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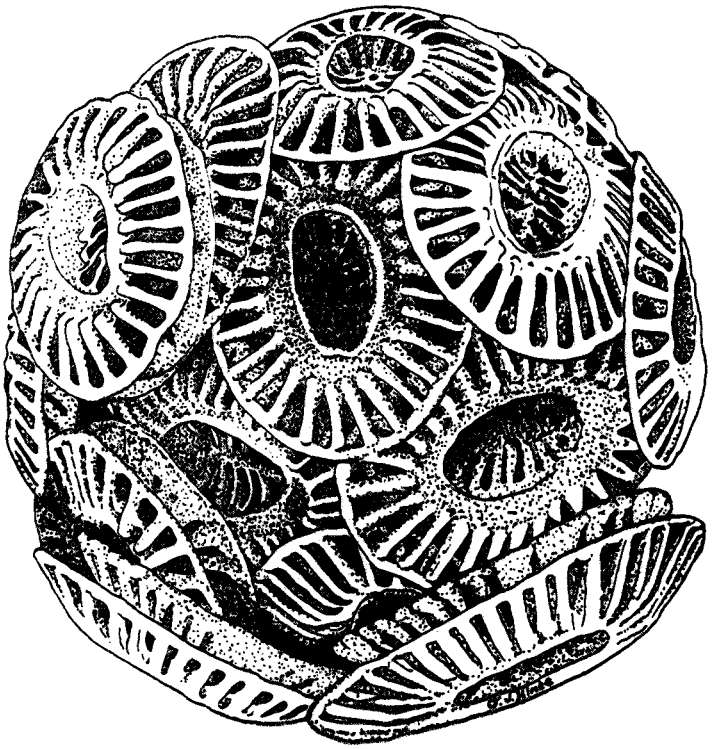
INA NEWSLETTER



INTERNATIONAL NANNOPLANKTON ASSOCIATION

VOLUME 15 NUMBER 1 1993

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INA NEWSLETTER

Proceedings of the International Nannoplankton Association

Volume 15 Number 1 June 1993

NEWS AND ANNOUNCEMENTS

Compiled and edited by Jeremy Young on behalf of the INA Committee

ANNICK PUJOS

We were shocked and very sorry to hear from her husband that Annick died last year. Jacques Giraudeau who did his PhD with her has written an appreciation.

INA COMMITTEE

It is traditional for election of INA officers to occur as far as possible at the biennial conferences. This year the only definite change of officer is the presidency which has, of course, already been decided (democratically) - Shirley van Heck is to take over from Katharina. The other officers are willing to continue but we would be very happy if members volunteered to replace or help us - if you want to do something for INA please just write to Katharina or Shirley. For instance if you would like to edit the Newsletter or compile the Bibliography please tell us - we will not be offended.

One new post we would like to make is "E-mail Officer" to organise a database of E-mail addresses and perhaps set up an INA Bulletin Board - if you are an expert in this area or would like to try and experiment please get in touch (see also the article on E-mail below).

INA TREASURER

Please note the INA treasurer is Nicky Hine (not Magdy Girgis who is still receiving mail!). Also Nicky has moved - her new address is:

Nicky Hine, Industrial Palynology Unit, Mappin St., Sheffield, S1 3JD, UK

NEW JOURNAL POSSIBILITIES

After the experience of editing the Prague Proceedings Bohumil Hamrsmid is seriously interested in the possibility of starting a new international journal from Czechoslovakia specialising in nannoplankton and other microplankton. Publishing costs are lower there than in the west, but printing quality is not much different, and with a good editorial board editing can be of the same standard. With a circulation of about 300 it would be possible to produce a journal for about $10-15 per issue. This is not very different to the existing INA subscription so one *possibility* would be to produce an INA Journal from Czechoslovakia with the content of the current INA Newsletter plus additional scientific articles. This idea will be debated at the Salamanca Conference, but we would also like to hear from anyone else.

SALAMANCA 1993 INA CONFERENCE

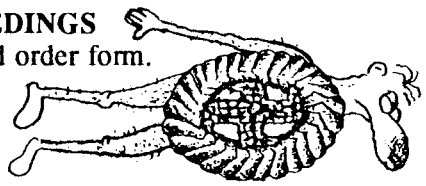
Things are looking very good for this conference, and we look forward to seeing you there. More abstracts have been received than for any previous INA meeting and they are generally of a very high standard. The abstract volume will be sent out with this Newsletter. In addition all members should have already received (in March) the second circular for this conference. Please remember the following: The deadline for registration was 1st May 1993, and for accommodation reservation 1st June 1993. It is now really too late for any extra talks.Late registration and poster presentation may still be possible - but communicate immediately!

All communication to:

José Abel Flores, Depto de Geología, Fac. de Ciencias, Universidad, 3708 Salamanca, Spain.
Fax 34-23-294514. E-Mail <paleo@a655.usal.es>

PRAGUE 1991 INA CONFERENCE PROCEEDINGS

These are now available - see enclosed leaflet and order form.



FLORENCE 1989 CONFERENCE PROCEEDINGS

These are still available through the INA. Price £68 (*including* £8 postage). Cheques payable to INA. Send orders to:

Nicky Hine, Industrial Palynology Unit, Mappin St., Sheffield, S1 3JD, UK

SEPM Poster Session - April 1993

A poster session on "Nannofossil Biostratigraphy and Paleo-Oceanography" was held at the annual AAPG-SEPM meeting in New Orleans, April 25-28, 1993. The co-ordinators for the session were Dick Constans and Woody Wise (who assures me the session "went off fine").

The following posters were presented:

J.J. Pospichal: Nannoplankton Succession Across the K/T Boundary: El Kef Revisited

T. Dunn: Calcareous Nannofossil Biostratigraphy and Paleoecology of the Fort Hays Limestone Member (Upper Cretaceous), Niobrara Formation, from Jewell County, Kansas, Wolcott, Colorado, and Wagon Mound, New Mexico

Tim J Bralower, S.E. Mock, J.H. Ekdahl, L.C. Gaskins, J.M. Blakeney: Towards Morphometric Biochronology

Jorg Mutterlose, E. Erba: Towards a World-Wide Applicable Biostratigraphy of Early Cretaceous Nannofloras

Jim A. Bergen, R.A. Salomon: Cretaceous Nannofossil Zonations: A New Look At Fossil Datums for Biostratigraphic Applications

Laura M. Bybell, J.M. Self-Trail: Evolutionary Trends in Paleocene and Eocene Calcareous Nannofossil Species from the Gulf and Atlantic Coastal Plains

M. Carminatti, G. Villa: High-Resolution Stratigraphy of the Ilerdian Figols Allogroup (Southern Pirenees, Spain)

Mitch Covington: Neogene Nannofossils of Florida

Wuchang Wei, S.W. Wise, A. Peleo-Alampay: Accelerated Dispersion of New Pelagic Taxa Associated with Cooler Climates and More Vigorous Oceanic Circulation

Marie-Pierre Aubry: The Global Early to Middle Eocene Hiatus(es): Calcareous Nannofossil Evidence

T.S. Staerker, S.W. Wise, N.S. Lundberg, P. Reid, J.Y. Collot, H.G. Greene: Nannofossil Evidence for Thrust Faulting and Sediment Mixing in an Accretionary Complex (New Hebrides Island Arc)

J.P. Muza, A. Rahman: Japan Sea Paleoceanography and Geologic History Based on Calcareous Nannofossils

ANNICK PUJOS

Annick Pujos died of cancer on July 31, 1992. Though she informed me of her illness a few years ago, It was with shock that I received the sad news. So great was her courage and love for her research that she kept on working till the final week of her life, as shown from the mail I received from her after she passed away. Her determination not to give up in front of this terrible disease was evident from her enthusiastic plans for future research projects and prospective collaborations. Never did I hear Annick complaining about her physical state, nor did she mention her illness as an explanation for any short drops in her otherwise great activity. She hid her physical pain behind an unfailing good humour, and a great pride.

Annick Pujos accomplished her career entirely at the University of Bordeaux. After submitting her doctoral thesis, she entered the Dept of Geology in 1966 as a benthonic foraminifera-specialist, but quickly orientated her work toward nannofossils. Among her achievements are her works on the biostratigraphical value of the various morphotypes of *Gephyrocapsa*, her input to the scientific results of DSDP Legs 80 and 85, and the use of the transfer function technique on nannofossil census-counts for paleoceanographical reconstruction. In her latest works she looked at the spatio-temporal distribution of some (Quaternary coccoliths, and applied a new transfer function on Plio-Pleistocene nannofossils from the northwestern margin of tropical Africa. I am very proud that I was given the chance to work at her side for the last five years. I will deeply miss her.

Jacques Giraudeau, Cape Town.

BIBLIOGRAPHY - of Annick Pujos' papers on calcareous nannofossils.

Pujos-Lamy A., 1977: *Emiliania* et *Gephyrocapsa* (nannoplancton calcaire): biometrie et intéret biostratigraphique dans les Pleistocene Supérieur marin des Acores. *Revta. esp. Micropalaeont.*, **9**, 69-84.

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Pujos A., 1985: Nannofossils from Quaternary deposits in the high-productivity area of the Central Equatorial Pacific, DSDP Leg 85. *Init. Rep. Deep Sea drill. Proj.*, **85**, 553-578.

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Giraudeau, J., & Pujos, A., 1990: Calcareous nannofossils based transfer function in Caribbean Pleistocene sediments. *Oceanol. Acta*, **13/4**, 453-469.

Pujos, A., & Lamia B.1991: The Quaternary Prinsiaceae (calcareous nannofossils) in a core from the Mozambique Channel: Are these essential stratigraphical markers influenced by external forcing?*Bull. Inst. Geol. Bassin d'Aquitaine, Bordeaux*, **50**: 71-78.

Pujos A. 1992: Calcareous nannofossils and the <25μm fraction in Quaternary sediments of the subtropical N.E. Atlantic Ocean. *Mem. Sci. Geol.* **43**

Pujos A., 1992: Calcareous nannofossils of Plio-Pleistocene sediments from the northth western margin of tropical Africa. In, Summerhayes, C.P. *et al.* (eds.), "Upwelling systems: evolution since the early Miocene". *Geol. Soc. Spec. Publ.*, **64**, 343-358.

ELECTRONIC MAIL

E-Mail is a wonderful system which enables almost instantaneous and free communication. Here in the museum we have been a bit slow about getting connected but (with the aid of some *E.huxleyi* research money) I now have my new computer directly linked to the outside world via Internet. As an example I have received about 1/3 of the INA Abstracts by E-mail which removed the need for translating text between word-processors, scanning or re-typing. Also I have had valuable "conversations" with Woody, Katharina, Jim, Jose (actually some technical problems there) and Patrizia.

Do you have E-mail already? If so please send me a message so I can add you to the address list. Also give my your ideas - should we set up an INA bulletin board? *Would you like to run it?* Do other bulletin board systems exist which we could usefully become part of?

Why you should get E-mail? As nanno workers we are a small community of only 2-300 workers scattered all round the world most of whom should have reasonably easy access to E-mail. This is the most efficient way we can communicate, good for anything from messages to manuscripts. As we develop an informal network of INA members then we should be able to use it for developing databases, sending out general appeals for help, sharing ideas etc.

How can you get E-mail? Very broadly you need access to a mail-server computer which will be permanently switched on sending and receiving electronic mail. You can do this two ways (1) If you are in a western university, government lab or big company then almost certainly there will be such a mail-server in your institute. You then get in touch with the computer people who run it and ask how you can use E-mail. You may have to walk over to the computer lab or the library each time to use it, or if you are lucky there will be a cable network inside your institute you can connect your PC to (you will need some extra hardware and software, perhaps $100-200). Either way *using* the system should cost you nothing. (2) If your institute cannot help you then probably you would need to buy a modem for your computer and get connected to a bulletin board which has access to Internet. In this case you will have to pay a subscription to the bulletin board so using the system will cost you something.

E-Mail addresses of some INA members

Jorg Bollmann	<bolle@erdw.ethz.ch>
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Jim Pospichal	<Pospi@FSU.EARN>
Samir Shafik	<sshafik@frend.bmr.gov.au>
Jeremy Young	<jy@nhm.ic.ac.uk>
Woody Wise	<wise@geomag.gly.fsu.edu>
Wuchang Wei	<WWei@ucsd.edu>

I hope to have a much longer list for the next issue, and will send out a couple of E-mail updates out before then, if there are enough to make it worth while.

Jeremy Young - jy@nhm.ic.ac.uk

INA MEMBERS - NEWS & GOSSIP

The Newsletter is meant to be a source of informal communication as well as formal, so here is a compilation of bits of news we have on nannofossil workers (sorry for the UK bias) - we hope to make this a regular feature so please send me (or Jeremy) any relevant information.

If you have recently achieved the dizzy heights of PhD status, and having people bow and scrape and call you `doctor' just isn't satisfying enough for your ego, why not let us advertise your status and your thesis title FOR FREE in our `RECENTLY ACQUIRED PhDs' section?!
And for those of you who reach the out-of-this-world-and-orbiting climax that is professorship, where better to brag about it than in such a prestigious journal as this? You'll find yourself (alone, probably) under our `PROFESSORSHIPS' section.

Specifically for those desperate and slippery nannoplankton people with wanderlust/ants in their pants/no fixed abode/unstable income* (*delete as appropriate), we have designed the `CIRCULATING' section. If you're on the move (or if you have moved and you think your lack of post is because no one knows where you went), and you think someone out there may be remotely interested, let us spread the word of your movements. Big Brother INA would like to keep an eye on you! (N.B. The INA accepts no liability if you advertise your whereabouts and still don't receive any post!).

RECENTLY ACQUIRED PhDS (1993)

JANUARY: *Brigitta van Niel* (UCL, London, U.K.) - Early Cretaceous *Nannoconus* (Calcareous nannofossil, *Incertae sedis*) in NW Europe. Briggy is now working with Phil Weaver's at the Institute of Oceanographic Sciences (U.K.).
FEBRUARY: *Thomas Ehrendorfer* (Woods Hole, U.S.A.) - Late Cretaceous (Maastrichtian) calcareous nannoplankton biogeography...
MARCH: *Sevinc Ozkan* (UCL, London, U.K.) - Calcareous nannofossil and calpionellid biostratigraphy of the Upper Jurassic to Lower Cretaceous in NW Anatolia, Turkey. Sevinc returned to a university career in Turkey.
APRIL: *Alfredo Rodriguez Saavedra* (Brest, France) - Plio-Pleistocene nannofossils from Gulf of Mexico DSDP Sites...
Jim Pospichal (FSU, Tallahassee, U.S.A.) - K/T boundary... Jim will consider any suitable propositions.
JUNE: *Annelies Kleijne* (VUA, The Netherlands) - Live nannoplankton...

PROFESSORSHIP

Alan Lord of University College London was recently awarded a Professorship.

MISCELLANEOUS FAME

Woody Wise has been made president of the Society of Economic Paleontologists and Mineralogists (SEPM) - a suitable consolation for being beaten in the INA election.

CIRCULATING

Jason Crux is believed to be alive and working in Venezuela.
Thomas Ehrendorfer (until recently at Woods Hole) was lured by the promise of our balmy British summers to take up a PostDoc with Paul Bown and Jeremy Young at UCL (U.K.).
Nicky Hine, our treasurer and until recently with the British Geological Survey, has acquired a Fellowship with the Industrial Palynology Unit at Sheffield University (still working on nannos!).
Ric Jordan (IOS, U.K.), having had enough of balmy British summers, heads for Japan in August to work with Hisatake Okada.
Ton Romein has found stable employment with Shell NAM.
Jeremy Young is not circulating but now has a "permanent post" fossilising at the museum - a dangerous place to be caught napping at your microscope, with all those taxidermists around...
Jackie Burnett joins the 10%+ of the British population enjoying the comforts of not being able to work for a living... donations welcome!
Alex Chepstow-Lusty has had enough of counting discoasters and is looking after chimpanzees in Tanzania

Jackie Burnett, Geology, University College London

OCEAN DRILLING PROGRAM NEWS

John Firth, Ocean Drilling Program, Texas A & M University

ODP Leg 147 (November 26, 1992 - January 21, 1993) cored two sites in Hess Deep, which recovered gabbros, peridotites, dunites, and harzburgites. Site 895 intersected the petrologic MOHO, or the crust/mantle boundary.

ODP Leg 148 (January 26 - March 10, 1993) returned to Hole 504B in the Eastern Pacific and deepened the hole to 2111 m. The crustal layer II/III boundary (sheeted dikes/gabbros)was not reached.

ODP Leg 149 (March 14 - May 27, 1993) drilled two sites off the Iberian Abyssal Plain to study the tectonic development of a non-volcanic rifted margin, and to study the transition from oceanic to continental crust. *Li Liu* and *Eric de Kaenel* were the nannofossil palaeontologists.

ODP Leg 150 (June 1 - July 27, 1993) will drill off the New Jersey margin to study the mid-Cenozoic sea level history recorded in the sedimentary sequences of the continental slope. *Marie-Pierre Aubry* and *Stefan Gartner* will be the nannofossil paleontologists on this leg.

ODP Leg 151 (August 1 - September 26, 1993) will drill on the Yermak Plateau in the Arctic Ocean and in the Fram Strait between Greenland and Svalbard, to study the evolution of surface and deep water masses, climate change, ice history, and sediment budgets through the time of the opening of the Atlantic-Arctic gateway. *Tokiyuki Sato* will be the nannofossil paleontologist.

ODP Leg 152 (October 1 - November 26, 1993) will drill off of East Greenland at 63°to study the nature of deformation and volcanism during the rifting of a volcanic margin. *Wuchang Wei* will be the nannofossil paleontologist for this leg.

ODP Leg 153 (November 29, 1993 - January 24, 1994) will drill the mid-Atlantic ridge crest (MARK) to recover deep crustal and mantle rocks in an exposed rift.

ODP Leg 154 (January 29 - March 26, 1994) will drill the Ceara Rise in the equatorial Atlantic to study Cenozoic palaeoceanography and bottom current history. Applications are now being accepted for this cruise.

ODP Leg 155 (March 31 - May 26, 1994) will drill the Amazon Fan. Approximately 21 shallow (100 m) sites will be drilled to study the facies distribution of the fan. Sediments will be Quaternary in age. Applications are now being accepted.

ODP Leg 156 (May 31 - July 26, 1994) will drill the north Barbados Ridge accretionary prism, to study the relationship of fluid flow and structural deformation in a fine-grained siliciclastic regime. Cenozoic sediments will be recovered. Applications are now being accepted.

ODP Leg 157 (July 31 - September 25, 1994) will drill the Vema Fracture Zone to test the Diamond Coring System. A limestone cap and underlying crust will be drilled on this leg. Applications are now being accepted.

ODP Leg 158 (September 30 - November 25, 1994) will drill TAG, a geothermal ?black smoker? site, to study the geochemistry, mineralogy, and fluid flow regime of the deposits. Applications are now being accepted.

To apply for participation as a shipboard scientist on an ODP cruise, send a letter of request and a resumé to the Manager of Science Operations, Ocean Drilling Program, Texas A&M University Research Park, College Station, TX, 77845. You will receive an application form to fill out and return to ODP.

THE ICBN: THINGS YOU NEED TO KNOW - 8

Shirley E. van Heck, SSB, Lutong, Sarawak, Malaysia

Our last journey through the labyrinth of the ICBN took us from Art. 6.2 in Chapter II to Art. 32.1 in Chapter IV. At that point we were directed towards Arts. 33-45, which we shall begin to follow here.

ARTICLE 33

33.1. A combination (autonyms excepted) is not validly published unless the author definitely associates the final epithet with the name of the genus or species, or with its abbreviation.

This rule states that it is not sufficient to name a new genus, and then merely list the species thought to belong to it. The species names have to be printed in combination with their new genus. This rule rarely causes problems, although in some of the older publications authors have made the mistake of mentioning only the basionyms, omitting the actual new combinations.

33.2. A new combination, or an avowed substitute (nomen novum), published on or after 1 Jan. 1953, for a previously and validly published name is not validly published unless its basionym (name-bringing or epithet-bringing synonym) or the replaced synonym (when a new name is proposed) is clearly indicated and a full and direct reference given to its author and place of valid publication with page or plate reference and date. Errors of bibliographic citation and incorrect forms of author citation (see Art. 46) do not invalidate publication of a new combination or nomen novum.

This is the single rule that causes most invalid combinations. Before giving further explanations, some of the terms may need clarification. A basionym is the original combination under which a name was first published. A nomen novum is a new name that is introduced to avoid the creation of a homonym when a species name is transferred to another genus. For example: Stradner (1961) introduced the species *Heliorthus tenuis*. In 1963 the same author decided to transfer the species to the genus *Coccolithus*, but the combination *Coccolithus tenuis* already existed for another species introduced by Kamptner (1937). He therefore had to introduce a new name, *Coccolithus helis* (the holotype of which is the holotype of *H. tenuis*), to avoid creating a homonym (see also INA Newsletter vol1/2, p.C-3, comment on B29,A14-5).

A new combination and a *nomen novum* are treated in the same way, in that the basionym must be mentioned with the original author, year of publication, page numbers of the original description, and figure number of the holotype. This, however, is not enough, as the complete reference must also be given. Note that it is not sufficient to cite the complete publication: the exact page(s) of the original description need to be cited.

Recommendation 33A.1 has bearing on this Article:

33A.1: The full and direct reference to the place of publication of the basionym or replaced synonym should immediately follow a proposed new combination or nomen novum. It should not be provided by mere cross-reference to a bibliography at the end of the publication or to other parts of the same publication, e.g. by use of the abbreviations "loc. cit." or "op. cit.".

If this had been a rule, most of our new combinations would be invalid. It may therefore be a good idea to start applying this recommendation, and it is to be hoped that if it is elevated to the status of rule (as often happens), it will be in effect only from a set date, and not backdated.

As a new combination has no legal status under the zoological code, many authors are not aware of the importance of either the basionym or the full reference. And unfortunately, while many authors do submit the reference correctly in the manuscript, some editors are not aware of the rule, and delete the relevant references from the paper. Numerous examples of invalid combinations are cited in the various issues of the INA Newsletter.

As the last sentence of Art. 33.2 indicates, an incorrect citation does not invalidate the new combination. This is fortunate, as confusion about the correct date of publication for some papers has led to several such incorrect citations.

This leads us to Art. 46, to which Art. 33.2 refers.

ARTICLE 46

46.1. For the indication of the name of a taxon to be accurate and complete, and in order that the date may be readily verified, it is necessary to cite the name of the author(s) who validly published the name concerned unless the provisions for autonyms apply (Arts. 19.3, 22.1, and 26.1; see also Art. 16.1).

This rule only describes correct practice and has no influence on validity as it refers to names already validly published. Unfortunately, it is often ignored as a result. The articles referred to have already been discussed in previous issues of this column.

46.2. When a name of a taxon and its description or diagnosis (or reference to a description or diagnosis) are supplied by one author but published in a work by another author, the word "in" is to be used to connect the names of the two authors. When it is desirable to simplify such a citation, the name of the author who supplied the description or diagnosis is to be retained.

This rule is commonly applied, and does not seem to present any problems. Example: *Rhabdolithus superbus* Deflandre in Deflandre & Fert 1954.

46.3. When an author who validly publishes a name ascribes it to another person, e.g. to an author who failed to fulfil all requirements for valid publication of the name or to an author who published the name prior to the nomenclatural starting point of the group concerned (see Art. 13.1), the correct author citation is the name of the validating author, but the name of the other person, followed by the connecting word "ex" may be inserted before the name of the validating author (see also Rec. 50A2).....

This rule is applied in cases of validations, and is generally straight forward. Example: *Crepidolithus crucifer* Prins 1969 ex Rood, Hay & Barnard 1973. N.B. The phrase "Prins 1969 ex" is optional so *Crepidolithus crucifer* Rood, Hay & Barnard 1973 is correct, but *Crepidolithus crucifer* Prins 1969 is not.

As no nannofossils were published before the nomenclatural starting point of either the algae or fossil plants, that item does not concern us (Art. 13.1 was discussed previously). Rec. 50A2 merely repeats Art. 46.3 in fewer words, and the omitted sentence deals with garden plants.

Article 46 is followed by several recommendations, most of which need not concern us. Recommendation 46C, however, is of interest:

46C.1. When a name has been published jointly by two authors, the names of both should be cited, linked by means of the word "et" or by an ampersand (&).

46C.2. When a name has been published jointly by more than two authors, the citation should be restricted to that of the first one followed by "et al.".

This leads us back to Art. 33.

Art.33.3. Mere reference to the Index Kewensis, the Index of Fungi, or any work other than that in which the name was validly published does not constitute a full and direct reference to the original publication of a name.

In our case, this implies that it is not sufficient to refer to the INA Newsletters or the nannoplankton Index published by Loeblich & Tappan.

The remaining paragraphs of Art. 33 deal with misplaced terms (such as species subdivided into genera), which has so far not been a problem in the nannoplankton literature.

REFERENCE:

Greuter, W., 1988: International Code of Botanical Nomenclature. Koeltz Scientific Books, 328 pp.

CONFERENCE REPORT - BIOLOGY OF THE PRYMNESIOPHYTA

29th March - 1st April 1993, Plymouth.

A Systematics Association Symposium in association with the British Phycological Society

Convenors: John Green (Plymouth Marine Lab.) & Barry Leadbeater (Birmingham Univ.)

Report by Jeremy R. Young, Palaeontology Dept., The Natural History Museum, London

This three day meeting was organised by John Green and Barry Leadbeater as a means of synthesising the diverse research that has been carried out on the biology of living coccolithophores and their non-calcifying cousins. It was in fact the first conference that has ever been held on this group and the venue of Plymouth was highly appropriate since it was here that Mary Parke and Irene Manton carried out their pioneering research which lead to the characterization of the haptophytes/prymnesiophytes as a distinct group. Some 81 participants came from around the world, including large French (6), Scandinavian (13, including Denmark), Dutch (6) and Japanese (8) contingents and a home team of 28 from the UK.

The program was centred on 23 invited talks providing a comprehensive coverage of Prymnesiophyte biology including biomineralization and other intra-cell processes, cell ultrastructure, biochemistry of cell components (chloroplast pigments and alkenones), life-cycles and reproduction, molecular genetics, ecology of particular groups (including non-marine and polar Prymnesiophytes), economic aspects (blooms and mariculture), global impacts, and overviews of taxonomic diversity, phylogenetic origins and geological record (which I gave). These talks will be published as a Systematics Association Special Volume. There were also about 20 other talks and a number of posters, giving details of research over a similar range of topics, it is intended that some at least of these will be published in the Canadian Journal of Botany.

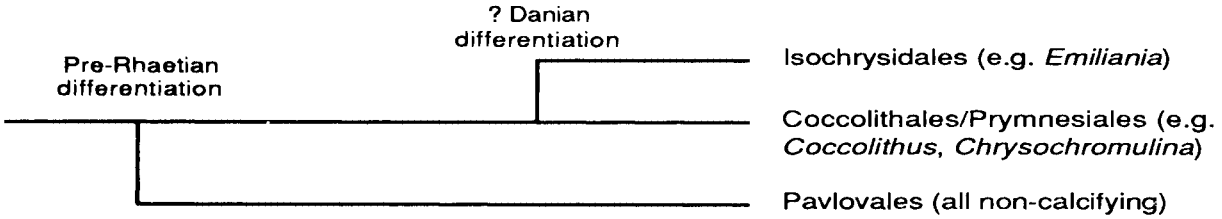
INA members present included Leslie Rhodes, Marie-Christine Janin, Ric Jordan, Peter Westbroek, Judith van Bleiswijk, Paul van der Wal, and Berit Heimdal. We all found the meeting extremely useful and enjoyable and learnt a great deal about the group we work on and the many other ways people are studying them. (I hope we also managed to convince some of the others to join INA). The Special Volume should form an invaluable resource for all nannoplankton workers, and probably will complement rather than duplicate the volume on *Coccolithophores* Bill Seisser and Amos Winter have nearly finished. For the moment I will try to summarise some of the most interesting information and perspectives that I got from the meeting.

MISCELLANEOUS POINTS OF INTEREST

Gary Barker (Bristol) has been working on the molecular biology of *E.huxleyi*, and showed that there is in fact little evidence of genetic differentiation within the species. This strongly supports the concept of *E.huxleyi* as a biological species and indicates that the variation documented within it is truly intra-specific. (I for instance had previously speculated that the *Emiliania* morphotype might have arisen polyphyletically from more than one *Gephyrocapsa* lineage). More broadly it does provide grounds for confidence in the use of coccolith morphology for taxonomy.

John Green explained that despite the recent tendency to use the name Prymnesiophyta - as in the title of the symposium - in fact Haptophyta may be a better name for the division, since it has priority and in the ICBN there is no need for the names of taxa above the rank of class to be based on genera (see also Young 1987).

Maureen Conte discussed recent work on the U^{k}_{37} alkenone palaeothermometry technique and explained how there are real problems in getting dependable results at low temperatures (below about 5°C). In discussion it became reasonably clear that the biomarker is characteristic of the Isochrysidales.



Order level phylogeny of the Prymnesiophyta

HIGHER TAXONOMY

Many speakers presented data and ideas on higher taxonomy based on a wide range of criteria, including flagellar structure, molecular systematics, photosynthetic pigments, and alkenone types. It was gratifying to find that all these approaches produced consistent results and there was a clear consensus as to the major groups, as summarised in the figure and strongly supporting the tentative conclusions of Green et al (1990, p.312-314).

First the Prymnesiophyta are clearly a major group well separated from other phytoplankton. Second two orders are easily separable from the rest: the Pavlovales which are probably primitively different; and the Isochrysidales which are a more recently diverged group. These orders were originally recognised on the basis of flagellar and haptonematal structure but all the other criteria support the division. Traditional classifications placed the coccolithophores in a fourth order, the Coccosphaerales, but it is now clear that they are better divided between the Isochrysidales (e.g. *Emiliania*, *Gephyrocapsa*) and the residual group, (e.g. *Coccolithus*, *Pleurochrysis*). It is unclear whether this residual group should be subdivided on the basis of presence/absence of coccoliths.

At the family level classification it was evident that the new biologists still have little to teach traditional taxonomists or palaeontologists. This is largely becauseonly a limited range of species have been studied in culture. However, Isao Inouye, revealed that he now has cultures of manyother species, including *Calyptrosphaera*, *Helicosphaera* and *Syracosphaera*. Study of these should be very rewarding.

LIFE CYCLES

Chantal Billard presented a particularly interesting paper summarising the work of the Caen group (Gayral, Fresnel, Billard - see especially Gayral & Fresnel 1983, and Fresnel & Billard 1991) and discussing possible extrapolations of it. In particular she showed that a common feature of the sexual life-cycles that have been documented is that there are consistently different body scale types in the haploid and diploid phases (as summarised below). She then showed that these scale types also occurred in many other Prymnesiophytes and appeared to form a key to predicting the life-cycles of these groups (although the Pavlovales and Isochrysidales are, as usual, different). By contrast other criteria including in particular presence/absence of coccoliths, and motility are not simply related to haploidy/diploidy.

FEATURE	DIPLOID STAGE (2N)	HAPLOID STAGE (N)
Can reproduce asexually?	Yes	Yes
Flagellae & haptonema?	Often	Always?
Coccoliths	Often - heterococcoliths	Often - holococcoliths
Body scales	rims	With rimsNo rims
prox ornament	radial + irreg concentric	radial
dist ornament	radial + irreg concentric	concentric (regular)

ECOLOGY

Helge Thomsen presented data suggesting that even in the open oceans non-calcifying and weakly calcifying Prymnesiophytes could be both more abundant and more diverse than coccolithophores. Hilary Jones described how mixotrophy by some of these species made them important micro-grazers. Many speakers discussed *Phaeocystis* which is notorious for producing nuisance-blooms of algal scum, and Ovind Møestrup reviewed toxic blooms by other species, including a bloom of *Chrysochromulina polylepis* in Norway in 1988 which killed 800 million tons of fish. Not surprisingly such blooms provide an important research topic for many algologists. An interesting perspective from this was that the number of species which are toxic is still unclear and it is quite possible that some coccolithophores may produce toxins.

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Gayral P. & Fresnel J. 1983: Description, sexualité et cycle de developpement d'une nouvelle coccolthophoracée (Prymnesiophyceae): *Pleurochrysis pseudoroscoffensis* sp. nov. *Protistologica*, **19/2**, 245-261.

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BOOK REVIEWS - ANOXIA AND UPWELLING FROM THE GEOLOGICAL SOCIETY OF LONDON

Reviewed by Tim Bralower, Geology Dept., University of N. Carolina, Chapell Hill, NC

MODERN AND ANCIENT CONTINENTAL SHELF ANOXIA.

Tyson, R.V. and Pearson, T.H. (eds.), 1991, Geol Soc. Spec. Publ., **58**, 470pp. £75, $125.

An ever-expanding field of research has centred on the occurrence of oxygen-deficient environments in modern and ancient oceans. It is becoming increasingly difficult to keep up with the growing number of papers, especially as they are spread through various major journals. Special Publication Number 58 of the Geological Society will be useful to those who need to catch up with the latest research being carried out on the effects on anoxia on shelf sedimentation. This volume includes 28 papers which discuss a broad set of topics relating to the origin of dysoxic/anoxic conditions on shelves and their effects on sedimentology, sedimentary geochemistry and faunal communities.

The volume is logically divided into two parts which separately discuss modern and ancient anoxic shelf systems. The first part includes a number of general papers which describe the physical and biological oceanographic factors which lead to oxygen deficiency on modern shelves. Other papers are concerned with the effects of this deficiency on benthic communities, inorganic and organic sedimentary geochemistry and sedimentology. This section includes studies of a geographically-widespread range of modern shelves. The second section begins with several detailed papers on general aspects of the sedimentology of ancient deposits of oxygen-deficient environments. This is followed by an impressive set of papers which centre on the record of ancient dysoxia/anoxia on specific organic-rich deposits, includes examples from the Devonian to the Tertiary. These deposits have been investigated from a variety of angles ranging from sedimentology, sedimentary geochemistry and benthic palaeoecology.

In itself, there are no papers in this volume which directly apply nannoplankton assemblages or stratigraphy, or which discuss the effect of oxygen deficiency on nannoplankton distributions in sediments. However, this volume should be of value to those who are interested in applying nannofossil stratigraphy and palaeoecology to help decipher the causes of oxygen deficiency in modern and ancient shelf environments.

UPWELLING SYSTEMS: EVOLUTION SINCE THE EARLY MIOCENE

Summerhayes, C.P., Prell, W.L. & Emeis, K.C. (eds.), 1992, *Geol. Soc. Spec. Publ.*, **64**, 519pp. £66, $110.

Most nannoplankton specialists are interested in ways to detect variations in productivity in modern and ancient oceans from assemblages preserved in sediments. This comprehensive set of 31 papers concerning various aspects of modern and ancient upwelling systems, provides us with a state-of-the-art account of how modern upwelling systems operate and ways to detect upwelling in the geological record.

This publication is divided into three sections. In the first, papers discuss various aspects of modern upwelling systems from their physical oceanography to the plankton assemblages and sediments associated with them. Various papers describe the applicability of paleo-upwelling criteria based on the modern record. This section includes studies of most microplankton groups but has a notable absence of nannoplankton assemblages. The second section contains investigations of diagenetic conditions of sedimentary components of upwelling systems. This section includes a comprehensive paper by Ten Haven and Colleagues describing the diagenesis of alkenones, organic molecules which can be produced by calcareous nannoplankton species. These authors show that by studying the abundance of these compounds, particularly using the U^{k}_{37} technique, we might learn more about the relationship of upwelling intensity and nannoplankton productivity.

The third section concerns the Neogene geological record of upwelling. This section includes an innovative paper by Annick Pujos on calcareous nannofossils in Plio-Pleistocene sediments off western Africa. This paper includes a discussion of the palaeoecological affinities of various nannoplankton taxa followed by a comparison of abundances in sediments from this area with salinity, temperature and productivity estimates from stable isotopes and other microfossil proxies. Finally, nannoplankton based-transfer functions are established for all three oceanographic variables. Pujos concludes that it is still not possible to isolate temperature, salinity or productivity as single factors causing changes in the abundance of individual taxa. This is

largely because physical oceanographic changes usually induce fluctuations in more than one variable.

This publication highlights the relative paucity of information regarding the behaviour of nannoplankton assemblages in upwelling environments. In attempting to establish these relationships, we must continue to compare changes in assemblages with other microplankton and geochemical proxies. The most useful aspect of this publication to the nannoplankton specialist is that it will help us adopt a more multidisciplinary approach in reading the modern and ancient record.

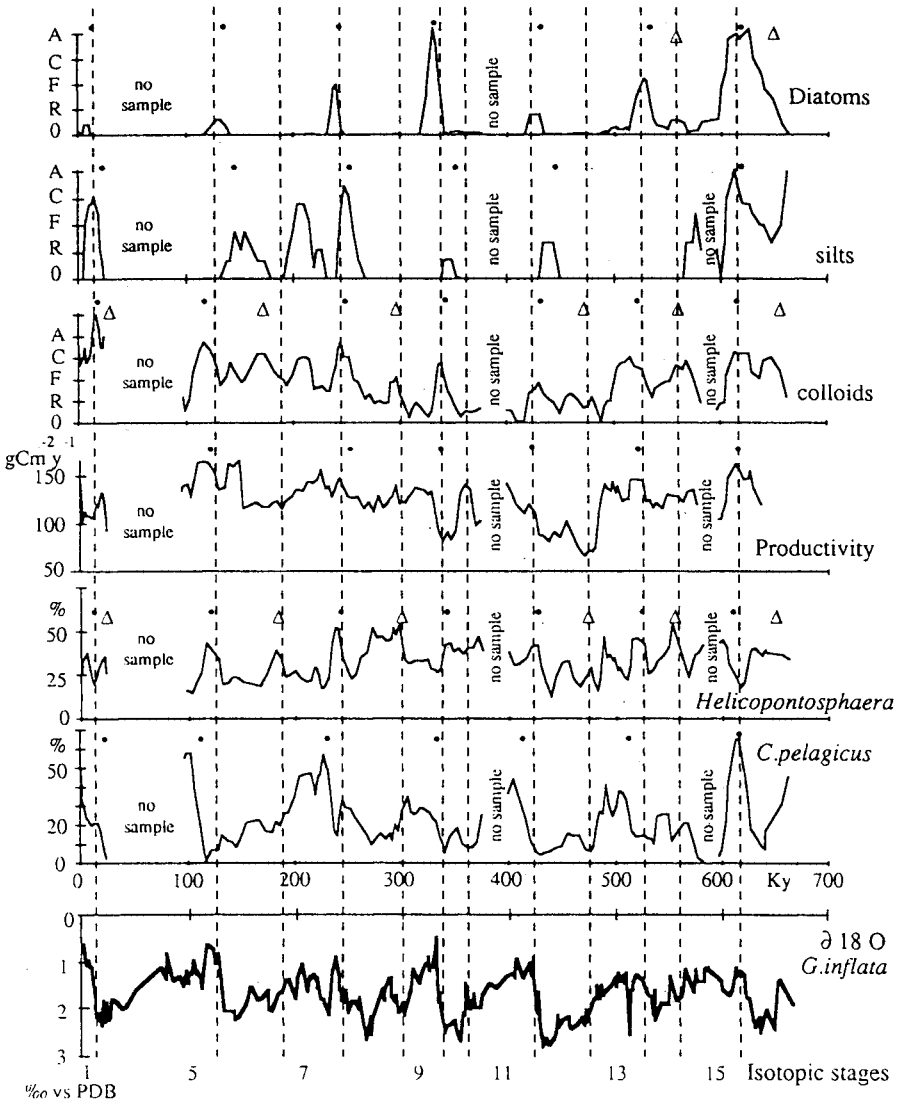

Fig. 7. The main events at glacial/interglacial (△) and interglacial/glacial (•) stage limits.

One of the detailed diagrams in Annick Pujos' paper in the Upwelling Systems volume.

Book Review - FOSSIL PROKARYOTES AND PROTISTS

Jere H. Lipps (ed), 1993, Blackwell Scientific Publications,
342pp, £35.00 (soft-back). ISBN 0-86542-073-4

Reviewed by Nicky M. Hine, Applied Palynology Unit, Sheffield University, UK

Having commented recently to a colleague that an up-to-date text on general micropalaeontology was needed, I was delighted when Lipps landed on my desk. Not that this book is, strictly speaking, a handbook on micropalaeontology. It is a text devoted to single celled organisms: prokaryotes and single celled protists. This diverse and complex group includes many of those forms commonly investigated by micropalaeontologists. By restricting the text to a particular level of cell organisation, rather than a particular technique of investigation, it inevitably excludes some of those groups (such as the ostracodes and conodonts), that come under the umbrella of micropalaeontological investigations.

The text assumes a prior knowledge of palaeontology and biology and is organised into two parts, the first dealing with general aspects of unicellular organisms, the second with each of the major groups. Chapters 1, 2 & 3 deal with the fundamental differences in cell organisation, prebiotic conditions and the origins of life, the early history of single celled organisms and their subsequent radiations and extinctions through geological time (Lipps, Deamer, Knoll). The succeeding chapter covers aspects of micropalaeontology including systematic palaeontology, palaeoecology and biostratigraphy. combined, these four chapters make a welcome refresher course on basic principles of palaeontology.

The next ten chapters deal methodically, a chapter a piece, with the major groups of unicellular organisms, each written by a practising expert in their field: Prokaryotes (Golubic & Knoll), Acritarchs (Mendelson), Dinoflagellates - including endoskeletal forms (Edwards), Ebridians (Ernissee & McCartney), Chrysophytes - including the silicolagellates (Lipps & McCartney), Diatoms (Barron), Calcareous Nannoplankton (Siesser), Foraminifera (Culver), Radiolaria (Casey) and Tintinnids (Tappan).

Each chapter follows the same general format, including sections on the history of research, morphology and systematics, biology and palaeobiology, the fossil record and biostratigraphy, and their evolutionary record. Each chapter is concluded with a supplementary reading list. The text is very well illustrated by a selection of line drawings, photographs and SEM micrographs. Where applicable, zonation schemes and range charts of biostratigraphically important species are presented, accompanied by photographic plates of the key biomarkers.

It is difficult to select highlights due to the very high standard of the entire book; however, there were a number of items which I particularly enjoyed. The Chrysophyte and Radiolaria chapters include well illustrated guides to their informal classification and systematics; the Dinoflagellate and Diatom chapters incorporate some magnificent SEM micrographs, with the former including comprehensive, clearly illustrated range charts of key Mesozoic and Cenozoic forms; the Radiolaria chapter includes a section on their application as palaeoceanographic indicators; the Foraminifera chapter has an interesting section on the relationship between environmental stress and speciation tactics; and the calcareous nannoplankton chapter includes range charts and zonation schemes for the Jurassic through Quaternary, presented as 6 range charts, accompanied by 2 photographic plates illustrating the key biomarkers. In all cases the modern biology of the organism (where known) is well covered, with some interesting examples of living organisms in their life-habitats. A single appendix consisting of collection and preparation techniques (living and fossil), followed by a glossary of terms and a subject index concludes the volume.

There is little to criticise, with the book successfully providing an understanding of the fossil record of unicellular organisms, their modern biology and geological history, and their current applications. The SEM micrographs could have been of a consistently higher quality, and some of the illustrations, in particular the foraminifera drawings are too dark, which is a great pity as much of their detail is lost. I also suspect that my interest in the book will far outlive the book itself, with the binding and book cover looking rather worn after just a few weeks.

This is an interesting and enjoyable, easy to read, informative text made amenable by its style, its regular format and its clear and careful illustrations. Considering the immense scope of the subject matter the editor has exercised great economy whilst preserving the salient detail. This is an immensely useful text for a specialist in one field who requires an up to date appraisal of a related field, and I have no reservations in recommending it.

UPDATED CENOZOIC NANNOFOSSIL MAGNETOBIOCHRONOLOGY

Wuchang Wei and Alyssa Peleo-Alampay
Scripps Institution of Oceanography, University of California, San Diego, USA

The Cenozoic magnetobiochronology of Berggren et al. (1985a, b, c) has been essential in translating biostratigraphic information into numerical age information and widely used in studies of Cenozoic marine sediments. However, a significantly improved geomagnetic polarity time scale has recently been published (Cande and Kent, 1992) and the age differences between the new time scale and that of Berggren et al. (1985) are up to 2.9 m.y. It is thus necessary to convert the magnetobiochronologic ages of Berggren et al. (1985) to the new time scale. Here we recalculate the nannofossil datum ages given in table 4 of Berggren et al. (1985a) and table 7 of Berggren et al. (1985b) and graphically present them in the new time scale (Fig. 1).

Each new datum age is calculated based on:

$$(A_o - T_o)/(B_o - A_o) = (A_n - T_n)/(B_n - A_n) \text{ or:}$$

$$A_n = (T_n \cdot A_o - A_o \cdot B_n + T_o \cdot B_n - T_n \cdot B_o)/(T_o - B_o)$$

where A is the age of the datum, T and B are the ages for the top and bottom, respectively, of the magnetic subchron in which the datum is located, and the subscripts "$_o$" and "$_n$" indicate old and new time scales, respectively.

A few of the datum ages given in Berggren et al. (1985a, b) are inappropriate even in the old time scale. These problems are corrected and briefly outlined below:

The age for the first occurrence (FO) of *Catinaster calyculus* was given the same age as that of *Discoaster hamatus* (Berggren et al., 1985b) and thus subzone CN7a does not exist, although Berggren et al. (1985b, c) inferred its existence. The last occurrence (LO) of *Sphenolithus belemnos*, the marker for the NN3/NN4 boundary, has an age of 17.4 Ma in Berggren et al. (1985b) based on DSDP Site 516, 18.8 Ma in Backman et al. (1990) based on ODP Site 710, and 18.7 Ma in Gartner (1992) based on DSDP Site 608. We adopt the age of 18.8 Ma, which translates to 18.5 Ma in the new time scale. The FO of *S. belemnos* was assigned an age of 21.5 Ma in Berggren et al. (1985b), who cited Miller et al. (1985) as the data source. However, the latter study gave an age of about 20.8 Ma, which is virtually the same as that determined by Takayama and Sato (1987). We use the latter age, which translates to 20.5 Ma in the new time scale. The FO of *Isthmolithus recurvus* has an age of 37.8 Ma in Berggren et al. (1985a). This age was revised to about 39.0 Ma based on data from the Massignano section (Italy) and ODP Sites 744, 689, and 690 (Wei, 1992). The latter age translates to 36.2 Ma in the new time scale.

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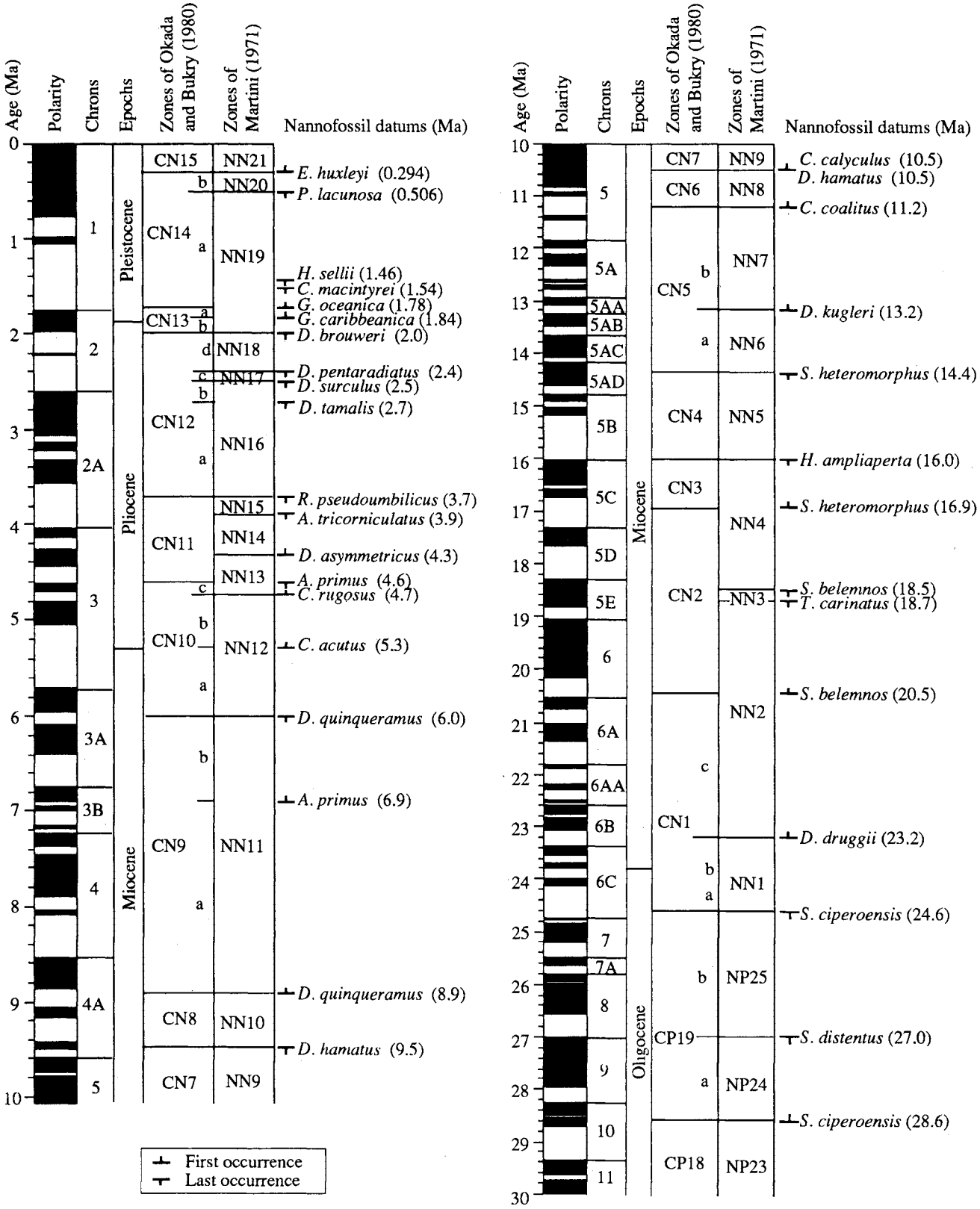

Fig. 1. Updated Cenozoic nannofossil magnetobiochronology. The magnetic polarity time scale is that of Cande and Kent (1992). The datum ages are converted from Berggren et al. (1985a,b) except for a few as discussed in the text.

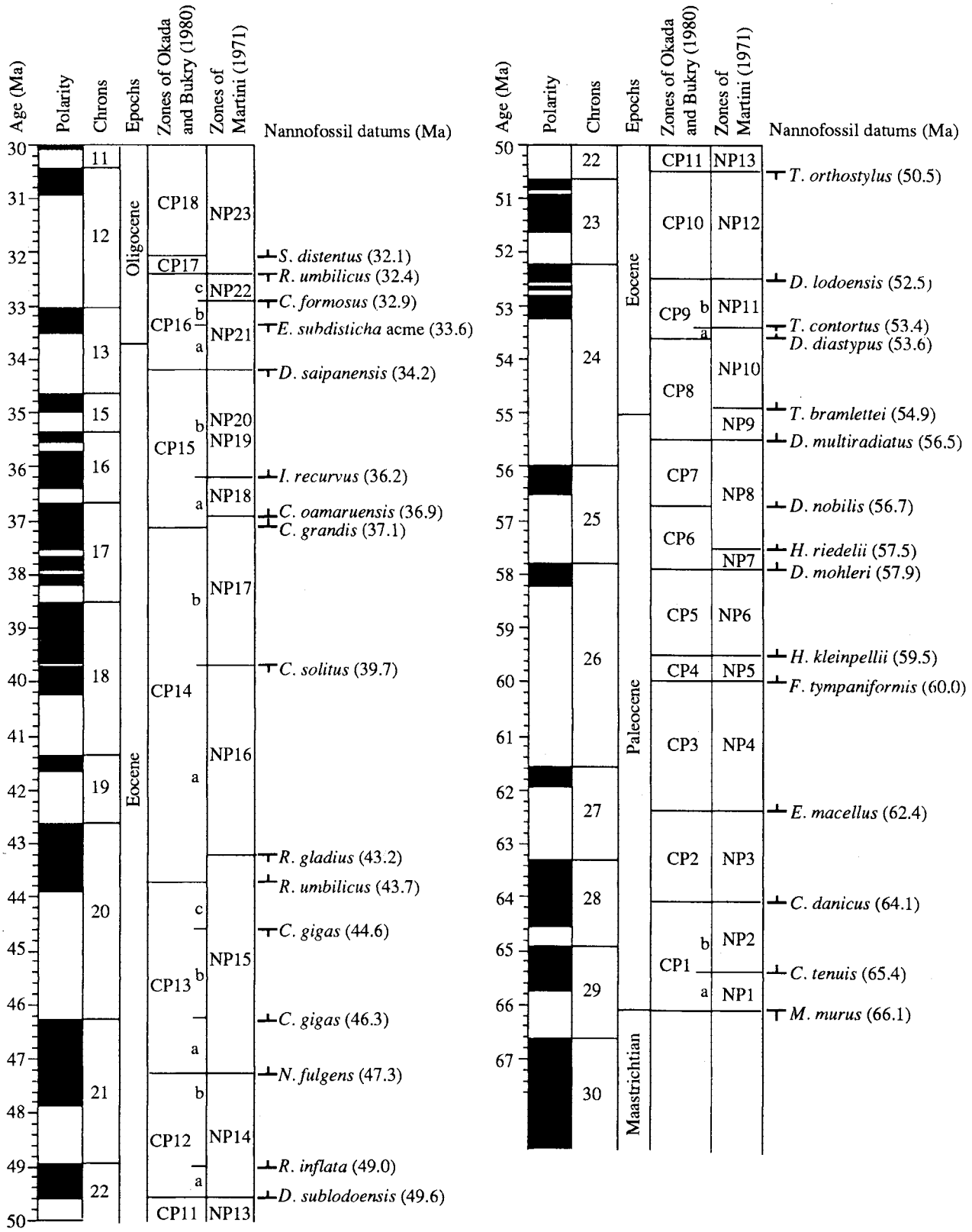

Fig. 1 (continued)

PROPOSED CHANGES TO THE CLASSIFICATION SYSTEM OF LIVING COCCOLITHOPHORIDS. III.

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Annelies Kleijne, Institute for Earth Sciences, Vrije Universiteit, Amsterdam, NL
Berit R. Heimdal, Dept .of Fisheries and Marine Biology, University of Bergen, Norway

The classification of living coccolithophorids is presently under further scrutiny following the recent review by Jordan & Kleijne (in press). This has been initiated, in particular, by the needs of two ambitious projects, *The Encyclopedia of Algal Genera* (ed. B.C. Parker) and the Expert-Centre for Taxonomic Identification (ETI). As a consequence of their requests for information it has been necessary to re-examine, and in some cases revise, the generic concepts of a number of taxa, and to provide an up-to-date list of all known species (Jordan & Green, 1993). In this paper we discuss the new combinations of several species previously assigned to *Cricosphaera*, a genus regarded as a junior synonym of *Pleurochrysis*.

Also we propose that, where holococcolith and heterococcolith bearing species are shown to be alternate phases of a single life-cycle, the two phases should be recombined as one species, but with each phase assigned *forma* status.

TAXONOMIC RECOMMENDATIONS

Calyptrolithina divergens* var. *tuberosa (Heimdal, in Heimdal & Gaarder 1980) *stat. nov.* (Note 1)

Basionym: *Zygosphaera divergens* f. *tuberosa* Heimdal, in Heimdal & Gaarder, 1980, p.12, pl.3, fig.25.

Synonym: *Calyptrolithina divergens* f. *tuberosa* (Heimdal, in Heimdal & Gaarder) Heimdal, 1982, p.54.

Papposphaera borealis* f. *sagittifera (Manton *et al* 1976) *comb. & stat. nov.* (Note 2)

Basionym: *Papposphaera sagittifera* Manton., Sutherland, & McCully 1976, pp.228-229, figs 1-4.

Synonym: *Papposphaera borealis* (Manton, Sutherland & Oates 1976) Thomsen, Østergaard & Hansen, 1991, p.641, figs 2-4, 9 (in part).

Papposphaera arctica* f. *sarion (Thomsen 1981) *comb. & stat. nov.* (Note 2)

Basionym: *Papposphaera sarion* Thomsen, 1981, p.79, figs 5-8.

Synonym: *Papposphaera arctica* (Manton, Sutherland & Oates) Thomsen, Østergaard & Hansen, 1991, pp.640-641, figs 5-8 (in part).

Pleurochrysis elongata (Droop 1955) *comb. nov.* (Note 3)

Basionym: *Syracosphaera (Hymenomonas) elongata* Droop, 1955, p.240, figs 12-14.

Synonyms: *Cricosphaera elongata* (Droop) Braarud, 1960, p.212.

Hymenomonas elongata (Droop) Parke & Green, 1976, pp.552 and 554.

Pleurochrysis gayraliae (Beuffe 1978) *comb. nov.* (Note 3)

Basionym: *Cricosphaera gayraliae* Beuffe, 1978, p.458, figs 1-13.

Scyphosphaera apsteinii* var. *dilatata (Gaarder 1970) *stat. nov.* (Note 1)

Basionym: *Scyphosphaera apsteinii* f. *dilatata* Gaarder, 1970, p.119, figs 4-6.

Syracosphaera dilatata (Heimdal, in Heimdal & Gaarder 1981) *stat. nov.* (Note 4)

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

Synonym: *Syracosphaera halldalii* f. *dilatata* (Heimdal, in Heimdal & Gaarder) Jordan & Young, 1990, pp.15-16.

Tetralithoides Theodoridis 1984 *emend.*

Type species: *Tetralithoides quadrilaminata* (Okada & McIntyre) *comb. nov.*

Emended description: Coccosphere shape unknown, but with monomorphic oval coccoliths. Each coccolith rim bearing both a proximal and distal flange of equal size. Rim surrounding a large central area, with calcified plates covering the proximal part of the coccolith.

Type species: *Tetralithoides quadrilaminata* (Okada & McIntyre) *comb. nov.*

Tetralithoides quadrilaminata (Okada & McIntyre 1977) *comb. nov.* (Note 5 & Figs 1-2)

Basionym: *Cricosphaera quadrilaminata* Okada & McIntyre 1977, p.15, pl.6, figs 5-6.

Synonym: *Tetralithoides symeonidesii* Theodoridis, 1984, p.88, pl.9, figs 5-12.

Emended description: Oval caneolith-like coccoliths with a very large central area covered by three or four angular plates forming a solid bottom. Central plates interlock in a complicated manner in distal view. In proximal view plates appear fused giving X- or Y-shaped suture lines. Distal and proximal flanges similar in size. Proximal part of rim with a short oblique continuation directed into the central area and overlying the central area plates. Coccoliths 3.9 to 7.5 µm long and 2.9 to 5.2 µm wide.

EXPLANATORY NOTES

1) Use of varieties. In a previous paper the use of subspecies in coccolithophorid taxonomy was discussed and it was proposed that use of variety was generally preferable (Jordan & Young, 1990). At that time taxa of *forma* status were not mentioned. Since then there has been a proposal to adopt *forma*' status exclusively for the use of life cycle stages (Kleijne, 1991). This proposal is supported and continued below (see Note 2). However, within the classification scheme there are two taxa with *forma* status which are not alternate life cycle stages of the type form. To avoid future confusion it is proposed here to change their status to variety.

2) Heterococcolithophorid/holococcolithophorid combinations within the Papposphaeraceae. Recently, it has been reported that cells of *Papposphaera* and *Pappomonas* spp. were seen to combine consistently with cells of *Turrisphaera* and *Trigonaspis* spp. (Thomsen *et al.*, 1991). This association, called a "combination cell" (see Thomsen *et al.*, 1991, figs 8 & 9), only occurs between discrete pairs of species. For instance, *Papposphaera sagittifera* and *Turrisphaera borealis*, *Papposphaera sarion* and *Turrisphaera arctica*, *Papposphaera* sp. and *Turrisphaera polybotrys*, and *Pappomonas flabellifera* var. *borealis* and *Trigonaspis* cf. *diskoensis*. The authors believed that these associations were part of the life histories of these species. To emphasise this they transferred the *Turrisphaera* species to their *Papposphaera* counterparts. As the latter genus has priority *Turrisphaera* has now become superfluous and a junior synonym of *Papposphaera*. However, in the case of two species the new combinations took the specific epithet of the holococcolithophorid stage (*Turrisphaera*" phase), as they were described prior to, or at the same time as, their respective heterococcolithophorid stage. Thus the combinations *P. arctica* and *P. borealis* were created.

In the literature there are only two other examples of heterococcolithophorid-holococcolithophorid alternate life cycles. These are *Coccolithus pelagicus* and *'Crystallolithus' hyalinus*/*C. braarudii* (Parke & Adams, 1960; Rowson *et al.*, 1986), and *Calcidiscus leptoporus* and *'Crystallolithus' rigidus* (Kleijne, 1991). However, they do not form combination cells like those above, instead one stage is produced and subsequently released from inside the cell of the other stage. Furthermore, as recommended by Kleijne (1991) the stages in the life cycle of coccolithophorids should be retained as separate taxonomic units with *forma* status. Thus in accordance with this recommendation the combinations proposed by Thomsen *et al.* (1991) should be further subdivided to this level (see the section on taxonomic recommendations).

3) Assignment of species of *Cricosphaera*. Braarud (1960) described this genus for monomorphic cricolith-bearing coccolithophores Braarud (1960) transferred two *Syracosphaera* species into his new genus; *S. carterae* and *S. elongata*. The former was designated as the type species and two further species were later added to the genus; *C. quadrilaminata* (Okada & McIntyre, 1977) and *C. gayraliae* (Beuffe, 1978). However, several years earlier *Pleurochrysis* had been described by Pringsheim (1955) on the basis of its flagellar morphology and life

history, but without any knowledge of its coccoliths. These coccoliths were recognised later as cricoliths. At that time the two genera were separated by life history. Species were only retained in *Cricosphaera* if a benthic stage had not been recognised. However, Christensen (1978) transferred *C. carterae* to *Pleurochrysis* on the grounds that it possessed a benthic stage. By transferring the type species of *Cricosphaera* to *Pleurochrysis* the former became superfluous and a junior synonym of the latter. Thus the species of *Cricosphaera* should be transferred to *Pleurochrysis* or to another genus (see Note 5).

4) ***Syracosphaera dilatata.*** The taxon was first described as a form of *Caneosphaera halldalii* by Heimdal and Gaarder (1981) and later transferred to *Syracosphaera* (Jordan & Young, 1990). The coccoliths of this form are, however, significantly different from the type, *S. halldalii* f. *halldalii*. The type possesses a distinct, wide distal flange (see Gaarder & Heimdal, 1977, pl.6), whilst f. *dilatata* has merely a flared rim (see Heimdal & Gaarder, 1981, pl.2, fig.9). In addition, the presence of a beaded mid-wall flange on the circum-flagellar coccoliths of f. *dilatata*, which is mentioned but not figured by the authors (Heimdal & Gaarder, 1981, p.44), is a significant difference between this form and the type. Neither *S. halldalii* or its close relative, *S. molischii*, have a mid-wall flange. It is therefore proposed to elevate *S. halldalii* f. *dilatata* to species level.

5) ***Tetralithoides quadrilaminata.*** *Cricosphaera quadrilaminata* was first described from the deep photic zone of subtropical/tropical waters of both the Atlantic and Pacific Oceans (Okada & McIntyre, 1977). Since then it has only been recorded a few times: in deep photic waters of the subtropical N.E. Atlantic (Jordan & Kleijne, unpubl. obs); in Miocene sediments of the Mediterranean, the Atlantic and the Indian Ocean (Theodoridis, 1984); and in Quaternary sediments of the Philippine Sea (Matsuoka & Okada, 1989) and off the coast of Japan (Okada, 1992).

Its coccoliths were described as cricolith-like, however, the possession of calcareous elements associated with the proximal part of the tube and of other elements filling the central area (Fig.1), is not characteristic of members of the Pleurochrysidaceae. In our opinion these calcified plates may be homologous to the flattened plates of *Alisphaera* or the radial laths of *Syracosphaera* spp. In addition, the oblique continuation of the rim into the central area (Fig.2), is also a character of both *Alisphaera* and *Syracosphaera* spp. (Jordan *et al.*, in prep.). Thus transfer of this species to *Pleurochrysis* would not be not as satisfactory as for the other *Cricosphaera* species (see Note 3). Its taxonomic position would be more closely associated with the Syracosphaeraceae. Placement in *Alisphaera* would not be satisfactory, because the development of the central area in *C. quadrilaminata* is significantly different.

Theodoridis (1984) described a new genus and species, *Tetralithoides symeonidesii*, from the Miocene of the western Mediterranean (DSDP Site 372). He recorded occurrences from zones NN2 to NN11. The polarised light micrographs closely resemble the one featured later in Okada (1992), however, Theodoridis did not realise that his new species was identical to *Cricosphaera quadrilaminata* (Okada & McIntyre, 1977) described seven years earlier. We therefore propose the new combination *Tetralithoides quadrilaminata.*

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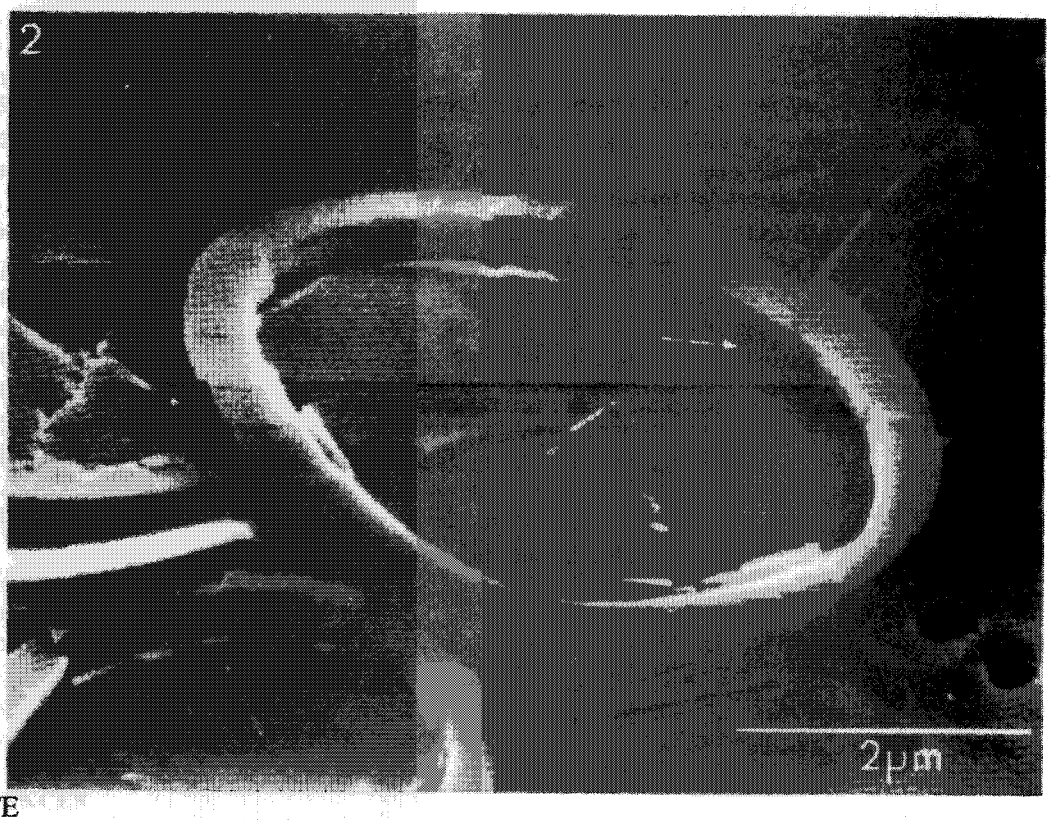

PLATE

Figure 1: Coccoliths of *Tetralithoides quadrilaminata* showing both distal and proximal views. In distal view the 3 or 4 central area plates are shown to be overlapping, whilst in proximal view they appear fused in X- or Y-shaped suture lines. Specimen from 160m at St.11311 (26°11'N 44°53'W). Bar = 2 µm.

Figure 2: Coccoliths of *Tetralithoides quadrilaminata* showing both distal and proximal views at higher magnification. Note also the smaller oblique continuations of the rim at the proximal end of the tube (arrowed). Bar = 2 µm.

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A474

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B175

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Trochoaster simplex (KLUMPP 1953) subsp. *variabilis* MARTINI 1991b, p. 171, pl. 1, figs. 1-8, pl. 2, figs. 1-12. Germany; lower Oligocene. A479-4

Vagalapilla dibrachiata (GARTNER 1968) RAHMAN & ROTH 1991, p. 769; (ex *Vekshinella*). A481-4

B176

Watznaueria coronata (GARTNER 1968) BUKRY 1969 emend. RAHMAN & ROTH 1991, pp. 775-776. A481-4

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Zeugrhabdotus binarius RAHMAN & ROTH 1992, p. 273, figs. 7.6-7.11. Central Russia; middle Oxfordian. A481-5

Zeugrhabdotus bussonii (NOEL 1965) RAHMAN & ROTH 1992, pp. 273-274; (ex *Zygolithus*). A481-5

Zeugrhabdotus cooperi BOWN 1992, pp. 372-373, pl. 2, figs. 1-12. Argo Abyssal Plain; Tithonian to Valanginian. A473-7

Calcispheres

"Bicarinellum" pulcher KEUPP & KOWALSKI 1992, pp. 221-222, pl. 5, fig. 13, pl. 6, figs. 1-24. Southwest England; upper Albian. A483-8

Cassianospica JANOFSKE 1992, p. 16; Type species: *Cassianospica curvata* JANOFSKE 1992. A483-6

Cassianospica curvata JANOFSKE 1992, pp. 16-17, pl. 9, pl. 19, figs. 8 & 9. Alps; lower Carnian. A483-6

Gonellum (KURTI) KEUPP 1987, emend. KEUPP & KOWALSKI 1992, p. 220. A483-8

Keuppisphaera radiata (KEUPP 1987) LENTIN & WILLIAMS 1989 emend. KEUPP & KOWALSKI 1992, pp. 216-217. A483-8

Obliquipithonella albiensis KEUPP & KOWALSKI 1992, pp. 222- 223, pl. 8, figs. 13-15. Southeast England; middle Albian. A483-8

Orthopithonella misurinae JANOFSKE 1992, pp. 12-13, pl. 1-3, pl. 19, figs. 1-3. Alps; upper Carnian. A483-6

Orthopithonella porifera KEUPP & KOWALSKI 1992, p. 218, pl. 2, figs. 6-15. Southeast England; upper Albian. A483-8

Orthopithonella prasina JANOFSKE 1992, pp. 14-15, pl. 4-6, pl. 19, figs. 4 & 5. Alps; lower Carnian. A483-6

Pentadinellum cretacea KEUPP 1992, pp. 131-132, pl. 5, figs. 6-10. Germany; middle Aptian. A483-7

Pentadinellum vimineum (Keupp 1987) KEUPP 1992, pp. 132-133; (ex *Carinellum*). A483-7

Praecalcigonellum triangularis (KEUPP 1981) KEUPP 1992, pp. 126-128; (ex *Echinodinella*). A483-7

B177

Ruegenia areata KEUPP, KOHRING & KOWALSKI 1992, pp. 196-198, pl. 2, figs. 1-14. Southeast England; upper Albian. A484-1

Ruegenia hadra KEUPP, KOHRING & KOWALSKI 1992, pp. 198-199, pl. 3, figs. 3-9. Germany; lower Aptian. A484-1

Ruegenia kyrta KEUPP, KOHRING & KOWALSKI 1992, pp. 195-196, pl. 1, figs. 1-13. Southeast England; middle Albian. A484-1

Ruegenia nodosa KEUPP, KOHRING & KOWALSKI 1992, p. 198, pl. 1, figs. 14-15. Escalles/Boulonais; middle Albian. A484-1

NEW TAXA

Genera

Bibreviconus
Cyrtosphaera

Species

argoensis, Cyclagelosphaera
atlanticus, Bibreviconus
bettenstaeditti, Eprolithus
binarius, Zeugrhabdotus
biscayensis, Acanthoica
bownii, Anulosphaera
braloweri, Stradnerlithus
cooperi, Zeugrhabdotus
deflandrei subsp. *pseudoquadrupes, Trochoaster*
deflandrei subsp. *torquatus, Trochoaster*
floridanus, f. *abisectus, Cyclicargolithus*
gaultensis, Seribiscutum
hexaradiatus, Rotelapillus
lecaliae, Cyrtosphaera
okaensis, Diductius
ovata, Millbrookia
pulcher, Bicarinellum
simplex, subsp. *variabilis, Trochoaster*
variabilis, Watznaueria

Calcisphere Genera

Cassianospica

Calcisphere Species

albiensis, Obliquipithonella
areata, Ruegenia
cretacea, Pentadinellum
curvata, Cassianospica
hadra, Ruegenia
kyrta, Ruegenia
misurinae, Orthopithonella
nodosa, Ruegenia
porifera, Orthopithonella
prasina, Obliquipithonella

INTERNATIONAL NANNOPLANKTON ASSOCIATION ACCOUNTS
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SUMMARY

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*1 The UK account consists of a current account, and a deposit account with opening balances of £1235.20 and £1030.27 respectively, and closing balances of £1323.37 and £1039.40. There was formerly a J.R. Young INA Account (opening balance £166.00) this has now been closed and the balance transferred to the current account.

*2 The moneys for the Florence proceedings are not INA Profits, but are for sales of the volume and will be paid out of the account in the coming year.

*3 The total membership has dropped by 19 from the previous year. This is largely due to my cancelling memberships that are more than two years in arrears, and that have not responded to my correspondence. If members have difficulty paying subscriptions please contact me.

N. Hine, Sheffield, 30th April 1993

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NEWSLETTER - ADVICE TO CONTRIBUTORS

TYPES OF CONTRIBUTION

The newsletter is essentially informal and contributions of any type submitted in any form will be considered, if not necessarily accepted. The following notes are 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 may 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.

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 any convenient form. Other items should be sent as proof ready copy *or* on computer disc *or* by EMAIL.

PROOF READY COPY: Submit on A4 paper (210x297mm) with 2.5cm left, right and top margins, 3.5cm bottom margin. Single spacing, 10point 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 3.5", 1.44Mb). Text in any common word processor format, or ASCII files (ideal WordPerfect 5.1 or DCA-RFT). *MacIntosh,* 3.5" discs, any word processor program or ASCII files. Alterations to the text, other than for spelling or minor mistakes, will be checked with the author.

EMAIL SUBMISSION: This is the most copnvenient means of subission for me, and should be available in most institutions. My address is: *jy@nhm.ic.ac.uk*

DIAGRAMS: Should be submitted as very clean computer printouts, photographs or photocopies of final size, do not send large or delicate originals. We cannot very high quaity reproduction of photographs and do not recommend submission of papers which are critically dependant on plates.

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.

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