower Valanginian through Lower Hauterivian in Speeton and the North Sea.

ACKNOWLEDGMENTS

I thank Ben Prins (Shell, The Hague) and Shirley van Heck and Wytse Sikkema (Shell, London) for constructive remarks and Shell Expro UK for permission to publish and for providing copies of the colour plate.

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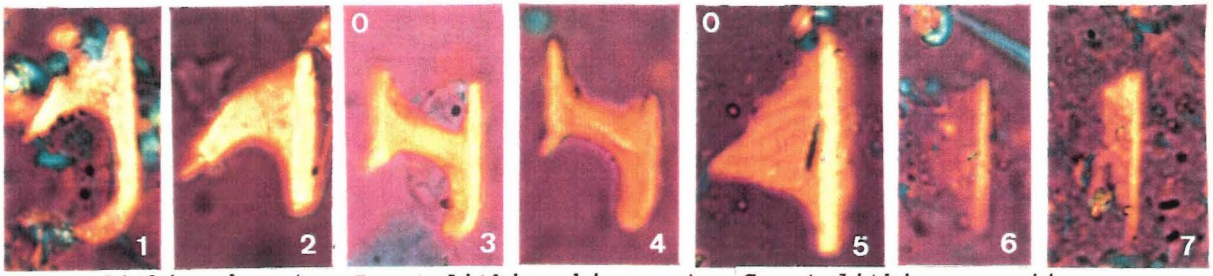
PLATE 1

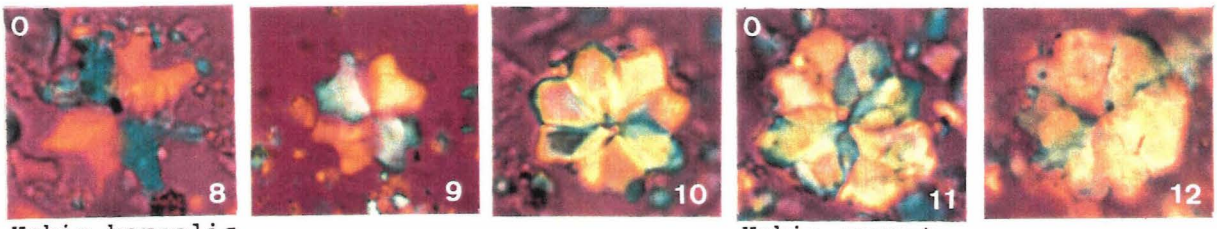
Magnification ca. 1800x; x-nicols with gypsum plate; holotypes indicated by O in upper left cornor of figures.

Figs 1,2	*Ceratolithina hamata*	Copt Point 13
Figs 3,4	*Ceratolithina bicornuta*	Copt Point 12
Figs 5-7	*Ceratolithina cruxii*	Copt Point 12,12,8
Figs 8-10	*Kokia borealis*	Shell/Esso 22/21-2
Figs 11-13	*Kokia curvata*	Shell/Esso 211/13-7
Fig. 14	*Kokia sp.* 1	Speeton, C2; RP 13
Figs 15,16	*Triquetrorhabdulus? shetlandensis*	Shell/Esso 211/13-7
Figs 17,18	*Micrantholithus lambertii*	Shell/Esso 30/11b-1
Figs 19,20	*Nannoconus alvus*	Shell/Esso 29/7-1
Figs 21-23	*Nannoconus concavus*	Shell/Esso 29/7-1
Fig. 24	*Nannoconus concavus*	Shell/Esso 30/6-3
Fig. 25	*Nannoconus quadratus*	Shell/Esso 29/7-1
Figs 26,27	*Nannoconus dislocatus*	Shell/Esso 211/29-8
Figs 28-30	*Nannoconus sabinae*	Shell/Esso 29/7-1
Fig. 31	*Nannoconus sabinae*	Shell/Esso 211/29-8
Figs 32,33	*Nannoconus oviformis*	Shell/Esso 29/7-1
Figs 34,35	*Nannoconus longus*	Shell/Esso 22/26-A2

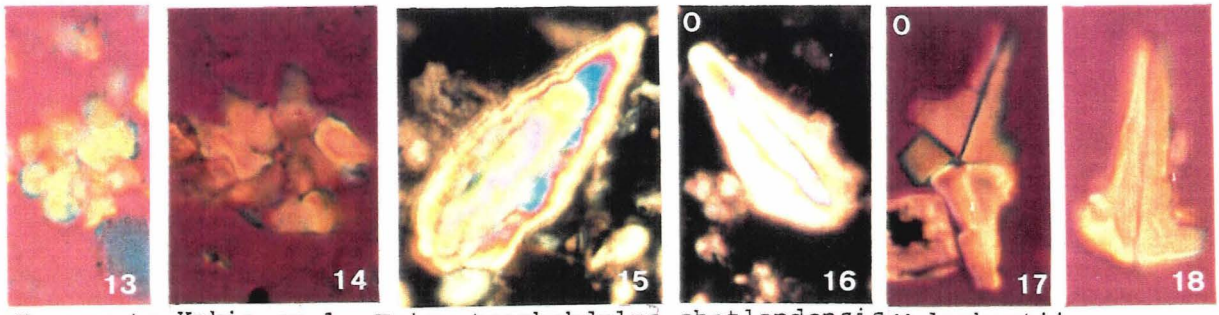
Plate 1



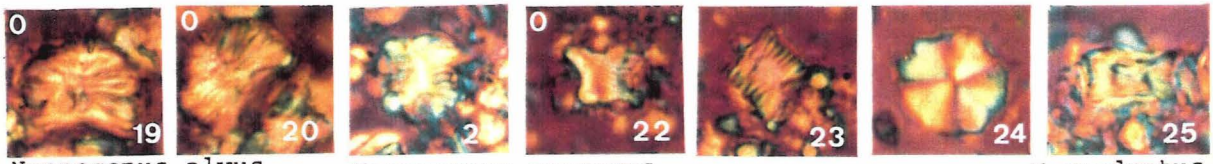
Ceratolithina hamata Ceratolithina bicornuta Ceratolithina cruxii



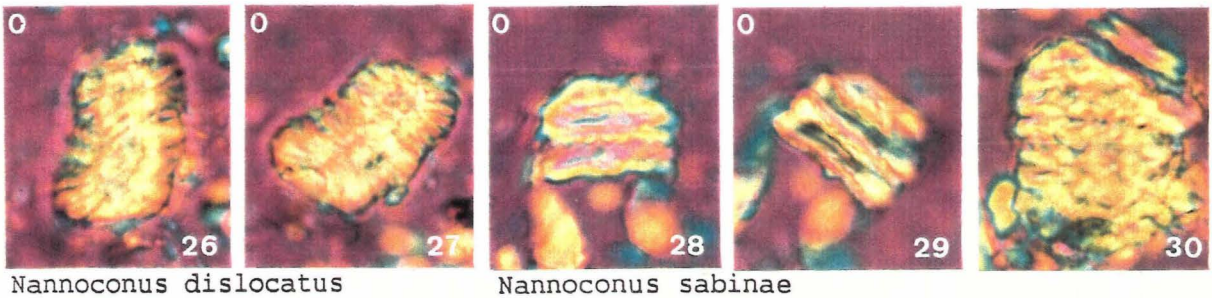
Kokia borealis Kokia curvata



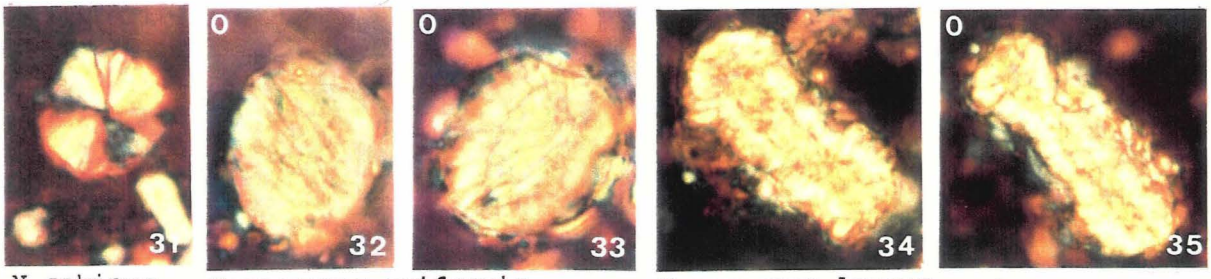
K.curvata Kokia sp.1 Triquetrorhabdulus shetlandensis M.lambertii



Nannoconus alvus Nannoconus concavus N.quadratus



Nannoconus dislocatus Nannoconus sabinae



N.sabinae Nannoconus oviformis Nannoconus longus

CONSIDERATIONS CONCERNING *Eu-discoaster tamalis* [KAMPTNER, 1967] THEODORIDIS, 1983

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Kamptner (1967) describes the species *Discoaster tamalis*, a tetraradiated asterolith is the following way:

"Der Kalkkörper besteht aus vier zu einem orthogonalen Kreuz angeordneten Armen. Diese sind durchwegs von gleicher Beschaffenheit. Vom Zentrum des Kreuzes an gerechnet, sind sie je 4,5 µ lang. An ihrer Basis sind sie 1,2 µ breit und ebenso hoch, verjüngen sich nach der Peripherie und endigen mit einer ½ µ breiten gerundeten Spitze. Von der Seite gesehen, erscheint das Profil des Kalkkörpers nach Art eines schmelen Sichelmondes gekrummt, wobei die Oberseite sich über die durch die Armspitzen gedachte Basislinie auf 2,7 µ erhebt. Die Oberseite des Kalkkörpers entbehrt jeglicher Skulpturen; vor allem sind in der Basalregion der Arme keinerlei Grenzlinien zwischen diesen wahrzunehmen".

Hay (1970) concluded that he was dealing with a subespecies of *Discoaster brouweri* Tan, and denominated it *D. brouweri tamalis* Kamptner. Theodoridis (1984) considers it as a "morphological variety" of the same species* —*D. brouweri*— although in many works other authors have considered it to be a separate entity (Perch Nielsen, 1977; Dermitzakis and Theodoridis, 1978; Haq and Berggren, 1978; Moshkovitz and Ehrlich, 1980 and Driever, 1981).

Backman and Shackleton (1983) and Backman and Pestiaux (1983), studying different DSDP sites in the Pacific and Mid Pliocene of the Atlantic, observed covariation between the species *D. tamalis* and *Discoaster asymmetricus*. These authors suggested the possibility that the model might be found at global level and that a certain taxonomic relationship could exist between the two species.

At site 397 of the NW Atlantic it is possible to find representatives of *Eu-discoaster tamalis** as from core 31 while from core 22 onwards a clear remission in its recording is seen (< 0.01%). According to Hamilton — (1979), the first event would be situated on the boundary between the Gilbert and Gauss magnetic epochs, while second occurs towards the beginning of the

* See appendix

Matuyama epoch. As may be seen in figure 1, the quantitative model of the distribution of *E. tamalis* is similar to that of *E. asymmetricus*, in contrast to that of *E. brouweri*

The fact that forms with peculiar characteristics (tetraradiated, with tetragonal symmetry, and lacking surface ornamentation) appear over a particular period of time (end of Lower Pliocene and Upper Pliocene) in a regular fashion**, suggest to us that they should be considered as separate entities, although it should be taken into account that their status as a "biological species" might not be absolutely correct. In other words, it would not be possible to rule out the notion that one were dealing with an ecophenotype resulting from environmental variations.

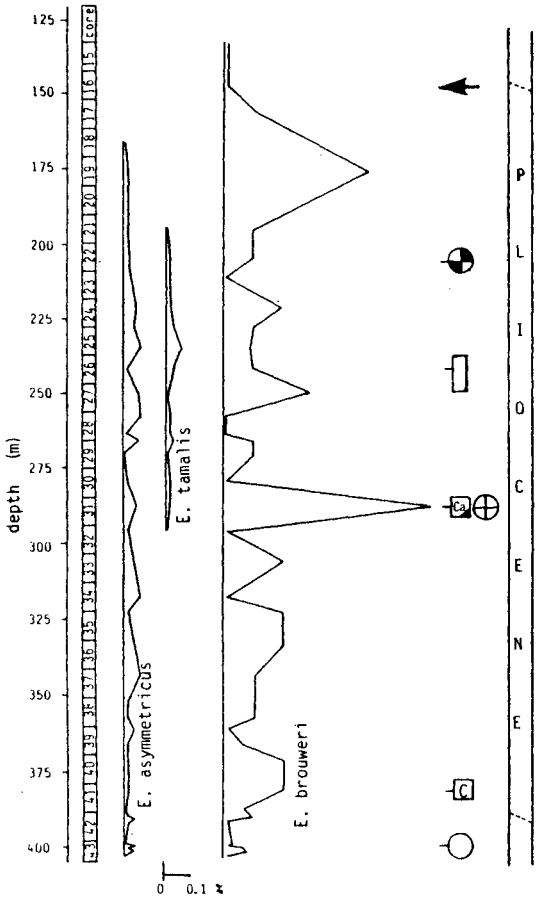

FIGURE 1.

Quantitative distribution of three species of asteroliths in site 397, during the Pliocene.

- Reduction in the regular record of *E. quinqueramus*
- C — Earliest record of *Ceratolithus*
- Ca — Latest record of *C. acutus*
- Earliest record of *E. tamalis*
- Increase in the proportion of *P. lacunosa*
- Reduction in the proportion of *E. tamalis*
- Reduction in the proportion of asteroliths

**FLORES (in.prep.) found tetraradiated forms in low proportion in the Upper Tortonian and Messinian from different DSDP sites (397, 135 and 410).

In view of all of the above, and following the systematic model proposed by Theodoridis (1984), the denomination *Eu-discoaster tamalis*, as Theodoridis him self proposed in 1983, seems feasible.

APPENDIX

Theodoridis (1984) considers *Discoaster tamalis* Kamptner, synonymous to *Eu-discoaster brouweri* subspec. *brouweri* , although previously, in his paper of 1983 cites:

> *Eu-discoaster tamalis* (Kamptner) n. comb.
> Basionym: *Discoaster tamalis* Kamptner, 1967: Ann. Naturhist. Mus. Wien, vol. 71, p. 166, text-fig. 29.

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DISTRIBUTION OF CALCAREOUS NANNOPLANKTON SPECIES IN MEDITERRANEAN SEA SURFACE WATER

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This note answers requests for a species list of the Mediterranean Sea calcareous nannoplankton. I studied 15 surface samples from the Mediterranean Sea (Figure 1), which were collected in July 1985, during Cruise Gx of the Indonesian-Dutch Snellius-II Expedition, the homeward voyage of the M.S. "Tyro" from Indonesia to The Netherlands. The samples were examined with a SEM, and 59 taxa could be identified.

The Mediterranean Sea nannoflora is characterized by an increased relative holococcolithophorid frequency. Compared to the other parts of Cruise Gx, they also show an increase in number of species (30 of the 59 taxa are holococcolithophorids) and in absolute abundance. I am preparing a paper on holococcolithophorids, in which the taxonomy of these species is treated, and descriptions of species, new combinations, new species and new genera are given. Also the heterococcolithophorid species will be dealt with in future publications. Since it will take some time to publish all manuscripts, the present note gives a list of the species that occur in the Mediterranean Sea surface samples (Table 1).

Some species were not differentiated from each other in the analysis, like Corisphaera gracilis KAMPTNER / Corisphaera type A, and Helladosphaera cornifera (SCHILLER) KAMPTNER / Corisphaera type B. Some other species show a gradual morphological variation; Gephyrocapsa ericsonii McINTYRE and BÉ, G. ornata HEIMDAL and G. protohuxleyi McINTYRE have not been differentiated, and therefore are listed together. They will be dealt with in a future publication.

For every species in Table 1 reference is made to published SEM- or TEM micrographs on which the species can easily be identified, and not primarily to the original description, or the description of a new combination.

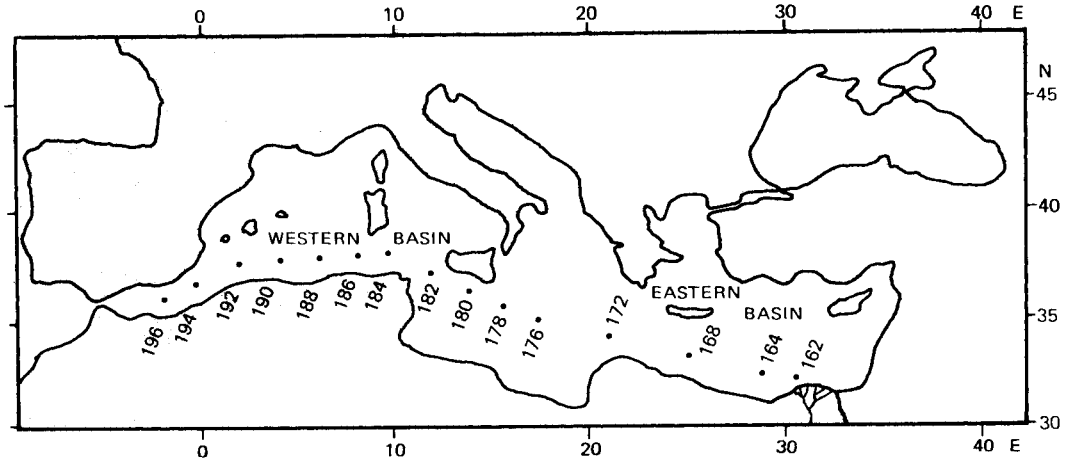

Figure 1. Sampling stations of Cruise Gx in the Mediterranean Sea.

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Table 1. Distribution of calcareous nannoplankton in Mediterranean Sea surface water.

SPECIES	STATIONS															REFERENCES
	196	194	192	190	188	186	184	182	180	178	176	172	168	164	162	
Emiliania huxleyi	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Hallegraeff 1984, figs.8-12
Umbellosphaera tenuis	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Hallegraeff 1984, fig.30
Rhabdosphaera stylifer	*	*	*	*	*	*	*		*	*		*	*	*	*	Hallegraeff 1984, fig.33
Syracosphaera pulchra	*	*	*	*	*	*			*	*		*	*		*	Gaarder & Heimdal 1977, pl.1
Caneosphaera halldalii	*	*	*	*	*	*			*	*			*	*	*	Gaarder & Heimdal 1977, pl.6.
Sphaerocalyptra quadridentata	*	*	*	*	*	*			*	*				*	*	Borsetti & Cati 1972, pl.41, fig.1
Calciosolenia murrayi	*	*		*											*	Manton & Oates 1985, pl.4
Rhabdosphaera longistylis	*		*	*	*				*	*			*	*	*	Okada & McIntyre 1977, pl.5, fig.6
Corisphaera gracilis/ Corisphaera type A	*		*	*	*									*	*	H & G 1980, pl.1, fig.6/Borsetti and Cati 1972, pl.49, fig.2b; Kleijne, in prep.
Syracolithus quadriperforatus	*			*	*	*			*						*	Norris 1985, figs.42,51-52
Gephyrocapsa oceanica	*				*		*		*						*	Okada & McIntyre 1977, pl.3, fig.5
Zygosphaera bannockii	*														*	Norris 1985, fig.56
Gephyrocapsa caribbeanica	*	*	*													McIntyre & Bé 1967, pl.9, fig.A
Syracosphaera epigrosa	*		*													Okada & McIntyre 1977, pl.7, figs.5-6
Syracosphaera histrica		*	*	*	*	*				*			*	*	*	Gaarder & Heimdal 1977, pl.2
Zygosphaera hellenica		*	*	*	*	*			*	*					*	Norris 1985, fig.57
Caneosphaera molischii		*	*	*	*	*				*						Heimdal & Gaarder 1981, pl.3
Calyptrosphaera oblonga		*	*	*	*	*			*							Reid 1980, pl.6, figs.9-10
Ceratolithus cristatus		*	*				*		*	*						Borsetti & Cati 1976, pl.17, figs. 5-8
Syracosphaera nodosa		*	*	*	*				*							Heimdal & Gaarder 1981, pl.10, fig.51
Poricalyptra isselii		*	*	*	*											B & C 1976, pl.16,figs.1-3;Kleijne, in prep.
Zygosphaera marsilii		*		*												Heimdal & Gaarder 1980, pl.3, figs.22-23
Helladosphaera cornifera/ Corisphaera type B			*	*	*					*			*	*	*	Norris 1985, fig.46/Gaarder 1962, pl.10; Kleijne, in prep.
Coronosphaera binodata			*		*	*	*		*	*	*		*	*	*	Gaarder & Heimdal 1977, pl.5, figs.27-32
Neosphaera coccolithomorpha			*		*	*			*	*			*	*	*	Okada & McIntyre 1977, pl.6, figs.1-2
Discosphaera tubifera			*		*				*	*			*	*	*	Hallegraeff 1984, figs.34-36
Calyptrosphaera sphaeroidea			*										*		*	Borsetti & Cati 1976, pl.12, figs.6-7
Alisphaera unicornis			*												*	Hallegraeff 1984, fig.41
Calciopappus caudatus			*												*	Manton & Oates 1985, pls.7-8

Table 1 continued.

SPECIES	STATIONS 196	194	192	190	188	186	184	182	180	178	176	172	168	164	162	REFERENCES
Gephyrocapsa ericsonii/ G. ornata/G. protohuxleyi			*	*	*	*	*							*		McIntyre & Bé 1967, pl.10/Heimdal 1973, figs.1-5/H & G 1981, pl.4, figs.20-21
Umbellosphaera irregularis			*						*				*			Reid 1980, pl.4, figs.4-5.
Syracolithus catilliferus			*	*	*	*						*				Borsetti & Cati 1972, pl.40, fig.2b
Periphyllophora mirabilis			*		*											Borsetti & Cati 1972, pl.51, fig.1
Umbellosphaera corolla			*		*											Heimdal & Gaarder 1981, pl.11, figs. 52-57
Dactylethra pirus			*	*												Norris 1985, figs.38-39
Anthosphaera fragaria			*													Gaarder 1962, pl.11
Calyptrolithophora papillifera			*													Heimdal & Gaarder 1980, pl.1, figs.2-3
Crystallolithus rigidus			*													Heimdal & Gaarder 1980, pl.2, figs.11-12
Syracosphaera pirus			*													Gaarder & Heimdal 1977, pl.3
Syracosphaera type E			*													Heimdal & Gaarder 1981, pl.13, fig.64
Umbilicosphaera sibogae foliosa			*													Okada & McIntyre 1977, pl.4, fig.1
Calyptrosphaera dentata				*		*							*		*	O & M 1977, pl.11, fig.6; Kleijne, in prep.
Calicasphaera blokii				*											*	Kleijne, in prep.
Anthosphaera periperforata				*	*	*				*				*		Kleijne, in prep.
Acanthoica acanthifera				*												Reid 1980, pl.3, figs.8-9
Helladosphaera pienaarii					*									*		Norris 1985, figs.47
Calyptrolithina wettsteinii					*	*										Halldal & Markali 1955, pl.5
Homozygosphaera triarcha					*	*										Borsetti & Cati 1972, pl.50, fig.2
Corisphaera strigilis					*											Heimdal & Gaarder 1980, pl.1, fig.8
Syracolithus type B					*											Norris 1985, fig.29; Kleijne, in prep.
Syracosphaera cf. nana					*											Heimdal & Gaarder 1981, pl.8, fig.42
Syracosphaera confusa						*	*			*	*		*	*	*	Kleijne, in prep.
Calyptrolithophora hasleana						*										Heimdal & Gaarder 1980, pl.1, fig.1
Ophiaster spec.									*	*						Manton & Oates 1983, pls.1-6
Alisphaera capulata									*							Heimdal & Gaarder 1981, pl.1, fig.4
Gliscolithus amitakarenae													*			Norris 1985, figs.40,42
Homozygosphaera arethusae														*	*	Borsetti & Cati 1972, pl.48, fig.3
Syracolithus bistratus														*		Kleijne, in prep.
Calicasphaera diconstricta															*	Kleijne, in prep.

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