Newsletter of Micropalaeontology

July 2003
Number 68

Edited by Jennifer Pike

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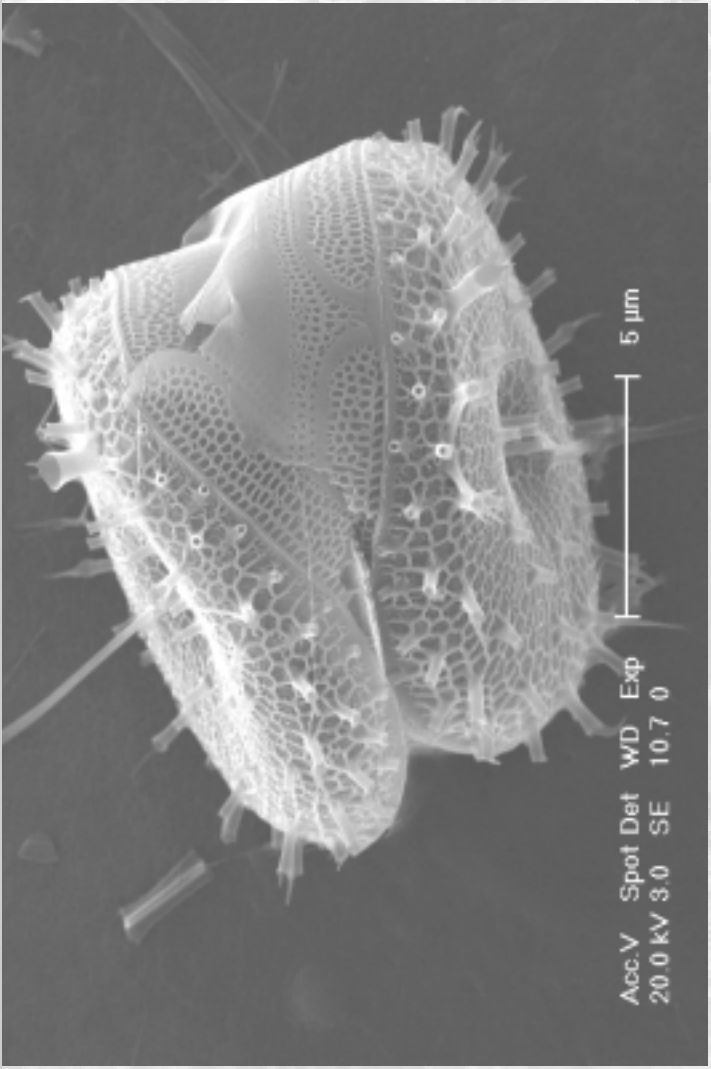

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The Micropalaeontological Society

http://www.tmsoc.org

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Notes from the Chair

Haydon Bailey
<hwb20@aol.com>

I've recently returned from the Foraminifera Group meeting held at the excellent facilities of Geomar in Kiel and it's taught me a number of important lessons. Firstly, that it's perfectly feasible to hold group meetings successfully outside the U.K. Travel costs are becoming less of an issue if the meeting location is accessible via cheap flight destinations. They're probably cheaper than travelling by rail anyway.

A second issue could well be a potential lack of audience but, as the Kiel meeting proved, with well over forty attendees, the Society has members located throughout Europe who are happy and willing to travel to group meetings. The German meeting had attendees from the U.K., Norway, Denmark and France, as well as the large local contingent.

Both factors should encourage us to extend the geographical range of our meetings. We all have colleagues located elsewhere in Europe, so talk to them and establish the potential of locating meetings outside the U.K. Finally, on a more cautionary note, when meetings are held in the U.K. they attract the 'older', established members of the Society who are based in the U.K. as that is where the Society started. This is fine, except for one thing, they didn't travel to Kiel and the local audience was, to put it politely, younger than me, certainly by the afternoon session. Not only was this the first full TMS group meeting held outside the U.K., it was also the first TMS meeting I can think of where I was probably the oldest person present. This, on a personal level, was a very salutary experience!

Signs of my aging apart, my thanks to Andy Henderson for organising such a successful meeting and a very big thank you to Joachim Schoenfeld and his colleagues in Kiel, particularly Ann Holbourn and Wolfgang Kuhnt, for being so welcoming. It was a good experience all around.

Other group meetings are scheduled outside the environs of south east England, with the palynology group planning a future meeting in France and the Siliceous microfossil group moving to South Wales. No doubt both meetings will be bilingual! This brings me to other meetings which are at an early planning stage, but worthy of note. As all of you are aware The Micropalaeontology Society held a very successful meeting at UCL last September along with our U.S. colleagues from NAMS and AASP. The North American Micropaleontology Society wishes to maintain the momentum generated by the London meeting by holding a joint conference in Houston, Texas probably during early 2005 with the title of 'Problem solving with Micropalaeontology'.

We, The Micropalaeontology Society, have been invited to be associated with this meeting and the committee has agreed to fully co-operate as Joint Convenors for the conference. So, at this stage I would recommend that you start looking at what results you may wish to present under this all encompassing title. At the same time I guess you'll need to start saving a 'fist full of dollars' and 'a few dollars more' to cover your expenses.

This meeting is at an early planning stage, but we'll keep you posted as soon as any additional information becomes available. Other gatherings to check on elsewhere in this newsletter include an early October open TMS meeting hosted at Robertson Research in North Wales and a first call for papers at the 2005 Lyell Meeting which is being convened by TMS on that occasion.

The wealth of new ideas I've heard both during and since the September conference and the suggestions and enthusiasm I've come across for future gatherings is incredibly encouraging. In the past, these 'Notes' have dwelt on the potential decline of our science, but I'm becoming increasingly aware of a buoyant and vibrant 'youthful' willingness to get involved and see micropalaeontology progress. This is great and keep it coming.....if only to encourage a person who's just been the oldest one there at the meeting for the first time!

Cover photo: *Thalassiosira gravida* from Marguerite Bay, west Antarctic Peninsula. Water column (live) specimen collected from 6 m water depth as part of a diatom taphonomy investigation along the continental shelf of the Antarctic Peninsula. Diatom is approximately 15 microns in diametre. Picture supplied by Jenny Pike.

Copy deadline for next Newsletter is 1st November 2003.

TMS FOUNDATION

The Micropalaeontological Society Foundation is a sponsorship scheme to help support the *Journal of Micropalaeontology*. The Foundation is made up of members, non-members and institutions who wish to support the science of micropalaeontology via the production of the *Journal*. Any level of subscription is welcome. A minimum annual donation of £25 is suggested; donors of £25 or more will be acknowledged in the *Journal* and the *Newsletter*.

Subscription is welcome at any time. Please send donations to James B. Riding, Treasurer, The Micropalaeontological Society, British Geological Survey, Keyworth, Nottingham, Nottinghamshire, NG12 5GG, UK. Please make cheques/money orders/bankers drafts payable to "**The Micropalaeontological Society Foundation**". If you wish to pay by Visa or Mastercard, please include amount you wish to donate, the card number, expiry date and cardholders address. If you wish to pay by Switch, please include the amount you wish to donate, the Switch Number, card issue number, expiry date and cardholders address.

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Editors, Stereo Atlas of Ostracod Shells

Society News

Proposals for Consitutional Changes, 2003

Concerns expressed by Dr. Steve Crittenden over the invalidity of the postal ballot circulated during the debate of the Society 'name change' made it clear that the existing Rules to the Constitution had become outdated after thirty years of the Society's existence. I gratefully acknowledge Steve's role in raising this point and thereby causing the present committee to take a look at the Constitution and its associated Rules.

Basically the Society Constitution is well written; it is robust and requires little alteration. However, with the advent of electronic mailing systems and a more geographically widespread membership, it is pertinent to consider the necessity of making minor alterations to the Rules in order to facilitate balloting of the membership in the future by both postal and electronic methods.

THE CONSTITUTION

Currently the Constitution can only be altered at a General Meeting. The Committee have considered this and wish this situation to remain unchanged. It is worth noting however that under the current Rules, 25 members of the Society constitute a quorum at a General Meeting and a two thirds majority of those present (i.e. 18 members) could, in theory, totally alter the Constitution if they thought it necessary. This hardly seems an adequate number for a Society of over 450 members. The Rules, if amended as suggested would give the Society the option of canvassing the whole membership prior to a decision being taken at a General meeting.

RULES

No amendment would be sought for Rules 1, 2 and 3.

Rule 4, items i) and iii) would be left unchanged.

Item ii) deals with postal ballots and therefore needs updating. I would suggest we consider rewording this as follows:

"A list of all candidates for election shall be issued by the Secretary in the form of a postal and/or electronic ballot four weeks (currently it's three) weeks before the AGM. Postal ballot forms must be returned to the Secretary by post before the meeting (or be handed in prior to the start of the AGM). In the case of postal votes, the ballot papers should be placed in a sealed envelope and forwarded to the Secretary in order that these votes can be opened at the AGM. In the case of electronic votes, the ballot papers should be mailed to the Secretary for receipt up until midnight of the day prior to the AGM."

"In the result of the ballot ending in a tie……" - this section would remain unchanged

Rule 5, items i), ii), iii) and iv) to remain unchanged, although the last sentence of item iii) should be separated out as a discrete item in order to make it clearer.

Item v) - It is suggested that we consider raising the quorum of a General Meeting to 10% of the individual membership of the Society.

Rule 6 - all items would remain unchanged, with the exception of the addition of "by a majority vote of those present at the meeting." at the close of item i).

Rule 7 - This deals with Postal Ballots. In this case the wording should be altered to include the possible use of electronic voting. This could be achieved by the simple addition of "/Electronic" after the word Postal. Otherwise it could be left unchanged.

Rule 8 - In the light of the above discussion I would suggest that Amendments to the Rules should in future be confirmed at a General Meeting following a Postal/Electronic ballot as outlined under Rule 7. Do we have a simple majority for this - as currently exists, or would it be wiser to move to a two thirds majority as for other postal/electronic votes?

I would very much welcome comments and opinions please before I put any formal motions before the Society. Please contact the Society Chairman - Haydon Bailey, at hwb20@aol.com

Secretary's Report

James Powell
<hystrichosphere@btopenworld.com>

Annual General Meeting 2003

The 2003 Annual General meeting will be held at University College London in the Cruciform Lecture Theatre 1 on Wednesday 26th November, commencing 2:00pm (to be confirmed). Items for the agenda should be presented to the Secretary <hystrichosphere@btopenworld.com> by Wednesday 5th November 2003.

The agenda for the AGM will then be displayed on the Society's website <www.tmsoc.org> on Wednesday 5th November.

Following Society business, two talks will be presented (see end of Secretary's Report for abstracts):

Dr Jim Riding (British Geological Society): The use of reworked palynomorphs in the provenance analysis of the Crag Group (Pleistocene) and the pre-Devensian glacial deposits of East Anglia

Dr Robert Jones (bp) and Dr John Whittaker (The Natural History Museum): Pleistocene Foraminifera and Ostracoda.

Following the AGM, a wine reception will be held in the South Cloisters at UCL together with a display of posters. Members wishing to contribute a poster should contact the Secretary <hystrichosphere@btopenworld.com> by Wednesday 5th November to ensure that adequate space is reserved. Poster boards have dimensions of 1m x 2m.

Changes to the Committee

The terms of office of the following Officers of the Committee come to an end at the 2003 AGM: Secretary, Treasurer, Journal Editor and Special Publications Editor. Nominations for these positions should be submitted to the Secretary by Wednesday 29th October 2003. Nominees, proposers and seconders should all be members of the Society.

The Chairman will stand down at the 2004 AGM, and the incumbent is ineligible for re-election. If you wish to consider standing for this position, please contact the Chairman <hwb20@aol.com> for information about the duties and responsibilities entailed.

Charles Downie Award 2003

The Charles Downie Award is an annual award made to the member of the Society who, in the opinion of the Committee, has published the most significant paper, in any journal, based upon his or her postgraduate research. The Committee has awarded the 2003 Charles Downie Award (best paper published in 2002) to Henning Blom for his paper (Blom, H., Märss, T. & Miller, G.C.) entitled

Grants-in-Aid 2004

Grants-in-Aid are awarded annually to help student members of TMS in their conference attendance, or any other specific activity related to their research which has not been budgeted for. Grants cannot be awarded for miscellaneous expenditure (e.g. slides, sample bags, sample preparation, laboratory costs, SEM photography or producing, photocopying, printing and binding of theses), nor can they be awarded retrospectively.

A maximum of £200 can be awarded to each successful applicant, and a total of £600 is available annually. Awardees are also expected to write a short report for the *Newsletter of Micropalaeontology* once their grants have been used.

Application forms may be obtained from the Secretary <hystrichosphere@btopenworld.com>

Deadline for applications: 28th February 2004

'Silurian and earliest Devonian Birkeniid anaspids from the Northern Hemisphere'. *Transactions of the Royal Society of Edinburgh: Earth Science*, 92(3-4), 263-323. Only one nomination was made to the Secretary by the deadline of 31st March. Henning will receive his award at the 2003 AGM.

Charles Downie Award 2004
Nominations for the best paper published in 2003 should be submitted either to the appropriate Specialist Group or the Secretary by 28th February 2004. Nominated papers can be either single or multiple authorship (as long as the nominee is the senior author).

Grants-in-Aid 2003
The Secretary received four applications (Helga Bara, Yoann van Eetvelde, Matthew Riley and Mark Woodger), for Grants-in-Aid by the deadline of 31st March 2003. The Committee will make its decisions at its June Committee meeting.

Grants-in-Aid are awarded annually to help student members of TMS in their conference attendance, or any other specific activity related to their research which has not been budgeted for. Grants cannot be awarded for miscellaneous expenditure (e.g. slides, sample bags, sample preparation, laboratory costs, SEM photography or producing, photocopying, printing and binding of theses), nor can they be awarded retrospectively. A maximum of £200 can be awarded to each successful applicant, and a total of £600 is available annually. Awardees are also expected to write a short report for the *Newsletter of Micropalaeontology* once their grants have been used. Applications should be made to the Secretary by 28th February 2004.

Membership Database
The Society's database currently comprises 435 (426) individual members, of which 235 (225) are resident in the UK, 99 (99) in Europe, and 101 (102) in the Rest of the World (2002 figures in brackets). Your address label indicates whether or not you have renewed for 2003 (and whether or not you pay by Direct Debit). Members who do not renew their subscriptions by the AGM (26th November 2003) will be struck off the database and will receive neither *Newsletter of Micropalaeontology* No. 69 nor Part 2 of Volume 22 of the *Journal of Micropalaeontology*.

Directory of Micropalaeontology
A new edition of the directory of members (renamed *Directory of Micropalaeontology*) has being compiled and is issued with this edition of the Newsletter. The new directory includes, where possible, email addresses and website details, telephone and fax numbers, as well as Specialist Group affiliations. It is the intention of the Committee that the *Directory of Micropalaeontology* will be also be made accessible through the website. Members who do not wish to have their details included on the website should let the Secretary know <hystrichosphere@btopenworld.com>.

AASP-TMS-NAMS Meeting 2002
The Secretary and Dr Jim Riding are editing a volume in the Society's Special Publication Series based upon papers submitted following last year's successful AASP-TMS-NAMS joint meeting at University College London.

AGM Presentation Abstracts

The use of reworked palynomorphs in the provenance analysis of the Crag Group (Pleistocene) and the pre-Devensian glacial deposits of East Anglia
J.B. Riding[1], J. Rose[2], R.J.O. Hamblin[1], B.S.P. Moorlock[1], S.J. Booth[1], J.R. Lee[2] and S. Pawley[2]

[1]British Geological Survey, Keyworth, Nottingham, NG12 5GG, UK
[2]Department of Geography, Royal Holloway, University of London,
Egham, Surrey, TW20 0EX, UK

Allochthonous palynomorphs have proved extremely useful in the provenance analysis of the Crag Group and the overlying pre-Devensian glacial succession in East Anglia, southeast England. The Crag Group is a marine deposit, which includes fluvial sediments. Palynomorph-bearing sedimentary clasts, which were eroded inland to the north and west, especially where the rivers were of high erosive force, can help model the paths of three major drainage elements. Likewise, the palynological content of Till sheets can also provide valuable evidence of provenance. In both the Crag Group and the Till succession, Carboniferous and Jurassic palynomorphs may be especially common, with lesser proportions of Cretaceous and Palaeogene elements. Palynomorphs of Silurian to Quaternary age have been observed.

Both derived palynofloras and clast lithologies from river and shallow marine sediments have been used to correlate pre-Anglian fluvial and coastal deposits in eastern England. The results are used to provide a lithostratigraphical framework for the Early and early Middle Pleistocene sediments, and to derive sedimentary models that can be linked to the tectonic and climatic processes that determined the behaviour of the geological systems. Three geological systems are recognised. i) The river Thames, which drained an area from Wales through Midland England to the Thames basin and southern East Anglia and reached the southern North Sea delta in the region of southern East Anglia. ii) The Bytham river which drained midland England and the southern Pennines and reached the southern North Sea delta in the region of north central East Anglia. iii) The Ancaster river which drained the southern Pennines and received sediment from northeast England. This river reached the sea in, and north of, northern East Anglia and contributed to some of the Cromer Forest-Bed. Each of these rivers contributed to the shallow marine sediments that formed around the eastern margin of the southern North Sea delta/estuary and are known as the Red, Norwich, and Wroxham Crag formations.

Similarly, the study of allochthonous palynomorphs can be effectively applied to the provenance of the pre-Devensian glacial deposits of Norfolk. Traditionally these deposits have been divided into a Lowestoft Formation, overlying a North Sea Drift Formation, the latter including three or four tills. All were considered to be Anglian, Oxygen Isotope Stage (OIS) 12. However, detailed mapping has demonstrated that the Lowestoft Till equates to the Walcott Till or Second Cromer Till, the second of the North Sea Drift tills. The deposits underlying the Lowestoft Till are now termed the Happisburgh Formation and were derived from northern Britain and the North Sea. The Lowestoft Formation is overlain by the Bacton Green or Third Cromer Till, for which derivation from northern Britain and the North Sea is also proposed; no Scandinavian erratics have been found in this till. The Bacton Green Till is overlain by the Overstrand Formation. This includes both sandur deposits (Briton's Lane Member) and till (Stody Member), both of which are dominated by coarse, rounded flints. Unlike the earlier formations, the Overstrand Formation reveals constructional geomorphology and contains Scandinavian erratics, and an OIS 6 age is proposed for this glaciation, corresponding to the major glaciation in the Netherlands.

Treasurer's Report

James B. Riding
<jbri@bgs.ac.uk>

Last years TMS accounts were included in Newsletter 67. The bottom line figures were significantly skewed upwards due to the AASP/NAMS/TMS conference income and expenditure. Once again I can report that the finances of the Society are relatively healthy. We do not hold large reserves, as the annual accounts will testify, but we are well on course to achieve a balanced budget for the financial year 2002-2003. The September 2002 AASP/NAMS/TMS meeting in London made a reasonable operating surplus, which has helped us in this regard.

It seems that the increase in individual subscriptions by £5 from 2003 has not caused a downturn in membership renewals. This situation is very gratifying as the committee is very much aware of the many geoscientific societies competing for your subscriptions. There are, however, some members who have not yet paid for 2003. Please check if you have paid your subscription for this year by eamining the date on your address label for this newsletter. If you have not paid your 2003 subscription, please send me a cheque as soon as possible.

In the last Newsletter I stated that I would be stepping down as Treasurer at the 2002 AGM. The person who volunteered to take over could not take up the post due to other commitments, so I agreed to stay on for another year. I can report that we now have another volunteer Treasurer who, should he/she be elected, will take over from me at the 2003 AGM.

New Members

We welcome the following new members to the Society: Maria Bolivar, Nils Cornelius, Angela Hayes, Vernon Hunter, Helga B. B. Jónsdóttir, David Jutson, Kate Larkin, Eleanor Maddison, Martin A. Pearce, Kirsty Penkman, Matthew Riley, David C. Rutledge, Steven Starkie, Simona Stefanelli, Catherine E. Stickley, Paul Tisserant, Mark Woodger, Sarah Woodroffe, Jimmy Van Itterbeeck and Helen E. Young.

Webmaster's Report

Andrew Henderson
<a.henderson@nhm.ac.uk>

Having taken over as Webmaster recently I would like to thank the previous Webmaster Ian Boomer (and before that Giles Miler) for setting up and maintaining such an excellent website. I have been slowly tidying up the site and removing any outdated links etc. in readiness for a re-launch when the new logo for TMS is released and as part of the re-branding exercise. My goal is to make TMS website the first port of call for all micropalaeontological queries and as such would like to keep the website as up-to-date as possible. I would ask that each member have a look at the website and forward any suggestions or ideas that they have. Also I would appreciate if members could supply me with details of meetings, useful URLs, photographs and anything else pertaining to the Society and the world of micropalaeontology in general.

Specialist Group News

Foraminifera Group

Andy Henderson
Foraminifera Group Chair
<a.henderson@nhm.ac.uk>

The Spring meeting took place this year at GEOMAR in Kiel, Germany on 25th and 26th of April 2003. This was the first meeting to be held outside of the UK and was extremely well attended with around 45 participants from all over Europe. The programme consisted of 15 oral presentations and 21 posters (details of abstracts below and on the website). The field excursions on Saturday were well attended and everyone had a very enjoyable time. The Cretaceous quarries at Lägerdorf were visited in the morning and the natural saltmarshes and tidal flats at Schobüll in the afternoon. An opportunity to sample typical north German cuisine was also appreciated at lunchtime. Very special thanks go to Joachim Schönfeld and colleagues from GEOMAR. Joachim organised the superb venue and put together the programme and an informative field excursion guide which was greatly appreciated. Thanks for all your hard work! Thanks also go to Wolfgang Kuhnt and Ann Holbourn for organising the wine reception at the Geosciences Institute and Museum of the Christian Albrechts Universitaet. The meeting was sponsored once again by ChevronTexaco and The Micropalaeontological Society.

The meeting was such a success that we have decided to make the journey out of the UK on a more regular basis. I have had suggestions from colleagues in France and Poland to act as hosts for the next meeting. Whether we alternate each year with a meeting in the UK has still to be decided. I would appreciate any comments or suggestions.

Spring Meeting Abstracts

ORAL PRESENTATIONS

Taxomorph

Albani, A.D.(1), Hayward, B.H.(2), Grenfell, H.(2) and Lombardo, R.
(1) School of Biological, Environmental and Earth Sciences, University of New South Wales, Sydney (Australia)
(2) Department of Geology, University of Auckland (New Zealand**)**

Taxomorph is an interactive computer-based catalogue for the natural sciences. It has been prompted by the need to offer an inexpensive illustrated catalogue with ample search capabilities to the researcher with limited library facilities. Its portability and ease of up-dates make this program a useful tool even for field stations. The program has been designed to work in the Macintosh and PC environments.
Although Taxomorph has been originally designed for the recent foraminifera, it can be easily modified and adapted to any other group. The program is designed as a series of modules whose composition is largely dictated by its use: each module may be restricted to a group of selected organisms or to a geographic region, or to an ecological niche or even a span of geologic time. The flexibility of a computer based system allows for new species to be added and for changes to the taxonomy to be implemented through a normal up-grade technique, relatively inexpensive and thus to maintain the up-to-date validity of the catalogue.
Well over 600 species, known from Australian and New Zealand coastal waters, are described in this version 1 of Taxomorph.
The initial screen defines the nature of the module, its purpose and it gives the initial choice of either the

CHARLES DOWNIE AWARD

The late Charles Downie was one of the pioneers of palynology in the U.K. and a mentor who guided the thinking and development of a large number of postgraduate students who passed through the University of Sheffield. Through the efforts of former colleagues at Sheffield, a permanent memorial has now been established to recognize Charles' contribution to micropalaeontology. An annual award will be made to The Micropalaeontological Society member, who in the opinion of The Micropalaeontological Society Committee, has published the most significant paper, in any journal, based upon his or her postgraduate research.

The second award of £200 will be made for the best paper published during 2003 and will be presented at The Micropalaeontological Society AGM in November 2004. Nominations for the best paper published in 2001should be submitted either to the appropriate TMS Specialist Group, or The Micropalaeontological Society Secretary by 28th February 2004.

Dr James Powell, TMS Secretary,
Winterbourne House, The Street, Chilmark, Salisbury, Wiltshire SP3 5AU, UK
Tel/Fax: +44 (0) 1722 716484; Email:hystrichosphere@btopenworld.com

Charles Downie Memorial Award Contributors (June 2003)

R. L. Austin	W.A.M. Jenkins
G. A. Booth	J. K. Lentin
B. Braham	R. S. W. Neville
J. P. Bujak	B. Owens
G. Clayton	T. L. Potter
M. D. Crane	A. J. Powell
S. Duxbury	S. M. Rasul
G. L. Eaton	M. Razzo
G. A. Forbes	J. B. Riding
K. J. Gueinn	W. A. S. Sarjeant
A. M. Harding	J. E. Thomas
R. Harland	J. Utting
K. Higgs	D. Wall
P. J. Hill	M. J. Whiteley
A. Hossein Zahiri	G. L. Williams

LYELL MEETING

9th FEBRUARY 2005

FIRST CALL FOR PAPERS

The 2005 Geological Society of London Lyell Meeting, sponsored by the Joint Committee for Palaeontology, is to be organised by The Micropalaeontology Society (Joint Convenors Haydon Bailey & John Gregory). This prestigious one day meeting, to be held at Burlington House, London is currently being planned for February 9th, 2005 and this is the first call for papers on the theme of 'Applied Phylogeny'. It is intended that the meeting will comprise three sessions, arranged stratigraphically (Palaeozoic, Mesozoic and Tertiary), each session with an invited keynote speaker, with the opportunity to discuss a complete range of macrofossil and microfossil subject areas within the proposed theme.

Contributors are asked to consider a single phylogenetic lineage and to pursue its development and application, both stratigraphically, and to any other area of applied usage. It is intended to publish the proceedings of the meeting at the earliest possible opportunity as a Special Publication of the Geological Society (author's notes will be distributed prior to the meeting).

Proposed titles and abstracts should be sent to Haydon Bailey either via e-mail at haydonbailey@btconnect.com, or to the address below, as soon as possible so that a complete programme can be drawn up.

Further details of this meeting will be made available once an initial programme has been established. Details will also be posted on TMS website at www.tmsoc.org .

Contact Details:-

Dr Haydon Bailey
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Unit 60,The Enterprise Centre
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haydonbailey@btconnect.com

Dr John Gregory
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AL1 5NF
john@jgregory.demon.co.uk

taxonomic or the morphologic search.
In the taxonomic path three possible criteria are available and they can be used together or one at the time; a choice to execute the search even among the synonyms is available; the list button will list all the species satisfying the selected criteria while the display button will search and display them, one at the time.
In the morphology mode a number of different morphological criteria can be selected; each major category (unilocular, triserial, etc) has a submenu with additional criteria. In each case there is the alternative path to either the morphology or the taxonomy search.
Each species card contains illustration, synonymy, description and remarks, distribution and bibliography. The distribution is shown as a series of dots on a map of Australia, New Zealand and Antarctica. The totality of the information related to each species can also be printed.
Detailed glossary and a brief introduction to the foraminifera are available on the CD-ROM.
For further information contact:
A.Albani@unsw.edu.au
On-line purchase is available:
www.unisearch.com.au and the cost is 30AUD.

Ecology of littoral foraminifera of the Iturup Island, Ochotsk Sea

Annin, V.K. V.I. Il'ichev
Pacific Oceanological Institute, Vladivostok, Russion Academy of Science, Baltiyskaya St. 43, 690041, Vladivostok, Russian Federation, annin@poi.dvo.ru

The modern forams in 87 samples were studied from the littoral zone about Iturup. The purpose of this investigation was to determine the influence of environmental parameters on the structure of complexes. During sampling (August-September 1998) the temperature of water at stations changed from 9° to 19° C which increased to 35°-36° C at the exit of thermal water.
21 species and 15 genera of benthic foraminifera are found in the littoral zone of Iturup. The number of species changes from 1 to 8 and is dominated by calcareous forms. The density of shell varies from 0 to 208000 / m^2. Iturup's foraminifera are patchy occurred. There are no foraminifera in mouth of rivers, in the sandy beaches of gulf head. Strong current are washing away the easy fractions of the deposit, containing the shell of foraminifera.
Emission of organic waste products from fish plants (Belavin Bay) do not influence the quantitative and qualtitative composition of the foraminifera. At the same time, the size of the shell *Buccella granulata, B. inusitata* have been increseed (diameter 0.8-1.2; thickness 0.5-0.8 mm) compared with other unpolluted gulfs.
Benthic foraminifera of the Pacific and Ochotsk coast are distinctive. Perhaps it was connected both to features of coastline and with different water masses. There are *Buccella granulata, Cassandra grandis, Discorbis globularis, Elphidiella arctica, E. recens, Florilus hadoi, Miliammina fusca, Polymorthina* sp. *Virgulina* sp. in Ochotsk coast and *Bolivina decussata, Buccella frigida, Cassandra limbata* on the Pacific coast of Iturup.

The potential of ion microprobe analysis in detecting geochemical variations across individual foram tests

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Trace element chemistry variations within individual foraminifera tests may provide valuable information on past ocean conditions. However, the combination of thin test walls and the presence of surface contaminants, not held within the carbonate structure, provides a stringent test to microanalytical methods. Initially, we analysed two tests of the benthic foraminifera Ammonia batavus by ion microprobe and compared two sets of analytical conditions. Subsequent analyses have focussed on the imperforate high-Mg calcite, imperforate test of Quinqueloculina seminulum. Using apertures to restrict the size of the analysed area reduced the effects of sample contamination. Sr concentrations were unaffected by any contamination encountered and Mg could be determined provided checks were made for silicate contamination using Al, Si and K intensities. Measured Mg and Sr concentrations were in reasonable agreement with previously reported values. Mn was present at a level too low to permit clean analysis, even at very low levels of contamination. Significant variations in Sr concentrations occurred within individual test chambers and may reflect the juxtapositioning of calcite of different ages as the test is deposited. Significant variations in Mg and Sr concentrations occurred between test chambers. Sr increased in concentration in the outermost (most recently deposited) parts of the test. This may reflect an increase in test calcification rate coincident with

increases in bottom water temperature or food availability.

Biodiversity and ecology of deep-sea benthic foraminifera of the Weddell Sea, Antarctica

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Little is known about foraminifera in the deep Weddell Sea. Most previous studies date to the early 20th century and are qualitative in nature. The only two recent studies both focus on hard-shelled forms, mainly of the southern and eastern Weddell Sea. The present investigation describes deep-sea foraminiferal assemblages of the Weddell Sea and includes previously overlooked, small soft-walled monothalamous (allogromiids and saccamminids) forms and macrofaunal komokiaceans. We examine their abundance and diversity and relate their distribution to environmental parameters such as food input.
Multicorer samples were collected in March 2002 during “Polarstern” cruise ANT XIX-4 (ANDEEP II) along a transect extending from the Antarctic Peninsula upper slope onto the Weddell Sea Abyssal Plain at approximately 65°S. The upper 1cm layer of cores were wet-sorted for living (stained) foraminifera which were separated into morphospecies. Preliminary results show that soft-walled species contributed the majority (49%) of the 199 species identified and most (>65%) of the assemblage on the abyssal plain. Abundances ranged from 585 individuals 10cm^{-2} at 1000m to 110 individuals 10cm^{-2} at 5000m. The use of syringe sub-samples (3.45cm^{-2}) from multicores provided information on the small-scale patchiness. Subcores from different deployments at the same station yielded 150 & 202 (1000m), 98 & 114 (2000m), 48 & 156 (3000m) and 95 & 75 (4000m) individuals. Small amounts of phytodetritus observed on core surfaces immediately after collection contained a phytodetritus-associated assemblage that included *Epistominella exigua*, *Alabaminella weddellensis* and *Tinogullmia riemanni*. These species are also associated with phytodetritus on the North Atlantic Porcupine Abyssal Plain, suggesting the existence of close faunal and ecological parallels between these two distant regions of the abyssal deep sea. In the Weddell Sea samples, these species were frequently found in fluff balls, making detection difficult, and were small or very small (50-140 µm *A.weddellensis* and *E. exigua;* 160-190µm *T. riemanni*).

Living benthic foraminifera of the Cap Breton canyon, Bay of Biscay: faunal response to sediment instability

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Analysis of live benthic foraminifera in multicorer samples taken along the Cap Breton canyon revealed that the faunal composition and vertical stratification of benthic foraminifera depends on the stability of the canyon microhabitat.
Faunas from canyon axis sites show high faunal densities and are dominated by *Bolivina subaenariensis* and *Bulimina marginata*. These two opportunistic taxa seem to benefit from the focusing of organic-rich deposits in the central part of the canyon. The near-absence of deeper infaunal living taxa may be explained by the instability of the canyon axis environments. Faunas from sites outside the canyon axis have lower foraminiferal densities, higher diversities, and contain a well developed part of deep infaunal taxa. Apparently, these faunas live in food-poorer microenvironments, which are less influenced by re-sedimentation processes, and have attained a more advanced stage of ecosystem succession. Foraminiferal assemblages from wider areas of the canyon already show close similarities to benthic foraminiferal assemblages from neighbouring areas of the Bay of Biscay.
At one site, recent (1999-2000) turbidite deposition has been shown. First samples, taken 4 months after the turbidite deposition, yielded a fauna dominated by *Technitella melo*, accompanied by *Cassidulina carinata*, *Fursenkoina bradyi*, and juvenile specimens of *Bolivina subaenariensis* and *Bulimina marginata.* The samples taken one year later (June and September 2001) at the same location contain a foraminiferal assemblage extremely dominated by

Bolivina subaenariensis. The first colonizing taxa (*T. melo, C. carinata* and *F. bradyi)* show a strong density decrease now. Since the benthic foraminiferal assemblage in 2001 show the same composition as other canyon axis faunas dominated by *B. subaenariensis*, we suggest that the recovery of the foraminiferal faunas in this extreme environment takes about 6 to 9 months.
We conclude that the combination of focusing of fine-grained, organic-rich sediments and a high degree of sediment instability is responsible for the presence of very specific benthic environments, where extremely rich, low diversity faunas, strongly dominated by opportunistic taxa proliferate.

δ44/40Ca in planktonic foraminifera *G. sacculifer* and *N. pachyderma* (sin.): a new proxy for palaeo-sea surface temperatures in high and low latitude oceans

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Reconstructions of sea surface temperatures (SSTs) by means of planktonic foraminifera are an essential tool in palaeoceanographic research. We report δ44/40Ca-temperature calibration on modern, cultured and fossil calcite foraminifera, showing that Ca isotopes provide a useful tool for past SSTs estimations. We focused our investigations on two foraminifera species, *Globigerinoides sacculifer* as a representative for subtropical and tropical environments and *Neogloboquadrina pachyderma* (sin.) occuring mainly in (sub) polar surface water masses. The latter is particularily important due to the fact that there is scarce knowledge on polar palaeotemperatures.
Ca isotope measurements performed on cultured *G. sacculifer* result in a δ44/40Ca change of 0.24±0.02‰ per 1°C defined by linear regression (Nägler et al. 2000). Remarkably the slope of this temperature dependence (although not the absolute values) is identical to the one recently defined for *N. pachyderma* (sin.) from the N. Atlantic Ocean. In order to test whether the correlation is influenced by hydrographic or genotype differences a second set of S. Atlantic specimen of *N. pachyderma* (sin.) has been investigated. Preliminary observations point to temperature as the main factor controlling δ44/40Ca variations. The trend of the temperature dependence has been observed to be similar as for Arctic specimen.
Application of this method to fossil *G. sacculifer* of a 150kyr spanning tropical Atlantic sediment core (GeoB 1112) confirms known changes in SSTs. The down-core variations of Ca-isotopes match fairly well with previously published SST proxy data for Mg/Ca and oxygene isotopes, thereby clearly reflecting glacial-interglacial cycles. Pronounced changes of δ44/40Ca are found at Termination I (Holocene-LGM) and Termination II. According to the current δ44/40Ca-temperature calibration the overall glacial-interglacial amplitude of the record is 3-4°C. This magnitude is in good agreement with previously published data for SST-changes in the equatorial Atlantic and shows that multi-proxy approaches are desirable.

Benthic foraminiferal extinctions across mid Cretaceous OAEs: Evolutionary turn-over or rock record bias?

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We examined records of well preserved benthic foraminiferal assemblages across Cretaceous oceanic anoxic events OAE 1a-c and OAE2 from bathyal and abyssal DSDP/ODP Sites (Sites 1049, 1052, Blake Nose; Site 551, Goban Spur; Site 603, and Site 641, Iberian Margin) and from bathyal to neritic onshore sections in Morocco, Spain, Southeast France and North Germany. Diversity, taxonomic composition and preservation potential of benthic foraminiferal assemblages at shelf localities are strongly influenced by changes in paleo-water depth, particularly at times of major sea-level change. Thus, most of the observed faunal changes at shelf sites express environmental change and taphonomic bias, rather than true extinction and radiation events. We found no evidence for a major benthic foraminiferal turn-over during OAE1 and OAE2 both at middle and upper bathyal sites. Most taxa recorded at these locations have stratigraphic ranges extending across oceanic anoxic events. By contrast, abyssal benthic foraminifers underwent a marked radiation after the late Cenomanian OAE-2 in the Atlantic Ocean and the Mediterranean Tethys, which may have been triggered by a general change towards better oxygenated deep-water masses after OAE-2. Our data suggest that during periods of extreme dysoxia accelerated faunal turn-over occurred within reduced or isolated populations in the deep sea. This implies that the extent, depth and intensity of oxygen minima within ocean basins varied considerably with time during OAEs.

The preservation potential of benthic foraminiferal assemblages at three deep-sea sites in the Northeast Atlantic.

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Benthic foraminiferal assemblages (live and dead) were examined from multiple core samples at three deep-sea sites in the Northeast Atlantic; Sites A (3600m water depth) and C (1920m) were located in the Rockall Trough, while Site B (1100 m) was in the Hatton-Rockall Basin. The sites were studied as part of the NERC Deep Ocean Benthic Boundary Layer (BENBO) programme, which aimed to determine the effects of differing organic carbon inputs on processes in the benthic boundary layer. The assemblage at Site A was similar to those previously described from the more southerly Porcupine Abyssal Plain, while those at Sites B and C contained characteristic bathyal species.

All three live (= rose Bengal stained) assemblages were numerically dominated by delicate soft-bodied and agglutinated species, when examined by wet sorting the sediment residues. The proportion of calcareous foraminifera decreased with increasing water depth; from 23% (Site B), to 13% (Site C), to 7% (Site A). This is consistent with previous observations that calcareous taxa are more responsive to organic carbon inputs, and form a larger proportion of assemblages in areas with higher organic carbon inputs. All three dead assemblages, examined by dry sorting, were dominated by calcareous taxa, indicating that with increasing water depth a smaller proportion of the foraminiferal assemblage will be fossilised. We consider possible consequences for the interpretation of fossil assemblages, and particularly whether the “phytodetritus signal”, which reflects seasonal inputs, survives fossilisation.

The environmental changes in central and south-western parts of Okhotsk Sea in late Pleistocene-Holocene (by benthic foraminifera)

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The bottom sediments investigations of marginal seas have great means for reconstructions of environmental changes in Pleistocene-Holocene. The study of fossil and modern benthic foraminifera complexes allow to retrace the spatial-temporal conformity of foraminifera distribution in bottom sediments and to expose their diversity for reconstruction of paleoconditions of bottom sediment formations.

The sediment samples for foraminifera analyses were taken from deep-sea cores GE 99-10-3 (length 774cm; depth 1335m; southeast slope of the Sakhalin Island) and LV 28-41-5 (length 715cm; depth 1114m; the Academy of Sciences Rise) during the KOMEX expedition (Russian-Germany Project). The stratigraphy and the age of sediments in these cores were based on oxygen-isotope records, magnetic susceptibility and tephrachronology. As a result, 6 isotope stages (MIS) were marked out in cores and changes of the benthic foraminifera complexes were exposed for every age interval.

The most favourable conditions for development of foraminifera existed during warm epochs MIS 1 and MIS 5 (5.e). These layers are characterized by rich foraminifera assemblages with relative abundance of the species-indicators of high organic carbon and low oxygen contents (*Uvigerina.peregrina*, representatives of *Brizalina* genus, *Cassidulina laevigata*).

The high benthic foraminifera abundance for sediments of cold MIS 6, 4, 2 may be explained by the high content of opportune species *Alabamminella weddellensis* and *Uvigerina auberiana*, which are blooming under conditions of low productivity. The reasons of high species variety was appearance of arctic species typical for shelf biofacies of Okhotsk and Bering seas (representatives of *Cribroelphidium, Quinqueloculina* genus).

The global climate warming during MIS 3 little reflected in the benthic foraminifera complexes and similar to MIS 2, 4 foraminifera complexes.

The benthic foraminifera data is compared with results of diatom and ice rafted debris analysis for these cores. This complex study give possibility to receive the most complete and reliable information about environmental changes for paleoceanological and paleoclimatic reconstructions.

Recent advances towards a re-classification of the agglutinated foraminifera

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The agglutinated foraminifera constitute a diverse and

geologically long-ranging group of organisms. Morphologically, they form a heterogeneous group that has its origins in the Vendian. Over the past two decades, many studies have emphasised the importance of wall structure and cement composition as an important criterion for suprageneric classification of the agglutinated foraminifera. However, there does not appear to be any consensus regarding the taxonomic level at which wall structure and cement composition ought to be used. The most widely used classification scheme is that of Loeblich & Tappan (1992), who recognized four orders of agglutinated foraminifera subdivided into 19 superfamilies, 87 families, and 100 subfamilies. The number of new genera and higher systematic groupings has been growing at a steady pace since the publication of Loeblich & Tappan's (1987) monumental book. As new groups of foraminifera are described each year, the need for an updated classification scheme increases. Moreover, the outline classification published by Loeblich & Tappan in 1992 did not list the genera included within the families and subfamilies. The purpose of this study is to compile a more complete classification that incorporates the 139 new genera, families, and subfamilies of agglutinated foraminifera published subsequent to Loeblich & Tappan's book, thereby providing a firmer basis for taxonomical studies. The agglutinated foraminifera (as here defined) constitutes a subclass containing four orders that are defined based upon gross morphology, wall structure, and cement composition. The cement that binds the test together may be organic (as in the Astrorhizida), calcareous and canaliculate (as in the Textulariida), or of mixed nature (organically-cemented, calcareous, or microgranular). The newly revised classification is modified from the suprageneric scheme used by Loeblich & Tappan (1992), and incorporates all the new agglutinated genera described up to and including the year 2000. The newly proposed suprageneric scheme consists of four orders, 16 suborders, 27 superfamilies, 106 families, 121 subfamilies, and contains a total of 747 valid genera. One order, four suborders, two families and four subfamilies will be described as new. The major differences from the Loeblich & Tappan (1992) classification are (1) the use of suborders within the hierarchical classification scheme (2) use of a modified Mikhalevich (1995) suprageneric scheme for the Astrorhizida (3) transfer of the Ammodiscacea to the Astrorhizida (4) restriction of the Lituolida to forms with simple wall structure (5) supression of the order Trochamminida, and (6) inclusion of the Carterinida within the Trochamminacea (7) establishment of a new order for forms with complex inner structures (8) broadening the definition of the Textulariida to include perforate forms that are initially uniserial or planispiral. Numerous minor corrections have been made based on the recent literature. The new scheme will be published by the Grzybowski Foundation in the "Proceedings of the Sixth International Workshop on Agglutinated Foraminifera".

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Benthic foraminifera from Marmara Sea deltas refute the "Noahs Flood Hypothesis", and indicate outflow from the Black Sea at 9.5 k.y.

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The Marmara Sea Turkey, is a pull-apart basin that has developed along a set of *en echelon* dextral strike-slip faults. It is located between the Aegean Sea, to the west, and the Black Sea, to the east. Two relatively shallow and slender straits connect the Sea of Marmara to the two adjacent water masses, the Dardanelles and the Bosphorus. Benthic foraminiferal assemblages were studied from three gravity cores (MAR97-11, MAR98-7 and MAR98-9) in the Marmara Sea as part of an investigation to study the nature of deltas discovered at the southern entrance of the Bosphorus, and to establish the timing of marine connections to the Mediterranean and Black Seas.

Microfossils from cores in the central Marmara Sea indicate that basin was a fresh to brackish water, well oxygenated, inland lake during the last glacial maximum, until about 12 ka when the level of the Aegean Sea level rose to the height of the Dardanelle sill. The initial influx of marine waters from the

Aegean Sea (~ 12 ka) introduced saline waters to the deeper parts of the Marmara basin but left the shelf margins brackish; and began a two-way water exchange between Marmara and the Aegean Seas. The deeper parts of the Marmara basin show an initial colonisation of the substrate by abundant "pioneering" foraminifera, such as *Aubignyna*, *Cassidulina*, *Nonionella*, and *Fursenkoina*; whereas the shallow-water, brackish, fauna of the Sea of Marmara shelf (Bosphorus delta) is dominated by a low abundance *Ammonia* assemblage at this time. The drowning of the delta located at the southern entrance to the Bosphorus and the establishment of a stratified water column is constrained by radiometric dates of 9,840 and 9,070 yr. BP. At this time, benthic foraminiferal assemblages in deltaic sediments are dominated by the genus *Ammonia*, indicating brackish water conditions resulting from the outflow of Black Sea surface water through the Bosphorus. This Black Sea outflow subsequently declined, and the initiation of a two-way flow between the Aegean Sea and the Black Sea through the Bosphorus is constrained by radiometric dates at ~8,800-6,100 yr. BP. During this interval, an increase in "dysoxic" forms such as *Bulimina* and *Brizalina* is observed at all locations. The establishment of a strong halocline leading to dysoxic conditions at the sea floor is documented by low values of Kaiho's Benthic Foraminiferal Oxygen Index. Stabilisation of the stratified water column and a slight increase in bottom-water oxygenation is observed from ~6,1 ka to the present. This is manifested by an increase in the BFOI and the first appearance of planktonic foraminifera. However, no return to fully oxygenated conditions was observed at any time since the onset of marine deposition. If the hypothesis of Ryan *et al.* (1997) is correct, and surface water of Mediterranean origin had catastrophically infilled the Black Sea about 7,150 years ago, the Marmara Sea would have been effectively flushed with well-oxygenated Mediterranean waters. Rather the occurrence of a dysoxic assemblages throughout the period between ~12 and ~6 ka supports the scenario of Aksu *et al.* (1999), which attributes the deposition of sapropels to a stable stratification that resulted from the outflow of fresh water from the Black Sea into the Aegean Sea via the Sea of Marmara.

These data support the hypothesis of Aksu *et al.* (1999) that Mediterranean seawater began to flow into the Sea of Marmara at ~12 ka. At approximately 9,5 ka, water level reached the Bosphorus sill level but was unable to penetrate into the Black Sea owing to the strong outflow of freshwater. Importantly the "Noah's Flood Scenario" of Ryan *et al.* (1997) and Ryan & Pitman (1988) that a catastrophic inflow of Mediterranean water penetrated the Black Sea at ~7,15 ka (flooding the inhabited continental shelves of the Black Sea) is not supported by our data.

The physico-chemical microenvironment of recent planktonic and benthic foraminifers- a microsensor study

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Microsensors for O_2, CO_2, pH and Ca^{2+} were used to study the physico-chemical microenvironment of single symbiont-bearing planktonic and benthic foraminifers. The diffusive transport of O_2 and CO_2 through both perforate and imperforate calcite shells of the foraminifers was fast and allowed the investigation of symbiont photosynthesis and community respiration by microsensor measurements at the shell surface of individual specimens. Microscale measurements with O_2, CO_2 and pH microsensors around the foraminiferal shells demonstrated significant changes of the local carbonate chemistry due to the metabolic processes of respiration, photosynthesis and calcification. In the light, photosynthetic uptake of inorganic carbon (CO_2, HCO_3^-) increases the pH, which in turn increases the CO_3^{2-} concentration. In the dark, opposite concentration changes are to be expected due to CO_2 release by respiration and calcification. The level of CO_2 is thus a key variable for inorganic carbon transfer between these processes. Our data support the assumption that vital effects change the isotopic composition of the shell carbonate as a pH and CO_3^{2-} increase affect the isotopic ratios of the shell calcite. Deviations in $\delta^{18}O$ and $\delta^{13}C$ due to metabolic CO_2 effects have been postulated. Recent oxygen microsensor measurements in symbiont barren shallow-water foraminifers demonstrated an oxygen depletion towards the shell surface. Oxygen gradients were used to estimate O_2 consumption rates of single specimen.

Foraminifera of the Providence Bay (Anadyr Bay , the Bering Sea).

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The Providence Bay is situated in the south-eastern part of the Chukot Peninsula (64, 3 N, 174,5 W). Ten bottom grab quantitative samples of ground were collected during expeditions of the Zoological Institute, Russian Academy of Sciences in 1976 and in 1989. Samples were collected using aqualungs and grab sampler "Ocean" with the area of capture 0.25 m^2 from depths of 3 to 54 m. Foraminifera were collected from the surface layer of the sediment (0-1 cm).

61 species have been noted; arenaceous assemblages constitute only 31 % of the total population. The peculiarity of the fauna is that along with a small number of abundant species, widely spread within the entire water area, high diversity of species composition has been noted. In this area the most widely spread and numerous forms were *Cribroelphidium clavatum*, the number of which in separate samples is 45-79% of the total number of species, *Elphidiella frigida* (76 %), and *Ammotium cassis* (53 %). Subdominant place belongs to species: *Buccella tenerrima* (24 %), *Deuterammina rotaliformis* (23 %) and *Paratrochammina lepida* (17 % of the total number of species in samples). Apart from these above listed forms, in the Providence Bay, we have identified 55 more benthic species of forams noted in small amount. These species are Aderc*otryma glomerata*, *Atlantiella atlantica*, species of the genus *Bolivina*, *Crithionina pisum hispida*, species of genera *Favulina*, *Fissurina*, *Lagena*, *Oolina*, *Parafissurina*, *Quinqueloculina*, etc. The presence of such diverse fauna at different depths suggests a close relationship between the water area under study and the Anadyr Bay of the Bering Sea.

The composition of the order Hormosinida Mikhalevich, 1980

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Order HORMOSINIDA Multichambered test with rectilinear or curved row of chambers usually enlarging in size; wall often ferrugenous, simple or complicated; aperture terminal: rounded, slitlike or cribrate, in *Nodosinum* with inner radial ribs, in forms with the ramifying last chamber – two apertures present. Ordovic – Holocene.

The uniserial Dusenburyinidae I place in the subclass Textulariana (class Rotaliata) as having inner tooth like Stilostomellids.

Superfamily Hormosinoidea Haeckel, 1894: test with the simple wall. Families: Hormosinidae with Hormosininae (*Hormosina, Loeblichopsis, Pseudonodosinella, Reophanus , Siliconodosaria*), Ginesininae Mikhalevich, 2003 (chambers with long thin necks, test with the double coating of the wall) (*Ginesina)* and Nodosininae (*Nodosinum*), Reophacidae with Reophacinae (*Reophax, Hormosinoides, Nodulina*), Polychasmininae Kaminski, 2003 (*Polychasmina*), and Bireophacinae Mikhalevich, 2003 – test branching dichotomously with rounded apertures at the end of each branch (*Bireophax*), Oxinoxisidae (*Oxinoxis*) , Glaucoamminidae (*Glaucoammina*), Cuneatidae (*Cuneata, Acostata , Cribratinoides, Psammolingulina, Sulcophax, Warrentia*), Kunklerinidae (*Kunklerina, Leptohalysis , Scherochorella, Subreophax*), Earlandinitidae (*Earlandinita, Darjella, Lugtonia*).

Superfamily Cribratinoidea Loeblik&Tappan, 1984 (complex wall) : Cribratinidae (*Cribratina, Pseudotriplasia*), Thomasinellidae (*Thomasinella, ?Protoschista, Axicolumella).*

I place the order HORMOSINIDA in the subclass HORMOSINANA – the lower subclass of the class NODOSARIATA basing myself on the profound similarity of the morphological features (test form, type of coiling, form and position of the aperture) of the representatives of this subclass having the agglutinated shell wall and that ones of the higher subclass NODOSARIANA whose representatives have calcareous wall. According to the new conception of the foraminiferal evolution ((Mikhalevich, 1980, 1992 - 2000) it is considered that the transition from the agglutinated to fully secretious shell wall was going independently and in parallel in the different phyletic foraminiferal lines.

What is *Orbulina universa* and can it be used as temperature indicator in recent and fossil environments?

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Many investigation has successfully demonstrated that the present day major temperatures zones are reflected in the distribution of planktonic foraminiferal fauna assemblages. Further, it seems that the main physical features (such as temperature, salinity and level of oxygen) of a water mass may be reflected in morphological parameters of the foraminiferal test. This study has focused on such morphological parameters of *Orbulina universa*. Several morphological studies of *O. universa* from the modern oceans suggest that an increase of pore-sizes, porosity and test diameter corresponds to an increase in water temperature, but so far these results have been transferred to fossil environments with only limited success.
A preliminary study of more than 400 samples from the Bio-Far project, the Danish deep-sea expedition Galathea and the Gulf of Aqaba seems to confirm that at least the test diameter of *O. universa* may serve as a reliable temperature indicator in recent environments.
Results from a Pleistocene series of samples from a succession in the eastern Mediterranean seem to confirm the above results and imply a significant and general warming. This result is somewhat at variance with previous investigations. However, this apparent discrepancy may reflect merely that measurements had been performed on different species lump together as *O. universa*. The morphological variation of *O. universa* observed in the samples seem to support this suggestion. Such results in combination with those of modern DNA studies, would seem to indicate that the taxon *O. universa* consist of several species. A preliminary study of a Spanish Miocene succession of Orbulinas, support this hypothesis and futher suggest that the genus Orbulina is far more divers than previous believed.

The Pacific Paleogene benthic foraminifera distribution response to Paleooceanologic changes.
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The benthic foraminifer complex analysis from the Paleogene along the submeridional profile across the North Pacific region, Obruchev (ODP Site 883), Schatsky (DSDP Sites 305, 577) and Hess (DSDP Site 465) Rises, and the comparison of these results with the data on benthic foraminifer distribution from the Campbell Plateau (DSDP Site 277) revealed some spatio-temporal faunal shifts in a response to certain paleoceanologic changes.
The benthic foraminifer associations from the North Pacific and the Campbell Plateau are distinctly different in the Paleocene. During the Eocene, North Pacific and Southern Ocean assemblages became similar to each other in the middle Eocene.
The data on changes in taxonomic and quantity distribution of benthic foraminifer assemblages suggest that those events were a response to the shifts in the deep-water circulation mode, which resulted in alternative penetration of either warm nutrient-enriched or cold nutrient-depleted water masses.
Quantity and diversity of the Obruchev and Schatsky Rise assemblages rapidly increased in the early Eocene and early middle Eocene and decreased from the early to middle middle Eocene. These data strongly correlates with that on influence of deep North Pacific single water source originated from the Southern Ocean in the early to middle middle Eocene and two sources in the early Eocene and middle middle Eocene to Oligocene.
Therefore, the increase of similarity between Eocene assemblages was probably related to oceanographic processes resulted in the eventual formation of psychrosphere with monotonous hydrologic regime by the end of the Paleogene. The penetration of the cold nutrient-depleted deep southern water in the middle Eocene resulted in decreasing of quantity and diversity of the North Pacific benthic foraminifer assemblages and similarity of these assemblages with the Southern one.

Benthic foraminifera as indicator of bathymetry of Japan and Ochotsk Seas in Cenozoic
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Comparative analysis of the benthic foraminifera in Japan, Ochotsk seas and surrounding land has allowed to allocate uniform fauna in Middle Miocene sediments. Composition of it is almost represented by agglutinated genera as *Bathysiphon, Cyclammina, Plectina, Asanospira, Haplophragmoides* and *Trochammina*. Today, such fauna inhabit the abyssal depths Pacific and almost no meet in Japan, Ochotsk Seas. The same "deep" fauna of this age widely is founded in sediments of the Western Kamchatka, Sakhaline and Korea. For the first time, E. Tai (1965) has paid attention to exotic composition of it, studying the geology of Honshu and named border,

changing carbonate on agglutinate fauna as" Sharp Foraminiferal Line" (FSL).
Abyssal *Cyclammina cancellata, Plectina nipponica, Bathysiphon edurus* no meet in Pliocene –Pleistocene sediments of both seas and found during Early? and Middle Miocene. Moreover, that genera are marked in Upper Cretaceous of Sakhaline(Salnikov et al., 2001) and Low Paleocene of Minor Kuril islands (Serova et al., 1986). Thus. during Late Mz-Kz have been favorable conditions sometimes to penetrate for introduction of deep –water Pacific fauna .Sakhaline phase of folding (N2-Q) has isolated Japanese. Ochotsk's hollows from Pacific and access of the abyssal species has stopped. Participants of 127/128 Leg ODP in Japan Sea distinguished FSL 1(14-15 Ma) and FSL 2 (-11 Ma) , which are related to the opening of the basin and to global deep-water cooling (intensification of thermohaline circulation) accordingly. We supposed, one of main reasons to appear fauna FSL was dissolution of the carbonate shell by acid interstitial water. Geochemical analysis of core 799 ODP(Japan Sea) show, that pH sharp decrease to 5 at depths 400 –600 m and 2rare in the southern Florida Straits, and *Cibicidoides wuellerstorfi* prefers a shallow epibenthic to endobenthic lifestyle here. The population density of epibenthic species is up to 4 times higher on the substrates than on the ambient sediment surface which again demonstrates the competition advantage of an elevated lifestyle. No living elevated species were found below 800 m. Corroborating evidence from the velocity structure of the Florida Current and sedimentological features suggest the lower limit of the current at that depth. These new data will allow to constrain and further develop the benthic foraminiferal current proxy. This will facilitate a palaeoceanographic reconstruction of the Florida Current and its implications for climatically driven throughflow and heat transport variations during the late Quaternary.

Benthic foraminifer assemblages as indicators for Cenomanian-Turonian 2 deposits predominantly consist of shallow water carbonates and dolostones and exhibit sedimentation patterns and benthic faunal associations of supratidal to shallow subtidal facies belts. Similar environmental conditions prevailed during late Turonian times. Fundamental changes of the depositional conditions occurred during late Cenomanian/early Turonian times. Deeper water and locally restricted dysoxic conditions are reflected by lithological and faunal changes. The carbonate content decreases and clayey (partly bituminous) deposits yield benthic foraminifer associations with reduced diversity and dominated by opportunistic forms. Abundant smaller calcareous benthic foraminifers like *Gabonita spp*. and *Neobulimina spp.* locally characterise the Cenomanian/Turonian boundary interval. These occurrences are often intercalated with a nearly monospecific fauna of agglutinated forms, e.g. *Haplophragmoides spp*. and *Hemicyclammina sp*., also indicating a stress environment. These lithological and faunal data allow to reconstruct facies shifts on the platform and through the time. Based on that model a sequence stratigraphic framework for the Cenomanian and Turonian was established, containing two major sequences. Sequence 1: a transgression, spanning lower to upper Cenomanian times, resulted in platform drowning during the uppermost Cenomanian and decreasing diversities of benthic faunas. A sea-level highstand (lower-middle Turonian) and a lowstand (middle Turonian) are followed by a transgression of Sequence 2. This transgressive phase induced again shallow marine conditions, an increase of carbonate production and a recovering of the Turonian platform.

From the Deep Ocean to the Carbonate Platform: Extinction, Innovation and Evolutionary Experiments in Foraminifera at the Paleocene/Eocene Boundary.

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The largest negative carbon isotopic excursion of the Cenozoic is going to delineate the Paleocene/Eocene boundary (55 Ma), providing a unifying boundary concept for marine and terrestrial deposits. This excursion is one of many features characterizing the Paleocene-Eocene Thermal Maximum (PETM), a brief period (<100 kyr) of extreme global warmth. Besides turnovers and migrations in biota ranging from dinocysts to land mammals, extinctions and peculiar short-lived blooms in foraminifera characterize this climatic event. One of the largest extinctions (40%) among deep-sea benthic foraminifera co2epibenthic foraminifera attached to bigger particles (e.g. *Cibicides lobatulus, Planulina arimiensis*) on the Vietnamese Shelf suggest that currents velocity is higher there than on the Sunda Shelf. The foraminiferal tests on the Vietnamese Shelf are well sorted, thick-walled and highly-abraded. Moreover, the occurrences of certain species (e.g. *Operculina ammonoides*, *Nummulites venosus*, *Amphistegina* spp.) are associated with the presence

of coarse sediments. All that, indicates the deep euphotic zone, nutrient-deficient and high energy environment on the Vietnamese Shelf.
Deep-water assemblages are comparable in both areas. This is due to similar and stable hydrological conditions at greater water depths. Occurrences of detritus-feeding species (e.g. *Bulimina aculeata, Uvigerina peregrina*) on both slope sites indicate high flux of fresh organic matter to the sea floor throughout seasonal upwelling.

POSTER PRESENTATIONS

Benthic foraminifers of the Campanian/Maastrichtian boundary deposits of the European Paleobiogeographic province (EPP).
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Comparative analysis was made on occurrences of some key taxa of benthic foraminifers (*Globorotalites, Gavelinella clementiana, Augulogavelinella, Neoflabellina reticulata)* in the Campanian/Maastrichtian boundary deposits of four sections in the western and eastern parts of the RPP. The lower Maastrichtian boundary is known to be defined by the first occurrence of *Belemnella lanceolata.*
1. The Lägerdorf quarry (NW Germany) (Schönfeld, 1990). The last occurrence of *Gavelinella clementiana* is recorded 20 m below the boundary; the first occurrence of *Angulogavelinella* is fixed 15 m below the boundary; *Globorotalites* disappears at the boundary; and *Neoflabellina reticulata* appears 4 m above the boundary.
2. The Lüneburg quarry (NW Germany) (Hiltermann, Koch, 1955). *Neoflabellina reticulata* in association with *Bolivinoides paleocenicus* appears 1 m above the boundary.
3. The Aktulagai section. Northern Caspian area, western Kazakhstan (Akimets et al., 1983). The first occurrence of *Angulogavelinella* is recorded 3 m below the boundary and that of *Neoflabellina reticulata* is fixed 6 m above the boundary. *Globorotalites* and *Gavelinella clementiana* have their last occurrences 9 and 16 m above the boundary respectively.
4. The Shakh-Bogota section. The Mangyshlak Peninsula, western Kazakhstan (Naidin et al., 1984). There the Campanian/Maastrichtian boundary is drawn by the first occurrence of *Belemnella* cf. *Licharewi.* At the same level there appears *Angulogavelinella.* The last occurrence of *Gavelinella clermentiana* is 16 m above the boundary. The first occurrence of *N. Reticulata* coincides with the last one of *Globorotalites* at the level of 32 m above the boundary.

Conclusions
1. The first occurrence of *Belemnella lanceolata* is commonly considered to coincide with that of *Neoflabellina reticulata (*De Graciansky et al., 1998). However, in the key sections of the EPP *Neoflabellina reticulata* appears at higher level than *Belemnella lanceolata*: 1 m higher in the L section, 5 m in the L section, 6 m in the Aktulagai section, and 32 m in the Shakh-Bogota section.
2. In the Lägerdorf quarry *Gavelinella clementiana* and *Globorotalites* do not cross the Campanian/Maastrichtian boundary, whereas in the eastern Aktulagai and Shakh-Bogota section they disappear noticeably above the boundary. It suggests a hiatus at the Campanian/Maastrichtian boundary of the western sections.

Benthic Foraminifera from Sakhalin and Kamchatka Slope (the Sea of Okhotsk) - a view to Intermediate Water Changes During the last Glacial Interglacial
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We investigate the accumulation rates (AR) of benthic foraminifera in the last 40 kyr BP on the scale about 500 years in two cores around south-east Sakhalin slope (water depth 1200-1400 m) and one core at south-west Kamchatka slope (800 m). The Sakhalin core sites are within the present oxygen minimum zone of the Sea of Okhotsk (OMZ, 1000-1500 m water depth) with oxygen concentrations 0.5-0.6 ml/l. The glacial interglacial intermediate water changes are supposed to be connected with climatically controlled variations of surface productivity and production of the Okhotsk Sea Intermediate Water (OSIW, 200-1000 m water depth). Both these processes determine position and strength of the OMZ. In this study we reconstruct the evolution of benthic foraminifera assemblages in their

connection with intermediate water changes.
During the last glacial the effect of OMZ on benthic foraminifera was minimal as a result of low surface productivity and organic matter flux. Some increase of epifaunal benthic foraminifera AR at 27-15 kyr BP indicates insignificant oxygenation of deep intermediate water and very likely the increased formation of OSIW. Two peaks of accumulation rates of low oxygen tolerant species (deep infauna) in both Sakhalin and Kamchatka slope cores can be treated as thickening and shallowing of OMZ during last glacial termination stages 14,5-13,5 and 12,5-10 kyr BP. In its turn, the lower oxygenation is associated with such processes as high surface productivity and organic matter flux, interglacial sea level rising and slowdown the OSIW formation. Holocene (10-2 Kyr BP) benthic foraminifera were not affected by OMZ around Kamchatka slope. At the same time benthic foraminifera at deeper Sakhalin slope sites were markedly influenced by OMZ until 7 kyr BP with its further weakening during 7-2 kyr BP.
We conclude that benthic foraminiferal accumulation rate from sites strongly affected by OMZ cannot be used as indicator of surface productivity.

The Recent Foraminifera of the Mecklenburg-Vorpommern coast (southern Baltic Sea)

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Published literature on the Recent foraminifera from the coast of Mecklenburg-Vorpommern is sparse. Reasons are probably the low abundance and diversity of this group in the brackish water of this region. LUTZE (1965) described associations from a transect covering the marginal area of the coast in deeper water. Besides this only four other publications exist – three on a brackish water lagoon, the Greifswalder Bodden, and one concerning the Strelasund, an adjacent area.
Samples were taken from around 300 stations along the coast and from deeper water. The foraminiferal associations were analysed and the taxonomic composition and distribution data were recorded. The number of previously documented taxa is 29 species – far lower than the 85 species known from the coast of Schleswig-Holstein (GERLACH 2000), where higher salinity prevails. Salinity is clearly the main parameter controlling the distribtion of taxa. Within the inner coastal waters with a salinity below about 7 PSU, no living foraminifera were found. Up to about 9 PSU, *Miliammina fusca* dominates and is replaced by elphidiid taxa and *Ammonia* under higher salinity conditions. The second controlling factor is the substrate on which the foraminifera live. The associations below the halocline in the deeper basins are completely different from those above in shallower water.
The results presented are preliminary, as sampling and and taxonomical analysis continues. Distribution data is to be compared with several abiotical parameters drawn from measurements during the sampling campaigns and from various databases including remote sensing. Special attention is given to structural analysis of individuals in the context of ecological interpretation.
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Two dimensional oxygen distribution measurements of the microenvironment of benthic foraminifers with planar optodes

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A planar optode system was applied to obtain two dimensional oxygen distribution images of benthic foraminifers living within the sediment. This method allowed us to document the oxygen consumption of two shallow-water species of foraminifers (*Ammonia beccarii* and *Masselina secans*) at high spatial and temporal resolution. High spatial resolution oxygen profiles were extracted from a two dimensional (2D) oxygen distribution image which allowed us to calculate the oxygen uptake rate of each foraminiferal specimen. We could demonstrate a strong oxygen depletion around the living benthic foraminifers, presumably corresponding to the oxygen consumption by foraminiferal respiratory processes. In addition, we were able to follow the oxygen cencentration changes of the foraminifers through time. The oxygen content in burrows generated by foraminifers is low when a foraminifer is living in the burrow. When the

specimen desert the burrow, the oxygen concentration rapidly becomes equal to that of the sediment. Furthermore, our experiments show that *Masselina secans* is able to live in anoxic sediments. The physiological processes that allow this species to survive under such conditions are not yet known. Foraminiferal physiological processes produced a pronounced oxygen gradient around each organism. Consequently, their high abundance in many marine habitats is likely to have an important impact on the total respiration in the sediment. Our present data demonstrate the great potential offered by planar oxygen optodes for ecological and biological studies on benthic marine micro-organisms.

Biogeographic provinces and patterns of diversity in selected tropical and subtropical smaller foraminifera.

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The global biogeographic distribution patterns of selected recent benthic foraminifera allow the recognition of five well defined faunal provinces: 1) Central Indopacific, 2) Indopacific, 3) Atlantic, 4) East African, and, 5) East Pacific. Each province is characterized by the presence of specific taxa and largely follows the major current and temperature regimes of modern-day oceans. Comparative analysis of distributional data reveals that ocean currents govern the general extension of each biogeographic province while water temperature appears to constitute the major environmental factor that individually exerts control over each taxon.
Among the smaller benthic species analyzed, diversity is highest in the core region of the Central Indopacific (=„hotspot“). This region represents the largest shelf area in present-day oceans and is characterized by particularly high sea-surface temperatures throughout the year. Beyond this region diversity decreases steadily both towards the East and the West. The latitudinal extension of the species under consideration is limited to approximately 30°N and 30°S. The general pattern of smaller benthic foraminifera diversity including the “hotspot” in the Central Pacific core region and the extension of biogeographic provinces is largely congruent with the features observed in modern tropical corals, mangroves and larger symbiont-bearing foraminifera.

Effect of the closure of the Panama Gateway on temperature and salinity in the Caribbean Sea as indicated by Mg/Ca-ratios in *G.sacculifer*

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Samples from ODP-site 1000 from a waterdepth of 916 m were used to reconstruct a Mg/Ca-record for the Early Pliocene Caribbean Sea. The shallow waterdepth excludes that site 1000 has been under influence of carbonate dissolution due to the vicinity of the lysocline. Analyses were done on the planktonic foraminifer *G.sacculifer.* By comparing Mg/Ca values and $\delta^{18}O$ stable isotopes of *G.sacculifer* from the same samples we conclude that Mg/Ca is not only recording the temperature history of the formation of the Isthmus of Panama, but also includes a considerable salinity-effect. The interval prior to 5.6 Ma, when there still existed a free exchange of upper ocean watermasses between the Pacific and the Atlantic, shows Mg/Ca and $\delta^{18}O$-records which are negatively correlating with each other, with SST’s varying between 26.5°C and 29°C. After the effective closure of the Panamanian Gateway around 4.2 Ma, the Mg/Ca and $\delta^{18}O$ records show a positive correlation on a precessional timescale. Since the Mg/Ca-amplitude fluctuations suggest cycles with temperature variations of up to 5 degrees and maximum temperatures over 34°C, there must be another factor which is influencing the Mg/Ca-record. The anti-correlation between Mg/Ca and $\delta^{18}O$ implies that maximum temperatures are accompanied by maximum salinities. Since increasing salinity is known to increase the Mg/Ca- ratio in foraminifers (Nuernberg et al.’96, Lea et al.’99), we conclude that salinity changes of up to 3-4 PSU have increased Mg/Ca-ratios by as much as 20-30% after 4.2 Ma. To determine the salinity change during this interval, we extracted the temperature and ice-effect signals from the $\delta^{18}O$ -record. We used the 2-2.5 degree cyclicity from prior to 5.6 Ma in the Mg/Ca-record to extract the temperature signal from the $\delta^{18}O$ -record. The ice-effect was determined by tuning the benthic $\delta^{18}O$ -record from site1000 to the benthic $\delta^{18}O$ -record of ODP site 846 from the East-Pacific. The resulting Mg/Ca temperature reconstruction shows an increase in average SST after 4.6 Ma from 27.0°C to 28.5°C, while salinity cycles show increasing amplitudes which reach up to 3 permille variation after 4.2 Ma.

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Late Holocene climate variability on the Western Iberian Margin: benthic foraminiferal perspective.

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A sediment core (D13902) from the Tagus Prodelta has been studied in order to reconstruct the paleoenvironmental development on the Western Iberian Margin through the last 2000 years which covers the historical time and the time period where antrophogenic forcing have become significant. The benthic foraminiferal assemblage was investigated as well as the isotopic composition of benthic (*Uvigerina* sp. 221) and planktonic (*Globigerina bulloides* and *Globorotalia inflata*) foraminifera. Additional parameters like magnetic susceptibility, organic carbon content and C/N ratio, foraminiferal flux and diatom abundance were also used for the reconstruction. Considerable environmental fluctuations since 2000 cal. yr BP are indicated by both the faunal distribution and the isotopic composition. The most common foraminifera are species tolerant for low oxygen and organic rich sediments of inner shelf to bathyal origin (*Bulimina marginata*, *Bolivina pacifica*, *Cassidulina laevigata*, *Bolivina dilatata*, *Uvigerina* sp. 221, *Bolivina striatula* and *Hyalinea balthica*). In the upper part of the core species inhabiting brackish water lagoons or shelves are relatively more abundant (*Ammonia beccarii*, *Nonion asterizans* and *Elphidium* spp. as well as the agglutinated species *Eggerella scabra* and *Textularia earlandi*). An indication of increasing upwelling is observed in the time interval from 2000 cal. yr BP until 600/650 cal. yr BP. A period of less upwelling occurred between 1600 and 1350 cal. yr BP, which corresponds to the end of Western Roman Empire (AD 500-800). During the Medieval Warm Period (c. 950 – 600/650 cal. yr BP) upwelling conditions prevailed in the Tagus Prodelta, while a high freshwater input from the river Tagus influenced the area during the Little Ice Age (after 600/650 cal. yr BP).

FORAMPROX — an integrated ecological geochemical effort of proxy amelioration

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Observations on longer, supra-historical time series of ecological processes and biogeochemical cycles are crucial for our understanding of the sensitivity of the earth system to global change. Such records can only be obtained from longer sedimentary records. For these sedimentary records, a wide range of quantitative proxy methods exist which allow the quantitative reconstruction of parameters such as (new versus recycled) Primary Production, bottom water oxygen concentration, temperature and salinity. However, the often constrasting results of multy-proxy approaches suggest that most of our proxies are still rather imperfect.
The french national program FORAMPROX (PROOF-PNEDC) aims to arrive at more reliable proxy methods by combining ecological studies of the sea floor environment and geochemical studies of benthic foraminiferal microfossils. We believe that geochemical proxy records ($\delta^{13}C$, $\delta^{18}O$, Mg/Ca, etc.) based on the tests of microfossils can only be correctly interpreted if the ecological niche of the organisms, and the episodicity of the ecosystem characteristics are fully understood. Therefore, we will simultaneously study ecosystem functioning and the geochemistry of biologically meditated carbonates in several ocean system hot spot areas (continental margins, upwelling areas, deep water formation areas, oxygen minimum zones). In order to deconvolve the impact of jointly operating ecological parameters, field results will be accompanied by laboratory experiments, in which foraminiferal tests will be grown under controlled conditions of temperature, salinity, oxygenation and organic flux.

Stable isotope data from living (Rose Bengal stained) benthic foraminifera – initial results to improve the NW-Pacific benthic proxydata calibration

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Numerous paleoceanographic works use benthic foraminifera either directly (e.g. assemblage patterns, Benthic Foraminiferal Accumulation Rates, BFAR's) or as signal carriers (e.g. stable isotopes, Mg/Ca) for interpretations of parameters like past oceanic circulation patterns, food supply, primary productivity, etc.. However, still few studies have taken live (Rose Bengal stained) populations to calibrate their test's stable isotopic compound and microhabitat preferences to the water and sediment chemistry of the surrounding environment. We here present initial data from a study in the Okhotsk Sea, a region characterized by extreme climatic and oceanographic conditions. Not only does this marginal basin of the NW-Pacific experience the southermost extent (< 50°N) of seasonal ice cover in the entire Northern Hemisphere during winter, it also shows extremely high, mostly biosiliceous primary productivity and is presumed to act as regional sink for atmospheric CO_2.
We collected Multicorer samples from 15 sites during Cruise LV29 with „R/V Akademik Lavrentiev" (July/August 2002). We compare initial results of stable oxygen and carbon isotopes from most abundant taxa to isotopic compositions of bottom water DIC, nutrient inventories from the water column and productivity proxydata from sediment surface profiles (chlorines, TOC, biogenic opal). A brief evaluation with respect to the significance of benthic–pelagic coupling of productivity patterns will be given. Our geochemical investigations are complemented by initial results of benthic foraminiferal assemblage counts from selected stations.

Benthic foraminiferal $\delta^{13}C$ anomalies in gravity core GE 99-24-2: evidence for Holocene methane seepage off Sakhalin

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The Okhotsk Sea is known as one major marginal NW-Pacific basin with laterally widespread areas of gas hydrate deposits and intense methane venting. We recovered core GE99-24-2 from the continental margin off NE-Sakhalin known as "Obzhirov-Flare" cold seep area. Analysis of $\delta^{13}C$ from benthic foraminifera revealed past negative excursions in $\delta^{13}C$ signals of epi- and endobenthic foraminiferal species inexplicable by usual background water mass signatures. Our initial results reported values down to –18 ‰ (all vs. PDB) for endobenthic and –31‰ for epibenthic species in a ca. 30 cm-long section.

To circumvent the problem of being misguided by alterations due to early diagenetic processes or fillings of the chambers, we further evaluated our measurements by conducting a series of isotope measurements on selected specimen of *U. peregrina* and *Cibicidoides* spp. from three specific core depths with minimum $\delta^{13}C$ excursions. Specimen were divided into subsequent stages of alteration by dissolution and secondary encrustation. Single shells were crushed and underwent multiple cleaning procedures until almost translucent shell fragments were obtained. Analysis of fragments for $\delta^{13}C$ was carried out for different preservation and contqamination stages . Selected retained foraminiferal fragments were inspected under SEM to detect possible alterations of shell ultrastructure. Our results show a relatively wide scatter within single sample depths. $\delta^{13}C$ values range from –1.5 ‰ down to –18 ‰. These are neither significantly correlated to miscellaneous stages of shell preservation nor to potential rests of dirt or encrustations. So far, SEM observations have revealed no palpaple alteration of shell structure corresponding to specific negative values of single specimen. Thus we presume results to be primary signals and assign them to past pore and bottom water anomalies. $\delta^{13}C$ values may indicate either extreme CH_4-venting events or increased oxidation of CH_4 to CO_2 both below and

beyond sediment surface.

The Denmark Strait: Migration passage or barrier?

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The cold Denmark Strait Overflow forms a giant near-bottom outflow across a sill at 620 m water depth from the Greenland Sea down to the abyss of the northwestern North Atlantic. This outflow is a major source of the global thermohaline circulation system and its intensity is influenced by eustatically and isostatically controlled changes in sill depth. To compensate the outflow, the overlying East Greenland Current is transporting warm and high-salinity water into the Nordic Seas. Therefore, the Denmark Strait is an important migration passage for the exchange between polar and Atlantic faunas.
Within the DFG-project “Impact of Gateways on Ocean Circulation, Climate and Evolution”, samples of benthic foraminifers were taken using a multicorer and a box corer during the “Polarstern”-cruise ARK XVIII/1 in July 2002. Overall, 11 sampling sites were selected alongside the East Greenland continental margin at the northern and southern end of the Denmark Strait in water depths between 980 and 2560 m. Benthic foraminifers were stained with rose bengal to identify living individuals. The abundance of individual species was determined and diversity was found to be about 40 species. Biometric measurements (diameter, number of chambers) were made on dominant species such as *Cibicidoides wuellerstorfi*. To investigate the microhabitat requirements of benthic foraminifers, biotic sediment parameters such as chlorophyll, phaeopigments and DNA content were investigated. The results of these investigations will serve to estimate the importance of the Denmark Strait as a zoogeographically barrier or a passage for migration. A key question will be to determine how far the temporary blockade of the Denmark Strait during glacial epochs influenced evolutionary pathways of benthic foraminifers north and south of the sill.

Benthic Foraminiferal Change across the Cretaceous/Paleogene Boundary at Brazos River, Texas.

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The relationship between the global biotic turnover at the Cretaceous/Paleogene boundary (KPB) and an asteroid impact remains a controversial topic. Although there is general consensus that the Chicxulub crater was formed at KPB time, it is argued that gradual biotic and environmental changes preceded the impact level. One of the additional mechanisms of global change prior to the KPB is eustatic sea-level change. The study of fine-grained shelf sediments comprising a <0.5-m-thick siliciclastic unit - interpreted either as tsunamite, tempestite or lowstand deposit - outcropping along the Brazos River, Texas, have played an important role in this discussion. Many biotic and geochemical parameters of this area were investigated previously, leading amongst others to extensive discussions on the position of the siliciclastic unit relative to the KPB. Benthic foraminiferal distributions across the KPB were thus far rarely considered, despite providing excellent opportunities to reconstruct changes in water depth through time and thus to unravel sea-level history across the KPB. In this study, two cores drilled close to the Brazos River outcrops, together constituting an expanded succession of 15 m of the upper Maastrichtian and lower Danian, are investigated biostratigraphically and paleoecologically. Stratigraphic constraints are based on planktic foraminifera, calcareous nannofossils and mineralogy. The quantitative benthic foraminiferal record shows a succession of three distinct assemblages. The Maastrichtian assemblage is stable up to the base of the siliciclastic unit. In the overlying deposits, many Maastrichtian benthic taxa disappear and an impoverished benthic community settled. Subsequently, a stable Danian community became established. Our results do not provide evidence for shallowing highstand deposits just below the siliciclastic unit. If this unit indeed coincides with the KPB, it is unlikely that significant sea-level changes occurred in the Brazos area during the latest Maastrichtian. The biotic pattern in the earliest Danian, however, may relate to sea-level change.

Foraminifera as bio-indicators of pollution in the intertidal zone: the case of the Erika oil spill in the Bay of Bourgneuf

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On the 14th of December 1999 the oil tanker Erika was wrecked off the French Atlantic coast. The oil polluted a few days later more than 300 km of the French coast. In the Bay of Bourgneuf (Vendée, France), the oil pollution strongly affected the intertidal areas (mudflats and saltmarshes). Benthic foraminifera from these intertidal environments have been monitored for three years and are used as bio-indicators of the impact of oil pollution, and to evaluate the recovery of the study area.
Three separate studies are carried out:

- Five sites in the intertidal zone have been monitored since the Erika oil spill by collecting superficial sediment samples on a monthly/bimonthly basis. The first results are for site (A2), which is located in the southern end of the Bay. For the first three months after oil deposition, low density assemblages are recorded. However, after comparison of these low densities with the seasonal patterns observed in the 35-month field survey, it is not yet possible to draw the conclusion that the oil pollution is the main cause of this low density. It appears necessary to extend the field record in time in order to obtain a better knowledge of foraminiferal seasonal cycles. Therefore, at the present stage of the study, the potential effects of oil pollution on foraminiferal faunas are not yet clearly detectable in our field survey.
- Monospecific cultures of *Ammonia tepida* were subjected to different volumes of Erika oil (1.5, 3.0, 5.5, 30 and 72 mg of oil per 100 ml of seawater). The first results show that *Ammonia tepida* is not affected by the addition of 1.5 and 3.0 mg of oil. The addition of 5.5 mg of oil caused morphological abnormalities and cytological modifications in newborn juveniles. In highly polluted cultures with 30 and 72 mg of oil, all foraminifers died after two months.
- A recent project of experiments using mesocosms (aquaria with sediment and total assemblages of living foraminifera) is presently carried out. The mesocosm setup allows us to create constant environmental conditions, in which foraminiferal assemblages are subjected to various treatments with water accommodated fractions (WAF) of the Erika oil. The densities, and the morphological abnormalities of the tests will be studied in detail.

Relationships between vegetation and some Foraminifera on the tidal zone of Auray River (France)

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Since 1993, benthic foraminifera have been studied in more than 150 surface sediment samples collected on the tidal zone on the edge of the Auray River, on the Atlantic coast of France (latitude 47°36' N; longitude 3°56' W). This mesotidal estuary is an ancient fluvial valley (ria) partially filled with sediments since the last Quaternary transgression. The muddy to sandy sediments of the tidal zone contain less than 90 species of living (stained) benthic foraminifera; the maximal standing crop is around 8 000 living individuals per 50 cm^3 of wet surface sediment.
Three of the 20 dominant species can be well related to the presence of plants:
Living specimens of *Eggereloides scabrus* were mainly found on the rhizome of *Zostera noltii*; this marine plants forming large meadows on the intertidal zone of the lower part of the estuary.
Living specimens of *Quinqueloculina* cf. *Q. seminula* were related to the local and seasonal development of green algae such as *Enteromorpha* and *Ulva* in tidal basins and in the intermediate part of the estuary.
On the supratidal zone and in the upper part of the estuary, living *Trochammina inflata* and *Jadammina macrescens* were frequently found at the base of *Halimione portulacoides*; a halophyte plant characteristic of the upper marsh. Contrary to *Trochammina inflata*, living specimens of *Jadammina macrescens* were also observed in bare areas and till 10 cm deep in the sediment.
Even if the mechanisms of these foraminifera/plants relationships are not yet well-known (microhabitats, food supply,...), *Eggereloides scabrus*, *Quinqueloculina* cf. *Q. seminula* and *Trochammina inflata* should be used as bioindicators in cores sediment studies. They may be useful for following the evolution of vegetation in this region since the

last Quaternary transgression.

Benthic foraminiferal assemblages within the Porcupine Seabight and how they help to understand the evolution of a cold-water carbonate mound

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On- and off-mound sediment cores from Propeller Mound (Porcupine Seabight) were analysed for their benthic foraminiferal assemblages. Benthic foraminifera from the off-mound position show three different assemblages describing the Holocene, Marine Isotope Stage (MIS) 2 and late MIS 3. The Holocene assemblage is dominated by *Uvigerina mediterranea*, *Trifarina angulosa*, *Melonis barleeanum*, *Hyalinea balthica*, *Bulimina marginata*. These species are related to a higher supply of organic material. The glacial assemblage shows high abundances of *Cassidulina teretis*, *C. reniforme*, *Globocassidulina subglobosa*, and *Cibicidoides kullenbergi*, implying cold bottom waters and a reduced productivity. The lower part of late OIS 3 is dominated by high amounts of sediment supplied to the core site and >50% of *Elphidium excavatum*, a shallow shelf species generally reported from above 200 m water depth. This points to shelf erosion related to sea level lowering (approx. 50 m). Towards OIS 2 the system returns to normal background sedimentation pattern.
We transferred the established off-mound assemblages onto the on-mound core, in which the sediment sequence is incomplete. The Holocene assemblage describes almost the complete core with relative abundances of >20%, interrupted only by three sections with slightly higher amounts of the glacial assemblage, but not as comparable as in the off-mound core. Another assemblage described for the on-mound core is dominated by *Discanomalina coronata*, *Gavelinopsis translucens*, *Planulina ariminensis*, *Cibicides lobatulus* and to a lower degree by *Hyrrokkin sarcophaga*. These species are only found or show significantly higher relative abundances in on-mound samples and are grouped to the mound assemblage. This assemblage probably indicates a higher coral growth density on Propeller Mound in an earlier period, but is less abundant during the Holocene, which may indicate a 'retiring' of Propeller Mound.

Benthic foraminifers of the Cenomanian/Turonian platform in West Central Jordan

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The Cenomanian-Turonian shallow shelf system of west central Jordan was part of the passive margin of the Arabo-Nubian shield. Benthic foraminifers occupied different habitats of the carbonate-dominated shallow platform and are indicators of environmental changes. Therefore, benthic foraminifers are an important tool to reconstruct spatial and temporal facies changes and related controlling factors, such as sea-level fluctuations. Based on investigations on benthic foraminifer assemblages and lithological and facies changes, the platform development is divided into three stages: a Cenomanian platform, the Cenomanian/Turonian-boundary interval and a Turonian platform. Deposits of each stage exhibit a characteristic benthic foraminifer assemblage.
The larger alveolinid foraminifers of the lower to lower upper Cenomanian, like *Ovalveolina crassa* and *Praealveolina spp*., occur predominantly within carbonates deposited in open shallow subtidal environments (low energy, normal salinity), often associated with a high diverse fauna of calcareous and agglutinated benthic foraminifers like e.g. *Chrysalidina gradata, Biplanata peneropliformis*, *Pseudolituonella reicheli* and *Nezzazata conica*. Deeper water conditions and decreased oxygen contents during uppermost Cenomanian-lower Turonian times, are reflected by increased clay contents/reduced carbonate production and an abrupt change within benthic foraminifer associations. Some horizons yield abundant calcareous forms, like *Dentalina spp.*, *Lenticulina spp*. and *Astacolus sp*.. Locally, the C/T-boundary interval is characterised by high amounts of opportunistic small calcareous benthic forms, like *Gabonita spp*. and *Neobulimina spp*., which reflect dysoxic conditions. Shallow marine facies belts are re-established on the Turonian platform, but the benthic fauna did not recover or exhibit renewed diversification. Larger alveolinids are missing and relatively few species of the diverse Cenomanian assemblage, like *Pseudorhapydionina sp*. and *Cuneolina sp.* range into the Turonian. Based on these data, a major sea-level rise and a

drowning of the upper Cenomanian platform can be assumed, followed by a recovery of platform growth in upper Turonian times.

Black Shale Deposition and Sea-Level Change in the Tethys during the Paleocene-Eocene Thermal Maximum (PETM).

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The Paleocene-Eocene thermal maximum (PETM; ca. 55 Ma), a brief period (<100 kyr) of extreme global warmth, coincided with major evolutionary turnovers in various biota, including the largest Cenozoic extinction of deep-sea benthic foraminifera. We investigated microfossil records and organic geochemistry across the PETM of six sections arranged along a paleodepth transect (~ 50-600 m) in Egypt and Israel. In three sections (~200-600 m paleodepth), black shales with up to 2.7% TOC mark the PETM showing unique microfossil assemblages, largely composed of planktic foraminifera (P/B ratios >99%P) dominated by *Acarinina* spp., and a small proportion of opportunistic benthic foraminifera. Similar to the northern Tethyan margin, the PETM in the studied basin is associated with black shale deposition. In both regions this coincides with a transgressive pulse, correlative to the lower part of sequence TA2.3 of Haq et al. (1987), suggesting a eustatic control. Prior to the PETM, deeper parts of the basin were sufficiently ventilated to enable the settlement of diverse benthic communities. With the onset of the PETM, the inflowing intermediate water from the Tethys, probably contained less dissolved oxygen as a result from methane oxidation. Incorporation of this water into epicontinental circulation in combination with intensified upwelling and biological productivity, led to severe seafloor anoxia in all studied parts of the basin. Rare ventilation events, e.g., resulting from severe storms, may occasionally have supplied sufficient oxygen for temporary settlement by pioneer benthic foraminifera. After the PETM, Tethyan intermediate waters became better oxygenated so that the OMZ became restricted to neritic environments and bathyal sites were bathed in well oxygenated waters again. PETM black-shale deposition played an important role in drawing down carbon released from sedimentary methane reservoirs and thus acted as a negative feed-back mechanism, forcing a return to “normal” pre-PETM climate and oceanic circulation.

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Diversity of benthic foraminiferal assemblages along a two depth transects in the southern South China Sea.

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Species composition and spatial distribution patterns of modern benthic foraminifera were studied on the southern Vietnamese Shelf and Sunda Shelf of the southern South China Sea (R/V SONNE-115 cruise, Stattegger *et al.*, 1997). The investigation was based on the analyses of Rose Bengal stained samples from 75 sites.
The material revealed more than 800 taxa, 745 of which are identified on the species level. Eighteen surface-sediment samples from the southern Vietnamese Shelf comprise 530 taxa (including 218 stained). Fifty seven sites on the Sunda Shelf and its continental slope contain 749 taxa (incl. 590 stained). Ninety taxa occur through the entire studied water depth range (50-2000m), however most of the species exhibit a depth related distribution. Only 478 taxa occur in both regions.
Diversity indices (H(S) and Fisher’s Alpha) for stained and dead benthic foraminiferal faunas are high in both areas (average H(S)=4,08), while the species dominance is generally low (average E=0,46). The average absolute abundances on the shelf are 70000 indiv./100cc. The shelf assemblages from both areas exhibit a standing stock between 20-330 indiv./10cm^2.
The distribution patterns of the bathyal species generally follow the same trends in both study areas. Diversity and abundances of dead benthic foraminifera are inversely correlated to water depth on both continental slopes. However, the standing stock is not much lower on the Sunda slope than on the shelf.

Six main faunal associations are recognised within the studied depth ranges in the Sunda Shelf area: *Heterolepa* aff. *dutemplei - Asterorotalia gaimardii*; *Bulimina marginata - Neouvigerina proboscidea*; *Siphotextularia foliosa - Bulimina mexicana*; *Uvigerina* ex gr. *auberiana - Ehrenbergina undulata*; *Nuttallides rugosus - Uvigerina peregrina*; *Astrononion novozealandicum - Eggerella bradyi*. and three in the southern Vietnamese Shelf area (*Amphistegina papillosa - Nummulites venosus*; *Heterolepa* aff. *dutemplei - Cibicidoides pachyderma*; *Parrelloides bradyi - Oridorsalis umbonatus*).

Correlations of Holocene benthic foraminifera and planctic δ^{18}O-Isotopes in the SW-Pacific

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Short sediment cores were taken along two transects (South Tasman Rise and eastern Campbell Plateau) in the Southern Ocean between Australia and Antarctica. The almost undisturbed sediments were investigated in high resolution. The sediment record represents the entire Holocene period and is correlated to distinct climatic changes.
This study additionally describes correlations between climatic changes (indicated by planktic δ^{18}O isotope ratios of *Globigerina bulloides*) and the abundance of certain benthic foraminifera species:
Uvigerina peregrina is abundant in phases of warmer climate
Melonis pompilioides prefers phases of colder Sea Surface Temperature (SST)

Palecology of benthic foraminifera as an indicator for the paleoceanography of the SW-Pacific

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The ocean between Australia /New Zealand and Antarctica is the major gateway for water mass exchange between the Indian and the Pacific Oceans. Based on the palecology of holocene benthic foraminifera, we present a high-resolution study of the Holocene oceanographic variability of this area. Short sediment cores were taken from the South Tasman Rise and the eastern Campbell Plateau covering different water depths and water masses. The investigated foraminiferal assemblages reflect multiple environmental factors:

- Early diagenesis diminishes the abundance of certain arenaceous species in the uppermost cm of the sediment.
- Variations of nutrient flux have the major impact on the living fauna. *Fursenkonia contemplata* indicates high productivity at the South Tasman Rise, lasting until ~7500 years before present. The enhanced productivity might reflect the position of an oceanographic front.
- Several distinct benthic foraminiferal assemblages, associated with certain water masses as published elsewhere, were found and described. A *Nuttalides umbonifer* association indicates strong influence of Antarctic Bottom Water (AABW). A *Globocassidolina subglobosa* association is described in samples recently bathed in the Circumpolar Deep Water (CPDW).

The variability in benthic foraminiferal assemblages indicates a change in bathymetric position of deep and bottom water masses: The decreasing influence of the *N. umbonifer* association evolves into an abrupt change to the *G. subglobosa* association at the eastern Campbell Plateau at ~8000 years before present. This pattern is interpreted as a deepening of the water masses. The trend of the faunal associations at the South Tasman Rise is reverse: the influence of the N. umbonifer association increases throughout the last ~7500 years before present, while the significance of the *G. subglobosa* association decreases. A shallowing of the water mass body structure is assumed.

Microvertebrate Group

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The Microvertebrate Group ended another active year with the usual one-day gathering in conjunction with the Palaeontological Association Annual Meeting in December. Since the 2002 PalAss meeting took place in Cambridge, some keen group members spent a few cold hours in the Oxford Clay mud pits around Peterborough, before meeting up for a more comfortable evening of talks and dinner in Ely.

Presentations were made by Mark Purnell, Rosie Dhanda, Linda Wickström, David Jones and David Baines. Most memorable was Rosie Dhanda who valiantly rewrote her Powerpoint presentation in fifteen minutes flat after the Zip disk containing her first version had been corrupted. She then presented preliminary results from her cladistic analyses of Ordovician conodonts, focussing on the basal relationships of the prioniodinids.

Paul Smith reports that he attended the GSA Geobiology Division Symposium on Biogeography in October and presented a talk (authored by Paul, Phil Donoghue and Ivan Sansom) entitled "The biogeography of early vertebrates: phylogeny meets plate tectonics". Before and after the meeting he took the opportunity to look through Palaeozoic fish collections at Yale, the Field Museum and American Museum of Natural History, coming up with some interesting *Lasanius* material that Mark Purnell and he will work up.

Howard Armstrong informs us that his conodont work has progressed slowly over the last few months under an administrative burden of large proportions. However, his projects on growth and heterochrony in *Gnathodus* and growth, mode of life and life history events in panderodontids continue. Efforts have been directed to work on stable carbon isotopes from the Batra Mudstone with the hope of estimating Ordovician atmospheric carbon dioxide levels. Linda Wickström was in Lund, Sweden at Lundadagarna in March and talked about "Conodont feedings strategies - a phylogenetic and ontogenetic perspective", where she compared assumed feeding strategies of the Silurian conodont genus *Kockelella* with phylogenetic relationships and ontogenetic sequences. An abstract will be published in GFF later this year.

Several of the group members are looking forward to attend the Second Gross Symposium in Riga, Latvia this September. Giles Miller who will attend the meeting also reports that he soon hopes to release a web catalogue of the NHM conodont collections.

Nannofossil Group

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Back in January when Jackie Lees introduced a new set-up to the Nannofossil Group, she suggested that the inclusion of a nanno person from industry would hopefully help stimulate more interest and integration between the industrial sector and academia, making the industrial folk feel just as represented as the academic folk….Steve Starkie (Nanno Group Chair) has spent a lot of the last few months working offshore Norway and in Libya, and as a result of this, any communication we have had has been limited due to lack of e-mail out there.

However we have come up with some ideas, though no concrete plans yet…we'd love some feedback or comments on these ideas, and if any of you have any other suggestions, please email me and let me know (communications in Denmark aren't as bad as they are in Libya!). Here are some thoughts …

1) For the academics to see how the industrialists work, a small article on 'a day in the life of an offshore biostratigrapher' (the need for something like this was higlighted at the short course in Applied Micropalaeontolgy in June, there were lots of questions regarding life on an offshore installation).

2) The suggestion of having a nanno group meeting together with another group has been put forward. Personally, i don't know when the last nanno group meeting was held, so maybe we should start the ball rolling again and for our first meeting in a long while, it can be integrated with another discipline. This would give the opportunity for folk to present mulitdisiplinary studies (I for one would find this useful as a lot of work I do here at GEUS involves reports where nannos, palynology and forams are integrated). This would be one important difference between us and the INA, as the INA concentrates solely on nannos. On the other hand maybe it is best to see how much interest we have from the Nanno group after this newsletter is sent out….comments please!

3) I am in the process of compiling a nanno mailing list, this could be a good way for industry nanno folk to keep in better contact with the rest of the group as they are often offshore when meetings are organised.

4) The last time the nanno group got together for a field trip as far as I know was back in June 1998 when a small bunch of us visited Belgium and Etienne Steurbaut showed one group Ypresian sections while the other group lost the two cars in the front of the convoy and found themselves in France. Surely it's about time for another trip? One suggestion is to visit the famous K/T section at Stevns Klint, Sjælland, Denmark (of course this is fine for me as I don't have to fly anywhere to get there)….but other suggestions are more than welcome.

Back to the subject of integrating industry and academia; this was one of the main reasons for holding the short course in Applied

Micropalaeontology in Bonn back in June 2003 (see write-up in *Conference & Meeting Reports*, later in Newsletter). Of the 20 folk attending the course, 7 were nannopalaeontologists. 6 of these are presently in academia but are interested in looking to work in industry…. encouraging figures.

The only other conference I have been to since INA 9 in Parma was the Organic Carbon Burial, Climate Change & Ocean Chemistry conference at the Geol. Soc. London in December. This 3 day conference was very mulitidisciplinary in scope and saw an impressive number of nanno presentations, including ''Calcareous & organic phytoplankton as indicators of palaeoceanographic changes during the early Toarcian anoxic event'' by E. Mattioli and ''Calcareous nannofossils fro, Upper Jurassic sediments of the Volga basin (Russian platform): evidence for productivity-controlled black shale production'' by K. Kessels.

Have you been to a nanno related conference within the last 6 months? If so, please send a write up in for the next Newsletter!

Well thats it for now, have a nice summer!

Ostracod Group

Alan Lord
Ostracod Group Secretary
<a.lord@ucl.ac.uk>

Spring Meeting
Leicester, Friday 28 February - Sunday 2 March 2003

Attendees:
Dr Ian Boomer (Newcastle), Dr Roy Clements (Leicester) and Mrs Jan Clements, James Evans (Leicester), Dr Mick Frogley (Sussex), Dr David Horne (NHM), Prof. Hou Xianguang (Yunnan University, visiting Leicester), Dr Nicky Johnson, Prof. Alan Lord (UCL), Richard Pope (Greenwich), Prof. David Siveter (Leicester) and Mrs Pauline Siveter, Dr Ian Slipper (Greenwich), Dr Robin Smith (NHM), Radka Symonova (Charles University, visiting Greenwich), Dr Mark Williams (BGS, Keyworth), Vince Williams (Leicester), Mark Woodger (Bristol), Brett Woodhouse (Leicester).

The party assembled at the Ullesthorpe Court Hotel, Ullesthorpe on Friday 28 February and, following a convivial evening, were ready for work after breakfast the next morning. However, David 'insomniac' Horne had scored before breakfast with specimens of living *Candona candida* (O.F. Mueller, 1776) from a water butt in the hotel garden! The rest of the group, somewhat more torpid, had breakfast and travelled to the Department of Geology, Leicester for a day of varied and excellent presentations, sustained by lunch in a nearby pub, coffee, and a very fine coffee and walnut cake from the hands of Pauline Siveter.

The programme on Saturday 1 March commenced with thoughts for Dr Dick Benson and his family. Dick, who died on 19 February 2003, had close connections with Leicester through his friendship and collaborations with the late Prof. Peter Sylvester-Bradley, founder of *A Stereo-Atlas of Ostracod Shells*. Since our last visit to Leicester it is sad to note also the loss of Mrs Joan Sylvester-Bradley, a good friend and kind hostess to the Ostracod Group who died on 8 February 2002.

The following talks were presented:

Ian Boomer - 'Mesolithic coastal environments of Northumberland: Living in the oldest house in Britain' - as featured in a recent 'Meet the Ancestors' TV programme.

Mick Frogley and Alex Chepstow-Lusty - 'High resolution isotopic and faunal evidence for climatic variability in the Lucre Basin, Cuzco region, Peru, over the last 2ka'.

David Horne and Robin Smith - 'A new first British record of *Potamocypris humilis* (Sars 1924), a freshwater ostracod with a disjunct record in Britain and South Africa'.

Richard Pope - 'A Freshwater Mutual Climatic Range Method - using ostracods to establish past climates'

Ian Slipper - 'The faunal response of ostracods within Cenomanian chalk/marl rhythms'

David Siveter, Hou Xianguang and Mark Williams - 'China off the beaten track: huntin' bradorids' (yes, we know bradorids are not ostracods, but they are bivalved and we have adopted them).

Robin Smith, David Horne and John Whittaker - 'A new species of *Terristricythere* from the UK'.

Radka Symonova - 'Ostracods of the Cejc Lake, Czech Republic'.

Mark Williams, David Siveter and Giles Miller -

'Scottish Carboniferous ostracods. A case study from the Ballagan Formation'.

Roy Clements - 'Introduction to the Field Day, 2 March 2003'.

After this interesting and varied day, which included special displays prepared by Roy Clements and James Evans, the party retired to the Ullesthorpe Court Hotel for dinner.

Sunday 2 March turned out to be a wonderful, bright Spring day and it was a pleasure to be in the field, first to look at the Lower Jurassic at Tilton-on-the-Hill and then to sample for living material in Rutland Water, both to the east of Leicester.

Tilton Railway Cutting SSSI Nature Reserve (SK76130560).
The former railway cutting exposes the Lower Jurassic Lias Group, represented by the top of the Dyrham Formation, Marlstone Rock Formation, and basal Whitby Mudstone Formation, spanning the Upper Pliensbachian and Lower Toarcian stages. Roy Clements demonstrated the sequence, explaining that recent ammonite work (Howarth 1992) indicated that the base of the Toarcian stage falls within the Marlstone Rock Fm. and thus much lower than previously thought. A small faunal list for the Marlstone Rock section at Tilton was published by Lord (1982) and a full account of Toarcian ostracods from nearby Empingham (Rutland Water) is in Bate & Coleman (1975).

Whitby Mudstone Fm., Bed RGC12, base immediately above Ironstone Mbr., tenuicostatum zone, sample yielded:
Trachycythere verrucosa Triebel & Klingler, 1959
Kinkelinella tenuicostata Martin, 1960
?*Monoceratina* sp.
Paracypris sp.

Modern Locality 1: Tilton Railway Cutting, seepage-fed swampy pond with abundant macrophytes in the bottom of the cutting close to the road bridge.
Abdundant *Psychrodromus olivaceus* (Brady & Norman, 1889).

Modern Locality 2: Tilton Railway Cutting, seepages / ponds under wooden walkway in bottom of cutting, abundant decidous leaf litter.
Abundant *Eucypris pigra* (Fischer, 1851); Also some *Potamocypris fulva* (Brady, 1868).

Following lunch in the Noel Arms, Whitwell, the party sampled Rutland Water for living ostracods.

Whitwell Water Sports Centre (SK926082)
Ian Boomer demonstrated the workings of a Renberg corer and a dredge.

Modern Locality 3: margin of Rutland Water, sandy/muddy bottom 1-2m deep, adjacent to the jetty from which an intrepid boat team set sail to sample deeper waters.
Candona cf. *candida* (O. F. Mueller, 1776)
Cypria ophthalmica (Jurine, 1820) (abundant)
Cypridopsis vidua (O. F. Mueller, 1776)
Ilyocypris sp.
Limnocytherina sanctipatricii (Brady & Robertson, 1869) (one living adult female; several empty male and female carapaces also obtained)

Deep water sample, north arm of Rutland Water, near Limnological Tower (*circa* SK931073):
Material dredged by the boat crew yielded live*Candona* cf. *candida* (O. F. Mueller, 1776) *Cypria ophthalmica* (Jurine, 1820) (abundant) *Cypridopsis vidua* (O. F. Mueller, 1776) *Cytherissa lacustris* (Sars, 1863) *Ilyocypris* sp. *Limnocytherina sanctipatricii* (Brady & Robertson, 1869)

This is essentially the same fauna that was found on the margin at the jetty, with the addition of *C. lacustris*; this is only the third locality in Britain where you can find living *Cytherissa lacustris*, the other two being Semerwater in Yorkshire and Loch Assynt in Scotland (pers. comm. DJH, and IDB for the latter record).

Previous collecting on 28 September 1975 (Siveter 1975) yielded live:
Ilyocypris gibba (Ramdohr) - females only, very common, smooth and noded*Cypria opthalmica* (Jurine) - adults and instars, common
Potamocypris villosa (Jurine) - common
Eucypris virens (Jurine) - rare
Erpetocypris reptans (Baird) - rare

Anglian Water Birdwatching Centre lagoons (lagoon no. 3, at *circa* SK893078):

Modern Locality 4 - small creek on lake margin, surface covered with duckweed (*Lemna* sp.). organic rich mud on bottom. *Cypria ophthalmica* (Jurine, 1820) Juvenile *Candona* sp

Modern Locality 5 – *Phragmites* reed bed on lake margin – organic-rich mud and reed debris.
Candona sp.
Cypria ophthalmica (Jurine, 1820)
Cypridopsis vidua (O. F. Mueller, 1776)
Ilyocypris sp.
Isocypris beauchampi (Paris, 1920)
Potamocypris cf. *villosa* (Jurine, 1820)
Additionally some large empty valves of *Cypris pubera* O. F. Mueller, 1776 were found among the reeds at Loc. 5.

Burley Fish Ponds area, north arm of Rutland Water (*circa* SK886086)

The Burley Fish Ponds are now beneath the north arm of Rutland Water, but in 1975 yielded (Siveter 1975):
Mud from *Phragmites* reed bed:
Cypridopsis vidua (Müller) - adults, very common
Candona neglecta Sars - valves only, rare, dead
Erpetocypris reptans (Baird) - adult valve fragments, rare
Ilyocypris gibba (Ramdohr) - rare

Open water pond: *Cypria opthalmica* (Jurine) - adults and instars, common

Strand line sediment sample (SK889086):
A dry strand-line deposit of plant debris left by a former high lake level yielded empty valves of *Herpetocypris* sp., *Candona* sp. and juveniles of a large cypridid, possibly *Cypris pubera.*

Vince Williams will be conducting his undergraduate long project on Rutland Water ostracods, and we look forward to his results in due course.

Following a full day of collecting the party dispersed. We are very grateful to David Siveter and Roy Clements for organising such a successful weekend, and to the University of Leicester for lecture facilities. We are especially grateful to Mr Tim Appleton (Manager, Rutland Water Nature Reserve) and to Anglian Water for permission to collect and for use of a boat for deep water sampling. The Rutland Water sampling attempted to replicate the 1975 sampling, and by happy chance Tim Appleton was our host on that occasion.

Next Meeting
Ostracod Group Autumn Meeting, Friday 19 - Sunday 21 September, Scarborough. Programme: Saturday 20 September: Upper Cretaceous, Flamborough Head, followed by Lower Cretaceous Speeton Clay - Leader Prof. P.F. Rawson (UCL). Sunday 21 September: Quaternary Dimlington Silts, and Recent collecting Hornsey Mere. For details contact Alan Lord.

References:
Bate, R.H. and Coleman, B. 1975. Upper Lias Ostracoda from Rutland and Huntingdonshire. *Bulletin of the Geological Survey of Great Britain*, **55**: 1-42.
Howarth, M.K. 1992. The ammonite Family Hildoceratacea in the Lower Jurassic of Britain. *Monograph of the Palaeontographical Society*: 1-200 (Part 1: 586, **145**, 1991; Part 2: 590, **146**, 1992).
Lord, A.R. 1982. Metacopine ostracods in the Lower Jurassic. *In* Banner, F.T. and Lord, A.R. (Eds) *Aspects of Micropalaeontology*, George Allen and Unwin (pp.262-277).
Siveter, D.J. 1975 Report of Ostracod Group meeting in Leicester, 27-28 September 1975, *British Micropalaeontological Society Newsletter*. (Faunal identifications by John Athersuch, Eric Robinson and Peter Sylvester-Bradley.

Identifications: thanks to Ian Boomer, David Horne, Robin Smith and Radka Symonova.

Palynology Group Report

Paul Dodsworth & Susanne Feist-Burkhardt
Palynology Group Secretary and Chair
<dodsworth@ichron.com>

TMS Palynology Group Meeting, Department of Geology, University of Leicester, 19th March 2003

The annual meeting of The Micropalaeontological Society's Palynology Group was held at the University of Leicester. Gary Mullins organised a successful event that was attended by twenty-five members. Seven lectures were given on diverse topics, reflecting recent research projects undertaken by the speakers. Abstracts are available on the Palynology Group webpage of the TMS, www.tmsoc.org
The head of the Department of Geology, Prof. Dick Aldridge, opened the meeting with a welcome speech. Duncan McLean chaired the first session. John Marshall (University of Southampton) started the talks, "The Millennium Atlas of the North Sea: Devonian chapter – the spore story". John discussed a re-evaluation of the Permian-Devonian stratigraphy in

many North Sea wells and showed slides of outcrops from Scotland, Orkneys and Greenland, where lithostratigraphic units identified in wells from palynological and wireline data, are exposed. Ken Dorning (Pallab Research / University of Sheffield) addressed, "Observations on the classification of the acritarch microflora and Palaeozoic prasinophycean algae". He illustrated problems of consistently applying acritarch subdivisions and suggested that acritarch vesicle, process and flange morphology, together with vesicle wall ultrastructure and excystment mechanism, can be used to cluster forms with similar morphological characteristics that may be of greater practical value in palaeoenvironmental interpretation. Gary Mullins (University of Leicester) reviewed different lines of evidence regarding how and why some acritarchs, algae and dinoflagellate cysts form monospecific clusters and discussed this reference to some of his research material, "Aggregates of the acritarch *Dilatisphaera laevigata*: faecal pelletization, phytoplankton bloom or defence against phagotrophy?" Lisa Buckley (University of Newcastle) discussed her Ph.D. work on palynofacies and geochemistry of mid-Cretaceous cores from hydrocarbon wells, "Cretaceous crud from Canada… palynofacies analysis of the Colorado Group, Western Canada Sedimentary Basin".

Gary Mullins chaired the second session. Will Gosling (University of Leicester) outlined his Ph.D. work on, "The characterization of Amazonian ecosystems by their modern pollen spectra". Will has been carefully sampling pollen rain from 'terra firma rain forest', 'semi-deciduous dry forest' and 'cerradao savanna' ecosystems. He discussed the limitations of applying such data to interpreting the fossil record. Duncan McLean (McLean, Owens & Bodman, University of Sheffield) described the, "Palynostratigraphy of the Late Carboniferous Langsettian-Duckmantian boundary in Britain". The high-resolution distribution of spore zonal markers around the Vanderbeckei Marine Band at the Duckmanton stratotype and in core from North Sea well 44/22-1 was discussed. Ken Dorning spoke about, "Late Ordovician and Silurian climate change: evidence from the marine phytoplankton record", and opened the debate to the audience.

Discussions continued over cheese, snacks and wine, sponsored by TMS. Many of us went on to a nearby pub and, after regaining our appetites, a curry house.

Silicofossil Group Report

Catherine Stickley and John Gregory
<cathy@earth.cf.ac.uk> and
<john@jgregory.demon.co.uk>

In March, Catherine Stickley (Cardiff University) took over from Alex Mitlehner as group secretary. In an attempt to revive interest in the group we are currently conducting a survey of potential members both in the UK and abroad. Current TMS members who wish to receive event announcements please email either the secretary (cathy@earth.cf.ac.uk) or John Gregory (john@jgregory.demon.co.uk). Along with the Palynology Group, we are organising a joint Silicofossil-Palynology Group meeting to be held at Cardiff University in late Spring 2004. The broad aim of this meeting will be to increase awareness of how both groups (particularly the diatoms and dinocysts) may be of mutual benefit in palaeoenvironmental studies. The meeting will be open to all TMS members, and we particularly encourage participation from European members. Further details will be available in the next newsletter, although we welcome your interest by email at any time.

Micropalaeontology News

The International Palaeontological Association

The International Palaeontological Association (IPA) provides an international voice for palaeontology, and maintains two directories in electronic format:
Directory of Paleontologists of the World
<http://ipa.geo.ukans.edu/Directory/directory.html>
Directory of Paleontological Collections
<http://ipa.geo.ukans.edu/Fossil/fossil.html>
The IPA also sponsors and supports palaeontological meetings worldwide, including the first International Palaeontological Convention (IPC 2002) in Sydney, and the forthcoming second IPC (Beijuing, 2006). The IPA would like to develop its activities in the conservation of important palaeontological site by working closely with national organizations to protect our palaeontological heritage.

While the Committee of TMS has decided not to become a Corporate Member of the IPA, it does encourage members of the Society to join individually. Further details are available from the IPA President, Professor Richard Aldridge (ra12@le.ac.uk), Secretary-General, Professor Rosalie Maddocks <rmaddocks@eh.edu> and Treasurer, Professor Roger L. Kaesler <kaesler@ku.edu>.

James Powell
TMS Secretary
<ajp@dinosystems.co.uk>

Rogues Gallery

Ever wondered what your Officers and Group Representatives looked like??

Haydon Bailey
Chair

James Powell
Secretary

James Riding
Treasurer

Malcolm Hart
Journal Editor
Special Publications Editor

Jenny Pike
Newletter Editor

Rachel Preece
Publicity Officer

Andrew Henderson
Webmaster

Andrew Henderson
Foraminifera Group Chair

Michal Kucera
Foraminifera Group Secretary

Mark Purnell
Microvertebrate Group Chair

Henning Blom
Microvertebrate Group
Secretary

Steve Starkie
Nannofossil Group Chair

Emma Sheldon
Nannofossil Group Secretary

Ian Slipper
Ostracod Group Chair

Alan Lord
Ostracod Group Secretary

Susanne Feist-Burkhardt
Palynology Group Chair

Paul Dodsworth
Palynology Group Secretary

John Gregory
Silicofossil Group Chair

Cathy Stickley
Silicofossil Group Secretary

Forthcoming Conferences

Open Meeting at Robertson Research, North Wales

Wednesday 8th October, 2003.

A TMS Open Meeting is proposed for the afternoon of Wednesday, 8th October to be held at Robertson Research International facilities at Llandudno, North Wales. The meeting will start at 2 p.m. and will be followed by a buffet reception hosted by Robertson Research. Members are welcome to make a short (20 minute) presentation at this meeting on any micropalaeontological topic and abstracts should be sent to Haydon Bailey at <haydonbailey@btconnect.com> as soon as possible, so that a full afternoon's programme can be collated.

Prof. Malcolm Hart, University of Plymouth has generously agreed to provide a key presentation to the meting on the subject of 'Microfaunal associations along the rift margin of the Cauvery Basin, South east India.'

This is a great opportunity for TMS members in North Wales and north west England to congregate at the first regional meeting of the Society for a good while, so please get involved and send in any contributions.

Haydon Bailey
<haydonbailey@btconnect.com>

Exceptional Preservation – EPA-Workshop 2003

Teruel (Spain). Fundación Conjunto Paleontológico de Teruel, 24 to 27 September 2003

Key-notes will be presented by invited speakers; all interested people are welcome to present posters (discussion about posters are included in the programme).

Programme of events

24th September 2003.
a) Meeting at the Museo Nacional de Ciencias Naturales, Madrid (CSIC), with an opportunity to examine the collections of exceptionally preserved fossils held by the Museum. Lunch. Travel to Teruel.
b) Meeting at the Palacio de Exposiciones, Teruel. Visit to Dinopolis
25th September. Key-notes, poster sessions, opening ceremony, EPA General Assembly
26th September. Key-notes, poster sessions, closing ceremony
27th September. Excursion to Teruel continental Miocene sites with exceptionally preserved fossils.

All interested people are kindly requested to contact with the General Secretary:
Dr. Luis Alcalá, Fundación Conjunto Paleontológico de Teruel, Avda. Sagunto s/n (Edificio Dinópolis), E-44002 Teruel (Spain)
Tel. 34 978 61 76 30
Fax 34 978 61 76 38
alcala@dinopolis.com
www.dinopolis.com

Contributions to the Poster Session (abstracts) received before 31th May, 2003, will participate in a draw. Five contributions will be granted with a free registration for one author.

Accomodation booking system:
Viajes Tivoli
Tel. 34 976 20 03 68
Fax 34 976 20 14 04
congresos.citerea@mapfre.com

Geological Curators Group Workshop

The curation and conservation of micropalaeontological materials.
2nd September 2003. Natural History Museum, London.

This one-day workshop will focus mainly on the microfossil groups held in the Department of Palaeontology at the NHM; Foraminifera, Ostracoda, palynomorphs, Conodonta and Radiolaria. A series of case studies will be illustrated by curators with a speciality in those particular aspects of the collections. There will also be a short presentation by the Palaeontology Conservation Unit on the conservation of micropalaeontological material.

If you are interested in this session, please contact Giles Miller, Department of Palaeontology, Natural History Museum, Cromwell Road, London, SW7 5BD. Tel 020 7942 5415. E-mail G.Miller@nhm.ac.uk.

Conference & Meeting Reports

Workshop on Middle latitude dinoflagellates and their cysts

Bedford Institute of Oceanography, Dartmouth (Canada) April 29-May 2, 2002

Participants (in alphabetical order): Gail Chmura (McGill, Canada), Barrie Dale (Oslo, Norway), Anne de Vernal (GEOTOP-UQAM, Canada); Rob Fensome (GSCA-BIO, Canada), Kari Grøsfjeld (GSN, Norway), Rex Harland (DINODATA Services, R-U), Martin J. Head (Godwin Institute for Quaternary Research, R-U), Maryse Henry (GEOTOP-UQAM, Canada), Jobien Laurijssen (LPP, The Netherlands), Elisabeth Levac (St. Francis Xavier University, Canada), Laurent Londeix (DGO, France), Fabienne Marret (SOS-UWB, R-U), Jens Matthiessen (AWI, Germany), Francine MacCarthy (Brock University, Canada), Andrew McRae (GSCA-BIO, Canada), Peta J. Mudie (GSCA-BIO, Canada), Vera Pospelova (McGill, Canada), Taoufik Radi (GEOTOP-UQAM, Canada), André Rochon (GSCA-BIO, Canada), Sandrine Solignac (GEOTOP-UQAM, Canada), Merlijn Sprangers (LPP, The Netherlands), Jean-Louis Turon (DGO, France), Graham Williams GSCA-BIO, Canada).

The third workshop on dinoflagellates and their cysts organised by André Rochon and Fabienne Marret was held at the Bedford Institute of Oceanography. The objectives were to document the morphology, taxonomy and distribution of modern dinoflagellates and their cysts in middle latitudes, and to promote discussions between ecologists and paleoecologists. The workshop was held in the honour of Dr. Peta J. Mudie in recognition for her contribution to Quaternary palynology and paleoecology. A total of 15 presentations were made over 3 days. The afternoons were devoted to microscopic observation of slides and plenary sessions/discussions. Studies on several mid-latitude regions were presented. In particular, sediments from the Black and Caspian seas, which can be considered as extreme environments, proved to be extremely useful to study the influence of environmental parameters on cyst morphology and intraspecific variations. Several points were raised during the discussions, including the influence of hydrographical conditions on the cyst distribution, such as the stratification of water masses, vertical and lateral transport… The methods and interpretations of ecologists differ from those of paleoecologists and it became obvious that consultation and collaboration will be needed to avoid futur misunderstandings on the value of paleoenvironmental reconstructions based on fossil assemblages of dinoflagellate cysts.
Andrew MacRae gave a demonstration of the software package DINOFLAJ, which was developed at the Bedford Institute of Oceanography. André Rochon and Frank Thomas gave us a tour of the Environmental Scanning Electron microscope, which allows observing wet samples with minimum preparation. We had the opportunity to examine fresh specimens of Bitectatodinium tepikiense, collected in Bedford Basin, just outside the Institute. An excursion organised by Rob Fensome, Williams MacMillan, Andrew MacRae and Graham Williams led us to the famous Carboniferous fossil cliffs at Joggins, with abundant fossils of tree trunks and leaves (*Sigillaria*, *Calamites*, giant ferns) and amphibians (*Dendrerpeton acadianum*), the Triassic-Jurassic dinosaur-bearing red beds of the Parrsboro area, and the Fundy Geological Museum, including a behind-the-scenes tour.

Scientific Program:
Monday April 29 (9:30-12:00)

Opening remarks
Fabienne Marret – Shelf sea environments: the potential of dinocyst studies for reconstructing palaeoceanographic conditions.
Rex Harland – The seasonal succession of dinoflagellate cysts in Koljö Fjord, west coast of Sweden.
Vera Pospelova and Gail L. Chmura – Modern dinoflagellate cysts and their spatial distribution along environmental gradients in Buzzards Bay embayments (Massachusetts), USA.

Tuesday April 30 (9:00-12:00)
Peta Mudie, André Rochon and Helen Gillespie – Recent dinoflagellate cyst assemblages from the Aegean-Marmara-Black seas corridor and their relevance to the Noah's Flood myth.
André Rochon, Peta J. Mudie, Ali E. Aksu and Helen Gillespie – *Pterocysta*: a new dinoflagellate cyst genus from Late-Glacial sediments of the Black Sea.
Fabienne Marret – Dinoflagellate cysts in the Caspian Sea, Kara-Bogaz Gol Bay and the Aral Sea: A new genus, *Caspidinium*, a new *Impagidinium* species and morphotypes of *Spiniferites cruciformis*.

Wednesday 1 May (9:00-12:00)
Rex Harland – The use of dinoflagellate cysts as high resolution proxies for environmental change and the characterization of recent anthropogenic activity.
Jobien Laurijssen – Recent distribution of organic-walled dinoflagellate cysts from offshore SE South America.
Merlijn Sprangers – Modern organic-walled dinoflagellate cyst distribution offshore NW Iberia
Martin Head – Eemian dinoflagellate cysts from the Baltic Sea.

Thursday 2 May (9:00-12:00)
Kari Grøsfjeld – Dinoflagellate cysts and hydrography of the last interglacial in the White Sea region.
Francine M.G. McCarthy – What do palynological records record? Examples from the mid latitude abyssal North Atlantic and North Pacific Oceans.
Taoufik Radi – Preliminary results on dinoflagellate cyst distribution from surface sediments along the coast of British Columbia and in the Gulf of Alaska.
Barrie Dale – Views and thoughts on the use of dinoflagellate cyst assemblages for paleoecological reconstructions.
André Rochon – *Gonyaulax Spinifera*: Perpetuating the paradox.

A CD-ROM including the discussions and presentations in PowerPoint format is available upon request (contact Fabienne Marret: f.marret@bangor.ac.uk).

Fabienne Marret & André Rochon
<f.marret@bangor.ac.uk>

A Short Course in Applied Micropalaeontology

University of Bonn Palaeontology Department, 12th-14th June 03

After a successful 'first course' in Spring last year, it was decided to make the Short Course in Applied Micropalaeontology an annual event and the second course was held successfully at the University of Bonn in June. (See photos below)
The course is designed to encourage the integration, or at least an understanding between academic and industrial biostratigraphers. Applied biostratigraphy is an integral tool in the exploration for oil and gas. Provided that the global population and economy continue to grow at the current rate, the demand for fossil fuel energy resources (and therefore biostratigraphers) will remain at a high level for at least another 60 to 80 years.
The course is designed to give the participants an introduction to, and an understanding of, the methods that have been developed to apply micropaleontology to the requirements of the hydrocarbon industry.

As last year, the course was held in the Goldfuss Museum in the Department of Palaeontology at the University of Bonn. The small but 'hyggeligt*' teaching room (with skeletons of a Plesiosaur *Cryptocleidus oxoniensis* and an Ichtyosaur *Ophtalmosaurus icenicus* - both Jurassic - suspended above the presenters!) meant limited numbers could attend the course, but ensured a friendly and intimate atmosphere, allowing much useful discussion between students and presenters throughout the sessions.

20 folk attended (from industry as well as academia), from as far afield as Nigeria, Florida, Sweden, the UK and Italy, as well as students from all over Germany. And a pleasant surprise was that the backgrounds of the participants varied too; half the class were involved in biostratigraphy at some level (MSc, PhD or in industry) but the class also included a reservoir geologist and a number of sedimentologists, highlighting the requirement for a greater understanding between disciplines when working offshore as part of a large geological team.

After a reception in the museum where we had a chance (the first of many!) to sample the local Bitburger beer and meet each other, Dave Jutson started proceedings the following morning explaining amongst other things how a well is drilled, about different rig types, the function of different parts of a rig, how to collect samples at wellsite and the problems with mechanical and chemical degradation. He went on to describe living conditions offshore and demonstrated that the biostratigraphers job is a stressful (though often rewarding) one that involves lots of instantaneous decision-making.

My contribution on the second day of the course involved horizontal drilling and the role of high resolution biostratigraphy (using nannofossils, microfossils and palynology) in production geology, followed by an introduction to directional drilling and to electrical logging. This emphasised the importance of understanding the basic principles of the work performed offshore by other geoscientists.

Gitte Laursen went on to describe how biostratigraphy and graphic correlation are used in the exploration industry. She also demonstrated how biostratigraphy is used hand-in-hand with seismic interpretation allowing the reinterpretation of geophysical reservoir models and proceeded to explain how sequence stratigraphy fits into the whole story.

In addition to showing an example of how larger foraminifera can be used to reconstruct palaeoenviroments, Martin Langer demonstrated how DNA studies are increasing taxonomic resolution of Recent foraminifera. He also gave a very positive talk suggesting that despite fluctuations in oil prices and mergers of the 'major' oil companies to form the 'super majors' resulting in the loss of many oil company biostratographers, the need is still out there for industrial biostratigraphers…..albeit mainly with consultancy companies these days. The indications are that industry will need us for at least the next two generations!

Each presenter gave a practical exercise demonstrating how biostratigraphic methods are employed both offshore and onshore. These seemed to be really popular and gave rise to various comments: 'when do you ever get to eat'….'only 5 minutes to analyse one sample???'….'I don't think I can handle that kind of stress'….'you prepare your OWN samples?'…..!!

It wasn't all work though, there was a bit of time to have a look around Bonn (a really beautiful and unspoilt town beside the Rhine) and of course to visit (on more than one occasion) a huge 'Bier Garten' on the banks of the Rhine….sitting with hundreds of like-minded thirsty folk beside the water with the big orange full moon rising over 'die Siebengebirge mountains' on a balmy night…was it really orange or was it the huge amount of Weissbier/Kölsch we consumed?!…

Anyway, feedback from the course has been very encouraging and there are already names down on the waiting list for next years course….if you are interested, mail Dave Jutson <David.Jutson@rwedea.com>

*hyggeligt: a Danish word that kind of means cosy but you'll never find out exactly what it means unless you live here!!!

Dave Jutson (RWE-Dea, Germany), Martin Langer (University of Bonn, Germany), Gitte V. Laursen (Statoil, Norway) and Emma Sheldon (GEUS, Denmark)

Book Shelf

A Manual of Practical Laboratory and Field Techniques in Palaeobiology

Owen R. Green
Kluwer Academic Publishers £85 / €125
ISBN 0-412-58980-X

Micropalaeontologists should not be put off by the title of this 538-page manual. In his introduction, the author makes no apology for his apparent bias towards micropalaeontological techniques, stating that it is always more convenient to modify a technique towards extraction for macrofossils than visa versa. The manual is drawn from Owen Green's extensive experiences at South London College, Goldsmith's College, University of London and currently at the Department of Earth Sciences at the University of Oxford. The manual is divided into three sections with an introduction, a section on field techniques and finally the bulk of the work concerns laboratory techniques. Obviously, a manual is not written to be read cover to cover, so I decided to test the author's assertion that it can be used to answer two basic questions:

1. How do I carry out a certain procedure?
2. I want to examine a fossil of a known composition from a rock. What procedure should I use?

The section headings are well thought out and can easily be followed to the relevant section. There are many techniques that involve similar processes and the manual cross-references these well, navigating the reader clearly to the relevant parts of the manual. In this respect, the manual certainly answers these two questions. As a phosphatic micropalaeontologist, I decided to look in more detail at some of the technique entries under phosphatic fossil extraction. Obviously, each worker has their own method for carrying out their sample preparation but I found it strange to be told that the acetic acid needs to be decanted every 8 hours and that rock must be treated in smaller quantities than for the formic acid technique. Lennart Jeppsson's lab in Lund, Sweden regularly processes large samples of many tens of kilograms to enable representative conodont faunas to be extracted. Jeppsson's more recent paper (Jeppsson *et al*. 1999) advocates the use of large sample sizes and monitoring of the procedure by taking regular Eh/Ph readings. Having said this, the manual certainly challenges the reader to think about how their laboratory techniques can be refined. The section on laboratory design and layout is a useful contribution on which very little has been published previously. Health and safety information is given throughout and this has been emphasised in bold or by the use of text boxes. However, I was shocked to see the suggestion that concentrated HF can be used in the field to etch the surfaces of siliceous rocks and check for the presence of siliceous microfossils.

While thoroughly recommending this book, I do feel that the length and subsequent price of the volume is rather off putting. The book is eminently suitable for the professional and interested amateur alike but I suspect that prospective buyers will think twice about paying 85 GBP. The fold out flow charts are a useful addition but may have added to the costs of producing the book. I was slightly surprised by the choice of flow charts given fold out status. The diatom processing flow chart was allocated a normal A4 page whereas the non-routine palynological processing flow chart was reproduced on a fold out but could easily have been reproduced on a normal page or as a list of stages. There are a number of repetitions that add to the length of the book. Each section in the manual has a reference section following it and I found this particularly helpful. However, some references, for example, Brunton *et al* (1985) and Brasier (1980) are repeated in many section reference lists and then again in the main reference section that contains a complete list of references in larger font. There are not many recent references cited but this simply shows that this type of work is not published as often in the current academic climate. This serves to further emphasise the importance of Green's contribution.

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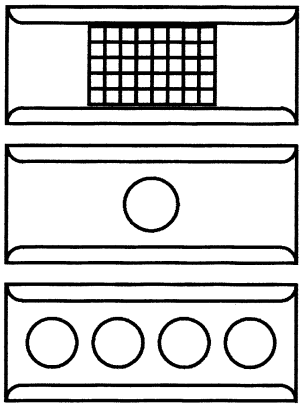

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