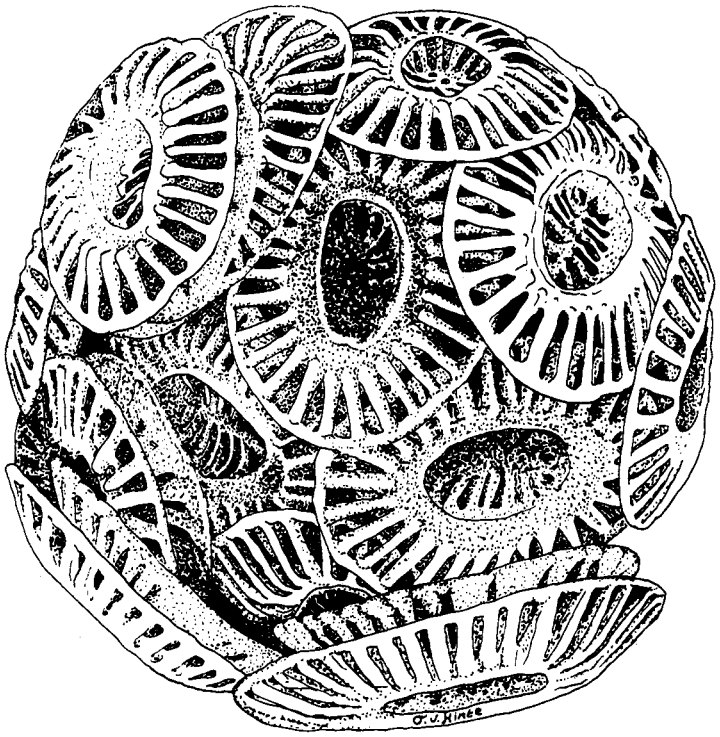
INA NEWSLETTER



INTERNATIONAL NANNOPLANKTON ASSOCIATION

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proceedings of the

INTERNATIONAL NANNOPLANKTON ASSOCIATION

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CONTENTS

Enclosed:
Financial report April 1986 - April 1987
Membership list per March 1987

!! NOTE !!

SALES OFFICE

Separate issues of the INA Newsletter can be obtained from the Secretary/Treasurer. Price per issue is:

- for non-members	£ 10.-	($15.-)
- for members	£ 5.-	($7.50)
- for student members	£ 2.50	($3.75)

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MAILING POLICY

Recent issues will be mailed by surface mail for countries inside Europe, by airmail for countries outside Europe. Back-issues will be mailed by surface mail, unless the extra costs for airmail are paid to the Treasurer.

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MEMBERSHIP

Applications for membership of the International Nannoplankton Association should be directed to the Secretary/Treasurer. Annual dues: £ 10.-/US$ 15.- Those who pay their dues in U.S. dollars are urged to send them to John Steinmetz (Marathon Oil, Denver Res. Center, P.O. 269, Littleton, Col., U.S.A.). Checks or money orders should be made out to INA; no account- or banknumber is necessary. Students can become a member for a reduced price (£ 5.-/US$ 7.50); please send a confirmation of your student-status when applying for membership.

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NEXT ISSUE

Contributions for the next issue of the INA Newsletter should be received before October 1987. Please send your contributions to: The editor of the INA Newsletter, S.E. van Heck (Address : see inside cover).

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INFORMATION TO CONTRIBUTORS

Manuscripts should not exceed four pages, although it is at the editor's discretion to accept longer papers. They will be reproduced in the INA Newsletter without being re-typed. Hence the authors are entirely responsible for the contents and quality of their contributions. Manuscripts of poor quality can be refused by the editor. Format: Manuscripts should be typed on A4 (this format); a blank margin of 2.5 cm (1 inch) should border the upper, the left and the right side of each page, and the margin on the lower side should be 3.5 cm (1.5 inch). DO NOT USE DOUBLE SPACING, as this takes up too much space !

EDITORIAL

Foreign literature

We must all have come across the situation of not being able to read some essential publication because it was written in a language we don't understand. Although things are improving, specially a lot of the older literature is written in French, German, Russian, Italian or some other exotic language. This may cause problems when we are trying to understand the description of taxa, as it is not always possible to find somebody who is able and willing to translate. However, translations must have been made of at least some papers, as the problem is not new. The difficulty is to locate them. Marie-Pierre Aubry wrote in with the request if anyone had translations of the papers of Kamptner and Lohmann for instance, and I my self would like to see some Russian literature translated. So if anyone is in the possession of any translations, please contact me, or better still, send me a copy. We can then list all the available translations in the Newsletter, and members could get copies against cost-price.

We could even take it a step further and make translations of some important papers. Professional translating is expensive, but surely amongst our members there must be some who are willing and able to translate one or two papers. Before we start out on that task, we need to know for which papers the demand is highest. So if you need any translations, please write in. We can then list the translations needed and with a bit of luck someone else has a translation or can make one. We can make a start by listing the following:

- any translations of the work of Kamptner and Lohmann which contain the descriptions of new taxa.
- a translation of: Golubev, 1981 (Real crystals in coccolithophorid skeletons), Edit. 'Nauka', Moscow.

Bibliography and taxa of silicoflagellates

Unfortunately, René Almekinders is no longer able to do the bibliography for silicoflagellates, and we are trying to find someone to take over that task. With the last questionnaire nobody volunteered for that job, so I now appeal to you again: if there is anybody who wants to help out, please contact me.

Catalogue of Calcareous Nannofossils

Vol. 12 of the CATALOGUE OF CALCAREOUS NANNOFOSSILS has just come out and can be ordered at the publisher who has a new name:

Technoprint S. a. s.,
Casella Postale 7072
ROMA - Nomentano
Italy

It costs US$ 200.- (postage included). Previous volumes are still available at the same place and at the same price as vol. 12.

Anna Farinacci asked us to inform our members that she plans to publish the forthcoming vol. 13 as soon as she will have available 250 new taxa. Therefore she would appreciate you sending her your reprints of recent and old publications where you describe new species or genera not yet published in her Catalogue.

S.v.H.

INA MEETING IN LONDON, 1987 : UPDATE

Registrations

We have so far about 50 people who have expressed an interest in the forthcoming meeting. Amongst those are many who filled in the preliminary registration form but not the final registration form. Of those who did fill in the final registration form, quite a few have stated they would possibly come, without a firm commitment. We are now faced with the following problem: At University College we have the choice of two lecture halls, for which we have made a provisional reservation. The first is at the Geology department. We can get it for free, we have facilities to organise our own catering (such as continuous coffee and other refreshments) we have literature at hand, and three separate rooms, of which one is the lecture hall, one could serve as microscope room and one could serve as coffee room and for discussions. But: it will only hold 50 people. The other hall is at Engineering. We would have to pay £75.- per day for that, and will be charged separately for several other items. There we are not allowed to organise our own catering, and we will be served refreshments only once in the morning and once in the afternoon. Any additional drinks will have to come from one of the coffee machines. We would only have one space next to the lecture hall, which can't be locked, which means clearing everything away at each break. It is obvious that we prefer the first choice, but we don't want to turn anyone away either. We have therefore decided on the following: By the first of June we must know how many people are coming. If at that date the total number is above 50, we will count only on those people who have sent in the second registration form, because we don't want to end up with an expensive venue that we don't need. The special issue of the Newsletter will be published in June, and we will enclose a confirmation to those who have registered. So please cooperate and let us know as soon as you can if you want to come. If you have sent in a preliminary registration and know you will not come, then please, let us know as well.

Student flats

The student flats will have to be paid in advance. The price is now set at £ 11.50 (incl. VAT) per night, which includes breakfast. We have reserved rooms for those who have applied from the 18th August to the 22nd August incl. But in order to make this a firm booking you will have to send a cheque or international money order in £ sterling payable to "University College London". Please send this to Dr. A.R. Lord, Postgraduate unit of Micropaleontology, University College London, Gower Street, London WC1E 6BT, United Kingdom. Please state clearly for which nights you want to book the accomodation, as some of you may want to leave early or stay longer. If the latter is the case, it is important to react quickly, as the reservations were made only for the dates mentioned. The student flats are about 300 metres from the university buildings.

Sponsorship

We are very happy to announce that so far we have received £ 1500.- in sponsorship money, which will go towards paying the conference party, the fieldtrip, the special conference issue of the Newsletter and the proceedings. This does not cover the costs entirely, but we still hope for one or two more contributions. The companies who have sponsored us so far are (in alphabethical order): British Petroleum, Chevron, Clyde Petrol, Esso, and Shell.

Presentations

Although we have not yet made a program, the following presentations have been announced (between brackets the presentations for which we do not yet have a firm title):

Aubry: (Problems related to the study of evolutionary lineages among Coccolithophoridae and consequences for our taxonomic approach.)

Biekart: Late Quaternary nannofossils and paleoceanography of the Indonesian seas.

Crux: Boreal Early Cretaceous nannofossils (Ryazanian - Barremian.

Curto: Biostratigraphic silicoflagellates association from the Betic (Spain).

Dockerill & Dockerill: (Evolution, Mesozoic)

Driever: Prinsiaceaean biostratigraphy ("paleoecology") of the Mediterranean Pliocene.

Erba: (The Middle Cretaceous cyclical deposition in the Umbrian - Marcheau Basin, Central Italy.)

Flores: Nannoflora in the Tortonian - Messinian and Miocene - Pliocene boundaries in east Atlantic O.D.P. sites and its relation with Spanish and Maroccan sections.

Gard: (Quaternary, arctic?)

Girgis: Lineages in some Lower Tertiary calcareous nannoplankton.

Hojjatzadeh & Lord: Cretaceous calcareous nannofloras of Tanzania and their regional significance.

Mutterlose: Calcareous nannofoffils as warm water indicators in the Upper Aptian of NW Europe.

Pavsic: (poster)

Perch-Nielsen: Geologic events and calcareous nannofossil distribution.

Prins: 1. Are nannofloral developments in the Early Jurassic of Western Europe related to geological events?
2. Developments in the family Arkhangelskiellaceae and the species concept in calcareous nannoplankton.
3. Phylogenetic strategies in calcareous nannoplankton: not a black and white picture.

Pujos: The use of a transfer function from coccolith assemblages: estimation of Quaternary temperature and salinity in the Caribbean and tropical Atlantic.

Raffi: Morphometrically based phylozonation: application of Gephyrocapsa group in the Lower Pleistocene.

Rio: Quantitative distribution patterns of Discoaters and Coccoliths in the Mediterranean Plio-Pleistocene: biostratigraphic and paleoecologic implications.

Saxena & Mathur: Upper Cretaceous and Paleogene calcareous nannoplankton from the subsurface sediments of the Krishna - Godavari Basins.

Toker: Standard Paleocene - Eocene calcareous nannoplankton zonation of Turkey.

Westbroek (invited speaker): (Recent nannoplankton)

Yanwen: The Upper Cretaceous and Paleocene nannofossils from the Tarim Basin, Xinjiang, China.

Young: Neogene nannofossil evolution and taxonomy, some problems and prospects.

Information to authors

We would like to remind you once more that all abstracts must be in by May 15th, or they can't be included in the special conference issue or the program. When you send your abstract, please indicate the length of time you need for your presentation. Remember that most presentations should be 10 to 15 minutes, but some may be 20 to 30 minutes. When we put the final program together we shall decide how much time each speaker may have. You will find this indicated in the final program. Also, please indicate if you intend to publish your presentation in the proceedings of the conference and if you need more than one projector.

The proceedings shall be published by Ellis Horwood, in the series of special publications of the British Micropalaeontological Society, under the title: 'Nannofossils and their applications - Proceedings of the INA Conference, London 1987'.

Guide to authors

1. Manuscripts should be written in English. They can be of any length, however, authors of papers anticipated to be more than 15 printed pages should contact the editors. If space does not allow the inclusion of these manuscripts, the authors may be asked to reduce their length.
2. Type double spaced with a left hand margin of 3 cm.
3. Informative but brief title.
4. There should be a short abstract.
5. References should be given in a uniform style: alphabetically by author, year of publication, title, journal title (abbreviated according to the World List abbreviation), volume number, page numbers.
   e.g. Kennett, J. P. 1978. The development of plankton biogeography in the Southern Ocean during the Cenozoic. *Mar. Micropal.*, 3, 301-345.
   For book references, please include publisher and place of publication.
   e.g. McIntyre, A. and McIntyre, R. 1971. Coccolith concentrations and differential solution in oceanic sediments. *In* Funnel, B. M. and Riedel, W. R. (Eds.). *The Micropalaeontology of Oceans*, 253-261. Cambridge University Press, Cambridge.
6. Figures should be of high quality and designed to be reduced to a maximum of 195 X 145 mm. Letter size after reduction should be a minimum of 2mm high.
7. Figure captions should be written double spaced on a separate sheet. Indicate in the margin of the text the position of figures and tables.
8. Plates must be kept to a minimum, be of good quality and designed to be reduced to a maximum of 145 X 195 mm. Magnifications given in the text must anticipate this reduction. Make use of a scale bar wherever possible and note the length of the bar in the plate description. Numbers should not be added to the plates as these will be put on by the printers. Please supply a plan of the plate numbering, either as a transparant overlay or on a separate sheet. Start numbering from the top left hand corner.
9. All papers go to referees, and on their advise may be refused.

For general style see "A Stratigraphical Index of Calcareous Nannofossils" edited by A. R. Lord and published by Ellis Horwood, Chichester, 1982.

Two copies of the completed manuscript should be sent to the editors by no later than the 1st October 1987.

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WORKSHOP ON CALCAREOUS NANNOFOSSILS

An informal workshop on calcareous nannofossils was held at the Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543, on September 7, 1986 prior to the Second International Conference on Paleoceanography. Over twenty conference participants representing ten countries of the world attended the workshop of which the main theme was "Evolution and calcareous nannofossils". Informal communications by Orin Leshner (USA), Simon Moshkovitz (Israel), and Jan Backman (England) on some Cretaceous (OL and SM) and Cenozoic (JB) lineages, and by Peter Roth on calcareous nannofossil diversity changes through the Mesozoic served as a basis for evaluating our expectations from calcareous nannofossil studies and their limitations. Other topics were also considered, in particular the paleoclimatic significance of Nannoconids (Jorg Mutterlose, Germany) and the usefulness of quantitative methods for determining calcareous nannofossil datum levels. I believe that the workshop was both fruitful and enjoyable and I take this opportunity to extend warm thanks to those of you who contributed to making it such a worthy experience.

M.- P. Aubry

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4th International Symposium on Fossil Algae

This symposium will be held on 6 - 11 July 1987 in Cardiff (Great Britain). For information please contact:

Dr. Robert Riding
Algal Symposium
Department of Geology
University College
Cardiff CF1 1XL
United Kingdom
tel: 0222-874329

Official deadline for registration and papers is April 30th, but the conference only came to our attention just now, and the organisers may be flexible. Registration fee is £65.-

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Compiled by John C. Steinmetz

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B138

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Helicosphaera porosa LEHOTAYOVÁ 1985; pp. 103-104, pl. 43, figs. 1, 2; pl. 44, figs. 1-4. Czechoslovakia, South Slovakia, Early Miocene, Zones NN1 to NN2.	A298-3
Helicosphaera salebrosa (PERCH-NIELSEN 1971) AUBRY 1986; p. 91; (ex Helicopontosphaera).	A290-5
Helicosphaera ? subantarctica (EDWARDS & PERCH-NIELSEN 1975) AUBRY 1986; p. 91; (ex Helicopontosphaera).	A290-5
Lithraphidites kennethii PERCH-NIELSEN 1986; p. 836, pl. 2, figs. 1-4. South Atlantic, Sao Paulo Plateau, DSDP Site 356, Late Maastrichtian, Nephrolithus frequens Zone, CC 26 of SISSINGH 1977.	A301-4
Lucianorhabdus inflatus PERCH-NIELSEN & FEINBERG in PERCH-NIELSEN 1986; p. 837, pl. 2, figs. 6-9. Kabylie, Algeria, Late Campanian, Quadrum trifidum Zone, CC 22 of SISSINGH 1977.	A301-4
Pappomonas MANTON & OATES 1975; pp. 96-97. Type species: Pappomonas flabellifera MANTON & OATES 1975.	A298-6
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Papposphaera sarion THOMSEN 1981; pp. 79-83, figs. 5-8. West Greenland, Recent.	A304-10
Pontosphaera aperta (PERCH-NIELSEN 1971) AUBRY 1986; p. 91; (ex Discolithina).	A290-5
Pontosphaera cornifera LEHOTAYOVÁ 1979; pp. 161-162, pl. 40, figs. 1-5. Czechoslovakia, Central Slovakia, Oligocene.	A297-9
Pontosphaera distinctoides (REINHARDT 1967) AUBRY 1986; p. 91; (ex Discolithus).	A290-5
Pontosphaera fibula (GETHA 1976) AUBRY 1986; p. 91; (ex Transversopontis).	A290-5
Pontosphaera lata (MÜLLER 1970) AUBRY 1986; p. 91; (ex Transversopontis).	A290-5
Pontosphaera lepida (BOUDREAUX & HAY 1969) AUBRY 1986; p. 91; (ex Koczya).	A290-5
Pontosphaera ovata (LEVIN & JOERGER 1967) AUBRY 1986; p. 91; (ex Discolithina).	A290-5
Pontosphaera panarium (DEFLANDRE 1954) AUBRY 1986; p. 91; (ex Discolithus).	A290-5

B139		
	Pontosphaera pauciforata (KAMPTNER 1956) AUBRY 1986; p. 91; (ex Discolithus).	A290-5
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	Quadrum sissinghii PERCH-NIELSEN 1986; pp. 838-839, pl. 3, figs. 3-5. Ain Amur, NW of oasis Kharga, Egypt. Late Campanian (Early Maastrichtian?), Tranolithus phacelosus Zone CC 23 of SISSINGH 1977.	A301-4
	Stoverius PERCH-NIELSEN 1986; p. 839. Type species: Chiphragmalithus achylosus STOVER 1966.	A301-4
	Stoverius achylosus (STOVER 1966) PERCH-NIELSEN 1986; p. 839; (ex Chiphragmalithus).	A301-4
	Tegulalithus CRUX 1986; p. 88. Type species: Lithastrinus septentrionalis STRADNER 1963.	A293-4
	Tegulalithus septentrionalis (STRADNER 1963) CRUX 1986; p. 88; (ex Lithastrinus)	A293-4
	Tegulalithus tessellatus (STRADNER 1968) CRUX 1986; p. 89; (ex Lithastrinus).	A293-4
	Truncatoscaphus intermedius PERCH-NIELSEN 1986; pp. 839-840, pl. 1, figs. 12-13. Armailles, France, Late Kimmeridgian.	A301-4

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Species names in alphabetical order.

achylosus, Stoverius
aperta, Pontosphaera
cornifera, Pontosphaera
distinctoides, Pontosphaera
fibula, Pontosphaera
flabellifera, Pappomonas
inflatus, Lucianorhabdus
intermedius, Truncatoscaphus
kennethii, Lithraphidites
lata, Pontosphaera
lepida, Papposphaera
lepida, Pontosphaera
ovata, Pontosphaera
panarium, Pontosphaera
pauciforata, Pontosphaera
pax , Pontosphaera
porosa, Helicosphaera
pulchripora , Pontosphaera
salebrosa, Helicosphaera
sarion, Papposphaera
septentrionalis, Tegulalithus
sigmoidalis, Pontosphaera
sissinghii, Quadrum
subantarctica , Helicosphaera
tessellatus, Tegulalithus
vanheckae, Cruciplacolithus
vesca, Pontosphaera
virgulosa, Pappomonas
wechesensis, Pontosphaera

New genus names.

Pappomonas	Stoverius
Papposphaera	Tegulalithus

++++++++++++++++++++++Corrections++++++++++++++++++++++

B107: Euconusphaera and Euconusphaera tollmanniae should be corrected to read Eoconusphaera and Eoconusphaera tollmanniae, respectively.

++++++++++++++++++++Some Comments++++++++++++++++++++

Since the first issue of the INA Newsletter in August of 1979, an earnest attempt has been made, either by Shirley van Heck or myself, to include reference to all nannoplankton-related literature published since 1971, the year through which Loeblich and Tappan had published their valuable "Annotated Index and Bibliography of Calcareous Nannoplankton". About 130 journals and other serial publications are currently searched on a regular and systematic basis to include reference to such literature. And new titles are added in almost every issue of the Newsletter, either because new journals are being published (such as the recent appearance of the journals Paleoceanography and Palaios), or journals are becoming available in the libraries where the bibilographies are being compiled. In my case, I depend heavily on the technical library at Marathon Oil Company which offers very good domestic (to the U.S.) and international coverage of geological and micropaleontological literature. For journals and serials not contained in Marathon's library (particularly those of Eastern Hemisphere origin), I journey to the U. S. Geological Survey library in Denver or the University of Colorado library in Boulder. Priority of inclusion in the Newsletter is always given to current titles, and as time permits, I search and include older literature. The game of "catch-up" is continual.

In the present edition of the "Bibliography and Taxa of Calcareous Nannoplankton", I have also included many of the journals that are more "biological" in origin (in contrast to the usual "geological" or "paleontological" ones), since much information concerning the growth, development, and distribution of Recent nannoplankton occurs in them. In searching such literature, all references to calcareous nannoplankton, nannoplankton, coccolithophores, and certainly generic names of coccolithophores are researched. Omissions may occasionally occur if the term "phytoplankton" occurs in the title or abstract of a particular article. Such articles are examined, but they as often as not are concerned with the "other" phytoplankton, i.e., diatoms, dinoflagellates, silicoflagellates, or other plant protists. In the future, these and other biological journals will be included on a regular basis.

This work is made easier and more complete by those of you who continue to remember to send a reprint or a notice of publication to me, so I encourage you again to send reprints, comments, and corrections so that the Newsletter can remain informative, current, and correct. Thanks in advance.

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SIX NEW SPECIES OF CALCAREOUS NANNOFOSSILS FROM THE LOWER CRETACEOUS STRATA OF ENGLAND AND GERMANY

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The Late Hauterivian to Early Barremian sediments of Speeton, (Yorkshire) and the Otto Gott clay pit, (Sarstedt near Hannover) contain rich nannofloras in which six new species and one new genus of coccolith have been found. These sections are described in detail and dated with ammonites and belemnites in Rawson and Mutterlose (1983) and Mutterlose (1984). Five of the new species of coccoliths; *Chiastozygus cepekii*, *Clepsilithus polystreptus*, *Cretarhabdus inaequalis*, *Rhagodiscus pseudoangustus* and *Watznaueria rawsonii* are heterococcoliths, the sixth species *Calculites sarstedtensis* is a holococcolith.

Genus *Chiastozygus* Gartner 1968

Chiastozygus cepekii sp. nov.
Pl. 1, Figs. 1-3, 6, 18-20.
(holotype Fig. 1)

Derivation of name: After P. Čepek, nannofossil specialist.

Diagnosis: A species of *Chiastozygus* with a large flaring spine. The spine has a serrated edge and is cut by four slits which run parallel to the supporting crossbars. The proximal side of the coccolith is covered by a reticulate grill.

Remarks: The possesion of the distinctive spine distinguishes this species from other members of the genus *Chiastozygus*.
Length of coccolith 3.9-4.1 µm (four specimens measured).

Type level: Bed 72 Otto Gott, Sarstedt (bed number after Mutterlose 1984).

Range: Late Hauterivian - Early Barremian, Otto Gott and Speeton.

Genus *Clepsilithus gen. nov.*

Derivation of name: After the Greek *clepsi-* deceiving *lithos-* stone.

Diagnosis: Elliptical coccoliths with a loxolith rim. The central area contains a spine base from which five or more bars radiate. Some of these bars may bifurcate before joining the outer wall of the coccolith.

Remarks: The genus *Clepsilithus* is similar to the genera *Corollithion* Stradner 1961 and *Stradnerlithus* Black 1971 but differs in the construction of its rim.

Type species: *Clepsilithus polystreptus sp. nov.*

Clepsilithus polystreptus sp. nov.
Pl. 1, Figs. 10 and 11.
(holotype Fig. 10)

Derivation of name: From the Greek *polystreptos*- much twisted.

Diagnosis: A species of *Clepsilithus* with nine to twelve bars.

Remarks: The central bars have a rope like appearance in proximal view.
Length of coccolith 2.6-3.1 µm (two specimens measured).

Type level: Bed 72 Otto Gott, Sarstedt (bed number after Mutterlose 1984).

Range: Recorded in the Late Hauterivian of Otto Gott (due to different definitions for the Hauterivian-Barremian stage boundary in Speeton and Otto Gott this record is possibly equivalent to the Barremian of Speeton).

Genus *Cretarhabdus* Bramlette and Martini 1964

Cretarhabdus inaequalis sp. nov.
Pl. 1, Figs. 7-9 and 22.
(holotype Fig. 7)

Derivation of name: After the latin *inaequalis*- irregular (not uniform).

Diagnosis: A species of *Cretarhabdus* with an irregular central grill. The grill has a cross in which the two halves of the longer bar are offset where they join the shorter bar. The four quadrants of the central area are further sub-divided by small bars parallel to the long and short axes of the elliptical coccolith.

Remarks: This species differs from other species of *Cretarhabdus* and *Retecapsa* Black 1971 by the distinctive construction of its central area.
Length of coccolith 3.4-5.5 µm (six specimens measured).

Type level: Bed 72 Otto Gott, Sarstedt (bed number after Mutterlose 1984).

Range: Late Hauterivian - Barremian (top not seen), Otto Gott and Speeton.

Genus *Rhagodiscus* Reinhardt 1967

Rhagodiscus pseudoangustus sp. nov.
Pl. 1, Figs. 4, 5, 16 and 17.
(holotype Fig. 4)

Derivation of name: After the Greek *pseudes*- false *angustus*.

Diagnosis: A species of *Rhagodiscus* whose shape is an elongated ellipse, the sides being parallel to slightly convex. The central area is bridged by a large spine base which completely crosses the coccolith.

Remarks: This species is very similar to *Rhagodiscus angustus* (Stradner 1963) Reinhardt 1971. It differs by having a larger spine base which completely crosses the coccolith. Forms attributable to *R. pseudoangustus* (*R. angustus*) were also recorded by Perch-Nielsen (1979). She noted that there were no granules of calcite present in their central area. Most specimens observed in the present study also lack calcite granules, but they are present in well preserved specimens (Pl. 1, Fig. 5). *R. pseudoangustus* has a stratigraphically older range than *R. angustus*. It occurs in the Late Hauterivian to Early Barremian strata of Speeton and Otto Gott, while R. angustus has a worldwide occurrence in Late Aptian and younger strata.

Length of coccolith 4.3-7.2 µm (five specimens measured).

Type level: LB 6 Speeton (bed number after Rawson and Mutterlose 1983).

Range: Hauterivian - Early Barremian, Otto Gott and Speeton.

Genus *Watznaueria* Reinhardt 1964

Watznaueria rawsonii sp. nov.
Pl. 1, Fig. 12.
(holotype Fig. 12)

Derivation of name: After P. F. Rawson, Mesozoic stratigrapher.

Diagnosis: A species of *Watznaueria* with a central tube surrounding a central area which is filled by a delicate, irregular grill of calcite laths.

Remarks: This species is similar to *Watznaueria fasciata* Wind and Čepek 1979; the two species are differentiated by the constructions of their central grills. Like *W. fasciata* the central grill of *W. rawsonii* could be removed by dissolution, leaving a form resembling *Watznaueria ovata* Bukry 1969. There is no way of knowing if the holotype of *W. ovata* is in fact a poorly preserved specimen of *W. rawsonii*, however, it could equally well be a poorly preserved specimen of *W. fasciata* or another, as yet undescribed species. Wind and Čepek (1979) noted that *W. fasciata* was smaller than *W. ovata*, the holotypes of *W. fasciata* and *W. rawsonii* are both approximately 4µm in length. The central grills were not observed under the light microscope.

Length of coccolith 3.9-5.7 µm (three specimens measured).

Type level: Bed 72 Otto Gott, Sarstedt (bed number after Mutterlose 1984).

Range: Recorded in both Late Hauterivian and Early Barremian strata of Otto Gott and Speeton respectively (due to the Hauterivian-Barremian stage boundary being defined differently in the two areas the Late Hauterivian record in Otto Gott may be equivalent to the Barremian of Speeton).

Genus *Calculites* Prins and Sissingh 1977

Calculites sarstedtensis sp. nov.
Pl.1, Figs. 13-15 and 21.
(holotype Fig. 13)

Derivation of name: After Sarstedt, the type locality.

Diagnosis: A species of *Calculites* with a thin outer rim and up to eight depressions in the distal surface arranged around a central boss or spine base.

Remarks: *Calculites sarstedtensis* is the earliest known representative of its genus, it occurs in Late Hauterivian strata, while the other members of this genus are restricted to the Late Cretaceous. Prins and Sissingh (1977) originally described *Calculites* as a heterococcolith genus, but Perch-Nielsen (1985) has noted that well preserved specimens show a holococcolith structure.

Length of coccolith 3.4-4.0 μm (five specimens measured).

Type level: Bed 72 Otto Gott, Sarstedt (bed number after Mutterlose 1984).

Range: Recorded in the Late Hauterivian of Otto Gott (due to the Hauterivian-Barremian stage boundary being defined differently in Otto Gott and Speeton, this record may be equivalent to the Barremian of Speeton).

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For further references see Perch-Nielsen (1985).

PLATE 1

bars at the top of scanning electron micrographs equal 1 μm

Figs. 1-3, 6, 18, 19 and 20. *Chiastozygus cepekii sp. nov.*

1. distal view, 2. proximal view, 3 and 6. side view Late Hauterivian, Bed 72 Otto Gott, Sarstedt.
18. bright field, side view, X 4600, Late Hauterivian, Beds 34-38 Moorberg, Sarstedt.
19. bright field, 20. x-nicols, X 4600, Late Hauterivian Bed 72 Otto Gott, Sarstedt.

Figs. 4, 5, 16 and 17. *Rhagodiscus pseudoangustus sp. nov.*

4. distal view, 5. proximal view, Early Barremian, LB 6 Speeton, Yorkshire.
16. bright field, 17. x-nicols, X 3400, Early Barremian, LB 6 Speeton, Yorkshire.

Figs. 7-9 and 22. *Cretarhabdus inaequalis sp. nov.*

7. distal view, Late Hauterivian, Bed 72 Otto Gott, Sarstedt.
8. distal view, 9. proximal view, Early Barremian, LB 6 Speeton, Yorkshire.
22. x-nicols, X 3800, Late Hauterivian, Bed 58 Otto Gott, Sarstedt.

Figs 10 and 11. *Clepsilithus polystreptus sp. nov.*

10. distal view, 11. proximal view, Late Hauterivian, Bed 72 Otto Gott, Sarstedt.

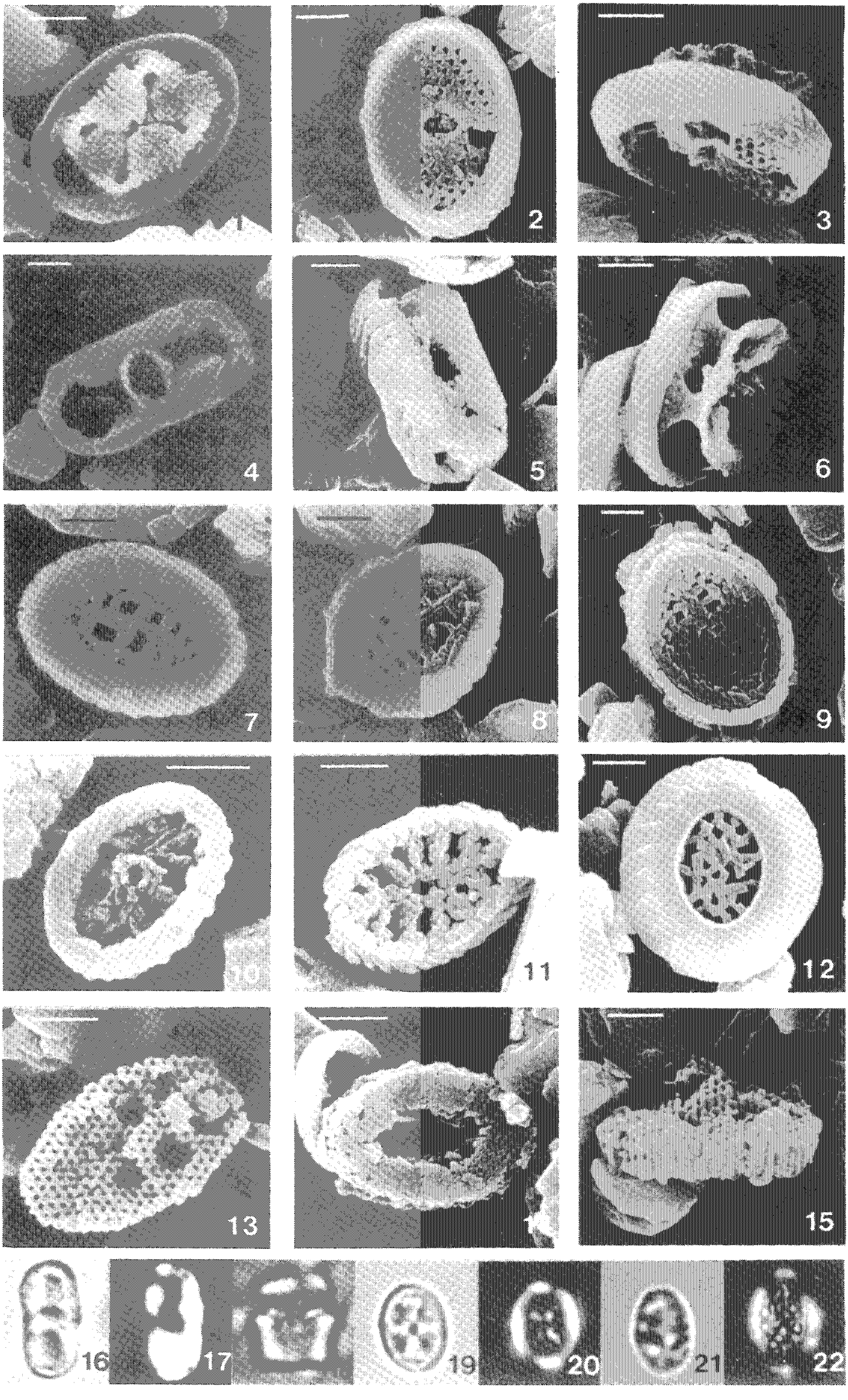
Fig. 12. *Watznaueria rawsonii sp. nov.*

12. distal view, Late Hauterivian, Bed 72 Otto Gott, Sarstedt.

Figs. 13-15 and 21. *Calculites sarstedtensis sp. nov.*

13. distal view, 14. proximal view, 15. side view, Late Hauterivian, Bed 72 Otto Gott, Sarstedt.
21. bright field, X 5400, Late Hauterivian, Bed 72 Otto Gott, Sarstedt.

Otto Gott and Moorberg bed numbers after Mutterlose (1984).
Speeton bed numbers after Rawson and Mutterlose (1983).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HIGHER CLASSIFICATION OF COCCOLITHOPHORES

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INTRODUCTION: Since constructing this chart, for my PhD, I have found that it provides a useful reference to the confusing array of groups in the phycological literature. On this basis I felt it might be of interest to others.

The main source I used in compiling it was Taylor (1980), with additional information from Blackmore & Toothill (1984).

NOTES

1. The chart is based on Kingdom Protista (unicellular organisms), rather than Plantae, in order to include all the microplankton groups. This is however a somewhat artificial group, since a number of divisions include both unicellular and multicellular algae.

2. Taxonomic levels: Cyanophyta, Haptophyta, Euglenophyta etc. - Divisions / Phyla. Dinophyceae, Prymnesiophyceae, etc. - Classes. Calyptrosphaeraceae, Coccolithaceae etc. - Families.

3. All algae with golden-brown pigments are sometimes included in one division, the Chrysophyta, including coccolithophores and diatoms. Of these the diatoms have allways been regarded as a distinctive group, class Bacillariophyceae. The other golden-browns were, however, for a long while considered to be a single class, the Chrysophyceae. Parke (1961) showed that they could be subdivided into two series, on the basis of their appendages and scale structure. This lead to the establishment of the class Haptophyceae by Christensen (1962), for coccolithophorids and related non-calcifying genera. Subsequent reasearch (see eg Hibberd 1976), has strongly supported this separation so that many authors now consider the haptophytes a separate division.

Unfortunately there is a further, nomenclatural, complication - Haptophyceae is a descriptive name and so invalid, under the ICBN, as a class level name. Hence Hibberd (1976) proposed the alternative typified names Prymnesiophyceae and Prymnesiophyta, from the genus *Prymnesium*. The former is widely used, the latter not so frequently.

4. Typical haptophytes and chrysophytes are planktonic and flagellated, with two (golden-brown) chloroplasts, a prominent nucleus and well developed golgi-body. They differ in the following ways: (A) The motile phases of haptophytes have smooth flagella, as opposed to the flimmer (hairy) flagella of chrysophytes. Also they have a unique third flagella-like appendage, the haptonema. This has a distinctive ultrastructure, is frequently coiled, and seems to be used for attachment rather than locomotion - it is best known from non-calcifying genera.

(B) Haptophytes nearly allways possess unmineralised organic scales, and often calcareous coccoliths. The scales of chrysophytes, when present are usually silicified, to varying degrees. [N.B. Prasinophyceae also have organic scales produced within the golgi body, and so are sometimes compared with chrysophytes and haptophytes].

(C) Haptophytes have uniquely developed golgi bodies (in which the scales and coccoliths are formed), distinctive pyrenoids, slightly different pigments, and various ultrastructural and biochemical differences.

(D) Haptophytes are predominantly marine, whereas most chrysophytes are freshwater.

6. The family level classification is not meant to be profound or original, I have only included extant families. The Hymenomonadaceae have delicate rarely (?never) fossilised coccoliths. *Hymenomonas carterae*, much studied by biologists, is in this family. I included families in the "non-coccoliths" group for the following, debatable, reasons: Ceratolithaceae - ceratoliths are not coccoliths, although coccoliths of a sort are produced (Norris 1965, 1971). Calciosolenaceae - scapholiths are markedly different in form to coccoliths and have an independant fossil record, also an uncalcified genus *Navisolenia* is known (see Leadbeater & Manton 1973). Braarudosphaeraceae - the pentaliths show very different ultrastructure, morphology, and distribution to other nannoliths. Lefort (1972), however, has presented reasonable evidence that *Braarudosphaera* is an haptophyte.

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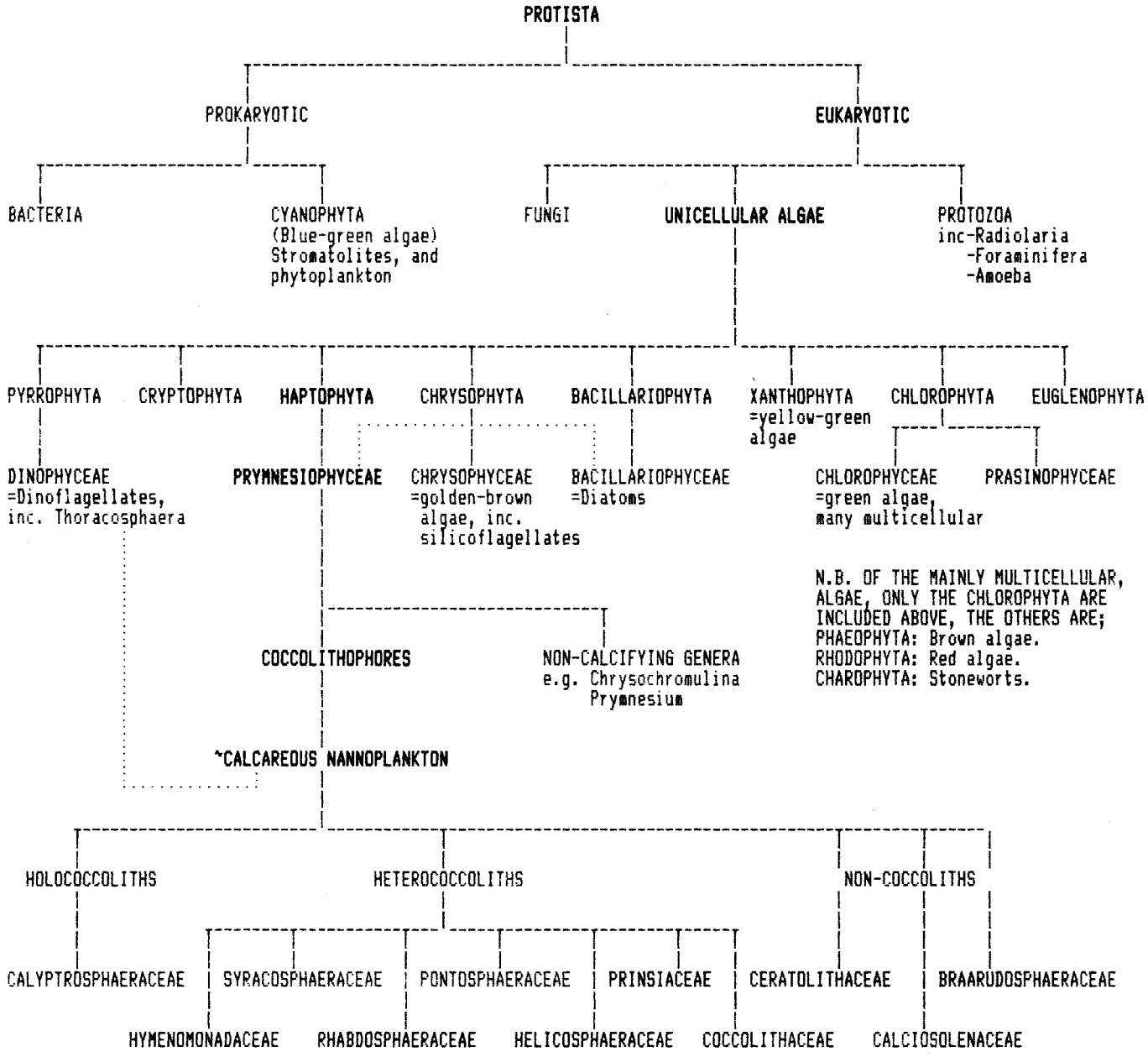

CHART: HIGHER CLASSIFICATION OF COCCOLITHOPHORES - *J.R.Young, 1986.*

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