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Edited by Jennifer Pike

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Newsletter of Micropalaeontology

Editorial

Jenny Pike

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Welcome to my first Newsletter of Micropalaeontology as Editor. You may notice some changes to this issue in relation to previous issues produced and edited by Phil Donoghue - a change of appearance never did anyone (or anything) any harm!

Research Opportunities

The first significant change that I intended to put into this Newsletter was a section entitled "Research Opportunities" that detailed the micropalaeontological PhD topics that were on offer around the country. This listing could be used to show undergraduates and Masters students who may be interested in a research career in micropalaeontology - an information resource. It will also help us all keep in touch with the sort of research going on within the different BMS Specialist Group disciplines and in different Departments around the country, and internationally.

Teething problems prevented me from producing this Newsletter as quickly as I thought I might so I am going to introduce this section in the next, winter, issue. Here the section will be more appropriate as we will all have our PhD topic lists ready to publicise over the winter. I realise that no funding will be secured at that point but there is no harm in advertising early! I would like to thank those of you that responded to my call for PhD topics earlier in the year, however, it is now too late in the day to include these at this stage, apologies . . . but get ready for next year.

Publicity

Ian Boomer is doing a great job as Webmaster for the BMS web site and, as well as promoting PhD topics in the Newsletter, can I encourage you all to post adverts for research projects and jobs on the web site and all have links to the BMS web site from your own personal or departmental web pages. Our web site is an excellent resource that we should all be using. Our new Publicity Officer, Rachel Preece, is actively trying to raise the profile of the BMS within academia, industry and around the world. Together, we have come up with some ideas to enhance the Newsletter as a useful resource for you, the BMS members, and we will be introducing these in the future. Any suggestions you may have for improving the PR of the Society - please let Rachel know.

Photograph Gallery

One thing that you may notice about this Newsletter is the lack of pictures - photographs and images of microfossils. What I would like to do is to include as many of your favourite images as possible, distributed through the Newsletter, as background images or plates, rather than just the front page. This will break up the text and make our message clear to casual readers in libraries, institutions, etc. If you have a photograph of a microfossil that you would like to see in the newsletter, please send me a copy with a note about what it is. All photographs will be acknowledged. If I don't receive any, I will have no option but to fill the next issue with diatoms!!

Copy deadline for the next Newsletter of Micropalaeontology is 1st November 2000.

I hope you enjoy this Newsletter and I welcome any comments or suggestions that you may have, at any time.

British Micropalaeontology Society

<http://www.bmsoc.org>

Society News

Godwin Institute for Quaternary Research,
University of Cambridge

New BMS Members

The BMS welcomes the following new BMS Members (to February 2000) to the Society:

Marco Chiari, Sue McNaughtan, Ewan Laurie,
Lindsay Wilson, Helen Coxall, Virginia
Ettwein,
Jens Steffahn, Anthony Butcher, Ben
Walsworth-Bell, Jacqueline Connolly, Kate
Lavender,
Jackie James

Secretary's Report

James Powell
<ajp@dinsystems.co.uk>

Year 2000 Subscriptions

Your address label shows whether or not the Society has received your subscriptions for 2000. If the label indicates 1999, please submit your subs (as indicate on the invoice you will have received) immediately to the Acting Treasurer: Dr Mike Stephenson, British Geological Society, Keyworth, Nottingham NG12 5GG, UK

Directory of Members

The Directory of Members is being compiled and is expected to be issued to members this summer.

Annual General Meeting 2000

The 2000 AGM will be held on Wednesday 15th November in the Gustave Tuck Lecture Theatre, University College London commencing 2.00 pm (subject to confirmation). Items for inclusion on the agenda must be notified to the Secretary by 15th October 2000. Following Society business, two talks will be presented.

Listening to cysts - dinoflagellates of the late Cenozoic
Dr Martin Head

Dinoflagellates are mostly free-living unicellular organisms. They rank among the most important primary producers in the world's oceans, and in high latitudes are rivalled only by diatoms. Yet half of the 1600 living marine species of dinoflagellate are heterotrophs, occupying critical higher parts of the food web especially in areas of nutrient upwelling and seasonal ice cover. So dinoflagellates are vital to the marine ecosystem, and their impact on society is magnified by the global spread of toxic dinoflagellate blooms. Within the world of micropalaeontology, research into dinoflagellate cysts has traditionally focused, for economic reasons, on the Mesozoic and early Cenozoic. However, dinoflagellates have now emerged as an indispensable analytical tool for the more recent past. A detailed Pliocene biozonation is presently under development for the North Atlantic, and both in situ and reworked dinoflagellates cysts are refining our understanding of Pliocene deposits within southern North Sea basin. But the most rapid progress is being made in Quaternary applications. A database of modern cyst distributions at mid and high northern latitudes now allows us to use transfer functions in quantitatively reconstructing Quaternary palaeoenvironments, including presence and duration of sea-ice cover. Cysts of toxic dinoflagellates have not yet been incorporated into this database, but their presence in late Quaternary sediments is being used to assess the history and migration of toxic species in the world's oceans as well as in predicting future outbreaks. These and other advances will be reviewed with emphasis on the need for detailed taxonomy in all aspects of late Cenozoic dinoflagellate cyst research.

Molecular view on origin,
macroevolution and
speciation of Foraminifera
Professor Jan Pawlowski
Station de Zoologie, Université de Genève

Recent advances in molecular biology and genetics have revolutionized evolutionary studies. Relatively easy access to molecular

data has opened yet unexplored archives of genetic information about origin and evolutionary history of organisms. Analysis of DNA sequences led to some most surprising discoveries concerning the origin and diversity of various groups of micro-organisms and allow for independent testing of morphology-based phylogenies of higher organisms.

Application of molecular methods to study foraminifera is still in a very preliminary phase. However, hundreds of foraminiferal DNA sequences deposited in the GenBank during the last five years prove a slow but continuous development of molecular systematics of this group. Results obtained until now led to the following conclusions: (1) foraminifera originated much earlier than suggested by the fossil record, (2) the group includes both marine and freshwater naked amoeboid protists, (3) diversity of benthic and planktonic species is higher than suggested by study of morphological characters. In view of molecular data, foraminifera appear as a highly evolved, diverse group of organisms, adapted to practically all types of water environments. Genetic diversity of foraminiferal species provides a new insight into their ecology and geographic distribution. Application of these data in micropalaeontological research can constitute in the future an important source of information about past environmental changes.

Wine Reception and Poster Displays

Following the AGM and lectures, a wine reception with posters displays will take place in the South Cloisters of UCL. Members wishing to contribute a poster should contact the Secretary by 31st October to allow adequate hanging space to be reserved. Please supply the title of your poster and a short abstract, if possible.

Grants-in-Aid

The Society's grants-in-aid scheme was reintroduced for 2000. At their March 2000 meeting, the Committee agreed that £100 each should be made available to Jacqueline Connolly and Kate Lavender (Trinity College Dublin) to help them attend the 10th International Palynological Congress in Nanjing

at the end of June 2000. The Committee also recommended awarding the maximum of £200 to Anthony Butcher (a self-funded student at the University of Portsmouth) to assist him undertake field work on Silurian strata in southwest Illinois. £100 was also awarded to Kathryn Riddington (Birmingham University) to go towards the cost of field work in France, and Marco Chiari (Universita di Firenze) will receive £100 to enable him to examine the Pantanelli radiolarian collection in Modena.

Secretary and Journal of Micropalaeontology Editor

At the 2000 AGM the term of office of both the Secretary and the Editor of the Journal of Micropalaeontology come to an end. While both incumbents have indicated their willingness to be nominated for a second term, other nominations from the Society's membership will be welcome. Nominations, including names of proposers and seconders (all of whom should be members of the Society) should reach the Secretary by 15th October 2000

Missing Members

The Society does not have contact addresses for the following paid-up members:

D B De Hauteville-Bell (student), I P Evans, M C Fernandez Arias (student), C O Jones, C MacLeod, J E White

If anyone can be of assistance, please contact the Secretary immediately at <ajp@dinosystems.co.uk> or at the address below.

Anonymous Foundation Member

One member who pays by Direct Debit, has made an apparently anonymous donation to the BMS Foundation. If it's you and you want your contribution acknowledged, please contact the Secretary immediately at <ajp@dinosystems.co.uk> or at the address below.

Dr James Powell, BMS Secretary, Dinosystems, 105 Albert Road, Richmond upon Thames,

Foundation Members

The BMS 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, British Micropalaeontological Society, British Geological Survey, Keyworth, Nottingham, Nottinghamshire, NG12 5GG, UK. Please make cheques/money orders/bankers drafts payable to "British 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.

BMS Foundation Donors of £25 or over (as of February 2000)

J B Riding, H J Oertli, R Lundin, C J Todd, L Trevisan, M B Hart, M A Kaminski, R J Aldridge, K L Knudsen, R A K Attewell, J R Haynes, A J Gooday, G V Laursen, D W Haig

Surrey TW10 6DJ
Tel: 020 8948 6443
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Email: ajp@dinosystems.co.uk

Journal Editor's Report

Malcolm Hart
<mhart@plymouth.ac.uk>

The Journal of Micropalaeontology Volume 19/1 is now in final form and should be distributed during May. The cover will carry a radiolarian, the image for which was kindly provided by Prof. Kjell Bjorklund of the University of Oslo. Thanks to all those who took part in the reviewing process for the papers in this issue. Thanks also to the various authors for a very quick turn-round of their proofs. Submissions still continue at a healthy rate and we have papers building nicely for the 19/2 issue due out in the Autumn.

Anyone with an interesting image for the front cover for Volume 20 (2001) is asked to contact the Editor as soon as possible. We use such images for the two parts each year and carry a full acknowledgement of the source.

Special Publication Editor's Report

Malcolm Hart
<mhart@plymouth.ac.uk>

The Society wishes to maintain a throughput of high quality Special Publications. Not only does this promote the aims of the Society but it also provides vital revue for the Society. We have a number of Special Publications in the pipeline, but as there is usually a very long lead time to the production of such a volume we have to ensure that germs of ideas are growing all the time. Anyone with a yearning to produce such a book, as either author or editor, is invited to contact me by letter or Email.

Publicity Officer's Report

Rachel Preece
<rprc@chevron.com>

Biostratigraphic notes from a huge continent

As the newly appointed Publicity Officer to the BMS I am taking this opportunity to introduce my self to the micropalaeontological community at large.

Having completed my first geology degree at the University of Wales Aberystwyth in 1994 (after many years of 'discovering

Specialist Group Meetings

Foraminifera Group Meeting

The Foraminifera Group hold a successful Annual Spring Meeting - see the next issue for information regarding the Spring 2001 meeting. For further information contact Norm MacLeod or Mike Kaminski.

Microvertebrate Group Meeting

The next meeting of the Microvertebrate Group will be held in December 2000 in Fife. For further details contact Mark Purnell or Paul Smith.

Nannofossil Group Summer Meeting

Patrick Quinn (Sheffield) is hosting a Group Meeting in Sheffield on Friday 9th June 2000 in the Department of Archaeology & Prehistory. A number of contributions have already been volunteered, including a talk from the Sorby Society. The Saturday will provide an opportunity for those who are interested to join an organised field-trip to the Peak District. For more information contact Ben Walsworth-Bell.

Ostracod Group Autumn Meeting

The Ostracod Group proposes to hold its Autumn Meeting in the Royal Belgian Institute of Natural Sciences in Brussels, hosted by Dr Koen Martens and Dr Isa Shoan. It would

myself' across Africa), I then spent some time playing at palynology under the supervision of Bruce Tocher in the Palynology Research Centre, also at Aberystwyth. As the wet 'n' windy wilds of west Wales took their toll a move to London and UCL in 1995 landed me in the office Mike Kaminski with an assortment of Miocene agglutinating foraminifera and a evolving PhD topic. Three years later, and my research completed, I was fortunate enough to find a post in Chevron UK as a 'lone biostratigrapher', transferring to a slightly sunnier San Ramon, California, just over a year later. California is where I currently reside as the 'American Outpost' of the BMS Committee.

The Publicity Officers role is many fold and largely defined by the BMS members. With the current trend towards the closure of geoscience departments, the dispersion and disposal of national collections, and the industrial 'mega-mergers', the plight of palaeontology is uncertain. Hence the need to raise the profile of micropalaeontology and provide a service to our members. In essence, I am soliciting suggestions from you, the BMS members - what can your society do for you . . . and what can you do for your society?

Please forward any suggestions, ideas, and criticisms to me either by email or at the address below. I am always keen to hear from members of the BMS, and if you find yourselves passing through California on your travels then perhaps we could meet.

Dr Rachel Preece, Chevron Overseas Petroleum Inc, 6001 Bollinger Canyon Road, San Ramon, CA 94583-2324, USA

Webmaster's Report

Ian Boomer

<ian.boomer@ncl.ac.uk>

At present, the evolution of the BMS web site is running smoothly. I would like to remind people to keep me informed about specialist group meetings. I would also appreciate any feedback about the specialist group pages so please take a look at those that are of interest to you and send me updates, meeting reports, photographs etc. - anything that will improve the content of the site. The web site is a resource for the members so will only be as informative as you make it!! Finally, when you use the web page address in any emails, circulars or notices, could you use the format <http://www.bmsoc.org>.

principally be a talks meeting, though some field work could be included if wished. Please let Ian Slipper have your thoughts on this. If you wish to present your recent work to the Ostracod Group, let either Ian Slipper or Mick Frogley know by sending a proposed title for your talk.

Palynology Group Meeting

A Palynology Group discussion meeting is planned for later this year, possibly at the Natural History Museum. Contact Tim Potter for details.

Silicofossil Group Summer Meeting

The Silicofossil Group is holding its annual meeting on the 16th August 2000, at 10.30am, in the Garwood Lecture Theatre, Department of Geological Sciences, South Wing, University College London. The meeting is hosted by Cathy Stickley and John Gregory. Talks are invited on any aspect of siliceous microfossils, and abstracts should be submitted with the registration form (see Silicofossil Group Report) by 1st August 2000.

Obituaries

Jos Bouckaert (1930-1999)

Jos Bouckaert died on December 6th, 1999. He was born in Aalst, Belgium, and started his career working for the Association for the Study of the Geology and Stratigraphy of the Silesian. He graduated as Doctor in Sciences with a dissertation on Namurian goniaticites. In 1959, he joined the Geological Survey of Belgium and he became the Director in 1986. He left in 1993.

During his career, Jos Bouckaert was active in many fields of the Earth Sciences. The first years of activity were mainly devoted to the geology of the upper Mississippian-lower Pennsylvanian around Namur. Then, discovering micropalaeontology, he became one of the pioneers of conodont stratigraphy in Europe. He first published, with Ziegler and Thorez, a memoir on Famennian conodonts (1965). Later, he published another on Namurian conodonts with A. Higgins (1968). During the Golden Sixties, Belgium started a lot of big civil works. During that period, Bouckaert was an applied geologist for the water dams, locks, speedroads etc. that were built in the Belgian Ardennes. At the same time, he produced the Ardennes sheet of the Mineral Deposits Map of France (1964) and, with P. De Bethune, a geological map of Belgium and surrounding countries (1966). Together, with Streeel and Conil, he created team of young geologists who reinvestigated the classical sections from the Paleozoic. They organized the international symposium on micropalaeontological limits from Emsian to Viséan at Namur in 1974. Later, he erected, mainly together with Paproth and Bless, a new team specialized in palaeogeographical reconstructions and which produced a number of theories on the origin of hydrocarbons and the energy resources. When he retired from the Survey, he lived with his wife Nicole at Marche-en-Famenne, where he became an expert on local natural history and history. One of his subjects of interest was the history of the Citadel of Namur, built on the hill where he started studying geology at the beginning of his career. His activity was not restricted to the Geological Survey. In 1973 he became Professor at the Catholic University of Leuven where he taught micropalaeontology and palaeobotany. He has been president of many scientific associations: the National Committee of Geological Sciences, the Geological Society of Belgium, etc. He was one of the founding members, and its first president, of the professional Belgo-Luxembourg Association of Geologists. He obtained many scientific awards, among which the Leopold von Buch Award (1989) from the Deutsche Geologische Gesellschaft and the Prix Baron van Erborn from the Royal Belgian Academy.

Eric Groessens

Geological Survey of Belgium
13, Rue Jenner
B - 1000 BRUSSELS

Forthcoming Meetings

Sixth International Workshop on Agglutinated Foraminifera - Prague, 2001

The Sixth International Workshop on Agglutinated Foraminifera will be held at Charles University in Prague on August 31 - September 7, 2001. The conference will consist of technical sessions and microscope workshops as well as pre-meeting and post-meeting field excursions. The preliminary schedule of the meeting is as follows:

31th August: Arrival and registration

1-2th September: Field trip

3-5th Sept. - Workshop sessions (conference dinner on 4th Sept.)

5th Sept. - Evening departure for field trip B (to Brno)

6-7th Sept. - Field trip B
The workshop will be organised by Miroslav Bubik (Czech Geological Survey), and the Grzybowski Foundation will make available small travel grants for scientists from the former Soviet Block. Further information can be obtained by contacting Miroslav at <bubik@cgu.cz>

International Workshop on North African Biostratigraphy for Petroleum Exploration
The First "North African Biostratigraphy Workshop" will be held at the Department of Geological Sciences, University

Iraida Viktorovna Makarova (1929-2000)

Iraida Makarova was not a member of the BMS but she was a great ambassador for micropalaeontology and I would like to take this opportunity to honour her life with this obituary from Nina Strelnikova and Dick Crawford. A full history of her life and work will appear in a future issue of *Diatom Research*.
Jenny Pike

Professor Iraida V. Makarova was born in Voronezh in 1929 and was a student in the Department of Botany at Leningrad (now St Petersburg) University under Sheshukovia-Poretzkaya. Here she studied Neogene marine and brackish diatoms from the Paratethis sediments near the Black Sea. From 1953 Makarova was a graduate student at the Komarov Botanical Institute in St Petersburg supervised by Proschkina-Lavrenko with a project entitled: "Plankton Diatoms of the Middle and South parts of the Caspian Sea". She received her doctorate here in 1957 and remained in the Komarov Institute until her death. Her Professorship was conferred after her second dissertation: "The genus *Thalassiosira*, morphology, evolution, geography, ecology, systematics" was published in 1979. During her career, Makarova published 180 works on morphology and systematics of marine and freshwater diatoms, all but 10 of them in Russian. Nina Strelnikova and Dick Crawford

Specialist Group News

Foraminifera Group

Spring Meeting 2000

The British Micropalaeontological Society's Foraminifera Group (BMS-FG) Spring Meeting took place on Friday, 5 May 2000 in the Palaeontological Demonstration Room of the Natural History Museum in London. All BMS-FG 2000 abstracts (see below) will also be published on the BMS web site:

<http://www.bmsoc.org> and the Foraminifera Group Meeting 2000 page:

http://www.nhm.ac.uk/hosted_sites/bms/fg00.htm

Students and professionals are always encouraged to attend the BMS-FG meeting to hear presentations of a variety of foraminiferal topics, to renew contacts with old friends, to network with colleagues, to meet new students of foraminifera, and to share in the hospitality of society of Chevron Overseas Petroleum Inc. who kindly agreed to provide support for the meeting. In addition, Dr. John Whittaker kindly offered to lead a meeting field trip on Saturday, 6 May, to the Fleet to collect Recent foraminifera and talk about the changes in the environment of this lagoon during the last 6000 years.

Norm MacLeod

<n.macleod@nhm.ac.uk>

Foraminifera Group Chair

College London on August 21-25, 2000. The workshop will consist of morning lectures on topics relating to the Micropalaeontology and Biostratigraphy of the North African petroleum basins. Afternoon workshop sessions will focus on microfaunas and microfloras from the stratigraphical record. Participants are encouraged to bring specimen slides and/or photographs. Microscopes will be provided at the workshop sessions. Morning sessions are open to all participants, but afternoon workshop sessions are limited to 15 people. Registration for the whole workshop is £700, but discounts apply to those who register for the morning session only. For registration information, contact Mike Kaminski <m.kaminski@ucl.ac.uk> ISO 2001: "Towards the New Ostracodology in the 21st Century" 1-4 August, 2001, 14th International Symposium on Ostracoda, Shizuoka University, Japan The organising committee (Prof. Noriyuki Ikeya, Dr Akira Tsukagoshi, Dr Takahiro Kamiya, Dr Toshiaki Irizuki, Dr Shin-ichi Hiruta, Dr Ryoichi Tabuki, Dr Keiichi Hayashi and Dr Michiko Yajima) are planning two scientific themes:

- 1) Earth environments and dynamics of Ostracoda

This will evaluate the possibility of Ostracoda as practical applications for long and short term environmental changes

Meeting Abstracts

The Former British Petroleum Collection at the Natural History Museum

HENDERSON, A. S. and MILLRT, G. M, Department of Palaeontology, The Natural History Museum, Cromwell Road, London SW7 5BD.

In the early 1990's the Natural History Museum received an important micropalaeontological collection from British Petroleum. This represents BP's working collection which was in use from the 1950's through to the late 1970's. The collection fell into disuse and was donated to the Museum, where it was subject to extensive curation and cataloguing.

The collection consists of three main components: the Reference Collection; the Palynology/ Nannoplankton collection and the Well Run collection. The latter is perhaps the largest and consists of around 100, 000 slides. It comprises many palynological and micropalaeont-ological residues along with actual picked slides and assemblage slides. The palynology/nannofossil components consists also of around 100,000 slides and residues. Perhaps the most important aspect of the collection is the reference collection. Consisting of around 60, 000 slides of foraminifera and ostracods it represents BP's type and reference collection.

The collection represents many years of world-wide collecting and research at BP and as such contains an unprecedented wealth of micropalaeontological information.

Key aspects of the collection will be discussed, highlighting important material and plans for its future development as an excellent resource for academic and industrial micropalaeont-ologists.

Palaeoenvironmental Reconstruction of the Late Quaternary Mekong-Molengraaff River Deltas on the Sunda Shelf, South China Sea

SHARMA, C., Department of Earth Sciences, Dalhousie University, Halifax, N.S., B3H 3J5, Canada <csharma@is2.dal.ca>

The Sunda and Vietnamese Shelf areas, the largest on earth, in the South China Sea, formed a coastal delta plain during the Late Pleistocene sea level lowstand with river systems such as the Mekong and the paleo-Molengraaff forming huge delta complexes along the southwestern margin of the South China Sea. During the post-glacial global sea level rise, this delta system and the entire Shelf area was flooded. A paleoclimatic reconstruction of the area is being done, using benthic foraminifera as proxies of the paleoenvironment, in combination with Parasound seismics, AMS radio-carbon dating, and sedimentary facies analysis. Two oceanographic cruises in the South China Sea (SONNE-115, 140) enabled collection of sediment cores from a wide range of environments spanning the paleo-delta system, out of which about 50 sediment-cores have been selected for this study.

caused by geological events and human activities.

2) Evolution and Diversity of Ostracoda

This will focus on the latest developments in phylogeny, origin and relationships to other crustaceans and on the descriptions and theories on taxonomy, ontogeny and ecology of Ostracoda.

Scientific contributions may be made as either papers or posters, those wishing to present papers must submit an abstract on or before December 10th 2000.

Keynote speakers will be invited from the fields of

geochemistry, micropalaeontology and crustacean research. The contributions will be edited and published in international journals of geological and biological sciences.

Six field excursions are planned:

A Paleozoic of China

B Mesozoic freshwater

Ostracoda in Korea

C Recent and Pleistocene subtropical Ostracoda in Okinawa, Japan

D Recent and Pleistocene temperate/boreal Ostracoda in Hokuriku (Japan Sea Coast)

E Miocene subtropical/temperate Ostracoda in Tochigi Prefecture (Central Japan)

F Boreal marine and freshwater Ostracoda in Hokkaido, Japan

The official language will be English. Suggestions for workshops will be most welcome. A cultural/sightseeing programme for accompanying persons is

Micropaleontological results produced so far show interesting qualitative and quantitative changes in benthic faunal assemblages down-core. These results coincide well with the sedimentary facies classification, and the paleo-events tie in well with the C-14 dates. Based on these, a sea-level history for the area is proposed.

Benthic foraminiferal faunas in surface sediments off NW Africa; relationship with the organic flux to the ocean floor
MORIGI, C., Istituto di Scienze del Mare, Università di Ancona, Via Breccia Bianche, 60131 Ancona, Italia, <c.morigi@popcsi.unian.it>; JORISSEN, F.J., GUICHARD, S., GERVAIS, A., Department of Geology and Oceanography, Bordeaux I University, UMR 50-08 CNRS, 33400 Talence Cedex, France.

Benthic foraminiferal thanatocoenoses have been studied in 29 sediment surface samples in the upwelling system off Cap Blanc (Mauritania). The results have been compared with estimated values of the downward organic flux and measured bottom water oxygen concentrations. Although in the study area the latter 2 parameters show a strong negative correlation, we argue that the organic flux is the main controlling ecological factor. The R-mode statistical analysis pointed 6 clusters, which are separated geographically by differences in organic flux and water depth. The sample scores on the first 2 principal component axes show a strong positive correlation with the estimated downward organic flux ($r^2=0.83$). Important faunal boundaries coincide with organic flux levels of 2-3 and 6-8 g C/m²/year. This flux dependency is best seen in many of the infaunal taxa.

Conversely, some highly opportunistic epifaunal elements, seem to respond to fresh phytodetritus periodical availability, and are less dependent of a specific annual flux level. We suggest that this relationship can be used on a local scale as a proxy for paleo-export production, provided that bottom water oxygenation do not fall below a critical level.

Keywords: benthic foraminifera; organic flux; upwelling; recent; NW Africa.

Benthic Foraminifer as Bottom-Water Oxygenation Indicators: A Re-Assessment of Species Boundary Conditions in the Northeastern Atlantic

SCHOENFELD, J., Geomar Research Center for Marine Geosciences, Wischhofstr. 1-3, D-24148 Kiel, Germany, <jschoenfeld@geomar.de>

Dissolved oxygen and food availability are the dominant factors in controlling the abundance and distribution of benthic organisms. Both factors are linked in a way that an increase in organic carbon flux leads to a decrease in dissolved oxygen in near-bottom waters. Several foraminiferal species were attributed to low-oxygen conditions by their deep endobenthic microhabitat preferences. The relation of deep endobenthic and shallow endobenthic to epibenthic species has been established as Benthic Foraminiferal Oxygen Index (BFOI) and is calibrated

also being arranged. Accommodation will be variously in a private high school dormitory near Shizuoka University and hotels in Shizuoka City.

Key Dates

September 2000 - Second circular

December 10 2000 - abstract deadline

March 2001 - registration deadline

May 2001 - third circular to those registered

To register your interest in attending this meeting please reply giving your name, address, phone/fax and e-mail to the following as soon as possible: By post: ISO2001, Department of Biology and Geosciences, Shizuoka University, Oya 836, Shizuoka 422-8529, Japan. By Fax: Japan (+81)542380491 E-mail: <iso2001@se-geomail.sci.shizuoka.ac.jp>

Progressive Palaeontology

Watch this space for news of Progressive Palaeontology 2001!!

Forams 2002:

International Symposium on Foraminifera

The purpose of this announcement is to provide you with information on initial planning for the symposium. We welcome comments about the plan and any innovations that you think we should attempt, and invite you to fill out the questionnaire and return it to us. Please alert other foram workers in your area. The symposium

to ambient oxygen concentrations. Low-oxygen species are abundant close to the sediment surface in areas with high flux rates of particulate organic matter (POM) where the bottom water is well oxygenated however. Oxygen estimates by the BFOI proxy bear therefore a considerable uncertainty at high oxygen levels. To improve the applicability for palaeoceanographic studies, the suite of key species indicating oxic, suboxic, and dysoxic environments is reassessed. The depth distribution of living benthic foraminifers is analyzed in near-surface sediments from the northeastern Atlantic and compared with in situ oxygen measurements, chloroplastic pigment concentrations (CPE) as indicator of fresh food resources, and the organic carbon flux derived from maps of primary productivity. It appears that several species previously regarded as oxic or suboxic indicators may tolerate a wider range of oxygen concentrations. The depth distribution limits of many endobenthic species coincide with the high-oxic, low-oxic and suboxic boundary values in pore-water oxygen however. Dysoxic indicators show strong abundance variations between sites with a very similar POM flux. They may even be absent at their usual microhabitat depth where nutrient resources not come up to certain threshold values as indicated by CPE concentrations. This suggests that oxic, suboxic, and dysoxic indicator species need to be redefined with reference to their ecological requirements in order to achieve more reliable estimates of ancient bottom-water oxygenation. Keywords: Benthic taxa, foraminifers, oxygen, paleoceanography.

Pleistocene and Holocene Benthonic Foraminifera from the British Isles

JONES, R. W., BP/AMOCO, Sunbury-on-Thames, Middlesex TW16 7LN; WHITTAKER, J. E., Dept. of Palaeontology, The Natural History Museum, Cromwell Road, London SW7 5BD; AUSTIN, W. E. N., School of Geography and Geosciences, University of St. Andrews, Fife, KY16 9ST

The authors are in the process of preparing a Palaeontographical Society monograph of the benthonic foraminifera of the British Isles.

The aims of this work are: to describe and illustrate all of the key species of benthonic foraminifera (in practice, all of the more commonly recorded or otherwise - particularly palaeoenvironmentally or stratigraphically-significant species for which material was available) from the Pleistocene and (sub-Recent) Holocene of the British Isles and surrounding coastal waters; to document their distributions in Pleistocene and (sub-Recent) Holocene sediments of the British Isles and adjacent areas, wherever possible with reference to established oxygen isotope stage stratigraphy and/or lithostratigraphy (Bowen, 1999); and to document their bathymetric and biogeographic distributions in Recent sediments of the British Isles and adjacent areas; with a view to enhancing their utility in stratigraphic subdivision and correlation and palaeoenvironmental interpretation.

is being co-ordinated by David Haig and Stefan Revets of the Department of Geology & Geophysics at the University of Western Australia [see details of the host department at <http://www.geol.uwa.edu.au/~biostrat/>]

Timing of Symposium:

Monday 4 February to Friday 8 February, 2002.

Venue: The Nedlands campus of the University of Western Australia, Perth.

Main components of Symposium:

Oral Presentations: We propose to schedule talks on Monday, Tuesday, Thursday, and Friday of the conference week. The talks will include plenary sessions with each talk of 45 minutes duration, and a number of thematic sessions with talks each of 20 minutes duration. An "editorial board" will be set up to advise on which "keynote" talks should be included in the plenary sessions. The lecture venues will have light and computer projection facilities. We will award "best paper" prizes in each session of the conference.

Poster Presentations:

Posters will be invited. We will schedule times free of oral presentations when authors can be present to discuss their posters.

Microfossil viewing and exchange: A laboratory with stereomicroscopes will be set up to allow participants to view and exchange foraminiferal material during the conference. Sediment residues from Western Australian

To date, we have produced a provisional stratigraphic range chart, a provisional environmental distribution chart, and provisional palaeogeographic maps for selected time-slices, annotated with palaeoenvironmental interpretations. Examples of these provisional products will be presented. Future work will focus on verifying species identifications - by reference to type material - and hence stratigraphic and environmental ranges and implications.

Distribution of Rose Bengal Stained Benthic Foraminifera Within the Indo-Pakistan Oxygen Minimum Zone, Northern Arabian Sea

MAAS, M., Institut fuer Geowissenschaften, Christian-Albrechts-Universitaet Kiel, Ludewig-Meyn-Str. 16, D-24098 Kiel, Germany <mma@gpi.uni-kiel.de>

The Indo-Pakistan continental margin, northern Arabian Sea, represents an extreme habitat for benthic foraminifera. High fluxes of organic matter offer on the one hand a high food supply and on the other hand lead to severe oxygen depletion as an intensified oxygen minimum zone (OMZ) develops from the base of the euphotic zone to water depths over 1000 m. Rose Bengal stained benthic foraminifera from the uppermost, the central, and the deeper part of the OMZ were counted and analyzed down to a depth of 10 cm. The ecologic structures of foraminiferal assemblages are characterized by high abundances at the sediment surface and a rapid decrease within the uppermost 2 cm of the sediment column. Maximum surface abundances, a high dominance by few species (especially *Globobulimina affinis*), and a low diversity in the central part of the OMZ result from specific physiological and morphological adaptations to almost anoxic conditions. The upper and lower margins of the OMZ are characterized by higher diversities and lower abundances. The shallowest part is dominated by calcareous foraminifera such as *Cancris auriculus* and *Bolivina dilatata*. The most common taxa in the deeper part of the OMZ are arenaceous taxa such as *Recurvoides aff. laevigatum* and *Ammodiscus cretaceus*. These findings are in agreement with the results of other recent works and, thus, reflect characteristic ecologic features of eutrophic, oxygen-poor habitats. Comparisons with previous works also show that the ecosystem of the uppermost part of the OMZ is influenced by monsoon driven seasonal oscillations controlling food supply and/or the availability of oxygen. In all cores, stained benthic foraminifera occurred down to the base of the sampled interval. This can be seen as a strong indication that oxygen is not a limiting factor for some taxa. It seems more likely that the distribution pattern of benthic foraminifera is preferentially controlled by trophic conditions.

Campanian to Palaeogene Biostratigraphy and Palaeoenvironments in the Foula Sub-basin, West of the Shetland Islands, UK

VAN DEN AKKER, D., Postgraduate Unit of

formations will be available for examination.

Mid-conference field day:

We plan to take Wednesday off from the normal conference business in order to catch some forams on Rottneest Island near Perth. The day will include a mixture of sight-seeing, aspects of local geology, and swimming among seagrass and corals and rock platforms in crystal clear waters floored by white carbonate sand. Forams will be everywhere so bring your bathers and join the fun!

Pre- and Post- Conference Field Excursions:

Depending on demand, excursions in Western Australia may be offered to Ningaloo Reef and the adjacent Carnarvon Basin (Cretaceous, Paleogene, Neogene); the Geraldton to Shark Bay area in Western Australia (looking at modern environments and Ordovician, Permian, Jurassic, Cretaceous, Paleogene, Neogene deposits); and to estuaries and saline lakes south of Perth to Albany (modern environments; Pleistocene and Eocene). It may also be possible to run excursions to other parts of Australia and the adjacent region (e.g. New Guinea). But remember it will be summer and hot!

Social Program: A cocktail party, barbecue, and dinner will be scheduled during conference week. Time will be available for you to explore the night-life of Perth and Fremantle. Nedlands is situated half-

Micropalaeontology, Department of Geological Sciences, University College London, Gower Street, London, WC1E 6BT <t.akkerr@ucl.ac.uk>

The Foula Sub-basin is part of the Faeroe Basin, which is located on the North Atlantic margin, west of the Shetland Islands. From the Foula Sub-basin ditch cuttings of 4 wells were processed for microfaunal analysis. The samples (> 125 m) contain abundant and diverse agglutinated foraminifera, calcareous benthic and planktonic foraminifera, diatoms and radiolarians. Based on the succession of shelly microfossils, stratigraphically distinct Campanian to Palaeocene assemblages are described.

Despite some local differences, the biostratigraphy of the Foula Sub-basin compares well with the biostratigraphy of the Western Tethys and northern North Sea, and is therefore an important link between the southern and northern areas of the North Atlantic margin.

The composition of the foraminiferal assemblages indicates that deposition of Campanian and Maastrichtian mudstones took place in a well oxygenated, deep marine environment with influxes of North Atlantic surface water masses. Analysis of agglutinating benthic foraminiferal morphogroups indicates a shallowing of the basin over a widespread lower Palaeocene unconformity.

Keywords: Foula Sub-basin, Campanian to Palaeocene biostratigraphy, morphogroups, palaeobathymetry, palaeoenvironments.

Jurassic Planktonic Foraminiferida from Dorset, England: Initial Report

OXFORD, M. J., & HART, M. B., University of Plymouth, Department of Geological Sciences, Drake Circus, Plymouth, PL4 8AA

Jurassic planktonic foraminifera have been discovered in the Oxfordian strata of Dorset. The foraminifera are poorly preserved, occasionally pyritized and are rare; i.e. less than 1% of the total assemblages. Their size is generally less than 200 microns, with the average being 125 microns in diameter.

Adhering to some of the specimens are coccoliths that have been confirmed as *Watznaueria*, probably *W. fossacinta* of mid-Jurassic to late-Cretaceous age, and establishing beyond doubt that the planktonic taxa are in situ.

There are 3(?) genera of planktonic foraminifera represented; *Globuligerina oxfordiana* (Grigelis 1958), *Haeuslerina helvetojurassica* (Haeusler 1881) and *Compactogerina stellapolaris* (Grigelis 1977). Associated with the planktonic species is a high diversity, benthonic assemblage which includes *Epistomina*, *Lenticulina*, *Lingulina*, *Dentalina*, *Fronicularia*, *Citharina*, *Planularia*, *Textularia*, *Trochammina*.

The fauna is preserved in the dark muds of the Furzedown Clays of the Oxfordian and associated with a macrofauna that includes the giant oyster *Gryphea dilatata*.

The benthonic fauna associated with the planktonic taxa appears

way between central Perth and the port city of Fremantle. Depending on demand, an “accompanying guest program” will be arranged.

Accommodation:

Inexpensive accommodation is being arranged at residential colleges on the University Campus. A variety of rooms will be available (single, twin-share, airconditioned or with fans, on-suite facilities or facilities shared by a small number of rooms). If you would rather stay in hotel accommodation (e.g. in Perth City or in Fremantle), we will provide you with contact addresses. Registration fees and other costs

We realise that airfares to Perth from overseas are expensive. Therefore we will attempt to keep the conference registration fee as low as possible. Our hope is that it will be less than the advanced registration fee for the 1998 Monterrey conference. At present one Australian dollar = 0.65 cents US. Pre- and post-conference excursions will be expensive and will probably cost (for travel and accommodation) in the order of \$1500-3000 (Australian dollars) for 5-7 day excursions. In Perth, university college accommodation will probably cost Aust.\$40-\$70 per night for bed and breakfast depending on type of room. Single room accommodation at city hotels in Perth will probably cost about Aust.\$150-\$300

to be characteristic of maximum flooding events at other levels in the Oxfordian succession. The stratigraphic level at which the planktonic assemblage has been found is characterised by a major expansion of “boreal” ammonite faunas into southern Europe.

Keywords: Planktonic foraminifera, Oxfordian, Dorset.

Microvertebrate Group

The Microvertebrate Group held its annual get-together at the Hark to Bounty, Slaidburn, in mid-December. Talks were presented by Mark Purnell and Phil Donoghue together with several by Howard Armstrong. The atmosphere in this 14th century inn (and, until the 1930s, local court) was very congenial to debate, and much debate was engendered. The talks were succeeded on the following day by an excursion to the Carboniferous of the Craven Basin in beautifully crisp, sunny conditions. Our thanks are extended to Alistair Bowden for organising the field day. Next year’s meeting will be to the Fife area, again in December immediately before the Pal Ass Annual Meeting, and will include a visit to the hallowed ground of the Granton Shrimp Bed.

Paul Smith

<m.p.smith@bham.ac.uk>

Microvertebrate Group Secretary

Nannofossil Group

I have recently taken over as Secretary of the Nannofossil Group from Matt Hampton, and, as such, would like to thank Matt on behalf of the group for his input over the last 3 years. Jeremy Young is staying on as Chairman.

One of my first tasks has been to ensure that the mailing list is comprehensive. If there is anyone out there who is not receiving Group e-mails and would like to do so, please get in touch. In particular this applies to those not on e-mail who require circulars to be delivered as hard copy.

In January a number of Group members joined a Thames riverboat party in the wake of the CODENET (EU coccolithophore research project) meeting in London. This provided a good chance to catch up with international colleagues, and to hear about the interesting results emerging from CODENET.

As mentioned in the last Newsletter, Patrick Quinn (Sheffield) some time ago suggested hosting a Group Meeting in Sheffield. A date for this meeting has now been set: Friday 9 June 2000. The venue will be the Department of Archaeology & Prehistory (reflecting one of Pat’s interests in nannofossil applications). A number of contributions have already been volunteered, including a talk from the Sorby Society (Henry Clifton Sorby was one of Sheffield’s greatest scientists, and a pioneer in the recognition of coccoliths as biogenic in origin). The Saturday

per night. The professional conference-organization group within the administration of our University (UWA Extension) is helping us organize registration and other logistics. Accommodation will be coordinated by St George's College.

Communication

We have a web site:

<http://www.geol.uwa.edu.au/forams/> On this site, we

provide preliminary information about the symposium and links to other web sites. Sneak a look at some of our beaches, catch a glimpse of the Swan River, tour Rottneest Island and see where our mid-conference field session will be held, look at Shark Bay, roam the outback, visit other states, and register your interest in the conference. The web site will be regularly

updated as we approach 2002. We have a dedicated email address

(forams@geol.uwa.edu.au).

Depending on your preference, we will

communicate with you either via post or email. We plan to produce the First Circular for distribution early in 2000.

Our proposed timetable is as follows: The Initial Circular with call for papers will be emailed to you early in November 2000, with return date by March 31 2001. Abstracts are to be submitted by October 31 2001. Registration will be called for in July 2001, with "early" registration closing on October 31, 2001.

will provide an opportunity for those who are interested to join an organised field-trip to the Peak District.

It is also time to start thinking of another Group Field-trip. The last (Ypresian of Belgium, Summer 1998) was a great success. I am currently canvassing for ideas regarding an excursion this Summer.

Finally, many Group members will already be starting to arrange their attendance at the International Nannoplankton Association Conference (INA8), taking place in Bremen (Germany) this September. Looks like another busy year in the world of nannos...

Ben Walsworth-Bell

<b.walsworth-bell@ucl.ac.uk>

Nannofossil Group Secretary

Ostracod Group

Ostracod Group Officers

The Ostracod Group wishes to give a vote of thanks to Matt Wakefield who has served as Chair of the group since 1996. He wishes to stand down due to pressure of work, and we thank him for all his hard work in keeping the Ostracod Group active in recent years, particularly the part he has played in bringing the Stratigraphical Atlas project back to life.

Ian Slipper, the current Secretary of the Group, is moving to the vacant position of Chair. I would like to thank Mick Frogley, of the Godwin Institute for Quaternary Research in the Department of Zoology at the University of Cambridge, for responding to the call and agreeing to take over as Secretary - welcome to the BMS Committee.

Spring Meeting

By the time the Newsletter is published the Ostracod Group will have had its Spring meeting in the English Lake District, which took place over the weekend of 31st March to 2nd April. I hope you enjoyed it! Watch out for a meeting report elsewhere in this Newsletter.

News of British Ostracod Workers

We would like to congratulate David C. Horne, who has recently successfully been examined by viva for his PhD. Dave's PhD title was "The Biostratigraphy and Palaeolimnology of Lateglacial and Holocene lake marls at Quidenham Mere, Norfolk". His Abstract has been included below.

David J. Horne is about to become a Scientific Associate at the Natural History Museum in the Palaeontology Department, as part of a one year Sabbatical.

Robin Smith now holds a Royal Society award (2000-2004) to study ostracod phylogeny with Takahiro Kamiya in Japan for 2 years, followed by 2 years with David Horne at the University of Greenwich.

Ian J. Slipper

<I.J.Slipper@gre.ac.uk>

Ostracod Group Chair

ESCAPE TO PERTH IN 2002 And bring your swimming gear, snorkel and mask. To assist us in planning the symposium, please fill in the following details and return as soon as possible. EITHER post this information to: FORAMS 2002, DEPARTMENT OF GEOLOGY & GEOPHYSICS, THE UNIVERSITY OF WESTERN AUSTRALIA, NEDLANDS 6907, AUSTRALIA or email the information to us at: forams@geol.uwa.edu.au

Your name:

Your address:

Your email address:

Do you prefer to correspond by letter or by email (cross-out what does not apply)

In what general areas you would like to contribute a talk(s) at the symposium?

Would you like to contribute a poster? Would you consider going on a pre- or post-conference field excursion? What would you most like to see?

If a partner or friend is likely to accompany you to Perth, would these people be interested in an organized "accompanying guest program", or would they rather plan their Perth adventure upon arrival here.

Please make any other suggestions that you think would make Perth a great conference

Early Palaeozoic
Palaeogeographies and
Biogeographies of Western
Europe and North Africa
Paléogéographies et

Biostratigraphy and Palaeolimnology of Late-glacial and Holocene Lake Marls at Quidenham Mere, Norfolk
David C. Horne
University of Cambridge,
DPhil

In southern Britain there are relatively few natural lakes that have records extending back to the beginning of the Late-glacial. The exceptions are the Meres of central East Anglia that are infilled with organic sediments, providing detailed vegetational records. Of these, Quidenham Mere is unique because its sedimentary infill is composed largely of lake marls. These contain abundant molluscs and ostracods, as well as beautifully preserved pollen, covering most of the Late-glacial and Holocene.

At Quidenham Mere, substantial thicknesses of sediment (c. 12 m) have accumulated relatively rapidly (at times 0.8 cm yr^{-1}), which has enabled detailed palaeoenvironmental reconstructions. The history of the Mere has been reconstructed using a range of fossils, including molluscs, ostracods, pollen and Chara remains. A multiple profile approach utilising three cores, one from the centre and two from the lake margin, has allowed a more comprehensive reconstruction than if a single profile had been used on its own. This approach was adopted because although Central cores are likely to yield continuous sedimentary records, they will not necessarily reflect the lake-level fluctuations that can be so obvious in marginal sequences, where the frequency of shells is invariably higher. The use of geochemical proxies (e.g. stable isotopes and trace elements) of ostracod, mollusc and bulk carbonates have also contributed to a more meaningful understanding of the palaeolimnology of the Mere. The poor correlation ($r < 0.7$) between the ^{18}O and ^{13}C values indicate that the Mere has been hydrologically open throughout its history.

Obtaining a chronology from the lake sediments at Quidenham Mere has proved to be extremely difficult because of their calcareous nature, which renders them unsuitable for radiocarbon dating. In an attempt to provide a chronology, a variety of methods including radiocarbon, U-series (TIMS) and ^{210}Pb dating have been utilised with varying success. U-series (TIMS) dating of the marls themselves proved problematic because of contamination by detrital thorium. Few terrestrial plant macrofossils could be recovered for radiocarbon dating so the age model has relied largely on ages inferred from pollen stratigraphy. However, dating the Marginal cores on the basis of the pollen stratigraphy was not straightforward, because of the surprising difficulty in correlating the Central and Marginal sequences.

The preservation of fossils in the lake sediments was remarkable. Remains of soft-tissues, including Zenker's organs

Biogéographies de l'Europe de l'Ouest et de l'Afrique du Nord au Paléozoïque inférieur

First Circular

After a successful meeting on the topic

Palaeozoic

Palaeogeography and

Palaeobiogeography of

Western Europe, held at

Lille in 1992, the

Laboratory of

Palaeontology of Lille

invites you to participate

and contribute to a

conference on early

Palaeozoic Palaeogeography

which will take place at

Lille in September 2001. A

pre-conference field trip to

visit the Lower Palaeozoic

of Belgium and a post-

conference field-trip to the

southern Montagne Noire

(Languedoc, southern

France) will be organized.

The conference topics are

designed to address various

subjects related to the

Lower Palaeozoic

palaeogeography and

palaeobiogeography of

Western Europe and North

Africa, and include:

1-The geodynamic and tectonostratigraphic framework of Western Europe and North Africa during early Palaeozoic times.

2-Relationships between the northwestern Gondwana margin, Baltica and related terranes (Ossa-Morena, Armorica, Perunica, Avalonia, etc.).

3-Palaeomagnetic versus palaeobiogeographical data.

and the hemipenis, survived in no fewer than 70 specimens of ostracod (belonging to five species). The ramus of a furca, an important taxonomic character preserved in one specimen allowed attribution to *Pseudocandona marchica*. The remains of spermatozoa in a specimen of *Candonopsis kingsleii* represents the first discovery of sperms in the entire fossil record.

A number of proxies from the three profiles have each provided valuable information concerning the trophic status of the lake, together with the response of lake-level to climate change. The basal sediments consist of substantial thicknesses of chalk slopewash deposits that accumulated in shallow pools during the early part of the Late-glacial. The presence of a soil across the basin reflects a cessation in slope movement and a stabilisation in the climate during the Allerød phase of the Late-glacial Interstadial. This soil contains land snails, such as *Punctum pygmaeum* and *Vertigo geyeri*, whilst a fragment of wood has yielded a date of $11,385 \pm 75$ yr B.P. The Younger Dryas has been difficult to distinguish palynologically but can be defined by the marked decline in values of ^{18}O . The environment during this interval was characterised by a small, possibly ephemeral water-body supporting species such as *Pisidium obtusale*. In the early to mid Holocene, between 10,000 and 5000 yr B.P., faunal evidence suggests that the water-depth fluctuated markedly, showing two main transgressions in lake-level, first in the early half of the *Corylus-Quercus-Ulmus* zone and the second shortly before the elm decline. After the elm decline (5000 yr B.P.) there was a regression in lake-level and a shift in the trophic status of the lake to a more nutrient rich state. Anthropogenically-induced disturbance (from 5000 yr B.P.) resulted in increased runoff from the catchment that may have directly controlled the carbon pool of the Mere and ultimately the ^{13}C of the microfossils. Throughout the Anglo-Saxon and Medieval periods, Quidenham Mere was used for retting hemp, an activity that appears to have caused severe depletions in the aquatic invertebrates.

The significance of the Quidenham sequence is discussed with respect to other important records that span this interval, including those from Hockham and Diss Mere, together with other sites across Europe. The lake-level variations, reconstructed from Quidenham Mere, appear synchronous with events seen in several other European lakes, suggesting a common climatic control.

Palynology Group

There is woefully little to report. Activity of the Group is at a low ebb, but we are certain this in no way reflects the activity of individual members. Changes in the Group's officers and a severe work/commitment overload for our Secretary (including yet another Company relocation) has somewhat paralysed the organisation. We are doing our best to rectify the situation and

4-Biostratigraphic improvements of the Proterozoic-Cambrian transition and the Lower Palaeozoic (Cambrian to Silurian).

5-Lower Palaeozoic geochemical anomalies and palaeoclimatology.

6-Palaeogeographical controls on biodiversity patterns.

7-Volcanoclastic events and geochronological framework.

8-Evolutionary trends in early Palaeozoic ecosystems.

9-Event stratigraphy and radiation/extinction turnovers.

10-Sea-level changes, cyclicity and palaeoenvironments.

The organizers welcome additional topics that participants wish to have included.

Dates and places:

Conference: Université des Sciences et Technologies de Lille, Villeneuve d'Ascq; September 24-26, 2001 [Organisers: José Javier

ALVARO & Thomas SERVAIS (Villeneuve d'Ascq)]

Pre-conference excursion:

Lower Palaeozoic of Belgium (Brabant, Condruz): September 22-23, 2001 [Organisers: Alain HERBOSCH (Brussels) & Jacques VERNIERS (Ghent)]

Post-conference excursion:

Lower Palaeozoic of the southern Montagne Noire: September 27-29, 2001 [Organiser: Daniel VIZCAINO (Carcassonne)]

your help is requested to speed this process up. Any ideas from the membership would be gratefully received. What sort of meetings would you see as useful? Where should they be held (London, Aberdeen, elsewhere)? any other suggestions? Please let either of us know your thoughts. Sandy Smith (Secretary) works as a stratigrapher for Shell in Aberdeen and can be contacted at <sandy.smith@expro.shell.co.uk> or <sandyw@clara.net>. Tim Potter (Chairman) recently 'retired' from Shell and is currently pursuing his hobby, Cambrian palynology, at the Natural History Museum in London and can be contacted at <timlyallpotter@hotmail.com>. We look forward to hearing your views and revitalising the Group.

Sandy Smith

Tim Potter

Silicofossil Group

After its inaugural meeting in Bath last year, we have decided to hold the next Silicofossil Group meeting at University College London on the 18th August, 2000. Catherine Stickeley will be the local organiser, but if you are interested in offering a talk, please let John Gregory know and see the meeting form under Specialist Group Meetings for details (John Gregory, Kronos Consultants, 33 Royston Road, St Albans, Hertfordshire, AL1 5NF; email john@jgregory.demon.co.uk). The BMS Newsletter can also be a forum for letting its members know what is going on in the Silicofossil world. So if you have any news of ongoing research projects, or are PhD students who are submitting, or have news of meetings, then this is the place to do it, just let either myself or Jenny Pike know. Additionally, as silicofossil research appears to be quite disparate within the UK, we would like to gather intelligence of ongoing projects and disseminate the results of this survey within the BMS Newsletter. If you are currently engaged in silicofossil research, why not let us know? The first of these articles come from Micha Bayer on behalf of the ADIAC group.

John Gregory

<john@jgregory.demon.co.uk>

Silicofossil Group Secretary

ADIAC (Automatic Diatom Identification and Classification)

The ADIAC project is a large collaboration funded by the European Union, involving diatomists and pattern recognition experts from seven institutions in six European countries. ADIAC aims at automating the whole process of analysing diatom slides, by providing automated scanning technology which will locate diatoms on slides and take images of these; specimens will then be identified to species level and beyond by the identification software.

Kimmeridge Clay RGGE Cores Available for Sampling

The Natural Environment Research Council's Rapid Global Geological Events (RGGE) special topic "Anatomy of a Source Rock" is now in its penultimate year. The project is based on core material recovered from three boreholes drilled in the type area, at Swanworth Quarry (SY 9675 7823) and at Metherhills (SY 9112 7911). We would like to advertise the availability of the cores' sample half, stored at the Southampton Oceanographic Centre. These part cores will not be archived, and before they are disposed of they will be available for a limited period to anyone interested in taking samples - probably until the end of 2000. In time, the completion of an enlarged core store at the British Geological Survey will ease access to the archive half.

Together, the cores represent a section throughout the Kimmeridge Clay Formation, and have allowed a variety of analytical methods to be applied at high resolution to the full thickness of the formation. Research on the cores to date has resulted in various analytical datasets including magnetic susceptibility, carbon isotope, trace element, wt% TOC, wt% carbonate, palynology and palynofacies. The project's web-site offers some background to the study: <http://www.earth.ox.ac.uk/~rgge/>. Detailed graphic logs have been recorded, and the cores are correlated with the type section exposed between Kimmeridge Bay and Chapman's Pool. The cores might be of particular interest to biostratigraphers, as ammonite remains are abundant in certain sections.

Interested parties should contact John Marshall, University of Southampton (John.E.Marshall@soc.soton.ac.uk) or Helen Morgans Bell, University of Oxford (Helen.Morgans-Bell@earth.ox.ac.uk).

Conference proceedings:
Bulletin de la Société
Géologique de France
Field-Trip Guide-books:
Annales de la Société
Géologique du Nord

Important Dates:

May 2000: First circular
October 2000: Second
circular - Call for papers
May 2001: Deadline for
Abstracts and registration
July 2001: Third circular -
Programme and final
arrangements

Please send

correspondence to:

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Please send these details

before October 1st, 2000

to:

José Javier Alvaro or

Thomas Servais

Name, Address, Phone, Fax,

E-mail

I am interested in

attending the meeting on

Lower Palaeozoic

Palaeogeography, and I will:

definitely plan to attend

yes/no

probably plan to attend

yes/no

The project is now nearing the end of its second year, and the first prototype of the identification software has just been completed. The first test results are encouraging and show that even a system using only established pattern recognition methods (which is just one of our approaches) is capable of achieving high identification rates if sufficient numbers of specimens are included in the training dataset for the system. At present, however, the work is limited to clean, unbroken diatoms in valve view, and automated analysis of "real world" diatom samples involving fragmented valves, a variety of valve orientations and dirty backgrounds is still a vision for the future.

Detailed information about ADIAC can be found on our main project website at <http://www.ualg.pt/adiac/>

As part of this project, we are establishing large libraries of high resolution diatom images, the first 2,000 of which have now been made available for public use. All our original images are downloadable as TIF files, primarily to interest other pattern recognition experts in the problem, but anyone is free to use the images providing that use is non-commercial and that ADIAC is acknowledged fully. Information about downloading can be found in the ADIAC public data web pages (<http://www.ualg.pt/adiac/pubdat/pubdat.html>).

The images are also available in a browsable/searchable WWW database, hosted by the Royal Botanic Garden Edinburgh at <http://www.rbge.org.uk/ADIAC/db/adiacdb.htm>. The database also contains some ecological information (compiled by Steve Juggins' group at University of Newcastle) and synonyms, and users will be able to retrieve taxa regardless of which names they are using. Please feel free to provide us with feedback on any issues you have regarding this database. Mistakes do occur to due to the volume of data, and we do not claim that the taxonomy is perfect. Even 'experts' are novices outside their own favourite genera. So, any suggestions for corrections will be gratefully received (contact details are available through the websites).

Micha Bayer

Royal Botanic Garden Edinburgh

Conference Reports

Lyell Symposium and Lecture 2000

The Lyell Symposium 2000 entitled "Plankton Evolution and Climate Change" took place as part of the Geoscience 2000 Conference at the University of Manchester on Tuesday 18th April. The series of invited presentations provided an excellent summation of the state of our knowledge of plankton evolution (reasonably well documented) and its relationship to climate change (very poorly understood).

I plan to present (or co-author) Talk(s)/ Poster(s) about:

I am interested in attending the
+ Pre-conference excursion to the Lower Palaeozoic of Belgium (September 22-23, 2001)

yes/no

+ Post-conference excursion to the Lower Palaeozoic of the Montagne Noire (September 27-29, 2001)

yes/no

Sue Rigby (Edinburgh University) started the symposium rolling with a stimulating talk on 'Palaeozoic plankton and climate change'. She posed four questions: 1) How does atmospheric climate affect ocean climate? 2) How to define ocean climate? 3) How do changes in ocean climate affect climate? 4) How do we demonstrate cause and effect? Drawing on examples from the graptolites, Sue identified three scales of investigation: 1) Ice-house/greenhouse scale. 2) Milankovitch scale (e.g. graptolite changes in the first part of the Silurian). 3) Local ecological scale. Because graptolites were mainly tropical in nature, their distribution does not reflect clear evidence for glacial retreats and advances - sea-level falls are not enough to account for species diversity (although at the end Ordovician glaciation there is evidence for a drop in diversity at the onset of glaciation, and a quick recovery afterwards).

Andy Gale (Greenwich University) then followed with a consideration of the functional morphology of selected Cenomanian heteromorph ammonites from Europe. The rise of the pseudoplankton in the Mesozoic is coeval with the development of greater host attachment sites. Through functional analysis of a baculitid and a turrilitid ammonite Andy concluded that these were vertically migrating macroplankton (similar in habit to graptolites) having conical shells with apertures oriented downwards. Their nearly cosmopolitan distribution supports the hypothesis that these ammonites were pelagic macroplankton.

Paul Pearson (Bristol University) began the micropalaeontological contributions in an attempt to establish a climate link with evolution in planktonic Foraminifera. Paul started by pointing out that both environmental and biological factors need to be taken into account when considering evolutionary control. He adopted three approaches: 1) Diversity trends. 2) Rates of speciation and evolution. 3) Survivorship. Paul demonstrated the radiation of planktonic foraminifera after the K/T boundary. The recovery took about 20 Ma into the Mid Eocene, followed by a decline with cooling through the remainder of the Eocene. Overall, however, there is not a very good picture about climate per se. Paul speculated that speciation rate and evolution rate show a co-variance, which might be related to cyclicity.

The first session was concluded by Dave Lazarus (Museum für Naturkunde, Zentralinstitut der Humbolt-Universität zu Berlin) who reviewed radiolarian evolution which seems to have been in response to changes in productivity (Radiolaria have an excellent, if poorly understood, fossil record - their biogeography is, however, well established). Dave also pointed out that extinctions could have been caused by non-environmental factors such as viruses, which would leave no trace in the fossil record. If oceanographic change has played an indirect role in plankton evolution, biological interaction would have also been important, e.g. competition with diatoms for

The Book Shelf

If, as you are perusing publishers book catalogues, you see a book that you fancy, why not let me know all the details and I will get a review copy for you. In return for a published review, you get a nice new book, the Newsletter gets copy of interest to Members and the publisher gets publicity!

I currently have a selection of books for review.

Faure, H., Heine, K. and Singhvi, A. (eds) 1998. Desert Margin Changes in Africa Since 135 ka: Implications for Water, Carbon and Mankind. Palaeoecology of Africa and the surrounding islands v. 25, 301 pp. A.A. Balkema, Rotterdam.

Section headings include Mauretania and West Africa; Sahara and Sahel of Northeast Africa; Congo, Eastern and Southern Africa; Arid belt from Israel to China and Arid regions in General.

Middle Devonian Bachiopods, Conodonts, Stratigraphy, and Transgressive-Regressive Cycles, Pine Point Area, South of Great Slave Lake, District of Mackenzie, Northwest Territories. 1998. Geological Survey of Canada Bulletin 522, 191 pp.

silica. Dave recommended that evolution should be studied on the basis of biogeographical regional pools - global biozonations do work for radiolarians. The first step would be to identify the regional pools, on some basis, and then look at the controls on evolution on that scale.

After a short tea break, Alain Le Hérisse (Université de Bretagne Occidentale) resumed the proceedings on a palynological note. Alain observed a correlation between acritarch diversity through the Cambrian and geological events of transgression and regression. Peaks in acritarch diversity appear to coincide with warm periods. Fairly rich and diverse Devonian assemblages were followed by the phytoplankton "black-out" during the Carboniferous and Permian, characterized by *Veryhachium* and *Micrhystridium* spp. These species continue to predominate until the appearance of dinocysts.

Jamie Powell (Dinosystems) continued the palynological theme with his consideration of the dinoflagellate evolution. Although the dinoflagellate fossil record starts in the Middle Triassic, there is strong evidence for a Precambrian origin. The Early Mesozoic radiation was a major evolutionary event probably related to the break-up of Pangaea. After an initial period of diversification the lineages show remarkable stability, with only relatively minor changes (at Family level) since the Jurassic. It is evident that dinoflagellate cyst assemblages are greatly influenced by ecological factors, but the influence of climate on dinoflagellate evolution is largely unknown.

Paul Bown (University College London) demonstrated considerable commonality between the various plankton groups - they basically show similar patterns in terms of diversity since the Mesozoic. By concentrating on Cenozoic calcareous nannoplankton, Paul plotted species richness per ~1 Ma and showed that high diversity tends to be associated with warm climates. Paul also illustrated two extreme examples: specialist (K) species tend to prevail in oligotrophic conditions, while opportunistic (r) species are abundant in association with upwelling. The Trophic Resource Continuum expands and contracts according to warming and cooling episodes.

Alex Mitlehner (Exeter University) completed the symposium with an informative account of diatom evolution. Diatoms are responsible for 35% of primary production and are therefore good nutrient indicators. They tend to be most abundant and diverse at high latitudes (partly due to the dissolution of calcareous taxa). Alex showed that tropical weathering during the Early Paleogene correlates with diatom blooms.

In the evening Professor Hans Thierstein (Geological Institute, ETH-Zentrum, Zürich) delivered the inaugural Lyell Lecture entitled "The climate-plankton link: when models confront

Part I: Startigraphy and Brachiopod faunas - A.W. Norris Part II: Conodont faunas - T.T. Uyeno

F. Abrantes and A. Mix (eds). 1999. *Reconstructing Ocean History: A window into the Future*. Kluwer Academic/Plenum Publishers, New York, 443 pp.

This volume is the proceedings of the 6th International Conference on Palaeoceanography held in Lisbon in 1998. It includes sections entitled Polar-Tropical and Interhemispheric Linkages; Does the Ocean Cause, or Respond to, Abrupt Climate Changes; Biotic Responses to Major Palaeoceanographic Changes; Past Warm Climates; and Innovations in Monitoring Ocean History.

I'd review this myself but I already have a copy!!

I have a series of six British Geological Survey/Earthwise publications/leaflets for review. Four are from the "Fossil Focus" series, including corals, brachiopods, fish, bivalves and trilobites. Two are from the "Holiday Geology" series, including the Lake District Story and Peak District. Anyone fancy looking at the whole batch, or maybe a handful?

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Newsletter Editor

evidence". The main theme of the lecture was an exploration of evidence for biotic and abiotic forcing. This very informative lecture attracted an audience of over 100 conference delegates and provided the perfect conclusion to a very successful Symposium.

It is hoped the proceedings of the Lyell Symposium and Lecture will be published in some form in the not too distant future, possibly as a volume in the Special Publications Series.

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Book Reviews

The Adequacy of the Fossil Record

S.K. Donovan, and C.R.C. Paul. (eds.). John Wiley & Sons, Chichester, 1998. 312 pp. ISBN 0 471 96988 5. Hardback. As we all know, there is more to palaeontology than describing fossils and ascertaining the age of the sediments that contain them. The premise of this book is that although the fossil record of past life may be incomplete (nobody denies that), it is adequate for testing a wide variety of interesting scientific questions. The editors have brought together an array of papers from a diverse set of specialists, which range from theoretical studies to treatments of specific groups. Just as the fossil record is highly selective of what gets recorded, so is this volume, and apart from the excellent paper by S.J. Culver and M.A. Buzas on benthic foraminifera, and some new data of M.R. Vaziri on the same group in another paper, micropalaeontologists may be disappointed. Nevertheless there are some very interesting contributions to be found within which I will mention in the order that appears to me most logical. The first chapter is by C.R.C. Paul, who reviews a variety of approaches to estimating the completeness of the record, either for individual collection localities or for specific fossil groups. What proportion of species have been discovered so far? I found the review very useful, and in particular Paul's clear-sighted critique of cladistic methods for completeness estimation is important (see below) but I think two issues have been neglected. First, it seems that some sorts of organisms speciate very easily producing many short-lived and morphologically indistinguishable taxa (consider the freshwater sticklebacks). Any attempt to estimate the global completeness of the fossil record by "species counting" must be skewed by such groups. Second, many palaeontologists are currently re-evaluating their species concepts in the light of biomolecular studies which are now widely available for most groups. How has this revolution affected our estimation of the completeness of the fossil record? The completeness theme is continued by C.R.C. Paul and S.K. Donovan (Chapter 5), who seek to argue that sea level changes may be responsible for systematic gappiness in the fossil record

and even be responsible for some apparent mass extinction events. An attempt is made to test for correlations between the Phanerozoic records of sea level change and familial diversity, but the result is negative. C.F. Koch (Chapter 8) provides an excellent review of the problems associated with various so-called “taxonomic barriers” that lurk in compendiums of fossils (such as the same species being assigned different names in different times or places). C.R. Marshall (Chapter 3) provides one of the most useful papers in this collection by reviewing the latest thinking on how to estimate the true stratigraphic ranges of taxa from their patchy record, building the argument from discrete morphotaxa to clades. This is important reading for all those who would use the record to search for patterns such as mass extinctions. The theme is extended in P.J. Wagner’s (Chapter 7) review of the various clade-based approaches to estimating the completeness of the fossil record, which have received considerable attention of late. (The gist of this is that one can compare the order of appearance of taxa in the fossil record with the order in which they should have appeared judging by their cladogram.)

To get technical for a moment, in my opinion the metrics that rely on the “ghost range” concept are highly vulnerable to the possibility that one taxon may be ancestral to another (to use Paul’s example, regular echinoids are widely believed to be ancestral to the irregulars) and therefore the record may not be as incomplete as the metrics imply. This is acknowledged by the practitioners (e.g. Wagner and Benton, in Chapter 12) who suggest that clades with no unique characters (so-called “metataxa”) might be regarded as ancestors, thus cutting down the amount of ghost range implied by the metrics. But this is a minor concession, because characters may be lost as well as gained in evolution, and taxa with their own distinctive characters (autapomorphies in the jargon) may also be ancestral to other taxa. Again, consider the echinoids (I am not an expert but I don’t believe that all the irregulars possess all the characters of the regulars, plus some others).

The remaining chapters are on more specific topics of interest. The taphonomy of Pleistocene corals is considered by B.J. Greenstein, J.M. Pandolfi and H.A. Curran

(Chapter 4) which is an excellent mixture of field data and careful analytical work designed to test specific questions. The article reminds us that there are multiple pathways between living and fossilised assemblages. The authors demonstrate very well that the Pleistocene coral record is adequate for testing ecological models that are important for the current crisis in the management of reefs. However they neglect to mention the many other taxonomic groups present in reef communities, for which the record is far from adequate. G.J. Retallack’s article (Chapter 6) is a new and extended study of the preservation potential of fossil soils, concentrating on the key variables acidity, oxidation and time. D.M. Martill (Chapter 3) provides a specific review of phosphatisation mechanisms in the famous Santana Formation of Brazil. Here I confess to being a little disappointed, because I expected more given the more general title.

The book ends with four admirable chapters on the completeness and adequacy of the record of selected important groups. S.J. Culver and M.A. Buzas (Chapter 9) review their excellent work on modern and fossil benthic foraminifera assemblages, showing that the record of this group is certainly adequate for addressing questions of community evolution over long timescales. Like the study of Greenstein and others on corals, they highlight the importance of the data for conservation. However, their work goes far beyond this and contains many points of interest (too numerous to report) for anyone interested in how evolution actually works. The record of Neogene cheilostome bryozoa is assessed by A.H. Cheetham and J.B.C. Jackson (Chapter 10) who demonstrate how well sampled their record is. An interesting conclusion is that up to 35% of the taxa they have sampled are likely ancestors of other taxa they have sampled (but, returning to an earlier point, I doubt that they are all “metataxa”). A well-balanced review of the bivalve record is provided by E.M. Harper (Chapter 11) who sticks to the point and shows that the record is certainly adequate for a variety of the most interesting questions. Finally, M.J. Benton (Chapter 12) applies all the latest techniques to assessing the record of the vertebrates, and proves that the record really is far better than the sceptics will admit.

There is more than enough here to justify

buying the book. But let us enquire into the origin of our supposed hang-ups about the adequacy of the fossil record, namely Darwin's account in *The Origin* on the "Incompleteness of the Fossil Record". Darwin asked whether the fossil record was adequate for testing the reality of evolution by showing the transitions from species to species through time (or stratigraphy), and concluded that it was not. In general, this result stands, because even the otherwise adequate records of benthic forams, cheilostomes, corals, bivalves and vertebrates provide very few examples of such evolutionary transitions. However, such transitions are commonplace in the fossil record of mineralising plankton, and many examples have been demonstrated. The biggest omission in this book is therefore a review of the adequacy of the planktonic microfossil record, which has allowed researchers to address fundamental questions of rate and mode of microevolution that usually cannot be attempted for other groups.

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Modern Foraminifera

B.K. Sen Gupta (ed). Kluwer Academic Publishers. 1999. 371 pp. ISBN: 0-412-82439-2. Hardback.

This book is divided into four parts. Part 1, basic considerations, includes chapters on systematics, a biological overview, shell construction, and quantitative methods. Part 2, features of distribution, has chapters on the biogeography of (North American) benthic and (global) planktonic forms, symbiont-bearing forms, marginal marine environments, microhabitats, flux of organic carbon, oxygen-depleted environments, and pollution. Part 3 concerns geochemistry of shells, dealing with stable isotopes and trace elements. Part 4 considers taphonomy from the point of view of bioturbation and dissolution.

Part 1. Identification of taxa is the major challenge for those starting out on foraminiferal studies. All too often it degenerates into looking at illustrations without much concern with descriptions. The main contribution of the chapter (2) on classification is to introduce a taxonomic key to Order level based on wall structure and morphology. This is followed by a summary classification to Family level.

However, it is a pity the examples of genera are not illustrated. This means that it will not help a student. In a way, it would have been better to integrate chapter 4 (shell construction in modern calcareous foraminifera) with classification since it nicely explains and beautifully illustrates the wall structures used in classification.

The biological overview (chapter 3) is a nice synthesis focusing on pseudopodia, trophic mechanisms, growth and test morphogenesis, and reproduction. Chapter 5 concerns quantitative methods of data analysis. This is quite informative and uses the same data set to show analysis by different techniques. However, univariate measures (such as diversity indices), which are the most widely used technique, do not rate a mention. Also, anyone who has carried out any form of multivariate analysis of a data set and then added further samples and re-run the program will know that the groupings commonly change dramatically. Their final caution that '...no statistical technique or software routine... can take the place of a deep understanding of the data and the processes being studied' should be heeded by all.

Part 2. Chapter 6, Biogeography of benthic foraminifera. The authors comment that few have attempted biogeographic analyses, but is that really surprising? As they point out, it is a daunting task which starts with the need to standardise taxonomy (i.e., eliminate synonyms) throughout all the literature surveyed. Then there are the questions of abundance versus presence/absence and the depth range to be considered. From their own analysis of the shallow water biogeographic provinces of North America they conclude that temperature and water masses are principal controls. Furthermore, there are no centres of evolution of taxa. By contrast, it is stated that the biogeography of planktonic forms '... cannot be separated from its evolutionary past' (chapter 7). The authors demonstrate that the large scale latitudinal faunal provinces do not correlate well with hydrographic features of comparable scale. They point out the value of using the past to interpret the present and the need for biogeographic and evolutionary/palaeobiogeographic studies to proceed in tandem. Nevertheless, while urging caution in the application of transfer functions, they still regard them as a valuable tool in

reconstructing past oceanic conditions. One has to question whether biogeography of benthic foraminifera has a practical application like that for the planktonic forms.

The advantages of algal symbiosis are elegantly explained in chapter 8: provision of energy for respiration thus enabling the host to utilise a high proportion of the organic matter from its prey for growth and reproduction; aiding wall calcification. The potential application of larger foraminifera in monitoring global environmental change is well made.

The discussion on foraminifera in marginal marine environments is rather rambling (chapter 9) and would have benefited from some summary tables characterising the genera/species in the different environments. The author does not make it clear throughout that the discussion is based on a mixture of live, dead and total data (and there is no discussion of these or any of the methodology for gathering data). A surprising omission is any serious discussion on species diversity measured by accepted indices as this is one of the most useful criteria for distinguishing between environments. Furthermore, there is no cross linking to chapter 16 on taphonomy. Likewise, although some authors have used multivariate methods to interpret their data, this is not mentioned and neither is there any reference to chapter 5.

The last decade has seen an increase in research on microhabitats and this is thoughtfully reviewed in chapter 10. Briefly, although species may be infaunal they are not consistently present at the same depth nor is morphology a reliable guide to microhabitat. The problem of separating the effects of oxygen (or other chemical controls) from abundance of food remains largely unresolved. We are reminded that quantification of foraminiferal microhabitats remains rudimentary and poses a challenge for the future. This theme is also picked up in chapter 11 (flux of organic carbon). Food is a limiting resource mainly in deeper water. Much of the discussion focuses on the macrofauna and evidence is presented to show that foraminifera may follow similar patterns of response. This chapter is good at pointing to questions that need to be addressed in order to understand the role of foraminifera in the recycling organic matter. The role of oxygen depletion is explored in chapter 12. One

interesting observation is that some foraminifera that have their tests in anoxic sediment may extend their soft parts into adjacent sediment with oxygen-bearing pore waters. This is because they can extend their pseudopodia up to ten times the test diameter. Thus mitochondrial activity can be carried out away from the test in the more favourable microenvironment. No foraminiferal species is found exclusively in low oxygen environments, therefore the interpretation of past oxygen conditions from preserved foraminiferal assemblages is dependent not only on the associations of taxa but also on changes in their abundance and diversity. Many questions remain to be answered in the future.

The final chapter of Part 2 is a comprehensive review of the effects of pollution. As with other aspects of foraminiferal ecology, some of the results are apparently contradictory and the use of foraminifera for monitoring pollution is not as simple as we might wish. One of the main difficulties is unravelling the effects of pollution from the consequences of natural environmental variability or change.

Part 3. Advances in geochemistry are closely tied to advances in analytical technology. With each new generation of equipment it is possible to analyse progressively smaller samples more accurately than was previously the case.

Therefore, there should be considerable advances in the field in years to come. The use of stable isotopes and trace elements in palaeoceanographic studies is already widespread and now, for the first time, there are comprehensive, clearly written reviews of the theory, methodology, interpretation and limitations of their use (chapters 14 and 15).

Part 4. This final section is a single chapter on taphonomy. The focus is on bioturbation and dissolution. Rather surprisingly, it is stated that little postmortem transport normally occurs. Clearly, this statement is not valid for those shallow shelves and marginal marine environments that are tidally-influenced. Time-averaging, smearing of first or last appearances through bioturbation, and the role of dissolution are considered.

How well does this volume succeed in its aims as 'an advanced text for university students that would also serve as a reference book for professionals'? One would expect a textbook to deal with principles and ideas and to give broad

coverage to the field. Professionals expect to be educated in new developments that they might not have had time to follow up in the ever increasing literature. Both groups might expect stress on practical applications. To a certain extent it succeeds in these aims. However, although the coverage is reasonably broad, there are some notable gaps. Part 1: nothing on how to collect worthwhile data or on the great progress there has been in understanding the construction of agglutinated tests. Also, with the important ideas on both benthic and planktonic foraminifera that are coming from molecular genetics, this surely warranted a chapter; Part 2: nothing on the ecology of normal oxygenated benthic environments deeper than inner shelf, a serious omission. Some authors have stressed practical applications (notably chapters 5, 7,8,10-15). All readers will learn something new.

While the benefit of a multi-author book is that each chapter is written by one or more experts, the disadvantage is that there is usually no continuity from one chapter to another. In this case, authors have clearly not seen drafts of other chapters so there is little cross-referencing from one to another. This is particularly noticeable for chapters 10-12 which deal with closely related topics (microhabitats, flux of organic carbon, and oxygen-depleted environments). If the authors of those chapters had been encouraged to work together to produce a single synthesis then some of the problems might have been resolved and a significant contribution to understanding would have been made. Perhaps it is not too late for them to consider that possibility at some time in the future? In the few months I have had this book, chapters 10-12 are the ones to which I refer most frequently.

The volume is produced to a high standard and there are few typographical errors except in chapter 9.

There are comprehensive general and taxonomic indexes.

This book should certainly be purchased by appropriate libraries.

John Murray

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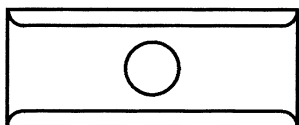
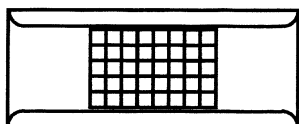
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