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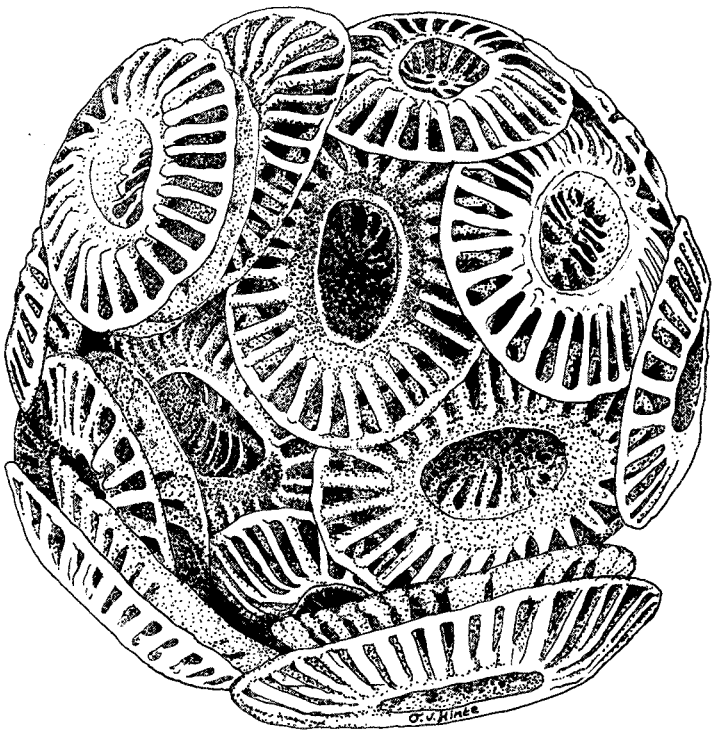
INA NEWSLETTER



INTERNATIONAL NANNOPLANKTON ASSOCIATION

VOLUME 13 NUMBER 3 1991

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NEWSLETTER MATTERS: Send all contributions, suggestions etc. to the editor. *Deadline for next issue 15th March 1992.* For advice to contributors see inside back cover.

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INA NEWSLETTER

Proceedings of the International Nannoplankton Association

Volume 13 Number 3 December 1991

NEWS ITEMS AND ANNOUNCEMENTS

HELENE MANIVIT

Dr. Hélène Manivit died on 9 November 1991. It was with shock and disbelief that I received this sad message. It seems like yesterday when I had the pleasure to sail with Hélène on Ocean Drilling Program Leg 108 to the eastern equatorial Atlantic Ocean. Many fond memories of that cruise are linked to Hélène, among which belong the celebrations of her fiftieth birthday. She was very french that day, elegant at work throughout her long (12 hour) shifts, and very spiritual, vivid and happy during the celebration that followed.

It may seem odd that Hélène participated in that particular cruise which was so strongly oriented towards the Neogene, because her love belonged to the Mesozoic. On top of that Leg 108 was one of ODP's first, very hectic palaeo-oceanography cruises, implying that kilometre after kilometre of white mud arrived on deck at incredible rates; we all walked on our knees towards the end of the cruise. Hélène never missed a minute of her 12-hour shifts. She was a proud person and wanted to do a good job, and never saved any effort to reach that goal. I think that her reward came when we unexpectedly recovered some cores containing Upper Cretaceous muds. She became the queen of the ship because she was the only one onboard who could say something meaningful about these sediments. They were good and productive days for Hélène. I am glad that I was given the opportunity to learn to know her and to work together with her. I will miss her friendly smile.

Jan Backman, Stockholm, 14th November 1991

For all of us who attended the Prague meeting this news is quite incredible. Hélène was there as ever, one of the great characters of INA, talking, dancing, and expostulating. Apparently she died almost instantly and without warning, of a massive brain haemorrhage. We will give a full obituary in the next newsletter.

Elisabetta Erba, Jeremy Young

SECRETARY / TREASURER POST

As announced elsewhere Magdy Girgis has resigned after two years highly efficient service. He warned that the job was getting rather demanding and it has now been split. Kevin Cooper will be membership secretary - maintaining the membership list, and Nicky Hine treasurer - handling the finances and sales of back issues. Changes of address should be sent to Kevin, membership subscriptions, and applications to Nicky. However, we are all in regular communication and if you send information to the "wrong" one of us we will pass it on. All our addresses are on the inside cover of the newsletter.

Kevin Cooper, Nicky Hine, Jeremy Young

PRAGUE PROCEEDINGS

To date (late November) Bohumil has already received 10 manuscripts and refereeing of these has commenced. Any authors who are intending to submit papers but have not sent them by the time they receive this newsletter (late December / early January) are running out of time fast and should contact Bohumil immediately.

NEW FILTERS FROM MILLIPORE

Millipore now produce a new range of filters which are similar to nucleopore filters but are *transparent*. They are thus suitable for use in both light microscopes and scanning electron microscopes, and should be ideal for sampling live nannoplankton. The brand name is "ISOPORE" and they are available with pore sizes from 0.2μm up, and diameters up to 47mm. The price is similar to that of nucleopore filters.

Jeremy Young

4th INA CONFERENCE, PRAGUE 1991

SOME STATISTICS

In all 98 participants made it to Czechoslovakia for the conference including several delegates from the Far East and, for the first time, South America. Of the participants just over half were women and well over half were under 35 (or seemed it), all enjoyed being there and meeting each other. They came from 28 countries and spoke nearly as many languages - although English, Dutch, German, French, Italian, Turkish, Czech and Russian seemed the most common languages. We had about 50 talks, 20 posters, 2 major workshops, 3 days in the field, 4 parties (2 with dancing, all with singing), 1 concert, and several thousand new contacts between individual workers.

A VOTE OF THANKS

The years between the Florence INA meeting (1989) and our arrival in Prague saw a rapid succession of historic events which changed the political map of Europe, including the destiny of Czechoslovakia itself. While Europe was undergoing its revolutions Bohumil Hamřsmíd had the unenviable task of organising the impending 1991 meeting, and while political change often appears to happen overnight, the same cannot be said to apply to the organisation of an international conference. I think I can say, with no fear of contradiction, that his effort was as well worth it and as rewarded by a meeting that was a great success.

The city of Prague is a beautiful and fascinating venue for a meeting and it was all the more interesting considering the changes that had gone before. The meeting itself proceeded with smooth efficiency, which said much for the preparation and temperament of Bohumil and his collaborators. Novotneho lavka, our meeting place, situated on the river in the heart of Prague old town, was perfect. The programme both scientific and social made the meeting a highly enjoyable one. At the welcome party Bohumil showed us that as well as being an efficient organiser, linguist, and nannofossil palaeontologist he has considerable talent in ballroom dancing (something I'll have to work on) - and in the Czech pastime of drinking beer. The field trips allowed us to sample the geology of Czechoslovakia and despite some fairly serious "socialising" (including more dancing) on our leader's part, he still appeared to be in complete control. We left Czechoslovakia a little exhausted but having experienced a thoroughly worthwhile and highly enjoyable conference.

It is my great pleasure on behalf of the INA committee and all 98 delegates to thank the following: Bohumil Hamřsmíd, Jan Krhovský, and Lilian Švábenická for masterminding the organisation. Katharina von Salis and Jeremy Young for external advice, finding funding for the "soviet" delegates and preparing the abstract volume. Stanislav Čech, Miroslav Bubik, Zdeněk Stráník, and Rotislav Brzobohatý for the enthusiastic introduction to their geology that hey gave us with the field trips and excursion guide. The fine and friendly team of ing. Benada, dr. Kraft, dr. Kulich, dr. Jarosova, Mrs. Domasova, and Miss Krhovska for their help in registering delegates, drawing posters, projecting slides and all the other tasks needed to run a meeting smoothly. MND Hodonin, Charles University Science Faculty, the Czech Geological Survey, DANCCO and OMV-Wien for their sponsorship, facilities, and loan of their staff.

Paul Bown

A WORD OF THANKS

Dear colleagues - in those two months since you visited us we have received a lot of very nice letters expressing your thanks for the INA conference in Prague. We all are very glad you enjoyed your stay here and cane back home with new impressions and without great damages. Thank you very much for your letters. We hope to see you soon, all our best

Lilian Švábenická, Jan Krhovský, Bohumil Hamřsmíd.

REPORT OF THE SCIENTIFIC SESSIONS - PRAGUE SEPTEMBER 1991

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

POSTERS

About 25 posters were presented in the lobby of Novotneho lavka and we had special sessions to view them. This was generally agreed to be highly successful, particularly for biostratigraphic studies - nannofossil distribution charts can, and did, prompt fascinating discussions in a poster session (but are disastrous in talks). I do not have a complete list but posters I noticed included ones by Aida Andreeva-Grigorovich (Ukrainian Neogene), Mitch Covington (the spectacular Niobrara Formation laminated deposits, cf. Covington 1985), Anders Henriksson (*Micula prinsii* biochronology), Hélène Manivit (a special study of *Lithraphidites*), Alessandra Negri (a biometric study of *Pseudoemiliania lacunosa*), Steve Root (nannofossils in sequence stratigraphy), Bill Siesser (Cenozoic nannofossils from ODP Leg 122, Indian Ocean), Wuchang Wei (Prinsius biometrics).

LIVING AND QUATERNARY NANNOFOSSILS (Chairman: Jeremy Young)

Davide Castradori opened the conference with a sobering overview of the factors that distort nannofossil assemblages and limit our ability to interpret them ecologically even in the Holocene. Discussion afterwards suggested that pragmatically we should first look for signals which do survive these factors, and second that we still need non-nannofossil information to interpret such signals and build ecological models. Two further talks provided good examples: Jose Abel Flores showed how in some environments bottom currents could have major effect on thanatocoenoses; Mario Cachao discussed the complex patterns developed in neritic environments, and particularly the anomalous distribution patterns of *Coccolithus pelagicus* and *Helicosphaera carteri*. Work on modern nannofloras must provide the basic models so talks in this area were particularly welcome: Michael Knappertsbusch described nannofloras along a depth-latitude transect and showed the strong influence of nutroclines; Paul van der Wal described a single bloom of *Emiliania huxleyi* studied in situ on a special nannoplankton cruise. They both produced calculations of productivity using quite different methodologies but yielding closely comparable results (see abstracts). Ric Jordan gave us a taxonomic respite by discussing the rare and extraordinary species *Turrilithus latericioides* that he has recently described (Jordan et al 1991).

PALAEOECOLOGY, PALAEOOCEANOGRAPHY AND PALAEOBIOGEOGRAPHY (Chairmen: Jorg Mutterlose & Elisabetta Erba).

This special session extended the theme of the previous one back into the geological record and showed how despite the problems nannoplankton studies can already provide many different palaeoecological perspectives. Tim Bralower discussed the complex nature of the mid Cretaceous Oceanic Anoxic Events which appear to have had varying duration, extent and causes, as reflected in varying signals from the nannofossil assemblages. Jorg Mutterlose discussed changes in Boreal-Tethyan nannofossil endemicity during the Early Cretaceous and possible palaeoclimatic interpretations. Elisabetta Erba presented results from ODP Leg 129 and showed that the equatorial palaeoproductivity belt is reflected in high abundances of *Biscutum constans* and *Zygodiscus erectus*, reinforcing previous interpretations of these as eutrophic species.

Jim Pospichal talked twice about research in the Southern Ocean: First he bravely attempted to explain Dave Watkins' work in Upper Cretaceous with only two overheads; then he tried to examine the Palaeocene / Eocene boundary discoaster record to test whether there was any sign of the palaeoceanographic event which caused widespread benthic foram extinctions. Unfortunately since his data set was still very small his interpretations were treated with the ribaldry he freely admitted they deserved. Tamara Gavtadze showed how transgressive and regressive sequences were clearly picked out by changing nannofossil assemblages in the Transcaucasian Eocene. Olga Dmitrenko gave us an overview of an impressive attempt at a synthetic study of nannofossil ecology using the DSDP database.

Three talks dealt with the unusual ecologically restricted nannofloras developed in the Paratethyan Realm during the mid Tertiary. Andras Nagymarosy discussed a succession of bloom events, endemic forms and bioproduction events. Jan Krhovský described highly detailed studies on laminated deposits displaying Milankovitch scale cyclicity. Katharina Sutovska discussed the relationship between productivity and diversity.

Finally Mario Cachão gave a provocative talk on a fine-scale study of Pliocene nannofossils from the Tyrrhenian Sea. He had found, as many other workers have, that it is difficult to correlate fluctuations in nannoplankton abundances with any other parameter. Unusually he proposed that such patterns could be taken as meaningful data but requiring a complex interpretation, in terms of non-linear ecological responses and chaotic behaviour.

TRIASSIC AND JURASSIC BIOSTRATIGRAPHY (Chairman: Paul Bown).

The interest in early nannofloras was reflected by a large number of presentations in this session. Paul Bown described Triassic - Liassic nannofloras from Vancouver, which proved less exotic than his field transport. Dorothea Janofske used wall structure to analyze the affinities of the calcispheres that often dominate Triassic assemblages. Angela Baldanza showed that there are significant variations in Pliensbachian and Toarcian nannofossil event successions even within the Tethyan Realm. She speculated that these may reflect complex palaeobiogeographic patterns. Jim Bergen argued that the controversial 26-30 Ma evolutionary event periodicity could be recognised in Mesozoic nannofossil assemblages, with major Jurassic turnovers in the Pliensbachian, Bajocian and Tithonian. Silvia Gardin highlighted the recent advances in Jurassic nannofossil biostratigraphy with a restudy of DSDP Leg 79, where she has radically revised the age assignments. Two workers discussed the problems of the Jurassic - Cretaceous boundary interval; Sevinc Ozkan described a practical zonation for poorly preserved material from Turkey; Mihaela Melinte described assemblages from the Carpathians with mixed boreal and Tethyan influences.

CRETACEOUS BIOSTRATIGRAPHY (Chairmen: Stanislav Shumenko and Pavel Cepek)

Brigitta van Niel opened this session by elucidating the structure of *Nannoconus* and showing how this could be used as the basis for a (long overdue) review of their taxonomy. Anna Romaniv and Michael Lodeserto gave examples of the practical application of Cretaceous nannofossils in respectively the Carpathians and the Northern Apennines. Osman Varol gave a stylish overview of Upper Cretaceous Polycyclolithaceae (*Micula* and its cousins) showing how a remarkable amount of biostratigraphic data could be extracted from this group (see his summary figure in abstracts). Magdy Girgis presented a revised zonation scheme for the Cretaceous of the North Sea. This caused a considerable amount of comment, reflecting perhaps the difficulties of work in this region. Stanislav Shumenko explained the difficulties of biostratigraphy in the Ukraine, not the least being the recent coup in the USSR which had deprived him of his projection slides (an excuse even our President accepted). Lilian Švábenická - who showed us some of her Carpathian sections in the field - described their salient features and developed Melinte's theme of mixed Tethyan/Boreal influences. Andrea Fiorentino described a detailed study of a fine Maastrichtian section at Hor Hahar, Israel. Ben Prins lamented the circularity and imprecision of much of Late Cretaceous correlation and particularly the Campanian-Maastrichtian boundary, this provoked the traditional argument on golden spikes, stage stratotypes and zonal markers.

TERTIARY BIOSTRATIGRAPHY (Chairman: Katharina von Salis).

Unfortunately by this stage of the meeting the social program was taking a serious toll on my faculties and I have only a hazy memory of the proceedings. I am assured that Ton Romein started the session by showing how the sequence stratigraphy technique could be coupled to nannofossil biostratigraphy to provide a powerful tool for synthesising regional studies. Coming from a notorious cynic this affirmation was apparently particularly impressive, it was also supported by a fine poster from Steve Root. In addition we were taken on a world tour of Tertiary sediments by Fawzy Naji (Jordan), Nicolae Meszaros (Transylvania), Monsieur Zevounou Crepin (Benin), Maria Baldi-Beke (Szolnok Flysch, Hungary-Austria), and Michael Postfach (Czechoslovakian Flysch).

GENERAL TOPICS (Chairman Shirley van Heck)

By the afternoon I (Jeremy Young) had recovered sufficiently to present some ideas on coccolith structure, and how we can understand it by folding pieces of paper. This was followed by three fascinating talks. Jackie Burnett followed up Ben Prins' earlier talk by showing how the problems of Campanian Maastrichtian stratigraphy are being resolved by a collaborative integration of zonation schemes. Jane Garratt described an original approach to the problem of designing computer software to analyze video images of coccoliths - she has developed a program to produce fourier power spectra from radial scans of coccolith images. The ultimate aim is ostensibly to produce a system capable of automatic identification of nannofossils by light microscopy, although many participants felt that biometric applications might be more promising in the near future. Finally Duan Weiwu gave a talk on nannofossils in manganese nodules, including both casts and, more unusually, original calcite specimens.

Katharina von Salis closed the scientific sessions with some thoughts on the strength of the INA, on the pleasure of meeting so many enthusiastic workers from so many countries, and praise for most people in heeding her instructions (von Salis Perch-Nielsen 1991).

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INA BUSINESS MEETING

The Prague conference ended with a business meeting attended by most delegates and chaired by Katharina von Salis. The following is a brief summary of the more important points.

VOTES OF THANKS

There were a lot of these.

MEETINGS

Yamagata 1992: Delegates were reminded that Hisatake Okada is organising the Second Asian Pacific Conference next year and were strongly encouraged to take this opportunity to meet their Asian colleagues.

Salamanca 1993: Jose-Abel Flores officially accepted the responsibility of organising the next General INA Conference, in summer 1993. This will be held in Salamanca University, which is the second oldest in Europe, and which has a central role in the Spanish speaking world. Excursions are planned to the famous Spanish Cretaceous/Tertiary boundary sections and to Neogene Basins.

USA 1994?: Many people felt that a meeting in the USA would be welcome and the American delegates (including Jim Bergen, Tim Bralower, Mitch Covington, and Steve Root) promised to think about it. Suggested venues included Denver, Houston, New Orleans, Tallahassee and Woods Hole.

Tbilisi, (Georgia) 1995?: Tamara Gavtadze and her colleagues invited INA to come to Georgia for the 1995 conference. We reluctantly decided that given the uncertainties in politics, economics and even transport we could not make a firm commitment at this stage, but will certainly re-examine the option in two years time. (Geographical reminder - Georgia is south of Russia and east of the Black Sea).

WORKSHOPS AND WORKING GROUPS

These were discussed (see reports below for details). It was strongly affirmed that thematic workshops and regional meetings of nannofossil workers were very valuable. It was agreed that any members wishing to organise meetings could use the INA name (e.g. Tallahassee INA Barbecue) so long as they gave some open advertisement and/or report in the newsletter.

INA OFFICERS

Secretary / Treasurer: Magdy Girgis resigned officially at the meeting, and was thanked for two years very efficient work. Nicky Hine was adopted in his place.
N.B. Osman Varol and Kevin Cooper had also volunteered to help but Nicky appeared to be in the best position to do the job. Since the meeting it has been agreed that Kevin Cooper will organise the membership list.

President: Katharina von Salis' intention to resign had created considerable debate but no clear successor. Katharina proposed that she should continue as President until the Salamanca Conference (1993), and that a ballot of the entire membership should be carried to decide the next President. This proposal was agreed by the meeting. *A nomination form is enclosed in this newsletter.*

REPORTS

President: Katharina von Salis explained that she was reverting from Perch-Nielsen to her maiden name (von Salis) as a personal affirmation of the recently won Swiss women's freedom to do so.

Secretary/Treasurer: Magdy Girgis made the point that despite his name he is not a girl. He explained that we are in a good financial position largely because we have not had to pay for the printing of two issues - the Dutch printer of 10/2 went out of business, and the English printer of 12/2 lost all records of printing it. In both cases we repeatedly asked for invoices. As a result the subscriptions do not need to be raised at present.

Bibliographer: Bill Siesser thanked members for sending reprints, and assured them that this did guarantee swift entry.

Nomenclatural secretary: Shirley van Heck reported that the work of John Steinmetz on integrating the entire INA and Loeblich & Tappan Indices and Bibliographies into a single database was proceeding well. She also explained that she was proposing a submission to the ICBN that Latin should be replaced by English as the mandatory language for diagnoses, and that this should extend to fossil groups. She requested the endorsement of the meeting, which was given.

Editor: Jeremy Young thanked Magdy Girgis and Paul Bown for their assistance and appealed for more contributions.

Shirley van Heck, Katharina von Salis, Jeremy Young

WORKSHOPS AND WORKING GROUPS - 1 REPORTS

TERMINOLOGY WORKSHOP

The idea of a workshop on terminology arose from various sources during our planning of the Prague meeting. I had a special interest in the subject as a result of work I have been doing on coccolith structure (with Paul Bown and others), so I undemocratically volunteered myself to prepare a discussion document for such a workshop. I did this in April last year and sent copies to Marie-Pierre Aubry, Paul Bown, Ric Jordan, Annalies Kleijne, Ben Prins, Katharina von Salis, and Osman Varol. I then amalgamated their suggestions into a revised document comprising some 12 pages of text and 10 of figures attempting to be an analytical guide to the descriptive terminology of coccoliths. This document formed the basis of our discussions.

We had a 3½ hour pre-conference workshop attended by about 40 workers. I started by running through the document (or rather the figures), then we divided into small sub-groups to discuss it, and identify missing aspects of terminology. We finished with a plenary session, again working through the discussion document and debating various points.

This was generally felt to be a useful but incomplete exercise and we were able to follow it up with about one hour of further discussion during gaps in the conference program. Finally it was agreed in a near unanimous conference vote that the process should be continued by a working group to produce a publishable "official" INA guide to descriptive terminology.

The working group will consist essentially of the people listed above, together with Ton Romein, Jackie Burnett, and Jim Bergen. We plan to meet around Easter next year, in The Natural History Museum, London. Anyone else who has a special interest in participating should contact me as soon as possible.

Jeremy Young, Natural History Museum, London

JURASSIC WORKSHOP

Despite coming at the end of a very full conference schedule the Jurassic workshop was enthusiastically attended and included much discussion on progress since the London Jurassic workshop. It was clear that much new work has been completed, but that most of this is still *in press*. For future plans there was general agreement on a number of Jurassic nannofossil taxa which remain problematic for taxonomy, biostratigraphy and evolution. It was agreed that a finite number of problems should be identified and that these should be the focus for attention over the next two years, with the final objective to present results in Salamanca in 1993. To achieve these aims a number of working groups were arranged to form a core for concentration of information, but it is hoped that anyone who is interested or who has an opinion will collaborate. The following themes were chosen; the names listed after the topic identify "volunteers" from Prague.

1. Taxonomy, evolution biostratigraphy of *Lotharingius* - co-ordinator **Eric de Kaenel** (sorry Eric, you were volunteered in your absence, I hope you don't mind), Jim Bergen, Miriam Cobianchi, Elisabetta Erba, Emanuella Mattioli, Ben Prins, Viviane Reale.

2. Taxonomy, evolution and biostratigraphy of *Biscutum* - co-ordinator **Paul Bown**, also Miriam Cobianchi, Silvia Gardin, Magdy Girgis, Jeremy Young (by subsequent volunteering, at the time he and Jan Krhovský were bribing the police to get his car back).

3. Nannofossils and the Jurassic/Cretaceous boundary - co-ordinator **Kevin Cooper**, also Tim Bralower, Silvia Gardin, Hélène Manivit, and Mihaela Melinte.

It is also hoped that come 1993 we will be in a good position to attempt a synthesis of stratigraphic ranges for all Jurassic nannofossils - a task that was initiated during the London meeting and which we hope to publish following the next meeting. The preliminary plans for the Salamanca workshop include a thematic session for presentation of results of he working groups and a more informal session discussion of problems using photoslides, microscope slides, and SEM micrographs.

Paul Bown, University College London.

WORKSHOPS AND WORKING GROUPS - 2 PLANS

NANNOSYS - DEVELOPMENT OF A NANNOFOSSIL DATABASE

Ton Romein, Paul Bown and others revealed strong interests in this area, and a working group is developing, see separate article by Ton.

CRETACEOUS/TERTIARY BOUNDARY WORKSHOP

During the post-conference fieldtrip the various INA members with interest in this boundary felt they could benefit from closer co-operation and especially a thematic workshop at the Salamanca meeting. Andrea Fiorentino agreed to co-ordinate such efforts and anyone interested should write to him: *Andrea Fiorentino, c/o Anna Farinacci, Dip. Scienze della Terra, Univ. la Sapienza, Piazza A. Moro, Roma 00100, Italy.*

NEOGENE WORKSHOP

The idea for a Neogene Workshop developed in the same way as that for a K/T workshop - from discussions on the fieldtrip. Those. Even more than the K/T workers those of who specialise on the Neogene felt that we had common interests and problems which were not discussed enough and that we should try to get an organised session in Salamanca, if not before. Enthusiasts included Mihaela Melinte, Bohumil Hamřsmíd, Jose-Abel Flores, Agata di Stefano and myself. We will try to get more organised soon, if you have ideas or want to be included please write to: *Agata di Stefano, Inst. Gelogia e Geofisica, Univ. di Catania, Corso Italia 55, 95129 Catania, Italy.*

PARATETHYAN WORKING GROUP

Andras Nagymarosy, Jan Krhovský, Sandor Nemethy and the other local experts were seen exchanging ideas, planning future field trips, and debating the problems of Paratethyan biostratigraphy and palaeoecology. This qualifies them as a working group, hopefully they will tell us about their adventures.

nannofossil ('nænəʊfɒsɪl). *Geol.* [f. as next + FOSSIL *a.* and *sb.*] A fossil of a minute plankton organism.

1963 H. STRADNER in *Proc. 6th World Petroleum Congr.* I. 167/1 Nannofossils (minute calcareous elements of planktonic marine flagellates) were found in sediments younger than Triassic. *Ibid.*, A key for the determination of nannofossil assemblages is given. **1971** *Nature* 3 Sept. 46/1 The ophiolites in those deep-sea troughs were overlain by.. radiolarian and nannofossil oozes. **1972** *Sci. Amer.* Dec. 33/2 The white ooze is a typical oceanic sediment, made up almost entirely of the skeletons of microfossils and nannofossils. **1974** *Nature* 13 Sept. 129/2 The chalk contains abundant nannofossils whose preservation is, unfortunately, somewhat marred by calcite overgrowths.

Nannofossil terminology, comments from Sandor Nemethy and the Oxford English Dictionary (2nd edn, 1989).

REPORT ON THE EXCURSION TO SOUTH MORAVIA

By: your special CNN (Calcareous Nanno Networks) reporter

Two buses filled with an international assemblage of nanno-addicts left Charles University in Prague on the 12th of September. They stopped after 3 minutes to load crates of the famous Pilsner beer, which rapidly disappeared, mainly in *Homo britannicus*; a couple of hours later we stopped again for an outcrop of wine cellars to test their contents. On to the hotel and dinner followed by a bonfire with even more wine, bratwurst and singing. Most nanno-folks went to bed at a decent time, but some went for a swim in the lake and had to enter the building via drainpipes and windows.

Thanks to positive thinking, and in spite of the date (Friday the 13th!), the sun was shining when we climbed the steep and long path to the first real outcrop Soutěska (late Jurassic?/early Cretaceous?). Upon arrival several participants decided to quit smoking and drinking; others made an attempt to break the Guinness record in fitting the maximum number of nanno-specialists into a hole in the ground.

Off to locality Turold where the Turonian-?Coniacian was sampled quickly in order not to miss the quarry lunch.

This was followed by another wine cellar and some nice trenches in NP21/22 near locality Pouzdřany (thanks for digging, boys!).

Next stop: "Frustration Point" near Uherčice, where a long trench had been dug in NP21/22, which was filled in by the local peasants two days earlier, dug out again and, oh dear, filled in again by the local "intelligentsia". It saved us quite some time, so off to another wine cellar near a cemetery (how convenient) in Křepice, where we sampled NP23.

A splendid "dinner-dansant" with live-music was prepared for us in, have a guess, another wine vault at Cejkovice; some claustrophobic old-hands took the early bus home.

Only a few colleagues (mainly the geriatrics) woke up early next morning for the soccer game (Sphenoliths vs. Scapholiths); the players didn't, so the match was postponed till the Salamanca meeting.

Off to Nosislav where another attempt was made to end up in the Guinness book; more intelligent colleagues just sampled NN2/3 from the cores laid out nearby. lunch with food canned in China, followed by group-dancing of the Italo-Anglo nanno-mafia on the battlefield of Austerlitz.

Last stop at locality Královo Pole a clay-pit in NN5 near Brno for scenic group-photos and a few samples. Then a pleasant sleep in the coach before returning nearly dead to Prague - where some at least spent a few more days recuperating.

Thank you Jan, Bohumil, Lilian, Co-workers and sponsors for a very well organized, well documented and extremely pleasant excursion!

Ton Romein, LPP Foundation, Utrecht University, The Netherlands

EXCURSION PROCEEDINGS - ON *PATROLITHUS* JORDAN & FIORENTINO, 1991

Andrea Fiorentino, Rome, Italy

(Editors note: This is manifestly not a valid description, but has been included for historical interest).

Patrolithus Fiorentino 1991

Description: See type species.

Derivatio nominis: From *pater*, latin for father and λιθος, greek for rock.

Type species: *Patrolithus abraham* Jordan & Fiorentino 1991.

***Patrolithus abraham* Jordan & Fiorentino 1991**

Description: Elongated elliptical form in plan view. In side view, which is more commonly observed, it shows a broad arch-shaped basal structure, on the proximal side of the shield, oriented parallel to the long-axis of the

ellipse. At the apex of the arch a central process is present, which is occasionally massive, and can be of varying shape, sometimes showing additional lateral knobs (termed here noses), doubtfully interpreted as secondary calcite overgrowth.

On the distal side a very high central structure is present whose height is between four and five times the maximum length of the shield, but which is commonly well preserved. It starts with a massive base and continues up into a bifurcate spine.

Holotype Dimensions: Long axis 40cm; Height 180cm.

Latin description: *Patro abraham septem filii erant; Septem filii patro Abraham erant; Atque is nunquam ridebat; Atque is nunquam plorabat; Totus is facieabat, huius modi erat: Lavi manui; Et dextrea manu; et laevo crure; Et dextrero crure; Et mpf.*

Derivatio nominis: After Abraham from the Latin description, name derived from the biblical patriarch.

Remarks: *Patrolithus abraham* n.sp. is usually found in side view, hence the rather limited description of the shield. *P. abraham* shows some similarity to *Scampanella,* such as the long bifurcate spine and broad basal structure, but it is impossible to confirm any real similarity with this or any other nannofossil genus. Hence it is placed in the *incertae sedis.*

In cases when the elements of the basal arch were found lying in the plain of the shield (looking unwrapped) perpendicular to the central process, the ratio between the length and height of the central process itself is approximately 1.

Specimens were often found in groups with a circular disposition, individuals being disconnected or only slightly in contact, with one additional specimen in the centre of the ring. The specimen chosen as holotype was initially noticed in the centre of such a ring.

Type level: Recent.

Type locality: Prague, Czechoslovakia (also noted in Carpathian Mountains).

Depository: Hollytree House, Dursley, Glos.

Holotype: Ric Jordan.

REVIEW - EXCURSION GUIDE 4th INA CONFERENCE, PRAGUE 1991

Ed. B. Hamřsmíd. Knihovnička Zemní Plyn Nafta, 13, Hodonín, 93pp, softcovers, $10, A5 size.

This is an ideal field guide containing the relevant topographic, geological and palaeontological information in a clear convenient format. It contains details on all the localities visited in both the pre- and post-conference excursions together with background articles on the Cretaceous Bohemian Basin (by S. Čech) and on the Western Carpathians (by Z. Stráník, J. Krhovský, R. Brzobohaty, & B. Hamřsmíd), there is also a full bibliography. The book is rather closely based on the 18th European Micropalaeontology Colloquium Excursion Guide, but has completely updated information and, in particular, detailed nannofossil occurrence data (it is also printed to a much higher standard). Any micropalaeontologist with an interest in Eastern Europe will find it invaluable. A limited number of copies are available from Bohumil Hamřsmíd (add Mikropaleontologie, MND Hodonín, Uprokova 6, Hodonín 695 30, Czechoslovakia), price US$10 inc. postage. Proceeds will go towards costs of producing the conference proceedings.

Jeremy Young, Natural History Museum, London

NANNOSYS

At the moment the average calcareous nannoplankton specialist needs 12 volumes of Farinacci's Catalogue, 4 volumes of Aubry's Handbook, 7 issues of Loeblich and Tappan, 26 issues of the INA Newsletter, Katharina's 1985 bible, the ICBN and a fair number of reprints to do a good job; she or he spends an awful lot of time on keeping up with literature and ploughing through it, searching for references, pictures, descriptions and ranges. In addition, she/he needs a good memory to find the right information.

Admit it, it gives you a headache! It is even worse: if your boss knew how much time is wasted on this, you would certainly get the sack in the next efficiency drive...

At the meeting in Prague, I therefore proposed to get started with a computerized database and image storage/retrieval system for calcareous nannoplankton. Such a system already exists for dinoflagellates; it is called DINOSYS, and it was developed in Utrecht University by the LPP Foundation. DINOSYS runs under Windows 3.0 on an ordinary IBM compatible PC*, it is user-friendly and fool-proof. Images can be loaded directly from the microscope or from pictures; descriptions and references can be typed in or scanned. Retrieval of images, graphics (ranges) and text takes only seconds; hard-copies can be made with a videoprinter.

A market survey (Bown, Young, myself) indicated that there is at present no other program with comparable features/options which can be made available economically. I therefore propose to use the DINOSYS software for our nannos and to call the package NANNOSYS. In my opinion NANNOSYS should be developed (i.e. loaded with data), maintained (i.e. updated continuously) and distributed (for a reasonable price) under the auspices and responsibility of the INA.

NANNOSYS will be more than just a catalogue system (although it would be a good idea to continue Farinacci's work using NANNOSYS software and create a separate NANNOCAT); it will be an "intelligent" system, which means that it contains the combined expertise of specialists.

It will be obvious that funds are needed to finance this project; costs mainly consist of salary costs for a full-time specialist and costs of travelling during 2-3 years (estimated total costs: US$ 150.000).
Several options to get funding have been discussed in the working group:

a. approach the major oil companies,

b. approach major scientific institutions,

c. a substantial increase of INA membership dues.

We did not like the last option, as many of our members can not afford the likely amounts; a combination of options a-c is perhaps best. Please let me know your opinion on these ideas as soon as possible and/or complete the questionnaire (enclosed with this newsletter):

Ton Romein, LPP Foundation, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands
Fax: 31-(0)30-535096 Phone: 31-(0)30-532796.

* MINIMUM REQUIREMENTS FOR RUNNING DINOSYS
- A fast 286 AT PC, with ≥ 1 Megabyte internal memory
- 3.5 Mb free harddisk space
- (Super-) VGA-card and colour VGA-screen
- Windows 3.0 & Mouse

NB: Early 1992 a demo-disk of DINOSYS will be available.

Editor's note: Planning is still at a very early stage. No firm decisions have been made on the system to use, data to include, mode of distribution, how to fund the system, or how to fill it. So please communicate now, particularly if you are, or have been contemplating, developing such a system. Friendly open collaboration has been one of the great successes of INA and we hope we can extend this into modern "information technology". The terminology workshop planned for Easter 1992 will bring most of the people currently debating Nannosys together so feedback before then would be invaluable.

MEETING REPORT - SECOND INTERNATIONAL *EMILIANIA HUXLEYI* WORKSHOP

Château de Blagnac, France, Sept. 22-26 1991.

Michael Knappertsbusch, Geomarine Centre, Vrije Univ., 1007MC Amsterdam, NL.

Since remote sensing imagery has become available, scientists became aware of large coccolithophore blooms occurring in spring and early summer, over almost the entire width of the temperate to subpolar North Atlantic. These blooms are dominated by a single species, *Emiliania huxleyi*, which is considered to be the most abundant calcium carbonate producer on earth. So in the context of the discussion of global atmospheric CO_2 levels this phenomenon has attracted scientists from diverse geological and biological disciplines to collaborate for the search of causes of global warming. What triggers these blooms? What kills them? What is their impact on the oceanic carbon cycle and on the formation of dimethyl sulphide (an aerosol responsible for cloud nucleation)? What are the rates of production of coccolith calcite in the photic layer and what are the rates and modes of coccolith calcite removal from the upper ocean into the deep ocean and into the sedimentary archive? These are some of the questions that are being investigated in the "Global *Emiliania* Modelling" initiative (GEM), with major teams from the Netherlands, UK, and Norway, and extra participation from Switzerland, Monaco, and Spain. GEM was established at a meeting in September 1990 (see report by J.R. Young in INA Newsletter 12/3). That meeting provided first level co-ordination of research on the effects of *E. huxleyi* and other coccolithophores on the present and past global climate.

One year later a second *Emiliania* workshop was held from September 21 to 26 1991 at Château de Blagnac, near Bordeaux. The goals were: to present and discuss new results; to formulate plans for 1992 and beyond; to discuss an EEC MAST proposal; and to prepare for the forthcoming joint NL-UK-N *E. huxleyi* spring bloom expedition to the fjords of Bergen, Norway.

Eighteen individual reports, as well as plenary and working group sessions were held in order to approach an integrated model consisting of quantified sub-routines for production (PIC, POC, DMS), transformation, preservation, and processes relevant to geological timescales.

Introductory talks were given by Peter Westbroek (Leiden, NL) on *E. huxleyi* biomineralization models, and by Geert-Jan Brummer (Netherlands Inst. for Marine Research - NIOZ) on global oceanic carbon reservoirs and fluxes, he emphasised different approaches to extracting palaeoproductivity proxies from skeletal signatures in the geological record. The topics were then rapidly focused on the results from two very successful Biogeochemical Ocean Flux Study (BOFS) cruises of the British team during June/July 1991 to a massive and unusually widespread *E. huxleyi* bloom south of Iceland. Roger Harris (Plymouth Marine Lab. - PML) presented a spectacular video of the bloom obtained by AVHRR satellite imagery over five days. Kerstin Muller (Bangor, UK) introduced alkalinity into the discussion and demonstrated that the bloom was enriched in CO_2, instead of being depleted. Emilio Fernandez-Suarez (Oviedo, Spain) and Paul van der Wal (NIOZ) compared photosynthesis and calcification rates in the bloom with those in non-bloom waters. Duncan Purdie (Southampton, UK) speculated that a major portion of the free floating coccoliths during an altering bloom are subject to dissolution in surface waters, well before they enter deeper water. Sue Turner (Norwich, UK) compared DMS and DMSP concentrations at different stages of the bloom with previous measurements and derived some implications for the interannual variability of these organosulphuric compounds. Glen Tarran (PML) demonstrated the application of a newly developed flow-cytometer to the study of microzooplankton grazing and Roger Harris (PML) discussed copepod grazing as a mortality term in coccolithophore bloom dynamics. Computer simulations of phytoplankton successions, presented by Arnold Taylor (PML), illustrated the usefulness of numerical sensitivity tests to discriminate between significant and less significant relationships between various phytoplankton and environmental parameters. Using data from the Dutch 1990 JGOFS Leg 4 Michael Knappertsbusch (Geomarine Centre Amsterdam, GMCA) estimated the annual coccolith carbonate production in the North Atlantic.

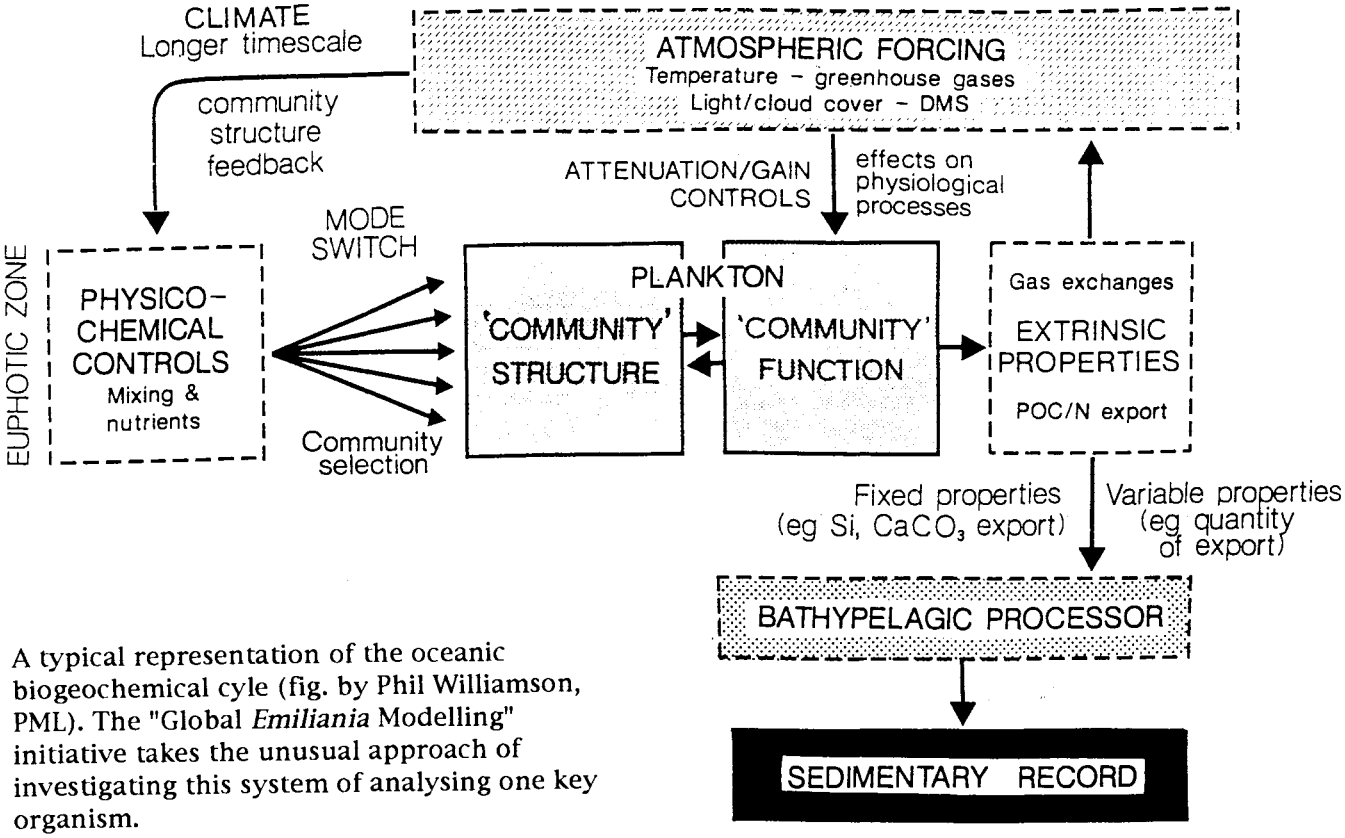
Great attention was given to possible couplings between mesoscale aspects of bloom dynamics and the biology of *E. huxleyi*. Linda Medlin (Bristol, UK) reported on the use of RNA sequencing to detect strain

differences in *E. huxleyi*. Marcel Veldhuis (NIOZ) and Judith van Bleiswijk (NIOZ) concentrated on DNA patterns during the life-cycle of *E. huxleyi* and on its growth rates and coccolith formation under various light conditions. Colin Brownlee (PML) showed much higher rates of photosynthesis in calcifying than in non-calcifying cells under CO_2 stressed conditions. Thomas Ietswaart (Groningen, NL), presented preliminary results on competition for organic nitrogen between *E. huxleyi* and bacteria under nitrogen limited conditions in a chemostat. Jorun Egge (Bergen, N) working on enclosure experiments speculated that metabolites produced by *E. huxleyi* could be responsible for the dominance of this species with respect to other coccolithophorids. Mikal Heldal (Bergen, N) on the other hand gave evidence for viral infections in *E. huxleyi* populations. An overview of the Norwegian *E.huxleyi* group activity was given by Berit Heimdal (Bergen, N).

Jan van Hinte (GMCA) emphasised that deep-sea sediments provide the most powerful record of palaeoproductivity and climatic changes over long time periods. Karl-Heinz Baumann (GEOMAR Kiel, FRG) reported on investigations of coccolithophore communities and their sedimentation in the Norwegian - Greenland Sea. Maureen Conte (Bristol, UK) reviewed the use of coccolith derived long-chain alkenones and alkyl alkenoates as palaeotemperature indicators. Janneke Ottens (GMCA) commented on the role of other carbonate producers in the oceans, such as planktonic foraminifers, while Gerard Ganssen (GMCA) illustrated how carbon isotope differences between the planktonic foraminifer species *Globigerina bulloides* and *Globorotalia inflata* can be interpreted in terms of palaeofertility patterns in upwelling areas.

Above all the conference was unique, guided by a highly stimulating atmosphere not only through the close interdisciplinary work, but also to a great extent resulting from Dorien and Jan van Hinte's hospitality at their wonderful Chateau de Blagnac.

A full report on this meeting is in preparation and will be available upon request (from myself, Michael Knappertsbusch).



A typical representation of the oceanic biogeochemical cyle (fig. by Phil Williamson, PML). The "Global *Emiliania* Modelling" initiative takes the unusual approach of investigating this system of analysing one key organism.

BOOK REVIEW - STRATIGRAPHY AND MICROPALEONTOLOGY OF THE CAMPANIAN SHELF IN NORTHEAST TEXAS

L.B. Thompson, C.J. Heine, S.F. Percival, JR. & M.R. Selznick

Micropaleontology Special Publication, 5: 148pp. Micropaleontology Press American Museum of Natural History, New York., 1991, Softbound, $45.

This book presents a collection of papers on the biostratigraphy and palaeoecology of planktonic foraminifera, the biostratigraphy of calcareous nannofossils, the distribution and palaeoecology of dinoflagellate cysts, and the lithostratigraphy of the Late Santonian to Early Maastrichtian shelf deposits of north-eastern Texas, from Waxahachie in the south-west to Texarkana (great R.E.M. song) in the north-east. The goal was to resolve bio-, chrono- and lithostratigraphical problems pertinent to the shelf deposits by mapping the outcrops, recording lithologies and sedimentary structures, and noting relationships, and by documenting the macro- and microfossil contents. The first chapter puts the book in context by highlighting the geological confusion extant in the area (prior to this study!). The authors have stuck their necks out therein and ditched the Gulf Coast chronostratigraphical terms in favour of the European ones (so now we all know what they're talking about!), whilst retaining the regional lithostratigraphical terms "Austin Group", "Taylor Group" and "Navarro Group", which are split further:

Navarro Group	Corsicana Clay
	Nacatoch Sand
	Neylandville Marl
Taylor Group	"Upper Taylor" Marl
	Pecan Gap Chalk
	Wolfe City Sandstone
	"Lower Taylor" Marl
Austin Group	Austin Chalk

The second chapter, by Thompson, indicates how poorly exposed the representative formations are in this geographical area, which has led to some stratigraphical confusion in the past 70 years. Much trouble has been taken to produce composite sections for the formations, well illustrated with maps, section data and lithofacies distributions. He describes the historical, lithological and biostratigraphical aspects of each formation; palaeoecological interpretations are based on lithofacies and sedimentary structures, trace fossils, macrofossils and microfossils.

The Late Santonian to Early Maastrichtian are divided into six planktonic foraminiferal zones, A to F. He then discusses these zones in relation to the type-Campanian. and to previous zonations of the area, and produces a correlation between Texas and Arkansas which highlights the diachroneity of the lithological units. The accompanying plates are clear and a taxonomical section is included in which two new species are described.

In Chapter 3, Percival deals with the nannofossil zonation of the composite sections, and wins Brownie points for applying Sissingh's (1977) cosmopolitan zonation scheme, so that the results can be compared to/correlated with sections elsewhere in the world. Approximately one quarter of the samples examined for nannofossils were also examined for planktonic foraminifera and dinoflagellates, so this is an integrated study. Previous nannofossil work on the area is reviewed and highlights how little work has been done on material that contains some of the best preserved assemblages I have ever seen. Besides Gartner's (1968) and Bukry's (1969) largely taxonomical works, only three small studies are noted (those of Thompson et al., 1978, Barrier, 1980 and Sheu, 1982, unpublished). An additional study has been made by Farhan (1985, and in prep).

Having already stated that the application of Sissingh's zonation scheme is a welcome feature of this work, I do not understand why Percival then felt the need to rename some of the zones. Just because *Ceratolithoides* and *Marthasterites* are missing from the material, there is no need to define yet more new zones using events already utilised by Sissingh. Their absence should be commented upon, and if any previously unused events could be substituted in these intervals to refine the zonation then their incorporation into Sissingh's framework should be attempted (e.g. see Burnett, 1990).

A couple of short comments: First Percival's placement of the Campanian/Maastrichtian boundary is a little too low (at the CC22/23 zonal boundary); it has been proved to occur in CC23A (Burnett et al., in press), i.e. *Reinhardtites anthophorus* has its last occurrence just below the boundary. Secondly, some of the taxonomy is outdated (e.g. the use of *Tetralithus*). The photos are adequate as illustrations of the marker species.

Selznick's chapter deals with foraminiferal palaeoecology, incorporating macrofossil environmental indicators. Previous pertinent work is reviewed. In the setting of a broad shelf environment, with sedimentary input from the WNW, and E- to NE- flowing surface currents, a change from transgression to regression to transgression from the Late Santonian to Late Campanian is recorded. The first transgressive phase, indicated by diverse foraminiferal faunas, crosses the Santonian/Campanian boundary (Blossom Sand to Gober Chalk/Brownstown Marl, deposited in middle neritic waters). The regression is characterised by the Brownstown Marl (terrigenous mud) to Wolfe City Sand, which were deposited in inner to middle neritic waters, and is indicated by a coincident decrease in foraminiferal diversity, with high P/B ratios indicating conditions of environmental stress. The second transgression occurred in the Late Campanian, through the upper Wolfe City Sand to the Pecan Gap Chalk (middle to outer neritic depositional environments). The Annona Chalk was deposited in a middle neritic environment and the Marlbrook Marl in an outer neritic environment. Once again the plates are clear and localities clearly identified.

The final chapter, by Heine, is a documentation of dinoflagellate cyst occurrences in the Late Santonian to Early Maastrichtian of Texas. Being another area of little apparent interest so far means that this study is more of a forerunner than a definitive biostratigraphical work, recording dinoflagellate species in relation to the biostratigraphy of the other groups, rather than producing a dinoflagellate biostratigraphy. However, the palaeoecological interpretations revealed five assemblages, four related to lithology, the fifth being considered as transitional. The photos are clear.

Overall the book is informative and interesting; there are a number of typographic errors and I think it could have been enhanced by the incorporation of a summary illustration integrating the European stages, regional lithostratigraphy, foraminiferal and nannofossil biostratigraphies, palaeoenvironments and transgression/regression curves. However, the work is a good example of the modern approach which involves multidisciplinary studies on similar material. As such it will be an essential purchase for anyone working in the region, and useful for workers in other areas studying rocks of this age.

Jackie Burnett, University College London.

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OCEAN DRILLING PROGRAM UPDATE

John Firth, Ocean Drilling Program

ODP Leg 138 (May 6 - July 5, 1991) drilled in the eastern equatorial Pacific Ocean, to study Neogene high resolution palaeoceanography. A record breaking 5500 meters of core was recovered at 11 sites. Using magnetobiochronology, magnetic susceptibility, density and colour spectral analysis of the cores, the shipboard party was able to determine that 8 of the 11 sites have complete recovery of the section from middle Miocene to Recent. Several basin wide synchronous oceanographic events were recognized by laminated, diatom rich layers. Milankovitch type sediment variations were also seen in most cores. The results of this cruise should provide the most detailed analysis yet of Neogene equatorial palaeoclimatology and palaeoceanography. The nannofossil palaeontologists were Jose-Abel Flores (University of Salamanca, Spain) and Isabella Raffi (Universita di Parma, Italy).

ODP Leg 139 (July 10 - September 11, 1991) drilled in the sediment covered spreading centres of the Juan de Fuca Ridge and the Gorda Ridge in the northeastern Pacific, to study submarine hydrothermal systems and hydrothermal deposits. Leg 139 recovered massive sulphide deposits, as well as characterized the hydrology of seafloor vents, and recovered a deep complex of alternating sills and turbidite layers with much hydrothermal alteration of the sediments. Two re-entry cone seals were deployed which will allow long term recording of temperature, pressure, and fluid chemistry in the sealed boreholes. The nannofossil palaeontologist was Shaozi Mao (FSU, Tallahassee, FL).

ODP Leg 140 (September 16 - November 12, 1991) drilled in Hole 504B through the sheeted dike complex in hopes of reaching Layer 3 of the ocean crust. Hole 504B is now the deepest penetration of any hole in DSDP/ODP history (about 1900 mbsf as of October 29, 1991, though it will be deeper by the end of the leg). No palaeontologists sailed Leg 140.

ODP Leg 141 (November 17, 1991 - January 13, 1992) will drill the Chile Triple Junction, in order to provide a history of processes of the collision of a spreading centre with a subduction zone. No nannofossil palaeontologists are sailing on this cruise.

ODP Leg 142 (January 18 - March 19, 1992) will drill the East Pacific Rise. Mostly engineering operations will happen, such as setting a hard rock guide base on the East Pacific Rise. No palaeontologists will sail on this cruise.

ODP Leg 143 (March 24 - May 19, 1992) will drill atolls and guyots to determine the Cretaceous and early Cenozoic history of the Marshall Islands region. Tim Bralower and Jorg Mutterlose are nannofossil palaeontologists for this leg. John Firth is sailing also, as Staff Scientist and palynologist.

ODP Leg 144 (May 24 - July 19, 1992) will be the second atolls and guyot s leg, and will study the Cretaceous history of simultaneous drowning of guyots of the northwest Pacific. Dave Watkins and Elisabetta Erba are sailing as nannofossil palaeontologists on this cruise.

ODP Leg 145 (July 24 - September 21, 1992) will drill a North Pacific transect to study the palaeoceanography and plate reconstruction of northern latitude Neogene and older sediments. ** Staffing for this leg is now in progress**.

ODP Leg 146 (September 26 - November 21, 1992) will drill the Cascadia accretionary prism, in order to determine the nature of channelled and unchannelled flow of fluids escaping from the Cascadia margin. **Staffing of this leg is now in progress**.

ODP Leg 147 (November 26, 1992 - January 21, 1993) will either continue operations on the East Pacific Rise (hard rock drilling) or core a complete section of oceanic crust generated at a fast-spreading ridge (again hard rock drilling, this time at Hess Deep). No palaeontologists will sail on this cruise.

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 - 5

Shirley E. van Heck, NAM, Assen, The Netherlands

This is the last instalment dealing with the formation of names of taxa, and discusses taxa above the rank of genus. I discuss the names of families first (Art.18), since they are the most commonly used.

ARTICLE 18

18.1: The name of a family is a plural adjective used as a substantive; it is formed from the genitive singular of a legitimate name of an included genus by replacing the genitive singular inflection (Latin -ae, -i, -us, -is; transliterated Greek -ou, -os, -as, or -ous, including the latter's equivalent -eos) with the termination -aceae. For generic names of non-classical origin, when analogy with classical names is insufficient to determine the genitive singular, -aceae is added to the full word. For generic names with alternative genitives the one implicitly used by the original author must be maintained.

Despite its length and complicated structure, the application of this rule is no problem in recent literature. Only in the old literature do we find terminations of the wrong rank applied, or terminations derived from the zoological nomenclature. Correct examples are: Eiffellithaceae from *Eiffellithus*, Coccolithaceae from *Coccolithus*.

18.2: Names intended as names of families, but published with their rank denoted by one of the terms "order" (ordo) or "natural order" (ordo naturalis) instead of "family"' are treated as having been published as names of families.

Fortunately I know of no examples in nannoplankton literature, as it could be difficult to judge what the author intended. The next rule is more tricky:

18.3: A name of a family or subdivision of a family based on an illegitimate generic name is illegitimate unless conserved. Contrary to Art. 32.1(b) such a name is validly published if it complies with the other requirements for valid publication.

Again we have the distinction between invalid (referred to in Art.32) and illegitimate. The distinction is, in summary, that an invalid name has no status, and as a result, is treated as if it were never published. In the case of family names, the only distinction is that an illegitimate name might be conserved, whereas an invalid name cannot be conserved. Since the process to have a name conserved involves a long legal battle through several publications, committees and the botanical congress, nannoplankton names are unlikely ever to be conserved, and this article is of little practical value to us.

18.4: When a name of a family has been published with an improper Latin termination, the termination must be changed to conform with the rule, without change of the author's name or date of publication (see Art. 32.5).

I printed this rule in bold face because it is important. Art.32.5 states the same, only more general. The point is, that in the past many names were published with a wrong termination . These names were rejected, either because the present rule did not exist or was overlooked. Because the current ICBN supercedes all previous editions, these names must be taken into account. The index published by Loeblich & Tappan (1966 e.a.) contains some examples. To name a few: the name Coccolithidae was introduced by Poche in 1913, while the name Coccolithaceae was used by Kamptner in 1928. Although the termination was wrong, the family name should be cited as Coccolithaceae Poche, 1913. Haeckel introduced the family name Rhabdosphaeralen in 1894,

Ostenfeld introduced Rhabdosphaerales as a family name in 1899, and Lemmermann introduced Rhabdosphaeraceae in 1908. The name Rhabdosphaeralen is invalid because it does not have a latin termination. The name Rhabdosphaerales does have a latin termination but needs to be corrected, so the name should be quoted as Rhabdosphaeraceae Ostenfeld 1894.

Art. 18.5 and Art. 18.6 are not relevant to nannoplankton. No recommendations are attached to this Article.

Article 19 deals with the names of taxa with a rank between family and genus: subfamily, tribe, subtribe. Although not popular in recent literature, these categories have been used in the past, and shall be dealt with briefly.

ARTICLE 19

19.1: *The name of a subfamily is a plural adjective used as a substantive; it is formed in the same manner as the name of a family (Art. 18.1) but by using the termination -oideae instead of -aceae.*

19.2: *A tribe is designated in a similar manner, with the termination -eae, and a subtribe similarly with the termination -inae.*

19.3: *The name of any subdivision of a family that includes the type of the adopted, legitimate name of the family to which it is assigned is to be based on the generic name equivalent to that type, but not followed by an author's name (...). Such names are termed autonyms (...).*

(...) indicates a reference to further articles with clarifications and definitions, that are not important here. As this situation is analogous to that of a subspecies (Art.26), and was discussed in detail in a previous issue (vol. 12.3), it needs no further explanation. The same is true for the next rules:

19.4: *The first valid publication of a name of a subdivision of a family that does not include the type of the adopted, legitimate name of the family automatically establishes the corresponding autonym (...).*

19.5: *The name of a subdivision of a family may not be based on the same generic name as the family or of any subdivision of the same family unless it has the same type as that name.*

19.6: *When a name of a taxon assigned to one of the above categories has been published with an improper Latin termination, such as -eae for a subfamily or -oideae for a tribe, the terminator must be changed to accord with the rule, without change of the author's name or date of publication (...).*

Art.19.7 is not relevant for us, and the one recommendation is rather obscure, and does not seem to apply either.

That leaves us with the names of higher ranks: order, class, division and kingdom, dealt with in Articles 16 and 17. Since very few people deal with these, I see no merit in copying them here. The philosophy is the same, although these names do not have to be based on a generic name, and may be descriptive.

This wraps up the rules on the nomenclature of taxa, Chapter III of the ICBN.

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A NOTE ON *GEPHYROCAPSA CARIBBEANICA* AND AMPHORA-SHAPED *SCYPHOSPHAERA*.

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In INA Newsletter 13/1 Young presented a Quatertnary nannofossil range chart. A couple of points seem in order so that errors contained in the chart need not be perpetuated. These errors involove 1. the range - indeed the identity - of *Gephyrocapsa caribbeanica,* and 2. the stratigraphic range of *Scyphosphaera* spp., more specifically amphora-shaped *Scyphosphaera* spp. (e.g. *Scyphosphaera amphora, Scyphosphaera pulcherrima*).

1. Young indicates an early Pleistocene age for *Gephyrocapsa caribbeanica* (*G.* sp. A-B), the youngest occurrence of the species being at about 1.1 million years. Young follows previous workers, all the way back to Hay et al (1967), who first described the species and designated it the zonal marker for the early Pleistocene, stating that its range extended from ".. the last occurence of *Gephyrocapsa oceanica* ...". Unfortunately the problem surrounding the true identity of *Gephyrocapsa caribbeanica* starts right there. The stratigraphic range of *Gephyrocapsa caribbeanica* is based on drilled cores - the submarex cores from Nicaragua rise, but the holotype and paratypes are from eleswhere. Hay and Boudreaux, in Hay et al (1967), illustrated four specimens and designated the stereo pair Plate 12 & 13, Figure 4 the holotype. The holotype and paratype illustrated on Plates 12 & 13, Figure 3, are from the 540cm level of a piston core, A240 M1. That core was published previously by Rosholt et al. (1961) and the data in that publication indicate a Pleistocene age for the type level of *Gephyrocapsa caribbeanica.* More precisely the 540cm level in core A240 M1 is in oxygen isotope stage 8 of Emiliani's numbering system (the same system commonly in use today), and which is also the level of first occurrence of *Emiliania huxleyi.* (Gartner & Emiliani 1976).

[Rosholt et al (1961) had derived an age of 150ka for this level; then, by matching the classical glacial stage succession with the generalized (but very limited) Pleistocene palaeotemperature curve known at that time from the planktonic foaminifer record, interpreted stage 8 to be the middle of the Mindel/Riss (in North America the Yarmouth) stage, i.e. early Pleistocene. From there originates the incorrect early Pleistocene age for *Gephyrocapsa caribbeanica.*]

The problem, then, is this: Based on objective criteria erelating to the holotype, the earlty Pleistocene "marker" cannot reasonably be *Gephyrocapsa caribbeanica*; nor can *Gephyrocapsa caribbeanica* be used as a marker for the early Pleistocene. The two additional paratypes of *G. caribbeanica* (Plates 12 & 13, Figures 1 & 2) only confirm the problem. These two specimens are from the top of core CG-9, which also yielded the two specimens (Plates 12 & 13, Figures 5 & 6) identified as *Gephyrocapsa oceanica* and the two specimens of *Emiliania huxleyi* (Plates 10 & 11, Figures 1 & 2). The species Hey et al (1967) designated *Gephyrocapsa caribbeanica* clearly co-occurs with *Gephyrocapsa oceanica* and with *Emiliania huxleyi* and must be late Pleistocene or, at the very least, extend into the late Pleistocene.

An alternative interpretatioin is that both the holotype and the paratypes of *Gephyrocapsa caribbeanica* are redeposited specimens. This interpretation perpetuates instability in nomenclature and in biostratigraphy and is, therefore, not desirable. Perhaps INA could sponsor a further analysis and resolution of this problem.

2. The second point can be made more briefly. it is my experience that the distinctive amphora-shaped *Scyphosphaera* (I identify them as *Scyphosphaera pulcherrima*) are no longer extant. The youngest occurence seems to be within or near the top of the small *Gephyrocapsa* interval. Further documentation should render this species a useful event marker, even though it is often rare. Representative illustrations include Perch-Nielsen (1985) Figure 52(11) and Figure 53(2).

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ORIGINAL AUTHORS REPLY

I am grateful to Gartner for these comments, one of my hopes in publishing the range chart was to stimulate discussion of this type. Both his points seem entirely valid to me, specifically:

1. This exposition of the true age of the *Gephyrocapsa caribbeanica* holotype resolves a long standing uncertainty (Gartner 1977). Manifestly the name *G. caribbeanica* cannot be applied to the Early Pleistocene form. Given this *G. lumina* Bukry 1973 is almost certainly the correct valid alternative. Sorting out the late Pleistocene taxonomy is a more complex problem - which I skipped over by simply including everything in *G. oceanica. G. caribbeanica* has of course priority over *G.margereli* Bréhéret (1978) and *G. mullerae* Bréhéret (1978). A co-operative effort here might be worthwhile.

2. My use of *Scyphosphaera pulcherrima* to illustrate the genus *Scyphosphaera* on the range chart was obviously unfortunate. Rechecking I find that Gartner's observation of restricted occurrence for this species is in agreement with my data and that of for example Samtleben (1979) and Bergen (1984). I doubt this will ever constitute a useful "marker event" but the occurrence of *S. pulcherrima* plainly can provide a useful additional criterion for distinguishing assemblages from above and below the small *Gephyrocapsa* event.

Jeremy Young, The Natural History Museum, London

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NANNOPLANKTON BIOSTRATIGRAPHY OF UPPER PALAEOCENE TO LUTETIAN FORMATIONS OF THE COASTAL SEDIMENTARY BASIN OF BENIN

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Topics: Palaeogene, Benin, Biostratigraphy

INTRODUCTION: This work is focused on the study of nannofossils from certain Palaeogene formations in Benin. We have studied by light microscopy over 300 samples from three cores drilled in the Central (Kpome - BS4) and Western (Sohoume - SM4, Bakpodji - BS8) parts of the epicontinental Benin Basin.

Various factors prompted this study:

(1) Previous biostratigraphic work had concentrated on foraminifera and ostracoda - including notably the work of Slansky (1952-59), BREDA geologists (1985-89) and other surveys, and Beninese work (determinations by S. Akpiti). The only study of calcareous nannofossils was that of Perch-Nielsen of 20 Eocene samples from the Zoungbarou area (western part of the basin). She identified two zones; the *Discoaster sublodoensis* zone and the *Nannotetrina fulgens* zone.

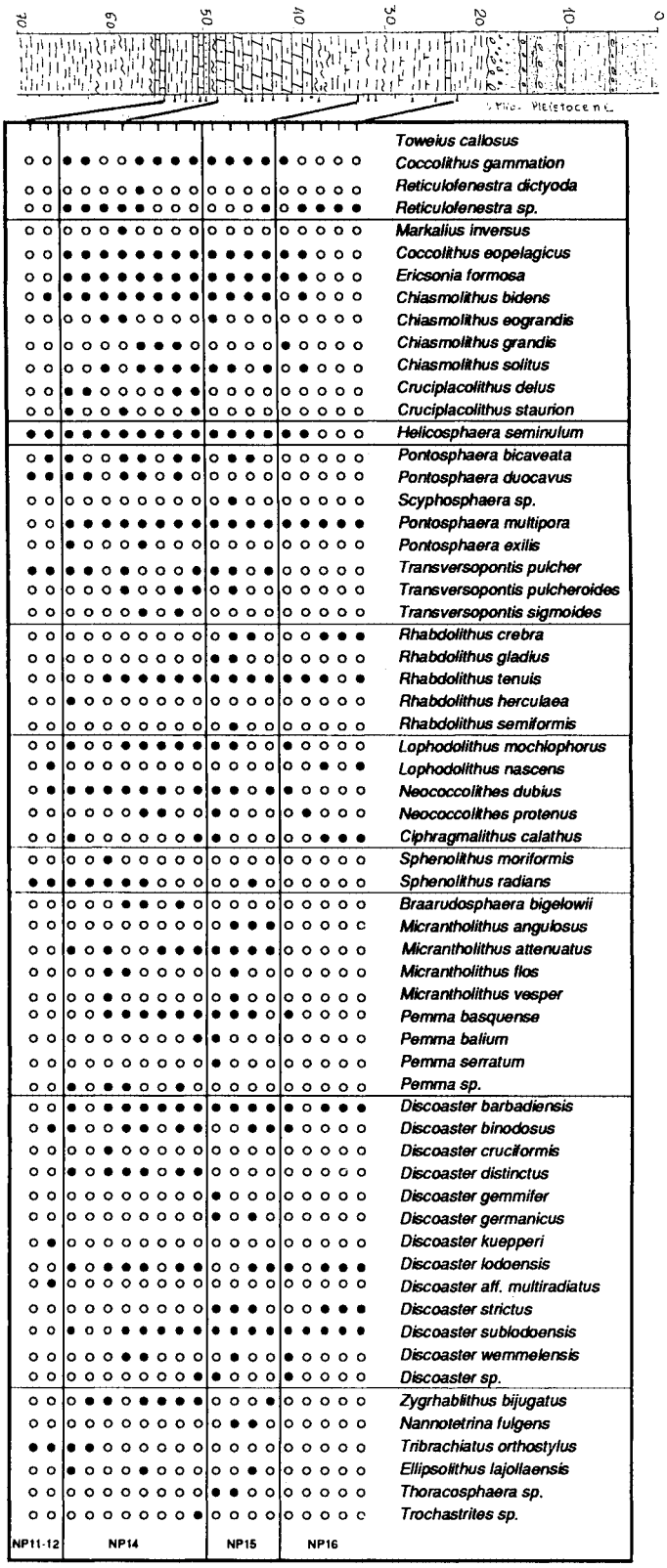
(2) Previous studies had been hampered by rarity of specimens, we hoped that calcareous nannofossils would not have this problem since they are usually abundant when present and their small size allows them to resist mechanical destruction, also their biostratigraphy is often more precise than that of other groups.

Nannofossil preservation is moderate to good, with some dissolution.

LITHOSTRATIGRAPHY: The upper Palaeocene starts with a condensed sequence (glauconitic - phosphatic hardground) and then is essentially attapulgite clay with a few calcareous beds (containing phosphatic nodules and concretions and vertebrate macrofossils at Kpome). In Bakpodji there are rare silts. This unit is 28m thick at Bakpodji, 40m at Kpome.

The Ypresian shows the typical facies for the region (Togo to Nigeria) - clays with light green attapulgite. It is 9m thick at Sohoume, 28m at Kpome (with silty and calcareous beds).

The Lutetian in the Sohoume area is 30m thick and consists of (from the base): Dark grey



DISTRIBUTION OF NANNOPLANKTON IN THE KPMOE BOREHOLE (BS4), BENIN, WEST AFRICA

fossiliferous micrite with nodules and phosphatic coprolites; kaolinitic clay; 9m dark grey marl with a few calcareous beds (with some coprolites and nodules). These beds are overlain by Plio-Pleistocene.

The Lutetian of the Kpome area is 33m and consists of; a few cm. parallel laminated sand with nodules and coprolites, grading into micrite; kaolinised clay; a calcareous bed with phosphatic nodules and coprolites. They are overlain by Lower Miocene formations.

BIOSTRATIGRAPHY - UPPER PALAEOCENE: Palaeocene nannofossils are only found in the first 10m of the Bakpodji core, they are etched, rare and of low diversity. Nevertheless the following species have been recognised; *Discoaster multiradiatus, Heliolithus* sp., *Toweius* sp., *Coccolithus eopelagicus, Chiasmolithus californicus, Zygodiscus sigmoides, Neococcolithus distentus. D. multiradiatus* indicates zone NP9.

BIOSTRATIGRAPHY - LOWER EOCENE: The Bakpodji and Sohoume cores both contain Lower Eocene nannofossils including; *Tribrachiatus orthostylus, Discoaster binodosus, Neococcolithus dubius, Sphenolithus radians, Transversopontis pulcheroides, Rhabdolithus tenuis, Zygodiscus sigmoides, Pontosphaera bicaveata, Coccolithus eopelagicus*, and *Discoaster cruciformis*. These Lower Eocene clays are known for their lack of fossils and the nannofossils are rare but relatively well preserved. We identified zones NP11 (based on absence of *D.lodoensis*) and NP12 (based on presence of *D.cruciformis*). The sediments are directly overlain by sediments with middle Eocene assemblages so it appears that there is an hiatus approximately corresponding to the last Early Eocene zone, NP13 (*D.lodoensis* zone).

BIOSTRATIGRAPHY - MIDDLE EOCENE: This interval has the most numerous nannofossils and I found practically all the species observed by Perch-Nielsen. Two zones have been recognised, NP14 (*D.sublodoensis*) and NP15 (*Nannotetrina fulgens*).

CONCLUSION: We can identify in Benin zones NP9, NP11, NP12, NP14, and NP15. The absence of NP13 appears to be a real phenomenon and correlates with the global recession suggested by workers in North West Europe (e.g. Aubry & Pomerol).

TOARCIAN CALCAREOUS NANNOFOSSIL BIOSTRATIGRAPHY FROM THE QUERCY AREA (SW FRANCE). COMPARISON WITH THE STRATOTYPE AREA OF AIRVAULT (DEUX SEVRES, FRANCE).

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Topics: Toarcian, S. France, Zonation

In the framework of an integrated stratigraphy (Galbrun et al 1991) a detailed biostratigraphy of Liassic calcareous nannofossils was carried out in the Toarcian stratotype area (Airvault quarry) and extended to the south west of France in the Quercy area (Penne and Cerède sections).

A semi-quantitative analysis of the calcareous nannofossils was performed mainly at light microscope; it showed first and last occurrences of important marker species together with fluctuations in abundance and specific diversity of the nannoflora.

In the Airvault section the total abundance varies from rare to common and preservation is moderate to poor due to unfavourable lithology (mainly detritic limestones). The Quercy sections, instead showed a good preservation and thus a higher specific diversity and abundance due to marly lithology.

All the nannobiohorizons identified in SW France were calibrated with ammonite zonation, reported in a synthetic chart and compared with recent tethyan and boreal zonations. The main events recognized are; the FOs of *L. crucicentralis, L. velatus, D. striatus, D. ignotus, C.magharensis* and the LOs of *B. novum, B. finchii*, and the LO of *L. hauffii* acme which seems to be related to the FO of *Ellipsagellosphaera* sp. followed by the FO of *W.* cf. *barnesae* and *W.* cf. *britannica*. These forms could be considered as transitional between *W. barnesae* and *W. britannica* which are found later in the boreal domain (Bown 1987) or in Italy (Reale et al 1991).

This regional nannobiostratigraphy has never been done before in SW France; it is well correlatable with zonal schemes of Portugal; (Bergen 1987) and Morocco (de Kaenel 1991). The slight discrepancy of some first occurrences can be related to palaeoprovincialism and to different taxonomic concepts.

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PALAEOTEMPERATURES SHOWN BY MORPHOLOGICAL VARIATIONS OF LITHRAPHIDITES *PRAEQUADRATUS - QUADRATUS* (SENONIAN CALCAREOUS NANNOFOSSILS INCERTAE SEDIS)

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Topics: Senonian, Pyrenees, Biometrics, *Lithraphidites*

Lithraphidites quadratus was distinguished from *L. praequadratus* (Roth 1988) by its less pronounced elongation, but all intermediate forms existed as well. This elongation can be defined by the ratio $\bar{\imath}=L/l$.

The average elongation of populations that combine all forms varies with time. Biometrical studies of this type require a rather precise knowledge of the age, a condition easily satisfied in the Central Pyrenees since earlier work had already applied the grade dating method (Gourinard 1987) to Senonian rocks, using the *Rosita fornicata* lineage (Fondecave-Wallez 1988).

The fluctuations of $\bar{\imath}$ show an average curve and four peaks. Comparing these variations with those of $\delta^{18}O$ in carbonates of DSDP Site 516, Leg 72 (Renard et al 1983, Clauser 1987) we note that the four peaks can be correlated with four $\delta^{18}O$ events. Therefore the measured morphological variation of *Lithraphidites* are mostly determined by the same causes as those of the $\delta^{18}O$ events. These seem to correspond to adaptation of the phenotype to temperature variations.

This biometric data thus provides qualitative indications of palaeothermal variations in the pelagic domain.

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PLIO- PLEISTOCENE CALCAREOUS NANNOFOSSIL BIOSTRATIGRAPHY OF SOME TERRIGENOUS DEPOSITS OF THE SOUTHERN APENNINIC FOREDEEP

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Topics: Plio-Pleistocene, Italy, Biostratigraphy, Methods

Quantitative and semi-quantitative methods proposed by Backman & Shackleton (1983) and by Rio et al (1990) to determine the pattern distribution of stratigraphically significant calcareous nannofossils of Plio- Pleistocene pelagic sequences are here tested for study of terrigenous successions - in the lithostratigraphic units of the Southern Apenninic foredeep.

For this several samples have been collected from four silty-clayey sections that outcrop along the internal margin of the Lucanian Foredeep, between Garaguso and Oliveto Lucano. All these successions consist of two overlying sedimentary cycles, of fine-grained detrital sediments previously referred without details to the Late Pliocene.

The samples have been examined for planktonic foraminifera and calcareous nannofossils. The nannofloral assemblages are diverse and contain all the important marker species; because of the prevailing detrital input the assemblages are poorly preserved and very rich in reworked species; so the marker species occur at diluted abundances.

Compared to pelagic sediments the terrigenous ones require extended investigations to identify the key biostratigraphic events in calcareous nannofossil assemblages. Despite these difficulties smear slide studies have enabled the recognition of both the assemblages and the events of the Mediterranean Plio-Pleistocene. In the first cycle sediments the base of the *Discoaster tamalis* zone has been recognized; in the second cycle the lowermost part can be referred to, top *D. tamalis* zone - base *D. pentaradiatus* zone, whilst the top of the succession can be referred to the *Calcidiscus macintyrei* zone. The local age of the foredeep successions is between the base of the Late Pliocene and the base of the Pleistocene.

In conclusion this study provided evidence that the quantitative and semi-quantitative methods originally proposed for pelagic sediments can also be applied to terrigenous ones.

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CALCAREOUS NANNOFOSSILS IN THE EQUATORIAL PACIFIC OCEAN DURING THE LAST 40,000 YEARS AND THEIR RELATIONSHIP WITH CLIMATE CHANGES

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Topics: Recent, Pacific Ocean, P'ecol./oceanogr.

The aim of this work is to analyze the composition of fossil coccolith assemblages and to compare the palaeoclimatic results from this with those previously obtained by other means. We compare nannofossil associations from the Central and Western Pacific. Calcareous nannofossils were investigated from four box cores taken by the Eurydice expedition (ERDC) from the Western Equatorial Pacific Ocean and four other cores obtained from the Central Pacific Ocean by the Pleiades expedition (PLDS).

The cores studies showed a very low specific richness (11 species and 2 genera, excluding reworked species). Compared to the present nannoplankton community of surface water in the Equatorial Pacific. Slight differences in the nannofossil thanatocoenoses during the last glacial period were found by applying multi-variate methods only when grouping levels of similar age in each of the studied areas. For the last 40,000 years the thanatocoenosis of coccoliths from the Equatorial Pacific has been dominated by species from the "*Gephyrocapsa* complex" (*G. oceanica, G. caribbeanica*, and intermediate forms) followed by *Cyclococcolithus leptoporus* . The greater relative abundance of the "*Gephyrocapsa* complex" and *C. leptoporus* during this period can be interpreted as a slight increase in the bioproductivity of these planktonic organisms. The Central

Equatorial Pacific is a zone with higher bioproductivity than the Western Equatorial Pacific, although it show a minor relative abundance of calcareous nannofossils, as it is an area with a high rate of calcium carbonate dissolution.

CALCAREOUS NANNOPLANKTON FROM FLYSCH SEDIMENTS - PROBLEMS AND HINTS FOR STUDY

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Topics: Miocene, Poland, Biostratigraphy, Methods

The majority of nannofossil marker species were described from oceanic sites and boreholes in pelagic sediments. The composition of nannofossil assemblages collected in sediments deposited in geosynclinal basins by density flows is quite different.

Investigation of samples taken from flysch sediments of the Polish Carpathians has led us to some conclusions. First, assemblages from this type of sediment pose problems of strong reworking from older strata. Second poor preservation of nannofossils can be an equally serious problem. These factors affect attempts at zonal assignments of samples.

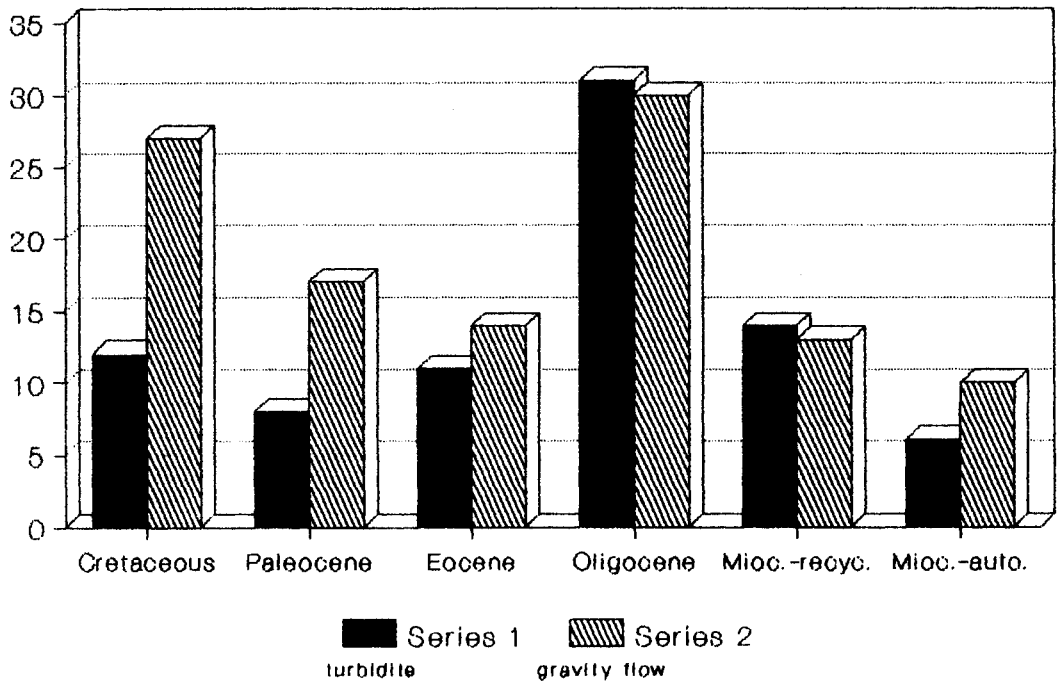

Fig.1 Autochthonous vs recycled nannofossils in different sediments.

Analysis of samples from recycled Lower Miocene sediments deposited near regions of active tectonic uplift show strong differentiation, connected to the type of sediment, in quantity, composition, and preservation of the nannofossils. Autochthonous taxa constitute only a small part of the total assemblage. The bulk of the assemblage is composed of allochthonous nannofossil taxa recycled from the older nearshore strata. The percentage of allo- autochthonous taxa and their preservation state are shown in figs. 1 & 2.

The preservation of calcareous nannofossils in sediments formed by high density gravity flows is much better than in those formed by turbidity currents (fig.2). We observed about a 100% increase in the number of Cretaceous and Palaeocene taxa recognized in samples from high density gravity flows as opposed to turbidity currents (fig.1). We also observed about a 30% increase of recognized autochthonous Miocene taxa in samples from the high density gravity flow sediments. An increased number of recognized taxa and a greater percentage

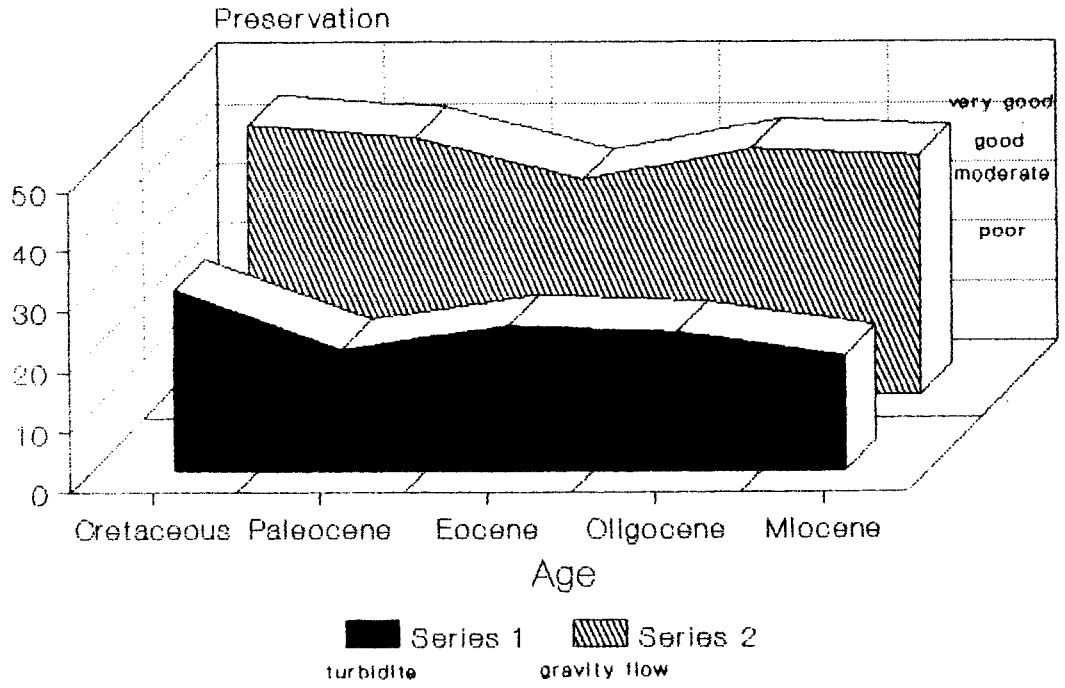

Fig.2 Nannofossil preservation in different sediment types.

of taxa representing specific time intervals were observed in samples from sediments formed by high density gravity flows as opposed to turbidity currents (fig.1).

This differentiation may be the result of three factors: different sources; different erosional competence; and different internal transport mechanisms. We observed increased relative abundance, preservation state improvement, and enrichment in well preserved Cretaceous and Palaeogene taxa in samples from high density gravity flows. This could be due to increased participation of older nannofossil rich sediments outcropping in a tectonically raised source, or transit areas. Particles of already formed sediments of different ages may have been eroded and incorporated in high density gravity flows, increasing the number of taxa and perhaps their preservation state. In addition in high density gravity flows the density and viscosity are much higher and the turbulence much lower than in turbidity currents. Thus in high density gravity flows pelagic particles are unable to emerge from the flow but remain in suspension within it, and are not dispersed beyond it. Also nannoplankton are not subjected to such high friction as in turbidity currents. In turbidity currents density and viscosity are lower turbulence is higher and particles move independently and can be dispersed.

GENETIC SEQUENCE STRATIGRAPHY - SOUTH CHINA SEA

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Topics: Neogene, S. China Sea, Sequence stratigraphy

The stratigraphic nomenclature applied at present in the subdivision and correlation of the Neogene sequences in the hydrocarbon bearing basins of the S. China Sea is of an highly informal and confusing nature. Current stratigraphic schemes consists of number and/or letter coded, local "Cycles", "Units", or "Stages", which are difficult to recognize or correlate as they are based on often poorly dated paleoenvironmental events. A unifying stratigraphic scheme based on a combination of high resolution (calcareous nannofossil) biostratigraphy and genetic sequence chronostratigraphy is proposed.

CALCIFICATION RATES IN A BLOOM OF THE COCCOLITHOPHORE *EMILIANIA HUXLEYI*

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Topics: Living, North Atlantic, Ecology/Oceanography, Productivity

During the cruise of RRS Charles Darwin in June 1991, focused on the biogeochemical significance of coccolithophores, a large bloom of *Emiliania huxleyi*, developed south of Iceland, was extensively studied. In this report the results of measurements of calcification rates using the radioactive tracer calcium-45 are presented. The impact of coccolith formation on some physical and chemical parameters of the sea water is briefly mentioned.

Sea water samples, derived from 0-35m water depth, were labeled with calcium-45 and placed either in an incubator on deck, or tied to a floating rig at the same depths from where the samples were collected (*in situ* experiments). After 24 hours ofincubation the samples were filtered over nucleopore filters, which were subsequently washed thoroughly with sea water. The radioactivity of the filters was measured in a scintillation counter.

$CaCO_3$ production in the bloom was highest at the surface and was usually confined to the upper 10 or 20 meters. The total production integrated over the first 35 meters of the water column ranged from 0.6 - 2.9g $CaCO_3/m^2/day$. Roughly estimated, a total amount of 10^7 tonnes of calcite may have been produced by the Icelandic bloom.

At one site close to the edge of the bloom a large population of coccolithophores, different from the one living in the surface mixed layer, was detected below a depth of 20 meters. Despite a light level of less than 5%, the cellular activity, expressed in rates of coccolith production per cell, was higher than the activity of the cells in the population in the surface layer. We discuss the possibility that the ability of *E. huxleyi* to thrive at low light levels is an important factor in the development of blooms of this species.

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Compiled by William G. Siesser

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7	**WISE, S. W. Jr., BREZA, J. R., HARWOOD, D. M. & WEI, W.** Paleogene glacial history of Antarctica. In: Controversies in Modern Geology, Chapt.8, pp. 133-171.	1991	Strat;Ecol. TERT.L Antarctica
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TAXA

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Alisphaera spatula STEINMETZ 1991, pp. 29-30, pl. 15, figs. 6-8. Central Atlantic; living. — A451-9

Anthosphaera KAMPTNER 1937 emend. KLEIJNE 1991, pp. 40-42. — A447-3

Anthosphaera lafourcadii (LECAL 1967) KLEIJNE 1991, p. 42; (ex *Helladosphaera [Cyclohelladosphaera]*). — A447-3

Anthosphaera periperforata KLEIJNE 1991, pp.42-45, pl. 9, figs. 3-6. Mediterranean & North Atlantic; living. — A447-3

Calcidiscus leptoporus f. *rigidus* (GAARDER 1980) KLEIJNE 1991, p. 17, pl. 4, figs. 4-6; (ex *Crystallolithus rigidus*). — A447-3

Calicasphaera KLEIJNE 1991, p. 22. Type species: *Calicasphaera diconstricta* KLEIJNE 1991. — A447-3

Calicasphaera blokii KLEIJNE 1991, p. 24, pl. 2, figs. 1-3. Mediterranean; living. — A447-3

Calicasphaera concava KLEIJNE 1991, p. 24, pl. 1, figs. 5,6. North Atlantic; living. — A447-3

Calicasphaera diconstricta KLEIJNE 1991, pp. 22-24, pl. 1, figs. 1-4. Red Sea & Mediterranean; living. — A447-3

Calyptrosphaera dentata KLEIJNE 1991, pp. 26-27, pl. 3, figs. 1,2. Mediterranean & Pacific; living. — A447-3

Calyptrolithina wettsteinii (KAMPTNER 1937) KLEIJNE 1991, p.46; (ex *Zygosphaera*). — A447-3

Coccolithus pelagicus f. *braarudii* (GAARDER 1962) KLEIJNE 1991, p. 17; (ex *Crystallolithus braarudii*). — A447-3

Coccolithus pelagicus f. *hyalinus* (GAARDER & MARKALI 1956) KLEIJNE 1991, p. 17, pl. 4, fig. 2; (ex *Crystallolithus hyalinus*). — A447-3

Flosculosphaera JORDAN & KLEIJNE in KLEIJNE, JORDAN & CHAMBERLAIN 1991, pp. 186-187. Type species: *Flosculosphaera calceolariopsis* JORDAN & KLEIJNE 1991. — A447-4

Flosculosphaera calceolariopsis JORDAN & KLEIJNE in KLEIJNE, JORDAN & CHAMBERLAIN 1991, p. 187, figs. 1-4. North Atlantic; living. — A447-4

Flosculosphaera sacculus KLEIJNE & JORDAN in KLEIJNE, JORDAN & CHAMBERLAIN 1991, p. 190, figs. 5,6. North Atlantic; living. — A447-4

Helicosphaera omanica SATO, KAMEO & TAKAYAM 1991, p. 50, pl. 1, figs. 1-3. Arabian Sea; upper Pliocene to lower Pleistocene. — A450-9

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Homozygosphaera arethusae (KAMPTNER 1941) KLEIJNE 1991, p. 31; (ex *Corisphaera*).	A447-3
Pappomonas weddellensis THOMSEN in THOMSEN et al. 1988, p. 429, figs. 32-34. Weddell Sea; living.	A452-7
Papposphaera obpyramidalis THOMSEN in THOMSEN et al.1988, p. 431, figs. 38-40. Weddell Sea; living.	A452-7
Papposphaera simplicissima THOMSEN in THOMSEN et al. 1988, p. 433, figs. 41-43. Weddell Sea; living.	A452-7
Pleurochrysidaceae FRESNEL & BILLARD 1991, p. 79. Type genus: *Pleurochrysis* PRINGSHEIM 1955.	A445-3
Pleurochrysis placolithoides FRESNEL & BILLARD 1991, p. 79, figs. 1,4,7. Atlantic coast of France; living.	A445-3
Pleurochrysis roscoffensis (DANGEARD 1934) FRESNEL & BILLARD 1991, p. 77; (ex *Syracosphaera*).	A445-3
Poricalyptra KLEIJNE 1991, p. 59. Type species: *Poricalyptra aurisinae* (KAMPTNER 1941).	A447-3
Poricalyptra aurisinae (KAMPTNER 1941) KLEIJNE 1991, p.61; (ex *Helladosphaera*).	A447-3
Poricalyptra gaarderae (BORSETTI & CATI 1976) KLEIJNE 1991, p. 61; (ex *Helladosphaera gaarderii*).	A447-3
Poricalyptra isselii (BORSETTI & CATI 1976) KLEIJNE 1991, p. 62; (ex *Helladosphaera*).	A447-3
Poricalyptra magnaghii (BORSETTI & CATI 1976) KLEIJNE 1991, p. 61; (ex *Helladosphaera*).	A447-3
Poritectolithus KLEIJNE 1991, p. 62. Type species: *Poritectolithus poritectum* (HEIMDAL 1980).	A447-3
Poritectolithus maximus KLEIJNE 1991, p. 63, pl. 16, figs. 4-7. North Atlantic, Pacific & Indian; living.	A447-3
Poritectolithus poritectum (HEIMDAL 1980) KLEIJNE 1991, pp. 62-63; (ex *Helladosphaera*).	A447-3
Poritectolithus tyronus KLEIJNE 1991, pp. 63-64, pl. 17, figs. 1, 2; North Atlantic; living.	A447-3
Reticulofenestra ampla SATO, KAMEO & TAKAYAMA 1991, p. 50, pl. 1, figs. 4-6. North Atlantic and Indian; Miocene - upper Pliocene.	A450-9
Sphaerocalyptra adenesis KLEIJNE 1991, p. 65, pl. 17, figs. 4-6. Indian & Red Sea; living.	A447-3
Syracolithus bicorium KLEIJNE 1991, p. 38, pl. 7, figs. 5,6. Mediterranean & North Atlantic; living.	A447-3

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Syracolithus confusus KLEIJNE 1991, pp. 34-36, pl. 6, figs. 3-5. Mediterranean & Red Sea; living. A447-3

Thoracosphaera wombatensis BRALOWER, BOWN & SIESSER 1991, p. 150, pl. 7, figs. 1-19. Indian (Wombat Plateau); Norian-Rhaetian. A443-7

Trigonaspis melvillea THOMSEN in THOMSEN et al. 1988, pp. 425-427, figs. 23-29. Weddell Sea; living. A452-7

Turrilithus JORDAN, KNAPPERTSBUSCH, SIMPSON & CHAMBERLAIN 1991, p. 176. Type species: *Turrilithus latericioides* JORDAN, KNAPPERTSBUSCH, SIMPSON & CHAMBERLAIN 1991. A446-9

Turrilithus latericioides JORDAN, KNAPPERTSBUSCH, SIMPSON & CHAMBERLAIN 1991, pp. 176-178, figs.2-12. Central Atlantic & Mediterranean; living. A446-9

Umbilicosphaera calvata STEINMETZ 1991, pp. 27-28, pl. 5, figs. 1-4. Panama Basin; living. A451-9

Umbilicosphaera scituloma STEINMETZ 1991, pp. 28-29, pl. 5, figs. 5-6. Panama Basin; living. A451-9

Wigwamma antarctica THOMSEN in THOMSEN et al. 1988, p. 423, figs. 9-15. Weddell Sea; living. A452-7

Wigwamma triradiata THOMSEN in THOMSEN et al. 1988, p. 425, figs. 16-20. Weddell Sea; living. A452-7

NEW TAXA

Calcareous Nannoplankton Families

Pleurochrysidaceae

Calcareous Nannoplankton Genera

Calicasphaera
Flosculosphaera
Poricalyptra
Poritectolithus
Turrilithus

Calcareous Nannoplankton Species

adenesis, Sphaerocalyptra
ampla, Reticulofenestra
antarctica, Wigwamma
bicorium, Syracolithus
blokii, Calicasphaera
calceolariopsis, Flosculosphaera
calvata, Umbilicosphaera
concava, Calicasphaera
confusus, Syracolithus
dentata, Calyptrosphaera
diconstricta, Calicasphaera
latericioides, Turrilithus
maximus, Poritectolithus
melvillea, Trigonaspis
obpyramidalis, Papposphaera
omanica, Helicosphaera
periperforata, Anthosphaera
placolithoides, Pleurochrysis
sacculus, Flosculosphaera
scituloma, Umbilicosphaera
simplicissima, Papposphaera
spatula, Alisphaera
triradiata, Wigwamma
tyronus, Poritectolithus
weddellensis, Pappomonas
wombatensis, Thoracosphaera

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