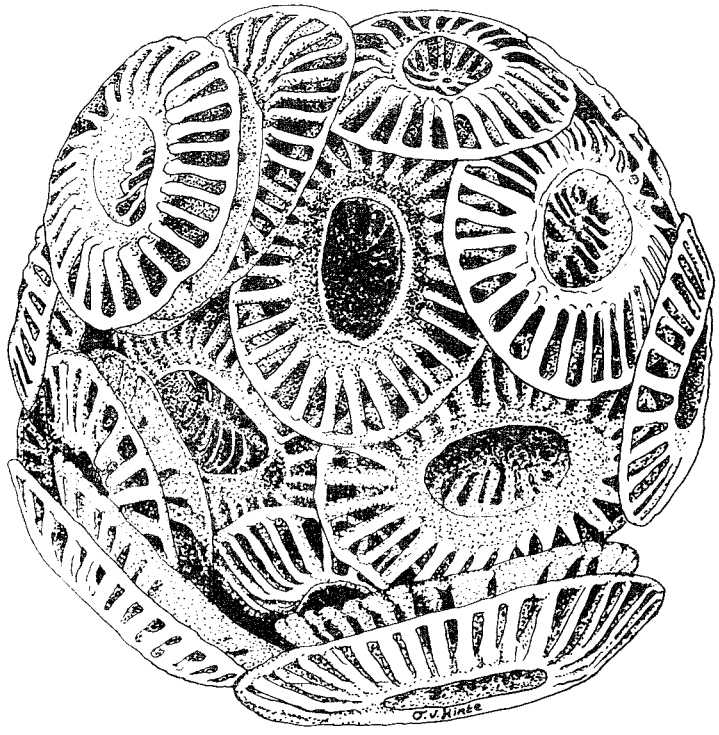
# INA NEWSLETTER



INTERNATIONAL NANNOPLANKTON ASSOCIATION

VOLUME 12 NUMBER 1 1990

# THE INTERNATIONAL NANNOPLANKTON ASSOCIATION



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# INA NEWSLETTER

Proceedings of the International Nannoplankton Association

Volume 12 Number 1 January 1990

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## EDITORIAL

Although I took over from Shirley van Heck some time ago this is the first issue of the Newsletter that I have edited, so it is only fitting to start by recording all our debt to her. Shirley edited the newsletter for eleven years taking it from a vague idea to a smart publication, without ever missing an issue. Now she has passed it on to me I hope I can do as good a job as she has. Fortunately there is no shortage of help, most importantly Bill Seisser has responded to the appeal in the last issue and will be taking over from John Steinmetz as bibliographer. This is the real labour behind the newsletter and we are again indebted to John for his work. In addition Stacia Spaulding has taken on the task of compiling a bibliography of silicoflagellate literature, the first instalment should be ready for the next newsletter. Paul Bown is assisting as deputy editor. John Firth and Shirley van Heck will be contributing regular items on respectively the Ocean Drilling Program and the ICBN. Katharina von Salis Perch-Nielsen continues to oversee our activities.

Our aim is to continue to progressively improve the newsletter, with an increase in news items and short papers. *Please send contributions.* On the production side we hope to use entirely laser printed copy, with submission primarily on computer disc rather than as proof ready copy (details on the inside back cover). We also intend generally to have scientific articles refereed. Hopefully these changes will both improve the quality of the newsletter and encourage more contributions.

This issue is largely taken up with details of meetings. There is a report of the very successful INA Florence meeting, a paper arising from the workshop on living nannoplankton, and a review of the field guide. In addition there are announcements of future meetings in London, Prague and Yamagata. The London meeting will be an informal session for Jurassic specialists. The Prague 1991 meeting will be the next european INA Conference. Czechoslovakia has changed considerably since the decision to hold the conference in Prague, but the political events should simply make the venue more interesting. The Yamagata Conference, in 1992, will be the second Asian INA meeting, following the workshop in Shanghai in 1988, it is hoped that the many workers in the Pacific region who have not been able to attend the european meetings will be able to go to this meeting.

This issue was planned for late 1989, but the other commitments (including a new daughter) that forced John to stop doing the bibliography finally caught up with him and he was unable to complete his last instalment till just before Christmas. By the time it arrived I was away on fieldwork. Hence this is issue 12/1 rather than 11/3.

*Acknowledgements:* Ths issue was produced using facilities at The Natural History Museum and at Imperial College London, I am grateful for much assistance provided by friends at these institutes particularly Andy Hyatt, Mike Rosenbaum and Adrian Rissone.

*Jeremy Young, January 1990*

## FUTURE MEETINGS

### JURASSIC WORKING GROUP MEETING, LONDON SPRING 1990

During the successful Jurassic workshop at the INA Florence meeting it was proposed that a working group meeting should be held in London in 1990 in order to encourage co-operation between the increasing number of nanno-palaeontologists working in the Jurassic. This kind of meeting provides an excellent opportunity for informal discussion, observation of comparative material, and the chance to tackle jointly problems of taxonomy, correlation, etc. It should be particularly useful for the Jurassic since this is probably the least studied interval for calcareous nannofossils, and the potential for increased biostratigraphic resolution and evolutionary understanding is enormous.

The workshop will be held at University College London, either at the end of March or early in April, with two days in the geology department and two in the field. Microscopes will be available at UCL, and participants are encouraged to bring slides, data etc. The field trip will visit classic Jurassic sections on the Dorset Coast.

Known Jurassic workers have already been circulated others interested in participating should contact me as soon as possible.

*Paul Bown, Geology Dept., University College, Gower St., London WC1E 6BT*

### INA CONFERENCE, PRAGUE 1991

Planning for the next INA meeting is well in hand with establishment of an organizing committee, identification of a venue, and development of a provisional programme. It is hoped to have three days of scientific sessions, and associated parties. These will be preceded by a one day excursion to the Cretaceous Bohemian basin, and followed by a two day excursion to South Moravia - where Jurassic, Cretaceous, Palaeogene and Neogene rocks are exposed in a wine growing area. In order to provide economical student accommodation it is proposed to hold the conference in August, rather than September. We will try to arrange times so workers can conveniently attend both the European Micropalaeontological Colloquium in West Germany and the INA conference. A first circular with finalised dates etc. will be included in the next INA newsletter.

*Bohumil Hamrsmid, Dept. of Mikropal., MND Hodonin, Hodonin 69530, Czechoslovakia*

### 2nd ASIAN/PACIFIC INA CONFERENCE, YAMAGATA JAPAN 1992

I should like to inform INA members that a 2nd ASIAN/PACIFIC INA CONFERENCE is now planned to take place in Yamagata (Japan), at the end of August 1992 to coincide with the 29th International Geological Congress (IGC). As you may know the IGC will be held in Kyoto from 24th August to 3rd September 1992, and the 2nd International Conference on Asian Marine Geology (ICAMG) is tentatively planned to be held in Tokyo immediately prior to the IGC. The 2nd Asian/Pacific INA Conference is not part of the IGC or the ICAMG and there is no need to register for these if you want to participate only in the INA Conference.

The 2nd Asian/Pacific INA Conference will be rather informal and no publication of the conference other than abstracts is planned. Since there are likely to be fewer participants than at the Florence meeting we will have plenty of time for presentations, discussion, workshops and sightseeing. A post-conference excursion is possible if a sufficient number of people are interested. A possibility for the excursion are the Miura and Boso Peninsulas, on either side of Tokyo Bay, where a thick Middle Miocene to Upper Pleistocene marine sequence is exposed.

Yamagata is about 3 hours from Tokyo by train (19 per day) and under 1 hour by plane (5 per day). There are also 3 flights daily from Kyoto so IGC participants will have no difficulty escaping temporarily to join the INA Conference.

A first circular will be distributed sometime in late 1990 or early 1991. Meanwhile any suggestions for definite date, workshops, excursions, or any other aspect of planning are welcomed.

*Hisatake Okada, Yamagata University, Yamagata 990, Japan*

## ANNOUNCEMENT - BIRBAL SAVITRI SAHNI FOUNDATION

The Birbal Savitri Sahni Foundation was established by the Late Padamshri (Mrs.) Savitri Sahni in memory of her husband Prof. Birbal Sahni, a distinguished palaeobotanist of Lucknow University. The foundation has programmes for: Exchange of scientists between the Lucknow Birbal Sahni Palaeobotany Institute and other palaeobotanical centres; support for young scientists to carry out palaeobotanical research in India; various awards and medals; and invited lectures. Applications from nannofossil workers would be most welcome. Further details are available from Dr. Shyam C. Srivastava / 686 Birbal Sahni Marg. / Post Bag No.1 / New Hyderabad Post Office / Lucknow - 226 007 / India.

*Syed A. Jafar, Birbal Sahni Institute of Palaeobotany, Lucknow University.*

## UPDATE - NANNOPLANKTON WORK WITHIN THE JOINT GLOBAL OCEAN FLUX STUDY

An outline of the objectives and plans for the pilot phase of the JGOFS project was given in the last newsletter (11/1). Since then the cruises have been carried out with varying success, there have been problems with the shallow sediment traps. I will be examining nannoplankton from the UK traps and cores. There is an extensive programme for nannoplankton studies of the Dutch material, involving primarily Leiden University geobiochemistry unit (Peter Westbroek, Judith van Bleiswijk) and Amsterdam Free University geomarine unit (Jan van Hinte, Geert-Jan Brummer, Michael Knappertsbusch). I do not have details of American, French, or German programmes.

*Jeremy Young, The Natural History Museum, London.*

## INA BUSINESS

A considerable amount of INA business was carried out during the week of the Florence conference, as far as possible this was presented at, and ratified by, the open Business Meeting at the end of the conference. Some additional decisions had to be made subsequently, these were discussed as widely as possible. All the developments are outlined below. Any comments will be very welcome, either directly to the appropriate officer (usually the President), or as a letter for publication to the editor.

## CHANGE OF OFFICERS

The following changes have been made, resulting in the new list of officers on the inside cover. These were mostly presented to the business meeting and were carried without opposition.

**1. Bibliographer**: Bill Siesser has very generously agreed to take over from John Steinmetz. In addition Stacia Spaulding has taken on the, lapsed, silicoflagellate bibliography. Please send them your reprints.

**2. Secretary / Treasurer**: Since the last newsletter Martin Jakubowski has changed job and given up his post after 4 years highly efficient work. Magdy Girgis has taken on the job. John Steinmetz is continuing to act as US Treasurer, and dollar subscriptions should be sent to him.

**3. Newsletter**: I have taken over from Shirley van Heck as editor. John Firth has agreed to act as ODP Correspondent, contributing regular news on the Ocean Drilling Program. Shirley van Heck will continue involvement as ICBN Correspondent, you are invited to address any nomenclatural queries and suggestions for submissions to the ICBN to her.

## FINANCES

Owing to confusion (which also affected the appointment of the Secretary/Treasurer) these were not properly discussed at the meeting and the following decisions had to be made subsequently.

**1. Financing of abstract volume.** The abstract volume cost approximately $2000 to produce. In order that additional copies should be sent to all INA members $1000 was granted from INA funds, rather than conference funds.

**2. Subscriptions.** Funding the abstract volume removed any safety margin from the INA funds so it was considered prudent to raise subscriptions as follows:

| |
|---|
| Normal rate raised from £10 to **£12** ($18 to **$20**). |
| Student rate raised from £ 5 to **£ 6** ($ 9 to **$10**). |

## FUTURE MEETINGS

Two offers had been made to host the 1991 INA conference, from Jose-Abel Flores of Salamanca, Spain and from Bohumil Hamrsmid of Prague, Czechoslovakia. To decide between them they were invited to make presentations to the business meeting with a vote afterwards. Both made fine speeches outlining the attractions of their proposed venues and the hospitality they could assure us of. The decision was extremely difficult but the vote narrowly favoured Czechoslovakia. Many delegates expressed the hope that we could have another meeting in Salamanca and when subsequently, on the field trip, Flores offered to host the 1993 conference it was decided, after as much consultation as possible, to accept this offer. So our plans are:

| |
|---|
| 1991 - Prague, Czechoslovakia, convenor Bohumil Hamrsmid. |
| 1993 - Salamanca, Spain, convenor Jose-Abel Flores. |

In addition it is hoped that further regional meetings and specialist meetings will be arranged. Anyone wishing to propose such meetings is encouraged to do so via the newsletter.

*Jeremy Young*

## CONFERENCE REPORT - FLORENCE INTERNATIONAL NANNOPLANKTON ASSOCIATION MEETING

### INTRODUCTION

This meeting was the third of what has now become a dependable biennial series. In comparison to the previous meetings in Vienna and London it had over twice the number of participants (120), from a wider spread of countries - including India, Georgia, Japan and for the first time a large number from the United States. We also had more scientific presentations (50 talks and 30 posters). There are many reasons for this encouraging attendance, including the increasing use of nannofossils worldwide, the strength of the association, and for certain both the attraction of Florence as a venue and the success of the prestigious Organising Committee; Simonetta Monechi, Franca Proto Decima, Domenico Rio, Jan Backman and Hans Thierstein. Our anticipations were more than matched by the hospitality and efficiency of the Florence team of Sylvia Gardin, Viviana Reale, Simonetta Monechi and numerous helpers.

We were privileged to start the meeting in the magnificent Aula Magna of the University which combined medieval splendour with video technology. After the opening addresses and first talks we were let out for a "coffee break" and found a minor banquet of iced tea, fruit juices, coffee, pizzelini, and other small food. Sadly we had to leave the Aula Magna before long, but the gastronomic theme continued in the other intervals, and at the conference dinner in a fine Florentine restaurant. The menu here appeared to present a worryingly wide selection of Italian delicacies but choosing proved easy, we were served all of them. Stylish production continued with the abstract volume, the beautiful field guide, the poster produced to advertise the meeting and a tee-shirt with all our names to commemorate it.

Sadly around half the participants left before the field trip thus missing another excellent dinner, our first reasonably priced beer, the extraordinary city of Gubbio and its cool mayor in his, early, medieval hall, the most continuous pelagic sequences in Europe, Woody Wise's tales of INA long ago, and two more days of each others company.

As well as being a party and get-together the meeting was an intensive scientific event. We had two and a half full days of presentations although the number of talks meant they had to be restricted to 15 minutes each and there was little time for poster sessions or workshops. This was a pity since posters can be very effective means of presentation and there were a large number of them.

### WORKSHOPS

Three workshops were held. (1) On living nannoplankton, particularly taxonomic aspects, resulting in a series of recommendations as given in the article by Ric Jordan (this issue). (2) On Jurassic Nannofossils - it was felt that longer discussion was needed and a proper workshop was planned for Easter, in London (convenor Paul Bown, UCL). (3) On Quaternary biostratigraphy and *Gephyrocapsa* taxonomy - a difficult area and the disparate workers do not seem to have reached conclusive results.

### TALKS

In order to keep these notes manageable I have not tried to be totally objective so they reflect my own biases, and I missed some talks. Only the speaker is mentioned, the abstract volume (INA Newsletter 11/2) gives full authorship. The sequence adopted here loosely reflects that of the meeting.

#### Living nannoplankton

Four talks, two posters and one video were given on living nannoplankton, this is an improvement on previous meetings but many workers are still missing this opportunity to present their work to a genuinely interested audience. The dominant theme was ecological

control - a difficult topic because phytoplankton ecology is poorly understood. Hisatake Okada discussed sediment traps and results from an extended study of sediment bottom assemblages from various depths. He showed how the presence of distinctive deep dwelling (*Florisphaera*) and nearshore (*Gephyrocapsa* and *Helicosphaera*) communities resulted in a strong offshore - onshore trend. Ric Jordan described a study of filter sampled living populations in the N.Atlantic and particularly the deep dwelling *Florisphaera* community. He suggested that the community was thermocline dwelling and that the coccospheres were adapted for light concentration. I discussed the use of culture studies, and Amos Winter reminded us of the impact of coccolith production on the global $CO_2$ cycle. He speculated that the well documented discrepancy between the calculated and observed increase in global $CO_2$ may be due to buffering by increased coccolith production - a mechanism which would have great implications for research budgets. The discussion session was disrupted by my video - of living cells of *E.huxleyi* and *P.carterae.*

**Paleoecology and paleoceanography**

This has not been an area where nannofossil studies have made great contributions, but the presentations showed that rapid progress is being made. Woody Wise in his introduction to the session stressed one approach - use of a wide geographical perspective. This was well illustrated by Hans Thierstein who showed global nannofloral composition diagrams for Early and Late Cretaceous time slices and contrasted them with Holocene examples. This synthesis of existing data was complemented by Wuchang Wei presenting a mass of new data from the S.Atlantic Palaeogene - with detailed information on the distribution and inferred ecology of dozens of species. High latitude studies continued with Dave Watkins (S.Atlantic, Late Cretaceous) and Linda Eide (N.Atlantic, Quaternary).

An alternative, to using geographical distribution as the external control, is to study stratigraphic successions across which ecological change is known to occur. This can be conducted on at least four levels:

(1) Very long term ecological change - the correlation between nannofloral development and climatic change has long been discussed, Jackie Burnett presented a new compilation of data from the University College London research group and interpretation in terms of icehouse - greenhouse change.

(2) Single geological events - K/T boundary sections were discussed by Shimon Moshkovitz (Hor Ha'ar Section, Israel) and Jim Pospichal (ODP Sites 690 & 752), and the end Cenomanian anoxic event in England by Kevin Cooper. In each case rather remarkable nannofloras were described and data from study of isotopes and other fossil groups used to suggest interpretations of them, which hopefully will be of wider application.

(3) Mesoscale ecological fluctuations - Walter Wornardt showed how sequence stratigraphy could be used for interpretation in terms of sea-level change and suggested that transgressive episodes were marked by "blooms". The best mesoscale ecological control is, however, provided by the Quaternary glacial record, with oxygen isotope work providing independent control. Annick Pujos and Jacques Giraudeau described the derivation of Imbrie and Kipp type temperature transfer functions from low latitude assemblages, and showed that they correlated remarkably well with the isotope records. They also intriguingly documented low latitude Quaternary occurrences of *Coccolithus pelagicus*, possibly under salinity control. At higher latitudes Nicki Hine showed that with careful taxonomy it was possible to observe similar fluctuations using *Gephyrocapsa* alone. Several workers noted a curious lag between the coccolith derived data and that from foraminifera. Hans Thierstein showed that this was a characteristic feature of the isotope record and discussed possible biological and non-biological causes. He concluded that multiple biological causes were necessary to explain it.

(4) Milankovitch cycles - given their topicality we will doubtless see much work on the nannofossil record across milankovitch cycles and hopefully these will help in the ecological

characterisation of species. Two studies were presented here. Alex Chepstow-Lusty has applied the Backman (1986) absolute abundance counting technique to Pliocene *Discoaster* populations. Amongst other results, this has yielded an excellent Milankovitch signal, even at low latitudes, correlatable with other evidence. Elisabetta Erba described a study of the Gault Clay (Albian, S.England) with detailed relative abundance counting of finely spaced samples followed by factor analysis of the assemblage variation, and then time series analysis of the stratigraphic fluctuations in the factors, which duly yielded Milankovitch cyclicity. This was one of the most elegant presentations of the conference, although independent control would have been useful.

**Taxonomy and evolution**

Hans Thierstein opened this session with an outline of the potential contribution of nannofossil studies to evolutionary theory and an exhortation for more quantitative studies of single lineages. Fortunately his encouragement had been anticipated and we were treated to a succession of high quality studies, often beautifully illustrated. As at previous meetings studies of the Noelaerhabdaceae predominated: John Firth used a sophisticated combination of video microscopy and Principal Components Analysis to document changes in various Palaeogene species. Luc Beaufort gave very detailed data on Late Miocene *Reticulofenestra* size variation. He interpreted this in terms of ecophenotypic variation, but given the similarity of his patterns to those previously recorded (e.g. Driever 1988) evolutionary change may be more important. Hiromi Matsuoka gave probably the most detailed study of *Gephyrocapsa* to date. She documented three separate cycles of development of larger morphotypes. Use of three independent biometric parameters - length, central area length, and bridge angle - allowed resolution of the assemblage into two discrete sub-populations toward the end of each cycle and distinction of the three separate larger *Gephyrocapsa* populations. Rio (pers comm.) subsequently confirmed that these patterns were virtually identical to those he and Raffi have observed in the Mediterranean.

Breaking away from the Noelaerhabdaceae were; Wuchang Wei (*D.multiradiatus*) and Michael Knappertsbusch (*Calcidiscus*), the latter giving good evidence for both genotypic and ecophenotypic variation. Non-biometric studies were presented by Katharina Perch-Nielsen (*Nannoconus* and horseshoe shaped nannoliths - she withdrew the suggestion of salinity control), and by Elisabetta Erba (Jurassic Watznaueriaceae - an obvious candidate group for biometric work).

A rather different type of evolutionary study was presented by Ben Prins who discussed possible inter-relationships between nannofossil families based on structural analysis, using in particular observations made with the gypsum plate (cf Romein 1979, Moshkovitz & Osmond 1989). Some of his results were truly remarkable. I am confident that combination of this approach with the perspective provided by studies of coccolithogenesis (cf Young 1989) will result in a great clarification of nannofossil taxonomy and evolution.

**Biostratigraphy**

Biostratigraphy is not the easiest topic for talks and, probably sensibly, many workers presented their results as posters. In the talks two main themes were apparent. First, our knowledge of the nannofossil record in less well documented areas was augmented by contributions from India (Kale, Jafar), Russia (Gavtadze, Minashvili) and the Middle East (Naji, Toker). Second, work was concentrated on the two ends of the nannofossil record - the Quaternary and the Jurassic. Three studies of the Italian Jurassic were given (Erba et al, Baldanza et al, Reale et al) and an overview of problems in the Jurassic - Cretaceous boundary interval (Ozkan). These talks illustrated that nannofossils are now useful in the Jurassic, but that much further work is needed.

The Jurassic is currently divided into about 20 zones averaging 3.5Ma (Bown et al 1988), the Late Pliocene - Quaternary is 3.5Ma long and can be divided into 20 intervals by

nannofossils (Sato et al 1989), averaging 175ka. This is an extraordinary contrast, but may reflect the intensity of effort more than any other factor. A succession of workers (Sato, Rio, Verbeek, Raffi, Hine, Pujos, Matsuoka) provided evidence that, although difficult, Quaternary nannofossil biostratigraphy is practicable and reliable. In particular Domenico Rio produced evidence from magnetostratigraphy that most of the events used are remarkably synchronous throughout the Mediterranean and beyond. A problem for non-experts is the confused state of zonal nomenclature and *Gephyrocapsa* taxonomy - it is to be hoped that the specialists will collaborate to produce a clarified scheme.

In addition: Jose Flores discussed the Late Miocene; Jan Backman biostratigraphic precision and accuracy; Sherwood W. Wise silicoflagellates (including well preserved mid Cretaceous floras), subglacial biostratigraphy, and various other things; Hisatake Okada and Gunnar Olafsson problems of Mid-Tertiary zonations and particularly the use of the *Sphenolithus distentus* lineage.

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Young J.R. 1989: Observations on heterococcolith rim structure and its relationship to developmental processes. In, Crux J. & Heck S.E. van (eds.) "Nannofossils and their applications", *Ellis Horwood,* p.1-20.


## ABSTRACT VOLUME - AMENDMENTS

1. Correction of authorship.

The poster for which an abstract is given on p.76 "Variability of *Coccolithus pelagicus* and *Dictyococcites sp.* in the Upper Miocene - Pliocene Site 116 (DSDP Atlantic)" Martín & Flores, was in fact authored by A.J.Martín, J.A.Flores, & M.A.Bârcena.

2. Addition of late abstract

**Palaeo-ecological interpretation of calcareous nannoflora associations in the Upper Miocene - Pliocene of Site 397 (N.E. Atlantic).**


*M.L.Rodríguez-Pindado, & J.A.Flores., Dep. Geología - Paleontología, Universidad de Salamanca, 3708 Salamanca, Spain.*


An almost complete Pliocene sequence was studied from DSDP Site 397, Leg 47, N.E. Atlantic (6°50N, 15°10W). Two types of quantitative analysis were carried out, one of low resolution for taxa, morphotypes and/or groups whose frequency is above 0.5%, and a second for those whose frequency is above 0.005%. In both cases counts were designed to give an error probability of 5%.

Study of these two analyses allowed identification of nine signals. These were located relative to the conventional Pliocene biostratigraphic zonations and the magnetostratigraphic scale.

Interpretation of the variability of the calcareous nannofossil associations was conducted with reference to studies of: the oxygen isotopes by Shackleton and Cita (1979); palaeoproductivity by Stein (1985); and the geochronology of Hamilton (1979) and Berggren et al (1985).

We observed an increase in the proportion of nannoliths during the Pliocene, a consequence of the increase in productivity, which in turn is related to accentuation of upwelling, and coincides with a progressive temperature decrease.

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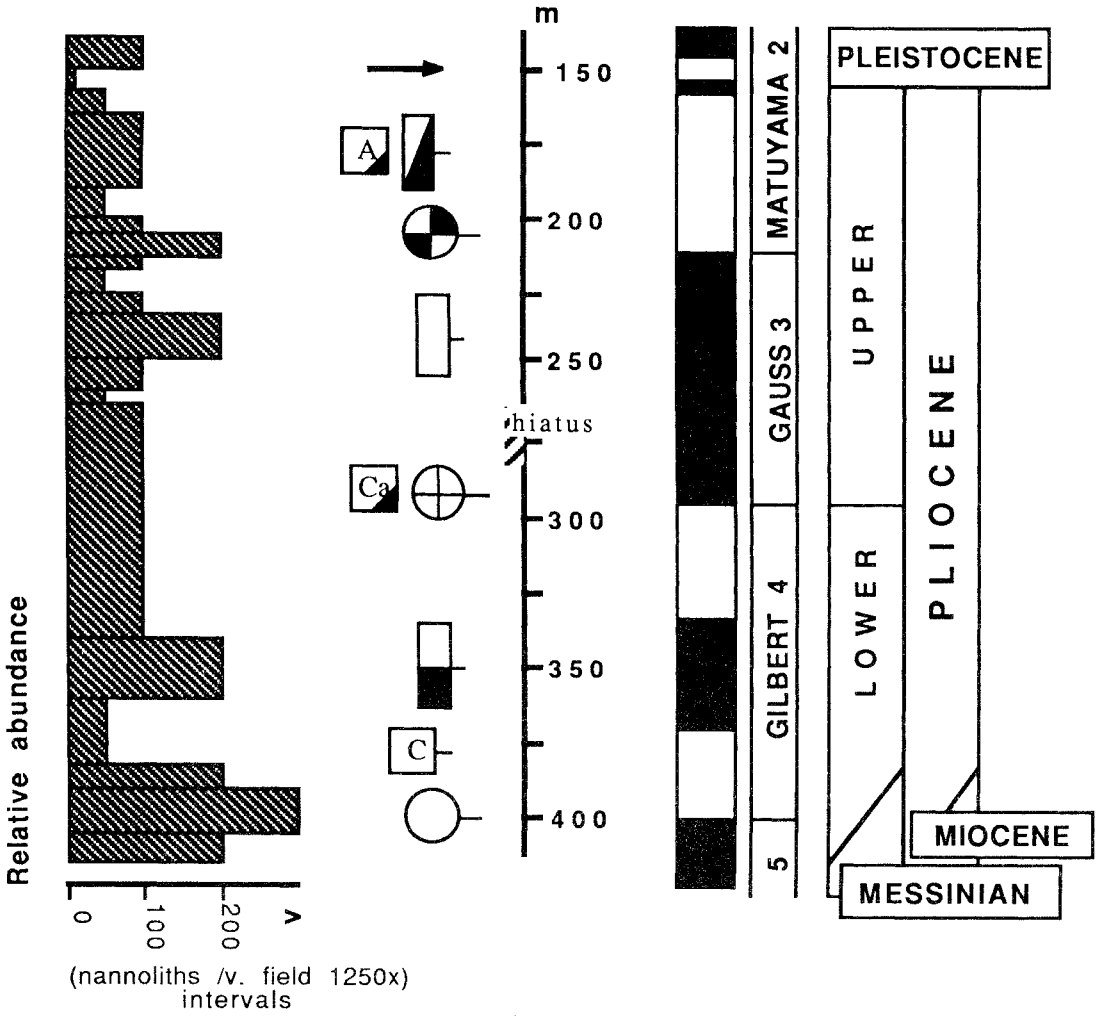


## BIOSTRATIGRAPHIC SIGNALS

- Reduction of E.quinqueramus
- C — First record of Ceratolithus spp.
- Reduction of D. antarcticus
- First record of E. tamalis
- Ca — Last record of C. acutus
- Increase in the proportion of P.lacunosa
- Reduction in the proportion of E.tamalis
- A — Last record of Amaurolithus spp.
- Reduction in the proportion of R.pseudoumbilicus s.s.
- Reduction in the asteroliths

## REVIEW - MESOZOIC-CENOZOIC STRATIGRAPHY IN THE UMBRIA-MARCHE AREA (GEOLOGICAL FIELD TRIPS IN THE UMBRIA-MARCHE APENNINES (ITALY)) S.Cresta, S.Monechi, and G.Parisi (eds.), in collaboration with A.Baldanza and V.Reale.

Initially produced as a field guide for the excursions following the INA meeting in Florence, this publication also provides an excellent introduction to the geological setting and development of the Umbria-Marche Basin. Beautifully produced in the Memorie descrittive della Carta Geologica D'Italia series, the guide is written in both Italian and English and includes 88 colour plates, maps, logs, and range charts. The book is divided into two sections, the first summarizes current knowledge of the Mesozoic-Cenozoic sedimentary succession in the basin, the second describes four geological field itineraries covering the major lithostratigraphic units and the famous Cretaceous/Tertiary boundary section above the town of Gubbio.

The Umbria-Marche Basin was an early Mesozoic passive margin ("Adria") which underwent considerable extensional faulting and subsidence during the Late Triassic and Early Jurassic. This established a pelagic basin with very little terrigenous input in which a relatively continuous carbonate sequence accumulated, with occasional radiolarites. The pelagic sequence lies on Triassic evaporite basement and is overlain by Miocene siliciclastic flysch-type deposits. All the lithostratigraphic units are briefly described along with the history of the basin development, the structural geology, and present geomorphology.

The field guide itself introduces each of the sections by means of location map, geological map, and stratigraphic/ lithologic log. Discrete sub-chapters describe the palaeontology and biostratigraphy of the section, concentrating mainly on calcareous nannofossils but often including foraminiferal, calpionellid, and ammonite data. There is much valuable new nannofossil information, particularly for the Lower and Middle Jurassic which is still poorly known from Tethyan sections. Also of current interest is the discussion included in the description of the Scisti a Fucoidi (Apecchiese road section), an excellent example of a cyclical pelagic sequence. The rhythmic fluctuations are shown to reflect changes in the calcium carbonate content, which are interpreted as representing variations in nannofloral productivity at Milankovitch frequencies.

As for the INA field trip it was, like the guidebook, a great success. In addition to the fascinating geology (despite occasionally being hidden behind impenetrable wire fencing) the countryside and weather were beautiful and the town of Gubbio (and its Mayor!) were charming. Thanks again are due to all those involved in the planning and leading of the trip.

*Paul Bown, University College London*

## REVIEW Aubry M-P. 1989, HANDBOOK OF CENOZOIC CALCAREOUS NANNOPLANKTON.

Book 3:Ortholithae (Pentaliths, and others)

Heliolithae (Fasciculiths, Sphenoliths and others)

Micropaleontology Press, The Museum of Natural History, New York, May 1989, 279 pp.

The price of this volume was not given but was originally $ 50.- when subscribing to the series.

Mindful of the publishers warning in the previous volume I first checked the number of pages, and found I had four pages twice and one page three times, while one other page was missing. So check your copy if you already have one, or when you get it. The quality of the photographs has improved in comparison to book 2, and is quite reasonable now.

In outward appearance and lay-out the book is similar to the first two volumes (reviewed in INA Newsletter vol.8(1) and 10(1)). After a short preface a taxonomic key is given to all three books. For Book 3, this key leads to the following groups:

| | |
|---|---|
| O-III-C: | *Braarudosphaera, Micrantholithus, Pemma, Quinquerhabdus, Pentaster, Octolithus, Biantholithus* |
| I | Intermediate between Ortholithae and Heliolithae: *Goniolithus* |
| H | Heliolithae |
| H-I: | *Fasciculithus, Heliolithus, Sphenolithus, Ilselithina* |
| H-II: | *Hayella, Coronocyclus* |
| H-III: | *Nannocorbis, Calciopilleus, Vermiculithina, Favolithora, Discolobatus, Gongylis, Pistillum, Nannoturba, Perforocalcinella, Tansinius* |

The book begins with an introduction to the pentaliths. I found only a few typing errors, and some cases where a sentence or expression did not make sense, so I assume an error occurs. For instance on p.3, where pentaliths are said to be good paleosedimentologic indicators - I assume paleoecologic is intended. On p.4 the same pentaliths 'have at times a significant petrologic role' and the *Braarudosphaera* oozes 'are a riddle still unsolved by sedimentologists'. I found these remarks somewhat cryptic, I have since been told that the first means to say they can be rock-forming, but I still don't understand sedimentologists should be expected to solve what is obviously a paleoecological problem. Apart from these little things though, this introduction describes clearly the differences between the genera, and the different views on their classification.

Some taxonomical and nomenclature mistakes occur in the chapter on *Pemma,* where *Pemma basquense* ssp. *basquense* is misquoted and the difference between this and *Pemma basquense* is indicated, rather than indicating in what respect the subspecies definition is narrower than the species definition. Although by definition a species is the sum of its subspecies, this rule is often not followed here, as shown by looking at the size-ranges indicated. Similar mistakes were made with *Pemma parisiense,* and these will have to be corrected by the author. No holotype was indicated for *P. angulatum,* as for some other species in the book. This too will be corrected by the author of the volume.

Apart from the pentaliths, group O-III-C consists of *Octolithus* and *Biantholithus.* The position of the former is perhaps a bit peculiar in this company and it might have been better placed with the holococcoliths. But then, the loose-leaved system enables one to make such adjustments when this is felt to be desirable.

Moving to H-I-A, the chapter on *Fasciculithus* gives an introduction with a helpful though incomplete phylogenetic overview and *idem* morphologic overview (one empty square was apparently intended for *F. richardii*). A determination key for *Fasciculithus* species is added. *Heliolithus* and *Sphenolithus* are treated in similar ways, although with the sphenoliths I lost track completely in the key, since the terminology that was used was not clear to me, and had not been properly explained. With expressions like 'heliolithid structure', 'ortholithid structure' and 'spherolithid structure' I did not get far in identifying the main groups, and only after a personal explanation by the author did I understand how to use the schematic drawings.

As for the remaining genera and species in the book: I was surprised at the position and thereby systematic classification of some of them, but I was very happy that all the obscure and unknown things had been included, rather than only the stratigraphically important groups, as is so often the case. One typo for correction: on p.221, Hay Mohler & Wade are quoted as 1959, which should of course be 1966. One taxonomic error: the genus *Nannoturba* is invalid, as no type was indicated (INA Newsletter vol.2(2):A64-2, B55).

Considering the number of taxa treated in this book, there are few mistakes, although they should be corrected. All in all, a useful book like the previous ones, and I hope Book 4 will appear as rapidly as Book 3, and I can review it for you next year.

*Shirley van Heck*

## BOOK ANNOUNCEMENTS

**PLANKTON STRATIGRAPHY - H.M.Bolli, J.B.Saunders & K.Perch Nielsen (eds) 1985.** Cambridge University Press, £35 part 1, £30 part 2.

Anyone who has wanted a personal copy of the relevant bits of the massively heavy and expensive "Big Yellow Book" will be glad to hear that it has been republished in two soft cover parts: calcareous microplankton (including Katharina Perch-Nielsen's invaluable reviews of the nannoplankton); and the rest. No alterations or corrections have been made, but the separated volumes are much more convenient, and the publishers remembered to divide the indexes. The page size, paper quality, and plate reproduction are virtually identical to the original volume, and the covers are still yellow. The original edition was reviewed by Shirley van Heck in INA Newsletter 8/1.

An advertising flyer for these volumes is enclosed which gives ordering information. It offers a £10 discount for purchase of both volumes - not ideal for nannofossil workers but the best we could get from CUP.

**CATALOGUE OF CALCAREOUS NANNOFOSSILS Vol.13 - A.Farinacci (ed.).**

The 13th volume of the Farinacci catalogue should be published in December. The price of the catalogue is $230 per volume, from:

*TECHNOPRINT S.a.s / Casella Postale 70772 / Roma - Nomentano / Italy.*

Anyone publishing papers with descriptions of new species should be sure to send reprints to, Anna Farinacci. This ensures the fastest possible inclusion in the catalogue, and is some repayment for the work of compiling the catalogue. Her address is:

*Prof. A. Farinacci / Cattedra di Micropalaeontologia / Museo di Paleontologia / Citta Universitaria / 00185 Roma / Italy.*

**NANNOFOSSILS AND THEIR APPLICATIONS - J. Crux & S.E. van Heck (eds.) 1989**

This volume is the proceedings of the London INA meeting, and includes papers on: Coccolith structure and geometry (J. Young, 20p.); Nannofossil phylogeny (M-P. Aubry, 20p.); *Reticulofenestra* (L. Gallagher, 35p.); Arkhangelskiellaceae and use of the gypsum plate (S. Moshkovitz & K. Osmond, 22p.); Early Mesozoic conical nannofossils (P. Bown & K. Cooper, 9p.); High latitude Quaternary assemblages (G. Gard 14p.); Aptian palaeoecology (J. Mutterlose, 21p.); Lower Cretaceous biostratigraphy and palaeogeography (J. Crux, 69p., and Applegate et al 11p.); Kimmeridgian - Valanginian provincialism (K. Cooper, 24p.); Late Miocene biostratigraphy (J-A. Flores & F-J. Sierro, 18p.); Palaeocene biostratigraphy (O. Varol, 43p.); Turkish Palaeogene nannofossils (V. Toker, 16p.); *Arkhangelskiella* size variation (M. Girgis, 22p.).

*We still have several copies available at the discount price of £35 for INA members (includes surface mail postage worldwide, for air mail outside Europe add £5). Either (1) send a cheque direct to me, made out to The International Nannoplankton Association, or (2) include payment with your INA subscription, and state that you are doing so. Please also include an addressed envelope label.*

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## OCEAN DRILLING PROGRAM NEWS

During 1990 the JOIDES Resolution will be in the West Pacific. The following cruises are planned (Information as of 1st September 1989, communicated by John Firth). N.B. workers interested on participating in future legs should contact their national ODP co-ordinator. Final staffing occurs 4-6months before the cruise.

**Leg 129 - Old Pacific Crust** 24/Nov/89 - 19/Jan/90

Goal: To drill into Jurassic crust to sample Mesozoic deep ocean sediments, volcaniclastics and basement. Objectives include investigating early Mesozoic palaeoceanography. The target area is thought to include the oldest Pacific crust, and **Jurassic** sediments. Participants include Elisabetta Erba, Milan University.

**Leg 130 - Ontong - Java Plateau** 24/Jan/90 - 27/Mar/90

Goal: To drill thick Neogene - Oligocene biogenic sediments on the plateau, also deep drilling for Palaeogene - Cretaceous sediments and basement. The site should recover excellent sequences of **Oligocene** and **Neogene** sediment.

**Leg 131 - Nankai Trough** 1/Apr/90 - 2/Jun/90

Goal: To drill the accretionary wedge of the Nankai accretionary system. The main objectives are tectonic and sedimentary, good nannofossil assemblages are unlikely.

**Leg 132 - Engineering II** 7/Jun/90 - 1/Aug/90

Goal: To test new drilling technology for penetration of difficult sequences, particularly chert - chalk alternations. Recovered sediments may include a record of the Apto - Albian anoxic event, but there will be few scientists on board.

**Leg 133 - North East Australian Margin** 15/Aug/90 - 10/Oct/90

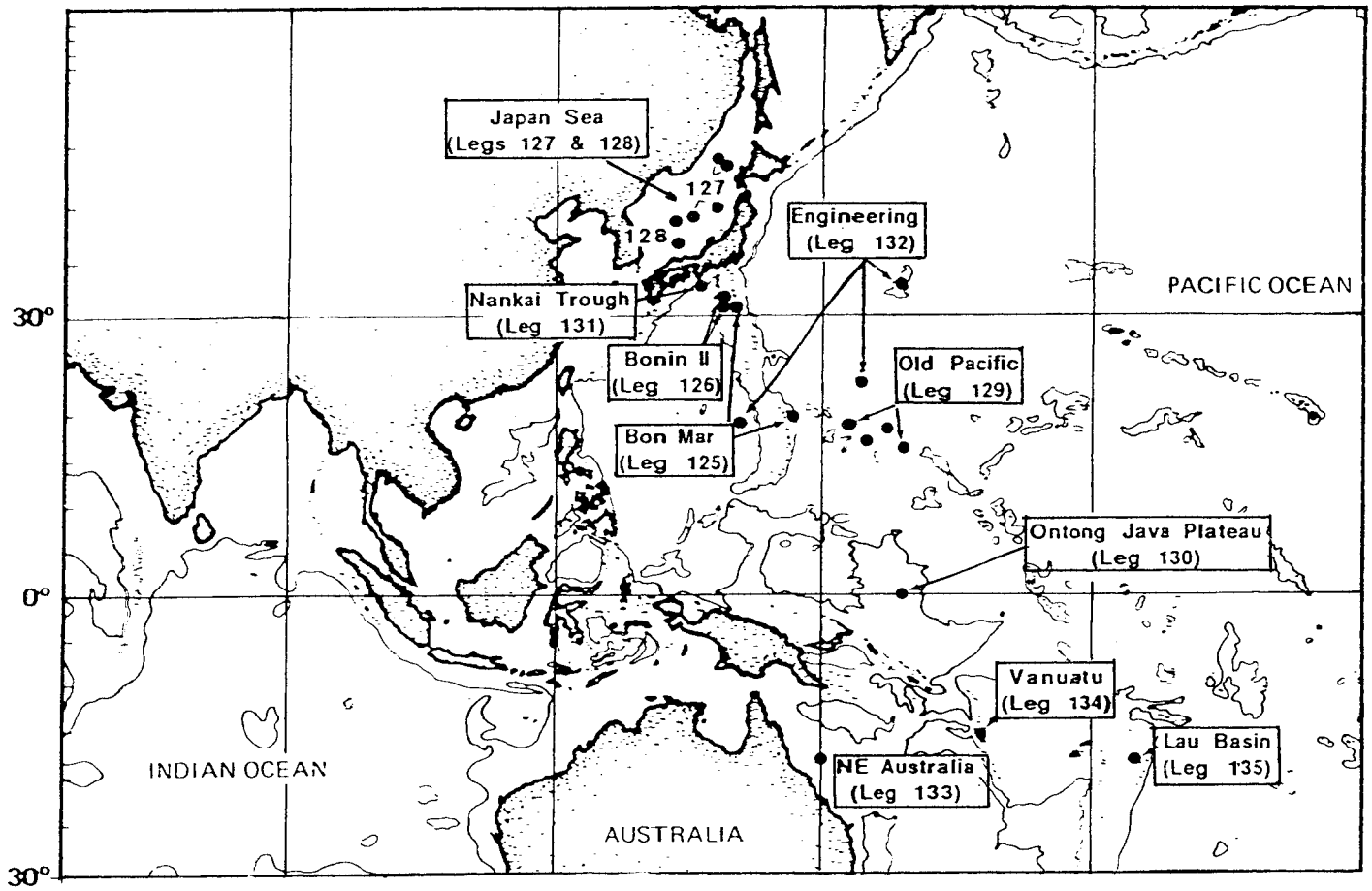
Goal: To drill reef and shelf sediments recording late Cenozoic sea level changes.

**Leg 134 - Vanuatu** 15/Oct/90 - 10/Dec/90

Goal: Study of processes involved in collision of an aseismic ridge and a guyot with an island arc. The main sediments will be late Cenozoic.

**Leg 135 - Lau Basin** 15/Dec/90 - 9/Feb/91

Goal: Investigation of history of back-arc opening. The basin opened in the Pliocene so older sediments are unlikely.



# PROPOSED CHANGES TO THE CLASSIFICATION SYSTEM OF LIVING COCCOLITHOPHORIDS

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The classification system of living coccolithophorids has long been in a state of flux, due to differing opinions and misidentifications. Also there has been no recent attempt to compile a comprehensive catalogue of the modern nannoflora, although several lists have been presented from localised regions or from one or more water masses. In an attempt to rectify these problems a classification system was informally presented and discussed during the workshop on living coccolithophorids, at the INA meeting in Florence. This paper represents the results of the workshop in which a number of changes were proposed and accepted by all the members of the working group. The "complete" taxonomic list will appear in the near future (Jordan & Kleijne, in prep.).

## WORKSHOP MEMBERS:

Linda Eide (Bergen, Norway), Ric Jordan (Cambridge, U.K.), Michael Knappertsbusch (Zurich, Switzerland), Hisatake Okada (Yamagata, Japan), Amos Winter (Mayaguez, Puerto Rico), and Jeremy Young (London, U.K.).

Additional comments were made at the meeting by Niki Hine (Norwich, U.K.), Syed Jafar (Lucknow, India), Katharina von Salis Perch-Nielsen (Zurich, Switzerland), and Phil Weaver (Wormley, U.K.), and subsequently by Annaliese Kleijne (Amsterdam, The Netherlands).

## TAXONOMIC RECOMMENDATIONS

i) new varieties

***Ceratolithus cristatus* var. *telesmus*** (Norris 1965) stat. nov. (Notes 1 & 2)
Basionym: *Ceratolithus telesmus* NORRIS, 1965, p.21-22, pl.11/5-8, 13/1-3.

***Oolithotus fragilis* var. *cavum*** (Okada & McIntyre 1977) stat. nov. (Note 1)
Basionym: *Oolithotus fragilis* subsp. *cavum* OKADA and MCINTYRE, 1977, p.11-12, pl.4/4-5.

***Helicosphaera carteri* var. *hyalina*** (Gaarder 1970) stat. nov. (Note 3)
Basionym: *Helicosphaera hyalina* GAARDER, 1970, p.113-119, figs. 1a-g, 2a-d, 3a.

***Emiliania huxleyi* var. *corona*** (Okada & McIntyre 1977) stat. nov. (Note 1)
Basionym: *Emiliania huxleyi* subsp. *corona* OKADA & MCINTYRE, 1977, p.9, pl.1/1-4, 6-7.

ii) new combinations

***Reticulofenestra parvula*** (Okada & McIntyre 1977) comb. nov. (Note 4)
Basionym: *Crenalithus parvulus* OKADA & MCINTYRE, 1977, p.6-7, pl.2/1-2.

***Reticulofenestra parvula* var. *tecticentrum*** (Okada & McIntyre 1977) comb. et stat. nov. (Notes 1 & 4)
Basionym: *Crenalithus parvulus* subsp. *tecticentrum* OKADA & MCINTYRE, 1977, p.7, pl.2/3-4, 7.

***Reticulofenestra punctata*** (Okada & McIntyre 1977) comb. nov. (Note 4)
Basionym: *Crenalithus punctatus* OKADA & MCINTYRE, 1977, p.7-8, pl.2/8-9.

***Reticulofenestra sessilis*** (Lohmann 1912) comb. nov. (Note 4)
Basionym: *Pontosphaera sessilis* LOHMANN, 1912, p.42-46, text-fig.9.

***Syracosphaera anthos*** (Lohmann) comb. nov. (Note 5)
Basionym: *Deutschlandia anthos* LOHMANN, 1912, p.46, fig.10/1, 3 (not 2).

***Syracosphaera halldalii* f. *dilatata*** (Heimdal 1981) comb. nov. (Note 6)

Basionym: *Caneosphaera halldalii* f. *dilatata* HEIMDAL, in Heimdal & Gaarder, 1981, p.44, pl.2/9.

iii) new genus and new combination

***Alveosphaera*** gen. nov. *(alveus* L. - trough) (Note 7)

*Coccosphaera fusiformis cum coccolithis monomorphismis. Coccolithi alveoformes, habens duo muri paene paralleli. Latus proximale areae centralis craticula opertum.*

*Typus: Alveosphaera bimurata* (Okada & McIntyre 1977) comb. nov.

Coccosphere spindle-shaped with monomorphic coccoliths. Coccoliths are trough-shaped with two walls arranged almost parallel to each other. Proximal side of central area covered by a grill.

Type species: *Alveosphaera bimurata* (Okada & McIntyre) comb. nov.

***Alveosphaera bimurata*** (Okada & McIntyre) comb. nov. (Note 7)

Basionym: *Calciosolenia? bimurata* OKADA & MCINTYRE, 1977, p.18-19, pl.7/1.

iv) new family (Note 8)

**Papposphaeraceae** fam. nov.

Typus: *Papposphaera* Tangen, 1972

*Diagnosis: Coccolithi pappolithiformi; margo anguste muriformis exteriorem versus leviter inclinatis, muro assulis speciarum duarum alterne verticalium tangetialiumque dispositis formato; altera species parva partio proximali muri limitata, altera species assulae verticaliter expansa; processus centralis saepe praesens.*

Diagnosis: Coccoliths are pappoliths; rim has form of narrow slightly flaring wall formed of laths of two alternating types. One lath type relatively small, confined to the proximal part of the wall, the other vertically expanded. Central process often present.

## TAXONOMIC NOTES

**1) Use of varieties.** There are several cases where continuity of variation and other criteria suggest that commonly distinguished coccolith morphotypes are examples of intraspecific variation. The workshop members agreed that it was often useful to distinguish these as discrete taxa and that it would be sensible to apply a single taxonomic level consistently. The ICBN treats all taxonomic levels as arbitrary pigeonholes, however, the terms species and subspecies have genetic and ecological meanings which do not conform to our understanding of these cases. Of the other intraspecific levels provided by the ICBN variety has been used much widely than form. It was considered that the status of subspecies should generally be changed to that of variety.

**2) Status of *Ceratolithus telesmus*.** Considerable variations in ceratolith morphology have frequently been seen in modern and fossil assemblages with continuous transition between the *cristatus* and *telesmus* morphotypes (Borsetti and Cati, 1976; H. Okada, our obs.). So we agree with Borsetti and Cati, 1976 that these should be regarded as intraspecific taxa, for the reasons discussed above we recommend use of varietal status.

**3) Status of *Helicosphaera hyalina* and *H.wallichii*.** There is considerable and continuous variation in the size and orientation of the central openings in modern *Helicosphaera*. Such variation is often visible between coccoliths on single coccospheres (Nishida, 1979; workshop members obs.). Specifically *H. carteri, H. wallichii* and *H. hyalina* appear to be closely associated. So we support the use of the combination *H. carteri* var. *wallichii* (Theodoridis, 1984) and propose the new combination *H. carteri* var. *hyalina*.

**4) Utility of *Crenalithus*.** As discussed by Backman (1980) there are no objective criteria for separating *Crenalithus* from *Reticulofenestra,* and the type species, *Crenalithus doronicoides* (Black and Barnes 1961) Roth 1973, is of dubious nature. The living species previously placed in *Crenalithus* are similar to typical, small *Reticulofenestra* spp. such as *R. minuta* (L. Gallagher, workshop members obs.). The species are therefore transferred to *Reticulofenestra.*

**5) Utility of *Deutschlandia.***

Heimdal & Gaarder 1981 demonstrated that *Deutschlandia anthos* Lohmann 1912 was the correct identification of the species termed *Syracosphaera variabilis* (Halldal & Markali 1955) by various authors (Okada & McIntyre 1977, Nishida 1979, Winter et al 1979). They decided to retain the genus Deutschlandia, however, the generic descriptions of *Deutschlandia* (emend. Heimdal & Gaarder, 1981) and *Syracosphaera* (emend. Gaarder & Heimdal, 1977) differ on only two points. Firstly that *Deutschlandia* has incomplete rather than complete caneoliths. Secondly, that the central part of the exothecal cyrtoliths in *Deutschlandia* have a distally raised hollow cone whilst their counterparts in *Syracosphaera* have a central depression.

Other workers taxonomy does not accord well with these generic concepts. For instance, Okada & McIntyre (1977) described several new species of *Syracosphaera*, resulting in a much wider morphological variation than that of Gaarder & Heimdal (1977).

*Syracosphaera* now holds 18 recognised species of which only 3 were assigned to it by Gaarder & Heimdal (1977). It has become a mixed bag, containing species exhibiting complete or incomplete caneoliths, dimorphism or monomorphism, dithecatism or monothecatism. But there is no easy solution, the creation of several new genera based on morphism, thecatism or caneolith-type would only produce smaller mixed bags which would inevitably add to the confusion. In addition the exothecal cyrtoliths are not always present in dithecate species and isolated caneoliths are often difficult to identify. It is therefore proposed to keep the genus as a group of species with variable morphology, related by the possession of caneoliths with or without cyrtoliths, but lacking the highly specialised polar coccoliths, found in *Michaelsarsia* and other syracosphaerid genera. So *Deutschlandia anthos* is transferred to the genus *Syracosphaera.*

**6) Utility of *Caneosphaera.*** *Syracosphaera molischii* and *S. halldalii* were transferred to a new genus, *Caneosphaera,* by Gaarder & Heimdal (1977) on the basis of the coccosphere being monothecate and the coccoliths lacking an intermediate continuous or beaded mid-wall flange. However, *C. molischii* has been observed, by a number of authors, (Okada & McIntyre, 1977; Nishida, 1979; Heimdal & Gaarder, 1981) with "deviating" (=exothecal) coccoliths around the flagellar field only (= pseudodithecatism) and the stomatal coccoliths of *C. halldalii* f. *dilatata* were described by Heimdal & Gaarder (1981) as bearing "..a ring of bead-like knobs like the stomatal coccoliths of *Syracosphaera exigua* Okada and McIntyre and all the endothecal coccoliths of *S. histrica* Kamptner", i.e. they possess a mid-wall flange. The reliability of the generic description is now uncertain and it is therefore proposed that the species of *Caneosphaera* be transferred back to *Syracosphaera,* and the new combination *S. halldalii* f. *dilatata* is proposed.

**7) New genus *Alveosphaera.*** In 1977 Okada & McIntyre described a new species which they tentatively assigned to *Calciosolenia.* This species, *C.? bimurata,* supposedly bore scapholith type coccoliths, although they were shaped like round-ended boats rather than parallelograms. Borsetti & Cati (1976) recognised the necessity for removing the species from the genus, and transferred it to *Syracosphaera.* However, they used the unpublished epithet *"duomura"* (from a preprint of Okada & McIntyre 1977) and thus their new combination, *Syracosphaera duomura,* was invalid. Its transfer to *Syracosphaera* also seems inappropriate as the coccoliths

differ from those found in other *Syracosphaera* species and it is therefore proposed to place it in a new genus, *Alveosphaera.*

**8) New family Papposphaeraceae.** Within the current classification system there are a number of genera which do not fit into the existing families. Some of these genera share common morphological characteristics and may therefore be tentatively separated into small families. It is proposed here that the two genera, *Papposphaera* and *Pappomonas,* bearing pappoliths (Norris, 1983) should be included together in the Papposphaeraceae. Norris (1983) showed that previous attempts to locate them within the Rhabdosphaeraceae (Parke & Green, 1976) and Halopappaceae (Tappan, 1980) were unsatisfactory and so he transferred these genera to the Deflandriaceae (= Prediscosphaeraceae). This assignment is also inappropriate as the family has left no fossil record since the Cretaceous and the coccoliths of the Prediscosphaeraceae radically differ in rim and process construction to those of the new family, the Papposphaeraceae.

## ACKNOWLEDGEMENTS

The authors would like to thank Tony Chamberlain and Norman Robson for their help with the latin diagnoses and Shirley van Heck for answering various taxonomic queries.

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## THE ICBN: THINGS YOU NEED TO KNOW - 1

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Reading through recent literature I come across numerous violations of the International Code of Botanical Nomenclature. Talking to people, such as on the latest INA Meeting in Florence, I find that very few ever look at the ICBN and then often use an outdated copy. So as a continuation of my attempts over the last ten years to persuade people to use the ICBN, I have decided to start this column in the Newsletter. Here, I intend to discuss some of the rules of the ICBN that seem to cause problems, using examples from the nannoplankton literature. I intend to indicate mistakes that have been made, and offer corrections for them - no slight is intended!

This first issue will begin to deal with species names, or rather: specific epithets as they are known in the ICBN. Although mistakes on this subject do not influence validity, they are the mistakes most commonly made, and a topic on which I am often questioned. The relevant sections in the ICBN are Art. 23 and Art. 73. I will discuss Art. 23 in this issue, and the relevant parts of Art. 73 in the next.

*ARTICLE 23*

***23.1:*** *The name of a species is a binary combination consisting of the name of the genus followed by a single specific epithet in the form of an adjective, a noun in the genitive, or a word in apposition, but not a phrase in the ablative (see Art.23.6(c)). If an epithet consists of two or more words, these are to be united or hyphenated. An epithet not so joined when originally published is not to be rejected but, when used, is to be united or hyphenated (see Art. 73.9).*

***23.2:*** *The epithet in the name of a species may be taken from any source whatever, and may even be composed arbitrarily (but see Art.73.1).*

***23.4:*** *The specific epithet may not exactly repeat the generic name with or without the addition of a transcribed symbol (tautonym).*

***23.5:*** *The specific epithet, when adjectival in form and not used as a substantive, agrees grammatically with the generic name (see Art.32.5).*

N.B. Articles not directly relevant to nannofossils have been left out, as well as the examples and recommendations, which will be discussed later.

Basically, Art.23.1 says a specific epithet can have three different forms: 1. an adjective, 2. a noun in the genitive, or 3. a noun. In the first case, when we use an adjective, Art.23.5 applies, and this is what causes problems in many cases. The problem is that you have to know some Latin grammar to know how the termination changes with the change of gender, so here is a concise overview:

masculine: *crassus grandis constans minor asper niger*
feminine: *crassa grandis constans minor aspera nigra*
neutral: *crassum grande constans minor asperum nigrum*

It is obviously important to know the gender of the generic name for this, but I will discuss that when discussing generic names. Examples: *Biscutum depravatus* (Grun & Zweili 1980) Bown 1987 should be *B. depravatum; Biscutum grandis* Bown 1987 should be *B. grande. Tegumentum tenuis* (Black 1971) Crux 1989 should be *Tegumentum tenue.*

The second case mentioned, a noun in the genitive, refers to epithets named after people or places (such as *cruxii, noeliae).* Name formation is described in Art.73 and so will be discussed later. These names do not change their termination. The third case, a noun, causes many

mistakes because often these are not recognised as such. Classical example by now are the epithets *'umbilicus'* (navel), and *'murus'* (wall), which do not change their termination because they are not adjectives but nouns. Therefore the correct combinations are *Reticulofenestra umbilicus,* and not *umbilica,* and *Micula murus* instead of *Micula mura.* Thus, in order to get the termination correct, you will have to check the meaning of an epithet either in the original publication or in a Latin or Greek dictionary.

***Recommendation 23A***

***23A.1:*** *Names of men and women and also of countries and localities used as specific epithets should be in the form of substantives in the genitive or of adjectives (see also Art.73,Recs.73C and D).*

***23A.2:*** *The use of the genitive and the adjectival form of the same word to designate two different species of the same genus should be avoided. Recommendation 23B*

***23B.1:*** *In forming specific epithets, authors should comply also with the following suggestions:*

*a - to use Latin terminations insofar as possible*

*b - To avoid epithets which are very long and difficult to pronounce in Latin*

*c - Not to make epithets by combining words from different languages.*

*d - To avoid those formed of two or more hyphenated words*

*e - To avoid those which have the same meaning as the generic name (pleonasm)*

*f - To avoid those which express a character common to all or nearly all the species of a genus*

*g - To avoid in the same genus those which are very much alike, especially those which differ in their last letters or in the arrangement of two letters*

*h - To avoid those which have been used before in any closely allied genus*

*i - Not to adopt epithets from unpublished names found in correspondence, travellers' notes, herbarium labels, or similar sources, attributing them to their authors, unless these authors have approved publications*

*j - To avoid using the names of little-known or very restricted localities, unless the species is quite local.*

We do not have many problems with these recommendations, although I could quote examples for each of them. They are not binding, but it is still wise to keep an eye on them, for in several cases recommendations have been promoted to rules.

One final remark: I have often heard people say they are not bothered with trivial matters such as correct spelling, but quite apart from the fact that it looks sloppy to make these mistakes, it is simply more efficient to spell a name correctly, and thereby facilitate retrieval, comparison and editing of names, particularly by computer systems.

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Compiled by John C. Steinmetz

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| 8 | **ZACHOS, J. C., ARTHUR, M. A., & DEAN, W. E.** 1989<br>Geochemical and paleoenvironmental variations across the Cretaceous/Tertiary boundary at Braggs, Alabama.<br>-Palaeogeogr., Palaeoclimatol., Palaeoecol., 69 (3/4): 245-266, 8 figs., 3 tbs. | strat.<br>CRET/TERT<br>boundary<br>America.N. |
| 9 | **ZACHOS, J. C., BREZA, J., WISE, S., KENNETT, J., STOTT, L., & THE ODP LEG 120 SHIPBOARD SCIENTIFIC PARTY.** 1989<br>A high latitude, southern Indian Ocean middle Eocene to Oligocene paleoclimatic record.<br>-Trans., Amer. Geophys. Un., 70 (15): 375. | abstr.<br>strat.<br>TERT.L.<br>Antarctic<br>Indian.Oc. |

++++++++++++++++++++++++++Calcispheres++++++++++++++++++++++++++

A417

1 **KEUPP, H., & ILG, A.** **1989** strat.syst.
Die kalkigen Dinoflagellaten im Ober-Callovium und Oxfordium der Normandie/ Frankreich. (The calcareous dinoflagellates in the upper Callovian and Oxfordian of Normandy, France.)
-Berliner geowiss. Abh., (A), 106: 165-205, 12 pls., 2 figs.
(In German with English abstract.)
JURA.U.,M.
Europe.W.

2 **KEUPP, H. & VERSTEEGH, G.** **1989** strat.syst.
Eine neues systematisches Koncept für kalkige Dinoflagellaten-Zysten der Subfamilie Orthopithonelloideae KEUPP 1987. (A new systematic concept for calcareous dinoflagellate-cysts of the Subfamily Orthopithonelloideae KEUPP 1987.)
-Berliner geowiss. Abh., (A), 106: 207-219, 2 pls., 2 figs.
(In German with English abstract.)
RECENT
QUAT
TERT
CRET
PREJURA

++++++++++++++++++++++++++Other titles++++++++++++++++++++++++++

3 **AGER, D.** **1989** REVIEW
Review of Das Klima der Kreide -Zeit by E. Kemper with contributions by D. J. Batten, I. Harding, Li Wenben, J. Mutterlose et al. [A382-10]
-Palaeogrogr., Palaeoclimatol., Palaeoecol., 70 (4): 413-414.

4 **FLEISHER, R. L.** **1989** REVIEW
Review of Plankton Stratigraphy edited by H. M. Bolli, J. B. Saunders, and K. Perch-Nielsen. [A255-7]
-J. Foram. Res., 19 (2): 164-168.

5 **GHLIS, M.** **1987** strat.syst.
Biostratigraphie et Paleoenvironnements du Campanien et du Maastrichtien du Sud-Constantinois, Algerie. (Biostratigraphy and paleoenvironments of the Campanian and the Maastrichtian of southern Constantine, Algeria.)
-Univ. Paris VI, Doctoral thesis, no. 87-48, 158 pp., 32 figs.
(In French with English abstract.)
CRET.U.
Africa.N.

6 **HECK, S. E. van** **1989** REVIEW
Review of International Code of Botanical Nomenclature by W. Greuter et al. [A-398-10].
-INA Newsl., 11 (1): 4-5.

7 **JANIN, M.-C.** **1989** REVIEW
Review of Nannofossils and their Applications, Proceedings of the International Nannofossil [sic] Association Conference, London 1987, by J. A. Crux and S. E. van Heck (eds.).[A395-7].
-Rev. Micropal., 32 (2): 161-162.
(In French.)

8 **JIANG, M.-J.** **1989** strat.syst.
Biostratigraphy and geochronology of the Eagle Ford Shale, Austin Chalk, and lower Taylor Marl in Texas based on calcareous nannofossils.
-Texas A & M Univ., Ph.D. dissertation,2 vols.,496 pp.,18 pls.,59 figs.,10 tbs.,3 apps.
CRET.U.,M.
America.N.

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| | |
|---|---|
| Amitha SHAFIK 1989; pp. 70-72. Type species: Amitha perfecta SHAFIK 1989. | A411-10 |
| Amitha perfecta SHAFIK 1989; pp. 72-74, fig. 3. Type species of Amitha SHAFIK 1989. Southeastern Australia, Victoria, Browns Creek Clays, late Eocene. | A411-10 |
| Amitha prolata SHAFIK 1989; pp. 74-76, fig. 4A-B. Southeastern Australia, Victoria, Browns Creek Clays, late Eocene. | A411-10 |
| Arkhangelskiella paucipunctata MOSHKOVITZ & OSMOND 1989; p. 85, pl. 4.1, figs. 8-9; pl. 4.2, figs. 13-15; pl. 4.3, figs. 1-3. North Atlantic, DSDP Site 605, latest Maastrichtian, Micula prinsii Zone; also northern Israel. | A403-10 |
| Biantholithus hughesii VAROL 1989; p. 297, pl. 12.5, figs. 26-29. Denmark, Kjølby Gaard, early Paleocene (Zone NNTp1). | A414-1 |
| Biscutum davyi BOWN in BOWN & COOPER 1989; p. 92, pl. 1, figs. 16-21, 35. England, Somerset, lower Toarcian. | A394-3 |
| Biscutum harrisonii VAROL 1989; p. 297, pl. 12.1, fig. 1; pl. 12.4, figs. 16-20. Northern Turkey, Zonguldak, early Paleocene (Zone NTp5). | A414-1 |
| Braarudosphaera minuta (TROELSEN & QUADROS 1971) AUBRY 1989; p. 22; (ex Citrocalculus). | A390-8 |
| Calculites anfractus (JAKUBOWSKI 1986) VAROL & JAKUBOWSKI 1989; p. 24; (ex Phanulithus). | A414-2 |
| Cleosphaera JANOFSKE 1989; pp. 47-48. Type species: Cleosphaera tripartita JANOFSKE 1989. | A400-9 |
| Cleosphaera tripartita JANOFSKE 1989; p. 48, pl. 1, figs. 2-3. Type species of Cleosphaera JANOFSKE 1989. Austria, Kleiner Zlambach-graben by St. Agatha, Rhaetian. | A400-9 |
| Conusphaera mexicana TREJO 1969 subsp. minor BOWN & COOPER 1989; p. 102, pl. 5.2, figs. 10-12. Blake-Bahama Basin, DSDP Site 534, lower Tithonian. | A394-2<br>*C-1 |
| Conusphaera mexicana TREJO 1969 subsp. minor BRALOWER in BRALOWER, MONECHI, & THIERSTEIN 1989; pp. 223-228, pl. 7, figs. 21-25. Western North Atlantic, DSDP Site 534, uppermost Kimmeridgian to upper Tithonian. | A394-6<br>*C-1 |
| Conusphaera tollmanniae (JAFAR 1983) JANOFSKE 1989; p. 49; (ex Euconusphaera). | A400-9 |
| Cretarhabdus madingleyensis (BLACK 1971) CRUX 1989; p. 184; (ex Polypodorhabdus). | A395-6 |

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|---|---|
| Cretarhabdus octofenestratus BRALOWER in BRALOWER, MONECHI, & THIERSTEIN 1989; pp. 212-213, pl. 3, figs. 1-6. North Sea, BGS Core 81/43, lower Berriasian to Cenomanian; also western North Atlantic and Tethys. | A394-6 |
| Discoaster bergenii KNÜTTEL, RUSSELL, & FIRTH 1989; p. 260, pl. 1, fig. 15. Atlantic Ocean, DSDP sites 541 and 542, late Miocene, NN10 Zone. | A401-11 |
| Eoconusphaera zlambachensis (MOSHKOVITZ 1982) BOWN & COOPER 1989; p. 104; (ex Conusphaera). | A394-2 |
| Fasciculithus chowii VAROL 1989; pp. 297-298, pl. 12.5, figs. 11-13. Northern Turkey, Zonguldak, early Paleocene (Zone NTp7). | A414-1 |
| Faviconus BRALOWER in BRALOWER, MONECHI, & THIERSTEIN 1989; p. 228. Type species: Faviconus multicolumnatus BRALOWER in BRALOWER, MONECHI, & THIERSTEIN 1989. | A394-6 |
| Faviconus multicolumnatus BRALOWER in BRALOWER, MONECHI, & THIERSTEIN 1989; p. pp. 228-229, pl. 8, figs. 1-6. Type species of Faviconus BRALOWER in BRALOWER, MONECHI, & THIERSTEIN 1989. Western North Atlantic, DSDP Site 534, lower to upper Tithonian. | A394-6 |
| Futyania VAROL 1989; p. 298. Type species: Toweius petalosus ELLIS & LOHMAN 1973. | A414-1 |
| Futyania attewellii VAROL 1989; pp. 298-300, pl. 12.1, fig. 8; pl. 12.2, figs. 1-8a. Northern Turkey, Zonguldak, early Paleocene (Zone NTp3). | A414-1 |
| Futyania petalosa (ELLIS & LOHMAN 1973) VAROL 1989; p. 300; (ex Toweius). Type species of Futyania VAROL 1989. | A414-1 |
| Heliolithus aktasii VAROL 1989; pp. 300, 308, pl. 12.5, figs. 21-25. Northern Turkey, Zonguldak, late Paleocene (Zone NTp12). | A414-1 |
| Heliolithus rotundus (HAQ & LOHMANN 1976) AUBRY 1989; p. 144; (ex Fasciculithus). | A390-8 |
| Isolithus LYULYEVA 1989; p. 11. Type species: Isolithus semenenko LYULYEVA 1989. | A402-5 |
| Isolithus semenenko LYULYEVA 1989; pp. 11-12, figs. e-k. Type species of Isolithus LYULYEVA 1989. South Ukraine, late Miocene-early Pliocene. | A402-5 |
| Lacunolithus LYULYEVA 1989; p. 11. Type species: Lacunolithus menneri LYULYEVA 1989. | A402-5 |
| Lacunolithus menneri LYULYEVA 1989; p. 11, figs. a-b. Type species of Lacunolithus LYULYEVA 1989. South Ukraine, late Miocene-early Pliocene. | A402-5 |

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|---|---|
| Lanternithus jawzii VAROL 1989; p. 308, pl. 12.5, figs. 19-20. Northern Turkey, Zonguldak, early Paleocene (Zone NTp5). | A414-1 |
| Lotharingius contractus BOWN & COOPER 1989; p. 93, pl. 1, figs. 1-7. Portugal, Brenha, Aalenian. | A394-3 |
| Lotharingius velatus BOWN & COOPER 1989; pp. 93-96, pl. 1, figs. 8-15. Northern France, Sainte Honorine-des-Pertes, Bajocian. | A394-3 |
| Micrascidites latens LYULYEVA 1989; pp. 12-13, figs. I-m. South Ukraine, late Miocene-earlyPliocene. | A402-5 |
| Multipartis ponticus VAROL 1989; p. 308, pl. 12.4, figs. 31-35. Northern Turkey, Zonguldak, late Paleocene (Zone NTp12). | A414-1 |
| Munarinus emrei VAROL 1989; p. 308, pl. 12.2, figs. 31-35. Northern Turkey, Zonguldak, late Paleocene (Zone NTp12). | A414-1 |
| Neobiscutum VAROL 1989; p. 308. Type species: Biscutum? romeinii PERCH-NIELSEN 1981. | A414-1 |
| Neobiscutum parvulum (ROMEIN 1979) VAROL 1989; pp. 308-309; (ex Biscutum). | A414-1 |
| Neobiscutum romeinii (PERCH-NIELSEN 1981) VAROL 1989; p. 309; (ex Biscutum?). Type species of Neobiscutum VAROL 1989. | A414-1 |
| Nannoconus compressus BRALOWER & THIERSTEIN in BRALOWER, MONECHI, & THIERSTEIN 1989; p. 229, pl. 8, figs. 7-12. Western North Atlantic, DSDP Site 105, middle Tithonian. | A394-6 |
| Nannoconus globulus BRONNIMANN 1955 subsp. minor BRALOWER in BRALOWER, MONECHI, & THIERSTEIN 1989; p. 231, pl. 8, figs. 22-23. Western North Atlantic. DSDP Site 100, upper Tithonian to lower Berriasian. | A394-6 |
| Nannoconus infans BRALOWER in BRALOWER, MONECHI, & THIERSTEIN 1989; pp. 229-230, pl. 8, figs. 13-18. Western North Atlantic, DSDP Site 391, upper Tithonian to lower Berriasian; also Tethys. | A394-6 |
| Nannoconus kamptneri BRONNIMANN 1955 subsp. minor BRALOWER in BRALOWER, MONECHI, & THIERSTEIN 1989; p. 230, pl. 8, figs. 25-27. Western North Atlantic, DSDP Site 534, lower to middle Berriasian. | A394-6 |
| Nannoconus wintereri BRALOWER & THIERSTEIN in BRALOWER, MONECHI, & THIERSTEIN 1989; p. 230, pl. 8, figs. 19-21. Western North Atlantic, DSDP Site 534, upper Tithonian to lower Berriasian; also Tethys. | A394-6 |
| Neocrepidolithus rimosus (BRAMLETTE & SULLIVAN 1961) VAROL 1989; p. 297; (ex Discolithus). | A414-1 |

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|---|---|
| Notiocyrtolithus SHAFIK 1989; pp. 76-77. Type species: Notiocyrtolithus rothii SHAFIK 1989. | A411-10 |
| Notiocyrtolithus rothii SHAFIK 1989; p. 77, fig. 5. Type species of Notiocyrtolithus SHAFIK 1989. Southeastern Australia, Victoria, Browns Creek Clays, late Eocene; also Lacepede Formation, early Oligocene. | A411-10 |
| Ommatolithus SHAFIK 1989; pp. 78-79. Type species: Ommatolithus australiensis SHAFIK 1989. | A411-10 |
| Ommatolithus australiensis SHAFIK 1989; p. 79, fig. 6. Type species of Ommatolithus SHAFIK 1989. Southeastern Australia, Victoria, Browns Creek Clays, late Eocene; also Lacepede Formation, early Oligocene. | A411-10 |
| Palaeomicula VAROL & JAKUBOWSKI 1989; pp. 25-26. Type species: Tetralithus quadrisphenus WORSLEY 1971. | A414-2 |
| Palaeomicula maltica (WORSLEY 1971) VAROL & JAKUBOWSKI; p. 26; (ex Tetralithus). | A414-2 |
| Palaeomicula quadrisphena (WORSLEY 1971) VAROL & JAKUBOWSKI 1989; p. 26, (ex Tetralithus). Type species of Palaeomicula VAROL & JAKUBOWSKI 1989. | A414-2 |
| Pemma complicatum (CHANG 1969) AUBRY 1989; p. 66; (ex Micrantholithus). | A390-8 |
| Pemma parisiense (BOUCHÉ 1962) AUBRY 1989; p. 66; (ex Micrantholithus). | A390-8 |
| Pemma parisiense subsp. parisiense (BOUCHÉ 1962) AUBRY 1989; p. 66; (ex Micrantholithus). | A390-8 |
| Pemma parisiense subsp. primordis (CHANG 1969) AUBRY 1989; p. 66; (ex Micrantholithus). | A390-8 |
| Perissocyclus plethotretus (WIND & ČEPEK 1979) CRUX 1989; p. 190; (ex Octopodorhabdus). | A395-6 |
| Perissocyclus tayloriae CRUX 1989; pp. 190-192, pl. 8.3, figs. 2-6; pl. 8.11, fig. 28. Germany, Sarstedt, Hauterivian-Aptian. | A395-6 |
| Praeprinsius VAROL & JAKUBOWSKI 1989; pp. 26-27. Type species: Biscutum? tenuiculum OKADA & THIERSTEIN 1979. | A414-2 |
| Praeprinsius africanus (PERCH-NIELSEN 1981) VAROL & JAKUBOWSKI 1989; p. 27; (ex Prinsius). | A414-2 |
| Praeprinsius dimorphosus (PERCH-NIELSEN 1969) VAROL & JAKUBOWSKI 1989; p. 27; (ex Biscutum?). | A414-2 |

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| Praeprinsius tenuiculus (OKADA & THIERSTEIN 1979) VAROL & JAKUBOWSKI 1989; p. 27; (ex Biscutum?). Type species of Praeprinsius VAROL & JAKUBOWSKI 1989. | A414-2 |
| Pseudoconus BOWN & COOPER 1989; p. 105. Type species: Pseudoconus enigma BOWN & COOPER 1989. | A394-2 |
| Pseudoconus enigma BOWN & COOPER 1989; pp. 104-106, pl. 5.2, figs. 13-20. England, Dorset, Watton Cliff, upper Bajocian - upper Bathonian; also Brenha, Portugal. Type species of Pseudoconus BOWN & COOPER 1989. | A394-2 |
| Pseudolithraphidites parallelus (WIND & ČEPEK 1979) CRUX 1989; p. 192; (ex Rhabdolekiskus). | A395-6 |
| Rectapontis VAROL & JAKUBOWSKI 1989; pp. 24-25. Type species: Zygodiscus compactus BUKRY 1969. | A414-2 |
| Rectapontis compactus (BUKRY 1969) VAROL & JAKUBOWSKI 1989; p. 25; (ex Zygodiscus). Type species of Rectapontis VAROL & JAKUBOWSKI 1989. | A414-2 |
| Rectapontis sisyphus (GARTNER 1968) VAROL & JAKUBOWSKI 1989; p. 25; (ex Zygodiscus). | A414-2 |
| Retecapsa incompta BOWN & COOPER 1989; pp. 92-93, pl. 1, figs. 22-30. Portugal, Brenhs, Aalenian. | A394-3 |
| Reticulofenestra maceria SHAFIK 1989; pp. 79-81, fig.4K-N. Southeastern Australia, Victoria, Browns Creek Clays, late Eocene. | A411-10 |
| Reticulofenestra martinii (HAY & TOWE 1962) GALLAGHER 1989; p. 46; (ex Cyathosphaera). | A397-10 |
| Reticulofenestra productella (BUKRY 1975) GALLAGHER 1989; p. 46; (ex Crenalithus). | A397-10 |
| Rhagodiscus nebulosus BRALOWER in BRALOWER, MONECHI, & THIERSTEIN 1989; p. 204, pl. 1, figs. 16-23. Western North Atlantic, DSDP Site 100, middle Berriasian to Valanginian; also Tethys and northern California. | A394-6 |
| Sphenolithus furcatolithoides LOCKER 1967 subsp. labradorensis FIRTH 1989; p. 277, pl. 2 figs. 15-16; pl. 3, figs. 1-4. Labrador Sea, ODP Site 647, middle Eocene, NP16 Zone; also South Atlantic. | A397-5 |
| Staurolithites mutterlosei CRUX 1989; p. 194, pl. 8.6, figs. 7-8; pl. 8.12, figs. 16, 21, 22. England, Speeton, Hauterivian-Barremian. | A395-6 |
| Stradnerlithus geometricus (GORKA 1957) BOWN & COOPER 1989; p. 91; (ex Discolithus). | A394-3 *C-2 |

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| B160 | | |
| | Stradnerlithus gorodishchensis (COOPER 1987) BOWN & COOPER 1989; p. 91; (ex Paractinozygus). | A394-3 *C-2 |
| | Tegumentum octiformis (KÖTHE 1981) CRUX 1989; p. 196; (ex Chiastozygus). | A395-6 |
| | Tegumentum striatum (BLACK 1971) CRUX 1989; p. 196; (ex Chiastozygus). | A395-6 |
| | Tegumentum tenuis (BLACK 1971) CRUX 1989; p. 196; (ex Chiastozygus). | A395-6 |
| | Umbria BRALOWER & THIERSTEIN in BRALOWER, MONECHI, & THIERSTEIN 1989; p. 200. Type species: Umbria granulosa BRALOWER & THIERSTEIN in BRALOWER, MONECHI, & THIERSTEIN 1989. | A394-6 |
| | Umbria granulosa BRALOWER & THIERSTEIN in BRALOWER, MONECHI, & THIERSTEIN 1989; p. 201, pl. 1, figs. 1-15. Type species of Umbria BRALOWER & THIERSTEIN in BRALOWER, MONECHI, & THIERSTEIN 1989. Western North Atlantic, DSDP Site 100, upper Tithonian to upper Berriasian; also Tethys. | A394-6 |
| | Umbria granulosa BRALOWER & THIERSTEIN in BRALOWER, MONECHI, & THIERSTEIN 1989 subsp. granulosa BRALOWER, MONECHI, & THIERSTEIN 1989; p. 201, pl. 1, figs. 1-3, 8-15. Western North Atlantic, DSDP Site 100, upper Tithonian to upper Berriasian; also Tethys. | A394-6 |
| | Umbria granulosa BRALOWER & THIERSTEIN in BRALOWER, MONECHI, & THIERSTEIN 1989 subsp. minor BRALOWER in BRALOWER, MONECHI, & THIERSTEIN 1989; pp. 201-204, pl. 1, figs. 4-7. Western North Atlantic, Blake Bahama Basin, DSDP Site 534, middle to upper Tithonian. | A394-6 |
| | Watznaueria fossacincta (BLACK 1971) BOWN in BOWN & COOPER; p. 96; (ex Ellipsagelosphaera). | A394-3 |
| | Zeugrhabdotus sisyphus (GARTNER 1968) CRUX 1989; p. 198; (ex Zygodiscus). | A395-6 |
| | ++++++++++++++++Calcispheres++++++++++++++++++ | |
| | Calciodinelleae KEUPP & VERSTEEGH 1989; p. 208; new tribe. | A417-2 |
| | Obliquipithonella pinguis KEUPP & ILG 1989; p. 173, pl. 11, figs. 1-6. France, Normandy, Villers-sur-Mer, early Oxfordian. | A417-1 |
| | Obliquepithonella rhombica JANOFSKE 1989; p. 50, pl. 1, fig. 5. West Germany, Garmisch-Partenkirchen, Rhaetian. | A400-9 *C-3 |
| | Obliquipithonella spathulata KEUPP & ILG 1989; p. 172, pl. 8, fig. 15; pl. 9, figs. 1-15; pl. 10, figs. 1-10. France, Normandy, Villers-sur-Mer, early Oxfordian. | A417-1 |

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| B161 | | |
| | Orthopithonella geometrica (JAFAR 1983) JANOFSKE 1989; p. 50; (ex Prinsiosphaera). | A400-9 |
| | Orthopithonelleae KEUPP & VERSTEEGH 1989; p. 208; new tribe. | A417-2 |
| | Praecalcigonellum KEUPP & VERSTEEGH 1989; p. 211; Type species: "Calcigonellum polymorphum KEUPP 1980. | A417-2 |
| | Praecalcigonellum mutterlosei (KEUPP 1979) KEUPP & VERSTEEGH 1989; pl. 2, fig. 11; (ex "Calcigonellum"). | A417-2 |
| | Praecalcigonellum polymorphum (KEUPP 1980) KEUPP & VERSTEEGH 1989; pl. 2, fig. 10; (ex "Calcigonellum"). | A417-2 |
| | Sphaerodinella KEUPP & VERSTEEGH 1989; pp. 210-211. Type species: Thoracosphaera albatrosiana KAMPTNER 1963. | A417-2 |
| | Sphaerodinella albatrosiana (KAMPTNER 1963) KEUPP & VERSTEEGH 1989; p. 210; (ex Thoracosphaera). | A417-2 |
| | Sphaerodinella arctica (GILBERT & CLARK 1983) KEUPP & VERSTEEGH 1989; p. 209; (ex "Thoracosphaera"). | A414-2 |
| | Sphaerodinella tuberosa (KAMPTNER 1963) KEUPP & VERSTEEGH 1989; p. 210; (ex "Thoracosphaera"). | A417-2 |

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Calcareous nannoplankton species names in alphabetical order.

africanus, Praeprinsius
aktasii, Heliolithus
anfractus, Calculites
attewellii, Futyania
australiensis, Ommatolithus
bergenii, Discoaster
chowii, Fasciculithus
compactus, Rectapontis
complicatum, Pemma
compressus, Nannoconus
contractus, Lotharingius
davyi, Biscutum
dimorphosus, Praeprinsius
emrei, Munarinus
enigma, Pseudoconus
fossacincta, Watznaueria
furcatolithoides ssp. labradorensis, Sphenolithus
geometricus, Stradnerlithus *
globulus ssp. minor, Nannoconus
gorodishchensis, Stradnerlithus *
granulosa, Umbria
granulosa ssp. granulosa, Umbria
granulosa ssp. minor, Umbria
harrisonii, Biscutum
hughesii, Biantholithus
incompta, Retecapsa
infans, Nannoconus
jawzii, Lanternithus
kamptneri ssp. minor, Nannoconus
latens, Micrascidites
maceria, Reticulofenestra
madlingleyensis, Cretarhabdus
maltica, Palaeomicula
martinii, Reticulofenestra
menneri, Lacunolithus
mexicana ssp. minor BOWN & COOPER, Conusphaera
mexicana ssp. minor BRALOWER, Conusphaera
minuta, Braarudosphaera
multicolumnatus, Faviconus

mutterlosei, Staurolithites
nebulosus, Rhagodiscus
octiformis, Tegumentum
octofenestratus, Cretarhabdus
parallelus, Pseudolithraphidites
parisiense, Pemma
parisiense ssp. parisiense, Pemma
parisiense ssp. primordis, Pemma
parvulum, Neobiscutum
paucipunctata, Arkhangelskiella
perfecta, Amitha
petalosa, Futyania
plethotretus, Perissocyclus
ponticus, Multipartis
productella, Reticulofenestra
prolata, Amitha
quadrisphena, Palaeomicula
rimosus, Neocrepidolithus
romeinii, Neobiscutum
rothii, Notiocyrtolithus
rotundus, Heliolithus
semenenko, Isolithus
sisyphus, Rectapontis
sisyphus, Zeugrhabdotus
striatum, Tegumentum
tayloriae, Perissocyclus
tenuiculus, Praeprinsius
tenuis, Tegumentum
tollmanniae, Conusphaera
tripartita, Cleosphaera
velatus, Lotharingius
wintereri, Nannoconus
zlambachensis, Eoconusphaera

* = Invalid

New calcareous nannoplankton genus names.

Amitha
Cleosphaera
Faviconus
Futyania
Isolithus
Lacunolithus
Neobiscutum
Notiocyrtolithus
Ommatolithus
Palaeomicula
Praeprinsius
Pseudoconus
Rectapontis
Umbria

Calcisphere species names in alphabetical order.

albatrosiana, Sphaerodinella
arctica, Sphaerodinella
geometrica, Orthopithonella
mutterlosei, Praecalcigonellum
pinguis, Obliquipithonella
polymorphum, Praecalcigonellum
rhombica, Obliquipithonella
spathulata, Obliquipithonella
tuberosa, Sphaerodinella

New calcisphere genus names.

Praecalcigonellum
Sphaerodinella

New calcisphere tribe names.

Calciodinelleae
Orthopithonelleae

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Comments

1 - B155 Conusphaera mexicana TREJO 1969 subsp. minor BOWN & COOPER 1989 was published a few months before Conusphaera mexicana TREJO 1969 subsp. minor BRALOWER in BRALOWER, MONECHI, & THIERSTEIN 1989 and, therefore, has priority. While I cannot supply the exact dates of publication for both references, the library I used received the BOWN & COOPER paper in CRUX & HECK's book in April 1989, shortly before the BRALOWER, MONECHI, & THIERSTEIN paper was published in Marine Micropaleontology in May 1989.

2 - B159, B160 Invalid new combination; ICBN Art 33.2 requires full reference to the basionym be given.

3 - B160 Obliquepithonella err. cit. pro Obliquipithonella. The name is still valid; ICBN Art. 73.

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

A1-1, B-2: Biscutum notaculum WIND & WISE in WISE & WIND 1977; p.298 and Biscutum notacutum WIND & WISE in WISE & WIND 1977; pl. 26, fig. 4 are invalid; ICBN Art. 43.

A310-7: = A169-4.
A312-5: 'clacareous' should be 'calcareous'.
A312-7: 'orgainc' should be 'organic'.
A322-3: 'JURA.E' should be 'JURA.L'.
A322-9: The reference shold begin 'In: Ruddiman...'.
A323-2: The reference shold begin 'In: Ruddiman...'.
A325-7: The pages should be 53-54.
A330-9: Add 'Atl.C.'.
A331-8: 'Palin' should be 'Plain'.
A332-8: The pages should be 36-38.
B140: Calyculus hommerili should be spelled Calyculus hommerilii.
B141: Discorhabdus biradiatus: The holotype reference is WORSLEY 1971, pl. 1, fig. 54.
B141: Octopodorhabdus plethotretus: add: 'p. 631. Holotype: WIND & CEPEK 1979; pl. 4, figs. 1-3. Eastern Atlantic, DSDP Site 397, Hauterivian'.
B142: The basionym of Rhagodiscus swinnertonii should be Rhabdolithina not Rhabdolithia.
B142: Triscutum expansus should properly be spelled Triscutum expansum.
B142: Rhagodiscus pseudoangustus CRUX 1987 was published before, and has priority over Zeugrhabdotus? pseudoangustus BRALOWER, APPLEGATE, COVINGTON, & WISE in COVINGTON & WISE 1987. The latter is not invalid, but it is a subjective synonym of the former.

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## NEWSLETTER - ADVICE TO CONTRIBUTORS

### TYPES OF CONTRIBUTION

Essentially the newsletter is informal and contributions of any type submitted in any form will be considered, if not necessarily accepted. The following notes are therefore a guide to possibilities rather than a set of directions.

A. BIBLIOGRAPHIES: These are produced by the bibliographers. Any suggestions, reprints of articles, and details of omissions should be sent to them directly.

B. ARTICLES: Short articles on any aspect of nannoplankton work are welcomed. Discussion, review, synthesis, and methodology articles are particularly welcome. Any articles with scientific content will be reviewed and should be submitted at least two months before the final copy deadline. The newsletter is a valid publication for taxonomic articles.

C. REVIEWS: Reviews of books, equipment items, or computer software and conference reports are welcome. To avoid duplication the idea may be suggested to the editor in advance of submission.

D. NEWS, & NOTES: Any news items, on forthcoming conferences, research projects, new appointments are welcome. *Changes of address should be sent to the Secretary / Treasurer* (not the editor or US Treasurer).

### SUBMISSION PROCEDURE

Two copies should be sent of all submissions. Include Fax number if available, for proof checking. News items and initial drafts of articles can be sent in draft form. Other items should be sent *either* as proof ready copy *or* on computer disc.

PROOF READY COPY: Submit on A4 paper (210x297mm) with 2.5cm left, right and top margins, 3.5cm bottom margin. Single spacing, 15point (elite) text. If possible use a laser printer.

SUBMISSION ON DISC: Include print-out and details of system used. I can easily handle the following. *IBM/MS-DOS*, any format, 5.25" or 3.5", discs (ideal 5.25", 1.2 Mb). Text as WordPerfect, WordStar, Smart, DCA, Navy DIF, MultiMate, or ASCII files (ideal WordPerfect 5.0). *MacIntosh,* 3.5" discs, Ms-Word, MacWrite or ASCII files. *Amstrad,* 3"discs, Locoscript, Wordstar, Tasword or ASCII files. Any alterations to the text, other than for spelling or very minor mistakes, will be checked with the author.

DIAGRAMS: Should be submitted as very clean computer printouts, photographs or photocopies of final size, do not send large or delicate originals.

REFERENCES: Use standard (World List) abbreviations, and format of examples below. ODP & DSDP volumes should be treated as periodicals using the following abbreviations: IRDSDP; Proc. ODP Init. Rep.; Proc ODP Sci. Res.

Spencer S. & Dobb A. 1988: New observations on Upper Cretaceous vombatidae. *J. Wom. Res.*, **25**, 35-67.

McCarthy J.J. 1980: Nitrogen. In, Morris I. (ed.) "The Physiological Ecology of Phytoplankton", Blackwell, p.191-234.