Editorial

The outgoing editor

This will be the final issue of the newsletter edited by me. Jenny Pike from Cardiff University takes over from issue 62 and I wish her success for the future. In a final vain attempt at injecting some news into the newsletter, this issue introduces a new column entitled *what the papers say* that is intended to summarise articles of interest to all facets of micropalaeontology. The first column is definitely foram-centric, but this fairly reflects a group in which much exciting research of global interest is being undertaken. I am sure that Jenny will be only too pleased to receive unsolicited reviews of recently published papers that are of broad interest to our membership.

Finally, I have a couple of books available for review in the newsletter, if any of you fancy filling up your book shelf, please contact Jenny Pike.

Faure, H., Heine, K. & 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.

Norris, A. W. & Uyeno, T. T. 1998: Middle Devonian brachiopods, conodonts, stratigraphy, and transgressive-regressive cycles, Pine Point Area, south of Great Slave Lake, District of Mackenzie, Northwest Territories. Geological Survey of Canada, Bulletin 522, 191pp.

Philip Donoghue <p.c.j.donoghue@bham.ac.uk>

Introducing the new editor of *Newsletter of Micropalaeontology*

Jenny Pike obtained a First Class BSc (Hons) in Geology from the University of Birmingham in 1991. She first dabbled in conodonts and ostracods at the University of Leicester under the watchful eyes of Dick Aldridge and David Siveter, and whilst resident at Leicester, demonstrated various courses to an undergraduate named Phil Donoghue! Jenny began a PhD in the Oceanography Department at the University of Southampton in 1992 where, in 1996, she was awarded her PhD in high-resolution palaeoceanography and palaeoclimatology from diatomaceous laminated sediments, Gulf of California, supervised by Alan Kemp. Her training in the identification and palaeoecology of marine diatoms was provided by Carina Lange at Scripps Institution of Oceanography, University of California at San Diego, and she has also picked up many pearls of wisdom from Connie Sancetta, now at the National Science Foundation in Washington DC. Jenny has used diatoms to infer past physical oceanographic processes and also investigated the effects that diatoms can have on sediment fabric and opal preservation in marine sediments. If asked over a beer what she dislikes most about micropalaeontology Jenny would probably reply "systematics and taxonomy" which she regards as an essential evil, closely followed by "hours of staring down the microscope"!! Jenny is currently a Lecturer in Marine Geoscience at Cardiff University teaching Introductory Micropalaeontology to second year undergraduates.

By building on previous efforts to set up a specialist siliceous microfossil group in the BMS, Jenny, together with John Gregory, has introduced the Silicofossil Group to the Society at the 1998 AGM. An inaugural meeting was held in September 1999 and it is hoped that this group will continue to be as successful as the other specialist groups. Jenny has published papers on diatoms and agglutinated foraminifera. As shipboard sedimentologist, she has described many smearslides dominated by nannofossils (both coccoliths and discoasters) so the only one of the BMS specialist groups entirely missing from her portfolio is Palynology . . . as editor of the Newsletter Jenny awaits her education!!

Jenny Pike <pikej@cardiff.ac.uk>

Chairman's introduction and report

As a Society founder member of 1970, Treasurer between 1982 and 1991, and erstwhile and long-standing member of the Editorial boards of both the *Journal of Micropalaeontology* and *A Stereo-Atlas of Ostracod Shells*, I can justly claim to be a true "old stager" of the BMS.

I started my research at Aberystwyth in 1968 on ostracods under Robin Whatley, and joined The Natural History Museum in 1971 to work on foraminifera with the late Geoff Adams. I am still in the same place. Since then I have continued actively to research both groups, which I suppose is rare these days. Presently, my scientific interests are primarily in systematics and palaeoecology, and are extremely varied. They include and range from the wall structure of agglutinating foraminifera to larger foraminifera in general; earliest planktonic foraminiferal evolution to the Neogene rotaliid foraminifera of the Indo-Pacific region; and more recently, Quaternary and Holocene foraminifera and ostracods with particular reference to the interpretation of archaeological sites. My strong interest in the Fleet lagoon, Dorset, where I started my research over 30 years ago, still continues through research students and the Fleet Study Group.

Throughout my career I have never failed to be amazed by the wealth of The Natural History Museum's collections and its marvellous Heron-Allen Library with which I am in every-day contact; where something new is just waiting to be discovered! Also, through the Museum's doors I have, over the years, been pleased to make the acquaintance of many "famous" names in the field of micropalaeontology, which in turn has led to some notable collaborations and friendships (the late Paul Brönnimann being a case in point). Latterly, my work with archaeologists has opened up a whole new world for me, and new friendships.

My hobbies are legion and so is the size of my family! When not organizing the football and cricket teams for which my boys play, I still find time for my extensive rose garden, stamp collections and railway library. I was hooked on steam trains as a small boy and have never grown up.

I am extremely honoured to be elected to the Chair of the BMS for the years 1998-2001. It is also a privilege to have succeeded Professor Dick Aldridge, who did so much for the Society and will indeed be a hard act to follow. Overall, the BMS seems to be pretty healthy and (reasonably) wealthy and certainly in terms of its Secretary and Treasurer, is very professionally run. You win some, you loose some, however. The *Journal of Micropalaeontology* now has international standing (and for those who bother about those things) is in the Science Citation Index, but the recent demise of *A Stereo-Atlas of Ostracod Shells* is particularly sad for me, if not inevitable. A word of praise here for David Siveter who did more than anyone else for the *Atlas,* which for 25 years remained a unique publication as well as a world leader in palaeontography. The Occasional Publications Series is still active but since their takeover of Chapman & Hall, will be published by Kluwer, at least for a trial period. I have made it my special interest that the long awaited books, *Micropalaeontology of the Former Soviet Union* and the Second Edition of *The Stratigraphical Index of Ostracoda* will be published without further delay. I am glad to say new titles are also in the pipeline. The Society now has a new group, the Silicofossil Group. Their first meeting is planned for September 1999; we wish them well. All the other groups remain active and each plan one or two meetings in the forthcoming year. Please give them your support.

The BMS is moving with the times. It has a new webmaster and an excellent www-page (http://www.bmsoc.org). We are also sponsors of that admirable pioneer electronic journal *Palaeontologica Electronica.* In 2000, we will be organising the inaugural Lyell Lecture as well as a half-day symposium on *Plankton Evolution and Climate Change,* as part of the Geoscience 2000 Meeting to be held in Manchester on April 18th.

These days are certainly challenging times for micropalaeontologists. Following the sad closure of both the Aberystwyth and Southampton M.Sc. courses and last year's downturn in the oil market, the position had become rather gloomy. Nevertheless, good young micropalaeontologists seem to be emerging again from British and European universities (at least), and there seems to be no shortages of jobs in the consultancy profession.

Finally, may I again remind you of two important ways of supporting the Society: the BMS Foundation, a sponsorship scheme to assist the publication of the *Journal of Micropalaeontology,* and through it to support the science of micropalaeontology; and the Deed of Covenent scheme for UK tax payers, where the Society can claim back the tax on your annual subscription, at no pain to yourself. Ask the Treasurer for details.

As your Chairman, I am keen to hear from members particularly if they have a strong opinion on what we should be doing (or not doing). I am always pleased to meet members at the Museum, particularly from overseas if they are passing through London, to discuss matters of mutual interest. Otherwise, I look forward to seeing you at our Annual General Meeting on November 17th at UCL.

John E. Whittaker <J.Whittaker@nhm.ac.uk>

Secretary's report

Directory of members

The revision of the database of members' addresses has been completed. A new Directory of Members, correct as of 17th November 1999, will be issued in early 2000.

AGM 1999

The 1999 AGM was held at 2.00pm on Wednesday 17th November in the Gustave Tuck Lecture Theatre, University College London. Honorary Membership was awarded to Professors Brian M. Funnell, John W. Neale and Bernard Owens in recognition of their services to the Society; each received an engraved salver. Members of the Society approved unanimously the change of the name of the Conodont Group to the Microvertebrate Group. Dr Ian Boomer was elected unopposed to the position of Webmaster, and Dr Jenny Pike was elected unopposed to the position of Newsletter Editor. In addition, Dr Rachel Preece becomes the new Publicity Officer. The Society is

grateful to Dr Phil Donoghue and Dr Giles Miller, in particular, for their past efforts as Newsletter Editor and Webmaster respectively.

After Society business, two guest lectures were delivered: Professor Patrick Holligan (Head of the School of Ocean and Earth Science, Southampton Oceanography Centre) spoke on 'Plankton and the Global Radiation Budget' and Dr Stephen Lowe (Stratigraphy Network Leader, BP Amoco) on 'The role and application of high resolution biostratigraphy in the hydrocarbon exploitation of the Cusiana Field, Llanos foothills, Colombia'. The meeting was very well attended and much discussion ensued.

Following the lectures, a wine reception, generously sponsored by Robertson Research International Ltd was held in the South Cloisters. About ten posters were on display and generated much comment. Amongst these were:

Doorke van den Akker (Department of Geological Science, University College London): Biostratigraphy and paleobathymetry of the Foula Subbasin (West of Shetlands).

Ian Boomer (Department of Geography, University of Newcastle), S. Juggins, B. Davis, W. Last and N. Aladin: A high-resolution, multi-proxy record of late Holocene environmental change in the northern Aral Sea.

Megan Ellershaw (Department of Geography, University College London): Effects of the closure of the Panama Isthmus upon the South Atlantic.

S.M. Khan (Department of Geological Sciences, University College London): Radiolaria and Cenomanian-Turonian environments of Hacho de Montejaque, Penebetic, southern Spain.

Martin Pearce (School of Geological Science, Kingston University), I. Jarvis, A. Swan and B. Tocher: Dinoflagellate cysts, chemostratigraphy and sea-level change in the Late Cretaceous: new data from the Banterwick Barn Chalk borehole, Berkshire, UK.

Mike Stephenson (British Geological Survey, Keyworth) and J. Filatoff: Description and correlation of Late Permian palynological assemblages from the Khuff Formation, Saudi Arabia, and evidence for the duration of the pre-Khuff hiatus.

Ben Walsworth-Bell (Department of Geological Sciences, University College London), P.R. Bown and G.P. Weedon: Jurassic calcareous nannofossils and environmental cycles.

Lyell meeting 2000

In a change to tradition, the Lyell Meeting 2000 (which the BMS Secretary is organizing on behalf of the Joint Committee for Palaeontology) will form a half-day symposium at the Geoscience 2000 Conference (University of Manchester, 17-20 April 2000) with the title 'Plankton Evolution and Climate Change'. The symposium will consider the evidence for climatic controls on plankton evolution, and to what degree plankton have influenced climate change. Specialists from both the macro- and micro- palaeontological communities will review the possible links between palaeoclimatic conditions, oceanographic change and patterns of plankton evolution, radiation and extinction.

Professor Hans Thierstein (Geological Institute, ETH-Zentrum, Zürich) will deliver the Lyell Lecture entitled 'The climate-plankton link: when models confront evidence' at 7.30pm Tuesday 18th April 2000 followed by a Reception. **Symposium speakers on Wednesday 19th April 2000 are as follows:**

Sue Rigby (Edinburgh University) and Barrie Rickards (Cambridge University); Palaeozoic plankton and climate change.

Peter Doyle (Greenwich University) and Andy Gale (Greenwich University); Climatic controls on macroplankton in the Mesozoic Greenhouse.

Alain Le Hérissé (Université de Bretagne Occidentale) and Malgorzata Moczydlowska-Vidal (Uppsala University); Relationship of global palaeoclimatic conditions to radiations and extinctions of acritarchs in primitive oceans.

Alex Mitlehner (Exeter University); From the Greenhouse to the Icehouse - and back? Diatom evolution and oceanographic changes since the Early Cretaceous.

Jim Riding (British Geological Survey) and Jamie Powell (Dinosystems); Dinoflagellate cysts and climatic change during the Mesozoic and Cenozoic.

Paul Pearson (Bristol University); Evolution in planktonic Foraminifera: can a climate link be established?

Paul Bown (University College London); Calcareous nannoplankton as agents and recorders of climate change.

Dave Lazarus (Humbolt-Universität zu Berlin); Evolution of radiolarians: patterns, mechanisms, and possible causal factors.

Special publication series

'A Stratigraphic Index of Dinoflagellate Cysts', edited by A.J. Powell (1992), was reprinted by Kluwer Academic Publishers in 1999 with minor corrections. The volume is available to BMS members at the discounted price of £80.21 (25% discount on the list price of £106.95). Other special publications in preparation have been delayed but are expected to be available in 2000.

Grants in aid

The Committee has agreed to reintroduced the Society's grants-in-aid scheme. Student members may apply to the

BRITISH MICROPALAEONTOLOGICAL SOCIETY

STATEMENT OF ACCOUNTS FOR FINANCIAL YEAR 1998-1999

Balance from year 1997/1998	**£6377.11**
Membership subscriptions	
Individual/Student for 1998	£164.00
Individual/Student for 1999	£10,704.20
Individual/Student for 2000	£229.67
Individual/Student for 2001	£25.00
Subtotal	£11,122.87
Library subscriptions for 1999	£11,139.71
Total subscription income	£22,262.58
Miscellaneous income	
Sale of Journal volumes. 1-17	£663.40
Advertising revenue	£375.00
BMS Foundation (inc. 2000/01/02)	£790.00
Interest from two bank accounts	£464.31
Geol. Soc. royalty	£537.88
Subtotal for Miscellaneous income	£2830.59

Journal of Micropalaeontology	
Volume 18, Part 1 (inc. postage)	£10,185.00
Volume 18, Part 2 (inc. postage)	£10,185.00
Total	£20,370.00
Newsletter of Micropalaeontology	
No. 59	£290.77
Postage/packing for No. 59	£294.05
Total	£584.82
Annual General Meeting 1998	
Hire of lecture theatre	£256.67
Speaker's expenses	£141.71
Total	£398.38
Miscellaneous outgoings	
Secretary's expenses	£291.02
Transaction charges card payments	£380.79
Postage for Journal backparts	£94.08
Refunds	£281.00
Internet fees	£15.66
P&P of invoices for 1999 membs	£374.60
BACS commission charges	£19.94
Seymour & Balfour EFT charges	£82.24
Ostracod Group meeting expenses	£14.00
Total	£1553.33

BALANCE FOR FINANCIAL YEAR 1998/1999 £8,563.75

This financial year ran from 11th November 1998 to 4th November 1999

Mike Stephenson (Stand-In Treasurer in Jim Riding's absence)

Bernard Owens and Ian P. Wilkinson (Honorary Auditors)

Society for funds to help in field work, conference attendance or any other activity related to their research. A maximum of £200 will be awarded to each successful applicant, and a total of £600 will be available. Applications should be submitted to the Secretary by 29th February 2000 so that the Committee may adjudicate at their next meeting on 8th March 2000.

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 have indicated their willingness to be nominated for a second term, other nominations from the Society's membership will be welcome.

Jamie Powell <bms@dinosystems.co.uk>

Treasurer's Report

I am at the moment on secondment to the Australian Geological Survey Organisation (AGSO) in Canberra, Australia. While I am in Australia, my colleague, Mike Stephenson at BGS Keyworth will be Acting Treasurer. If you have any matters for his attention, please contact Mike on <MHSTE@wpo.nerc.ac.uk>. My e-mail address in Australia is <jim.riding@agso.gov.au>. Mike has been fully briefed on all aspects of the job and I am confident he will do an excellent job. When I left the UK during September our financial situation continues to be excellent. Some of you will have received a communication from Jamie Powell regarding payment of the 1999 subscription. If you have not yet paid for this year, please do so immediately. Please also consider filling out a direct debit form in favour of BMS. This makes the payments easy for you in that you do not need to remember every January and benefits the Society in that subscriptions are paid regularly and on time. Mike Stephenson will be happy to supply you with a direct debit mandate.

I must apologise to those members who filled out deed of covenant forms earlier this year. I have been unable to find sufficient time to process these as yet and the Australian secondment will delay things further. These forms are somewhat laborious to process and the Treasurer's job is difficult enough as it is. Perhaps we need a volunteer Covenant Secretary?

Jim Riding <jim.riding@agso.gov.au>

Introducing the interim Treasurer

Mike Stephenson, a stratigrapher with the British Geological Survey, received a BSc in Geology from Imperial College and an MSc and PhD from the University of Sheffield. Mike's PhD studies concerned regional correlation of oil-bearing sediments from the Arabian Peninsula. His current research interests lie in the palynostratigraphy of Arabian and other Gondwanan Permian-Carboniferous glaciogene sequences and in palaeoecology, sedimentology and sequence stratigraphy of eustatically controlled cyclothemic sediments in the English Namurian. Mike is a member of the British Micropalaeontological Society, the American Association of Stratigraphic Palynologists, and the Petroleum Exploration Society of Great Britain.

Mike Stephenson <m.stephenson@bgs.ac.uk>

Journal Editor's Report

The new structure of the editorial 'team' appears to be working efficiently and we anticipate that 18/2 will be available in late November. Work is already in hand for 19/1 with a publication date planned for April 2000. This year (to date) we have received 17 submissions and already three of these are ready for publication in 19/1. This throughput of papers appears satisfactory and we have sufficient papers, of good quality, to maintain the high reputation of the Journal. We are using a considerable number of reviewers, based in the UK and abroad, and we are extremely grateful for the careful way in which these individuals undertake the significant workload that we place upon them. We are finding that about 25-30% of submissions fail to meet our standards, although some of these rejections are being re-submitted in much improved form at a later date.

The one area where we could benefit from increased submissions would be that of the Micropalaeontology Notebooks. Submission of these have declined and readers will note that few are appearing in the Journal. It is possible that the format (one page maximum) is quite restrictive, but it was only intended that these would fill up the 'dead' pages between articles. To expand the format of the Notebooks would defeat the object of having them as page fillers!

The use of an holothurian sclerite on this year's front cover has generated some correspondence; mostly favourable. Next year we will be using a radiolarian, and so the newly-reformed siliceous microfossil group should feel some degree of recognition.

As always, we rely on the quality of the submissions and I encourage both members and non-members to continue to submit to the Journal. The

Geological Society Publishing House take great care with the illustrations and plates that go into the final printings and I hope that the Society is pleased with what is, after all, their flagship publication. Particular thanks go to Jo Cooke at the Geological Society for the assistance that she gives the editorial team.

Malcolm Hart <M.Hart@plymouth.ac.uk>

BMS Webpage

Thanks to all of you who have commented on the new look web page and those who have offered updated information for the various areas of the site. Remember, it's up to you to provide the information for your particular group, I can normally turn around the text within a day and have it 'uploaded'.

Keep an eye on the 'Latest BMS News' page for recent changes. I would also like to take this opportunity to remind BMS members that if you purchase books on the internet via Amazon.com then could you please access the Amazon site via the BMS homepage, that way the society makes money - it's as simple as that!

As always, thanks to the Natural History Museum for hosting the site. I look forward to hearing from you all.

Ian Boomer <ian.boomer@ncl.ac.uk>

The Journal of Micropalaeontology in the former Soviet Bloc and Asia

As part of initiative sponsored by the Grzybowski Foundation and an anonymous sponsor, complete sets of back issues of the Journal of Micropalaeontology have been purchased and are now housed in academic/research institutions in Eastern Europe and Asia. This is part of an effort to (1) assist libraries in the developing countries and (2) make the results published in our journal available to a wider audience. The institutions that received the Journal of Micropalaeontology under this scheme are those where micropalaeontological research is currently active. These are:

Poland: Grzybowski Foundation Library, Jagiellonian University, Krakow. Czech Republic: Czech Geological Survey, Brno Branch. Romania: Department of Geology, Babes-Bolyai University, Cluj-Napoca. Romania: Laboratory of Paleontology, University of Bucharest, Bucharest. Ukraine: Institute of Geology & Geochemistry of Fuel Minerals, Lvov. Russia (Europe): Institute of Zoology, Russian Academy of Sciences, St. Petersburgh. Russia (Siberia): Institute of Paleontology & Historical Geology, Tomsk State University Philippines: National Institute of Geological Sciences, University of the Plilippines, Quezon City

So if you are ever travelling abroad in eastern Europe or the Philippines and need to desperately look up something in the Journal of Micropalaeontology, you know where to find it!

Mike Kaminski <m.kaminski@ucl.ac.uk>

ECRC Short Courses in Micropalaeontology

The Environmental Change Research Centre at University College London will host three short courses in the Spring Term, 2000 that may be of interest to Micropalaeontology students. Funding to attend these courses is available for NERC-supported Ph.D. students. Requests for funding from current Ph.D. students must be submitted to NERC on form FE2 (from NERC) at least six weeks before the course. Course fees will be paid directly from NERC. The following courses will be taught in the spring:

(1) February 28 - March 10: Numerical Analysis of biological and environmental data, by Prof. H.J.B. Birks & Dr. M. Kernan. Course fee: £650. (2) February 7 - 11: Introduction to Diatom Micropalaeontology, by Prof. R.W. Battarbee, Dr. L. Carvalho and Dr. H. Bennion. Course fee: £300. (3) February 7 - 11: Introduction to Foraminiferal Analysis, by Dr. Mike Kaminski, Course fee: £300.

For course registration forms or further information, please contact Catherine Dalton at the Environmental Change Research Centre, 26 Bedford Way, London, WC1E 0AP (Tel: ++44 (0)171-380-7575) or at www.geog.ucl.ac.uk/ecrc/teaching.htm

Mike Kaminski <m.kaminski@ucl.ac.uk>

Microscopical Societies

In conversation with Jim Riding regarding accesso ries for microscopes and the setting up of a silicofossil group within BMS prompted me to think that it would be worth detailing the societies that are available for those interested in, or using the microscope. There are several such societies or clubs, some national, or even international, others regional. Perhaps it would be pertinent to mention the three main national organisations:

Royal Microscopical Society (RMS)
This has a membership that is mainly made up of professional microscopists, including electron

microscopists. There are two regular publications; The Proceedings and The Journal, the latter being rather technical. Although there are specialised groups within the RMS, the instrument itself is the main focus of attention (no pun intended!).

The Quekett Microscopical Club (QMC)
The QMC was so-called to emphasise the informal atmosphere of what is nevertheless a learned society. Founded in 1865 to facilitate the friendly exchange of ideas between people interested in microscopy, these ideals are still very much at the heart of the club. Membership is predominantly amateur, and includes specialists in all manner of microscopy and allied subjects, including foraminifera and diatoms. There is a full programme of meetings, annual meetings and regional meetings. Yearly subscription includes a twice-yearly Journal and a quartely Bulletin, both of which contain very practical articles. The club also has book and slide collections, both of which can be borrowed by members.

The Postal Microscopical Society (PMS)
Was founded in 1873, with the principal objective, the circulation of boxes of microslides illustrating the work of members and/or that of professional mounters. This is still the main function. Society members, most of which are amateur, are organised into "circuits" of around 12 people. These receive a box of slides every three weeks, accaompanied by notebooks in which each recipient records comments, criticisms, and perhaps additional information. There is a newsletter, 'Balsam Post' which is published five times a year, written by the members, for the members.

As secretary of the PMS, I can send further details to anyone who wishes to know more, including a library list and a recent copy of Balsam Post. I am also a member of the Quekett. Further details can be found at:
QMC: <http://www.nhm.ac.uk/hosted_sites/quekett/>
RMS: <http://www.rms.org.uk>

There are many members of the above societies that study forams or diatoms, are skilled mounters or have experience with identification. They also have a breadth of practical experience in the use of the instrument. Even if membership was not a consideration for BMS members there could be some useful contacts that could be made I am sure.

Do not hesitate to contact me to discuss any of the above.

Mike Samworth <apochrom@eurobell.co.uk> <http://www.microcat.demon.co.uk>

Charles Downie (1923 - 1999)

Members of the Society will be saddened to learn of the death in July 1999 of Charles Downie, one of the pioneers of palynology in Britain.

Charles was a Glaswegian, born in 1923 in the industrial heart of that city. His education was seriously disrupted by naval service during the Second World War. For part of that time, he served on small craft in the Indian Ocean; indeed, he claimed to have visited almost all its islands. However, such was the modest nature of his character that details of this phase of his life still remain vague.

After the war, Charles returned to his home city and enrolled at its University to study geology. He was taught stratigraphy and palaeontology by Leslie R. Moore, then a member of the Glasgow staff. In 1949, Moore was appointed as the 3rd Sorby Professor of Geology at the University of Sheffield. Quickly he set about establishing a research school, with stratigraphy and palynology as major components. Moore had already proved the value of Carboniferous miospores in stratigraphical correlation and was anxious to expand that field.

By this time, Charles had already begun his Ph.D. research, an investigation of the stratigraphy and sedimentology of the Kimmeridge Clay Formation in Dorset. He followed Moore to Sheffield in 1952, when he was appointed as a Lecturer in Geology. His Ph.D. studies continued into those early Sheffield days and it was not until 1955 that the thesis was successfully defended.

Out of interest, Charles tried some of Moore's extraction techniques on his Jurassic samples, recovering both dinoflagellates and what were then called "hystrichospheres". His initial results on the Kimmeridge Clay were reported to the Geological Soeiety of London in 1956 and marked the start to British palynological studies of marine sediments. Earlier workers such as Wetzel, Eisenack and Deflandre had already described much of the morphology and biology of "Xanthidia" or "hystrichospheres" from the European Mesozoic, but it was Downie who was the first to demonstrate their stratigraphic potential in Britain. Moreover, it led to the development of an association with Moore which was to continue through to the latter's retirement and which would lay the foundations for the Palynological Research Laboratory in Sheffield, so soon to attain international renown.

From the outset, Charles made a significant input into the teaching of stratigraphy and palaeontology at Sheffield. After 1959, when Peter Sylvester-Bradley departed to the Chair of Geology at the University of Leicester, Charles's contributions formed the backbone of the major undergraduate courses on these topics. The generations of students whom he taught over the next two decades gratefully remember his lectures for their encyclopaedic content of fact and meticulous blackboard style.

Despite these demands, Charles remained an active and dedicated researcher. In 1957, he initiated a new dimension in research by investigating the morphology and potential stratigraphical application of the "hystrichospheres" in the Lower Palaeozoic. The first results, an account of assemblages from the Shineton Shales of Shropshire, were presented to the Yorkshire Geological Society in 1958. Subsequent investigations included, between 1958 and 1962, successful attempts to recover organic-walled microfossils from the Torridonian Sandstone (late Precambrian) in northwest Scotland. By the early 1960s he was clearly established as a world authority on organic walled microplankton and was widely consulted.

Linked with the parallel progress made in the field of Palaeozoic miospore studies by his colleagues Herbert Sullivan and Roger Neves, Charles's work caused the Sheffield deparünent to become a major research laboratory by the late 1950s. Charles embarked on the development of a research school, with a succession of postgraduates including William (Bill) Sarjeant, David Wall, Graham Williams, Tony Jenkins, Dick Lister, Tim Potter and Geoff Eaton, all of whom were to go on to successful careers in academe or the petroleum industry. It was clear from the wide range of topics they investigated - from the Cambrian to the Cainozoic - that whilst Leslie Moore was the visionary of British palynology, it was Charles who had become the driving force.

Throughout the 1960s and the early 1970s, his main research attention was devoted to the classification of dinoflagellate cysts, a task in which he was ably assisted by Bill Sarjeant and Graham Williams. Numerous publications were generated and a collaboration by Sarjeant and himself with Bill Evitt led to the joint formulation of a "non-Linnean" classification of the acritarchs - the former "hystrichospheres" without demonstrable dinoflagellate affinities. These studies stimulated systematic reviews of many dinoflagellate cyst genera, in landmark publications with Davey, Sarjeant and Williams. In addition, Charles served as co-author of stratigraphical accounts of Jurassic and Tertiary dinoflagellate assemblages, with Lucy Costa, Geoffrey Eaton, Jonathan Bujak and others.

However, it was to the acritarchs that Charles devoted greatest research attention henceforward. Studies, undertaken alone or with co-authors, embraced the early Ordovician Tremadoc sediments, the Silurian Wenlock Shales and the Devonian sediments of Ayrshire. These researches also aided in resolving the age of the Dalradian succession of Scotland, the Manx Slates of the Isle of Man, the Eycott volcanics of the English Lake District and the Chuaria Shales of the Grand Canyon in Arizona. Charles's last major palynological study (1982) was an attempt to correlate the Lower Cambrian acritarch assemblages of Scotland, Norway, Greenland and Canada. The summary account that he wrote of "Acritarchs in British stratigraphy", for a Geological Society of London Special Paper (1984), was essentially a summation of the researches by his students and himself.

Surprisingly to some, Charles did not devote all of his efforts to teaching and palynology. In 1956 he paid his first visit to Kilimanjaro in Tanzania, to study the East African Volcanic Complex. Further expeditions followed, led jointly by Charles and Peter Wilkinson, and eventually resulted in the publication (1972) of the definitive memoir on the geology of Kilimanjaro.

Charles succeeded Leslie Moore as the Sorby Professor of Geology in Sheffield in 1972, a promotion which, though it failed to dampen his enthusiasm for research, presented him with many new tasks in teaching and administration. He was a major proponent of the development of the Masters degree course in Palynology at Sheffield which, before his retirement in 1984, had already produced many of the current generation of scientists. Even in retirement, he continued his association with the Sheffield department, also building up a successful consultancy operation with Roger Neves.

Charles's achievements were widely recognised, both in Britain and abroad. The University of Glasgow conferred on him the degree of Doctor of Science in recognition of the contribution of his researches to geological knowledge. The Yorkshire Geological Society awarded him the John Phillips Medal in 1980 for his distinguished researches in micropalaeontology and stratigraphy whilst the Geological Society of London presented him with the Prestwich Medal. International recognition was reflected by the American Association of Stratigraphic Palynologists making him an Honorary Member in 1982 and upon his retirement, he was honoured in a special issue of the Joumal of Micropalaeontology (1984), which included a biographical article.

Charles Downie was one of the most loved and respected of palynologists. His death leaves a void that can never properly be filled.

Bernard Owens [Centre for Palynology, Department of Animal & Plant Sciences, University of Sheffield, Dainton Building, Brookhill, Sheffield S3 7HF, England] and **William A.S. Sarjeant** [Department of Geological Sciences, University of Saskatchewan, 114 Science Place, Saskatoon SK, S7N 5E2, Canada]

Conodont Group

It has been a quite remarkable six month period for the Conodont Group, with no fewer than four of the contingent getting permanent lectureships — Phil Donoghue and Ivan Sansom at Birmingham and Sarah Gabbott and Mark Purnell at Leicester. Further good news comes from Leicester, where Kim Freedman successfully defended her thesis on agnathan taphonomy in October. Congratulations to all concerned.

Dick Aldridge and Steph Barrett attended the Pander Society meeting in Calgary in August. Steph presented a talk on the apparatus architecture of prioniodontids, and took the opportunity to spend some time looking at collections with Godfrey Nowlan and Bob Nicoll. Dick presented a summary of the work by Phil Donoghue, Peter Forey and himself on a new phylogenetic analysis of conodont affinities. While in North America, Dick also undertook some fieldwork in Early Ordovician strata of the Hamburg Klippe, Pennsylvania, with Bob Ganis and John Repetski; Tremadoc samples are producing some protoconodont clusters in potential association with traces of cuticular tissue, although the specimens collected to date are tantalising rather than definitive.

Howard Armstrong had a busy and productive summer with papers involving conodonts submitted on environmentally entrained growth in conodonts and the provenance of limestone clasts in LORS conglomerates in the Midland Valley. Howard is currently working on faunas from the Garn Formation, Anglesey, and trying to date Dalradian limestones. Work progresses slowly on a revised model for Caledonian orogenesis in northern Britain. PhD projects for the coming year include *Controls on growth in the early vertebrate skeleton* and *Timing of terrane accretion in the Caledonian suture zone*. The latter will be a multidisciplinary study using micropalaeontology, geochemistry and radiometric dating.

Paul Smith had an office-based summer with no fieldwork, writing up rather than collecting Greenland data, together with a variety of fishy projects. These included one with Phil Donoghue on the anatomy of the Early Devonian thelodont *Turinia* and its phylogenetic implications, together with a variety of manuscripts on assorted Cambro-Ordovician fish with Ivan Sansom.

Giles Miller visited Saaremaa Island, Estonia to do some collecting with Tiiu Marss and Viive Viira. They collected some Wenlock and Ludlow shallow water conodont samples as well as some samples rich in anaspid scales. Following that, Giles spent some

time studying Viive's conodont collections and putting together a manuscript with Tiiu that will be published with Henning Blom of Uppsala Unviversity.

Most of Phil Donoghue's summer has been taken up with the transfer from Leicester to Birmingham, a whole six months after transferring from Birmingham to Leicester. He has managed to fit in trips to Paris, Stockholm and Chicago, which were a great success on the 'ostracoderm' front, though conodont studies have been restricted to cladistics.

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

Foraminiferal Group

The BMS Foraminiferal Group meeting was held on May 20 at its usual venue, the Palaeontology Demonstration Room at the Natural History Museum. Norman MacLeod led off the meeting by welcoming the 28 members who turned out to the afternoons event. Thanks are to be extended to Norman for organising the room and for providing refreshments.

Carl JENKINS led off the meeting with a talk about "Kimmeridgian agglutinated foraminifera - results from palynological preparations and dissolution experiments. Carl studied two wellsites near Kimmeridge. Most of the assemblages consist of small agglutinated foraminifera - but the foraminiferal test linings in palynological preps did not seem to match what was observed in the foraminiferal residues. Carl looked at samples from the Blackstone Band, picked out specimens, then dissolved them with 2% HCl. Agglutinates did not dissolve, so none had calcite cement. These were studied using a palynological microscope in immersion. Carl compared the acid preps with the standard palynological preps. Results were surprising - most of the test linings appear to be derived from aragonitic forms. It seems these foraminifera are under-represented in Kimmeridge micropalaeontological preps.

Andy HENDERSON followed up with a talk about Kimmeridgian foraminiferal biofacies from Dorset. This work was done in conjunction with the NERC Special Project on geologically rapid events. Ca. 300 samples were collected from the type Kimmeridge Clay at Kimmeridge. The goal of the investigation was to study the response of the foraminifera to rapid climate change, study the mesoscale distribution, and reproducibility of the micropalaeontological data. Seven biofacies and three taxon associations were recognised, based on generic presence/absence data. Two major faunal turnovers and three minor turnovers were found. Major turnovers were associated with some lithological changes, but not all. Comparison with the Russian literature allows the possibility of correlation with the North Sea, Spitsbergen, and northern Russia. Some zones are the same as those found by Jeno Nagy in Spitsbergen.

The micropalaeontology of the Mid-Cretaceous Mishrif Formation in Dubai (Dubai Petroleum Co) was presented by A. MENEGATTI. One of the goals of the study is to use micropalaeontology to interpret sequence stratigraphy in twelve exploration wells. Environments ranged from shelf lagoon to open inner to middle shelf environments. Shallowing upwards cycles were found. In one of the wells, the K/T boundary was found represented by a black clay that forms a seal between reservoirs. 3rd and 4th order sequences can be recognised.

Rachel PREECE flew in from Bahrain to present some of the results from her thesis research. A comparison between Miocene faunas from Venezuela and West Africa reveal interesting patterns of endemism. A new species of *Popovia* from the Miocene of Venezuela reveals interesting provincialisation. African forms are more complex than the Venezuelan forms. However, between N10 and N16, the inner complexity of the Venezuelan forms increases, with early forms having simple inner hemiseptae. Later forms have complex inner structure beginning early in ontogeny, and in later chambers they branch and anastomose.

Ruth HALE came up from Southampton to provided a report on her Ph.D. project, which is to study the Polar Front in the Scotia Sea. Two cores from the area between the Falklands and South Georgia on either side of the Polar Front were studied. This is the area of the ACC, the strongest current on earth. Benthic foraminiferal proxies for productivity provide evidence of increasing productivity upcore. In Glacial age sediments no foraminifera are found, whereas up to 700,000 pf/g are found in the Holocene, suggesting increasing productivity. *E. weddellensis* + *E. exigua* were also used as productivity indicators. These species increased at the start of the interglacial, when ice sheets moved back. Incoming *Gl. inflata* and *Gl. truncatulinoides* reflect warming in the area. Full interglacial conditions were re-established in the area by 12 ky. In the late Holocene a decline in productivity is observed in recent millennia.

Ahuva ALMOGHI-LABIN (visiting at Cambridge) presented results of her studies in the central part of the Red Sea. Living benthic foraminifera were studied The Red Sea is the warmest and saltiest of all the marginal seas. A pronounced oxygen-minimum zone is

present centred about 500 m, where values are below 0.5 ml/l. Multicore samples were chosen to reflect a range in O_2 values. The Red Sea is interesting because it is oligotrophic, whereas most benthic foraminiferal studies have been carried out in eutrophic environments. Highest abundances are found in the upper margin of the oxygen-minimum zone, whereas moderate abundances are found within, and low abundances below. Foraminiferal density values are one-third to one-quarter of those in other low-O_2 environments studied. The Deep Red Sea is among the most oligotrophic regions of the world.

John MURRAY began his talk with a wanted poster: Foraminifera - Dead or Alive? The talk centred around the problems of recognising live foraminifera. One of the problems is that we do not know how long protoplasm remains after the death of the animal. Production of dead tests takes place by abandonment of unilocular tests, predation, reproduction, starvation, or through disease. In some environments, there may be mass mortality. The rate of decay of a foraminifer is an unknown, but other protozoans decay rapidly. Cytoplasm is rapidly eaten by ciliates and flagellates. A estimate is that probably >80% of tests are formed by processes that remove cytoplasm naturally.

Kurt NIELSSEN from Copenhagen presented evidence of predation on the tests of foraminifera based on observations of bioerosional structures. Circular holes are observed in the tests of planktonic foraminifera. Some tropical juvenile forms have different types of holes. Cup-shaped and oval holes are found. Sometimes there is a single hole in each chamber. Are there distinct predator - prey relationships? For example *Orbulina universa* has a predator that makes a two holes separated by 22°. In some benthics, a hole may be surrounded by a dissolution aureole. Holes in agglutinates tend to be found near the apertures, whereas in some unilocular forms, they tend to occur away from the aperture. An important finding is the observation that all fossil and recent samples examined show evidence for predation. This is a global phenomenon, and there are both planktonic and benthonic predators.

Mike KAMINSKI had just returned from a cruise to the South China Sea on board the R/V Sonne, and gave a brief slide show on some of the initial observations. The recolonisation of the 1991 Mt. Pinatubo ash lobe by benthic foraminifera has entered a new stage, with more epifaunal, tubular, agglutinated foraminifera evident on the surface of the cores. Of interest to the recolonisation story was the finding of burrows infilled with post-1991 specimens of tubular forms. This finding reveals that predator-prey relationships are beginning to be reestablished on the ash lobe.

Finally, Mark HYLTON of the University of Plymouth shared his insight in manipulating digital images. Scanning electron micrograph digital images are stored on ZIP disks and edited JPEG files are around 100kb. Publication-quality typesetting is available to academics at the Oxford University Computer Centre, where 2400 dpi resolution printouts can be made.

After refreshments and a look at the posters, most of the participants dispersed to the local establishments.

In other news, Barun Sen Gupta's book "Modern Foraminifera" has just been published by Kluwer (see book review in this issue), and several BMS Foram. Group members have contributed chapters. Other interesting publications that have come out this summer include (1) the Drooger Symposium Proceedings, edited by Felix Gradstein & Bert van der Zwaan and published by Elsevier in Earth Science Reviews and (2) the Jost Wiedmann Symposium volume, edited by Wolfgang Kuhnt et al. and published as an issue of the Neues Jahrbuch fur Geologie und Palaontologie, Abhandlungen.

We extend our hearty congratulations to Sheila Stubbles (U. Plymouth), Rachel Preece (UCL) and to Ken Bell (Macquarie U., Sydney) who all successfully defended their dissertations and were recommended the award of their Ph.D. degrees. We also note with pleasure that Foram. Group members Bob Wynn Jones and Mike Simmons have recently published a book entitled "*Biosratigraphy in Production and Development Geology*" in the Geological Society Special Publication series (no. 152).

Several Foraminiferal Group members have carried out lateral moves this summer: Bill Austin and John Evans have moved up to St. Andrews University, where Bill has taken up a Readership. Steve Culver has moved back to the US where he has taken up a Professorship at East Carolina University. Also the recent mergers in the oil patch have necessitated mobility among our industrial colleagues. The merger of BP and AMOCO means that what is left of the AMOCO micropalaeontological group is now located at the University of Utah with Anthony Gary. Also the liquidation of SAGA Petroleum in Norway has implications for the BMS members located there. Beginning in the year 2000, Felix Gradstein will be based at the University of Oslo. We also note with interest that the planktonic foraminiferal and morphometric specialist Mikal Kucera has recently accepted a position at Royal Holloway Univrsity. Perhaps Mikal can be prevailed upon to join the Foram. Group once he's settled in.

The date of the millennium year Foram. Group Spring Meeting has been set for Friday, 5 May 2000. The venue will be the Palaeo Demo Room in the Natural History Museum. Abstracts are due on 1 March 2000 and can be sent to Norman MacLeod, Department of Palaeontology, The Natural History Museum, Cromwell Road, SW7 5BD; <N.MacLeod@nhm.ac.uk>. Abstracts may be submitted by e-mail. A public announcement (via listservers) of the meeting will be sent out in December at which time an abstract style sheet will be made available on the Foram. Group section of the BMS web site.

Finally, we note with sadness the untimely passing of Charles D. Hollister, who perished in a climbing accident in the mountains of Wyoming in August. Although not a micropalaeontologist himself, Charley worked closely with micropalaeontologists in the early days of the Deep Sea Drilling Project, and provided much inspiration and encouragement to his micropalaeontological colleagues. An example of this collaboration is the famous "Commotion in the Ocean" paper written by Berggren & Hollister (1974). In more recent years, Charley was the Dean of Students at WHOI, and then worked to raise funds for educational purposes. However, his legacy at WHOI (where Charley was based for 30 years) will live on in the form of the newly established Charles D. Hollister Graduate Student Fellowship at WHOI. Donations to the fund in his memory can be made by contacting John Farrington at the Woods Hole Oceanographic Institution, Woods Hole MA, 02543, USA.

Mike Kaminski <m.kaminski@ucl.ac.uk> & Norm MacLeod <n.macleod@nhm.ac.uk>

Nannofossil Group

Given that we have the held the posts of secretary and chairman for the nannofossil working group for three years we now feel it is time for a change of officers. If anyone is interested in the positions they should get in touch with either myself or Jeremy, with the names of a proposer and seconder. Conventionally only one officer should be changed in any year - normally the chairman, the secretary then becomes chairman and the new officer secretary. However, given that we are unable to devote as much time and effort as we would like to the group, we would be happy to step down for two enthusiastic volunteers keen to organise activities for the group.

Best wishes to Pat Quinn on his appointment as the materials science teaching fellow at the department of Archaeology and Prehistory at the University of Sheffield. Pat has just finished writing up his Ph.D. thesis titled "Ceramic Micropalaeontology: The analysis of microfossils in archaeological ceramics with special reference to its application in the southern Aegean".

Pat was also involved in organising a nanno group research meeting in Sheffield in September. Unfortunately this has had to be cancelled due to both clashes with work commitments and lack of interest. Pat is still prepared to organise another meeting, hopefully before the INA conference next year. If members are still interested in either attending or giving a talk then they should contact either Pat, Jeremy or myself.

Matt Hampton <100710.1020@compuserve.com>

Ostracod Group

News

In previous years, the International Symposia on Ostracoda have generated proceedings volumes which, while serving the active ostracod community very well, by allowing all delegates to publish their results, were inward looking and occasionally lacked firm editorial control. The concept suggested by the British contingent at the International Symposium in Prague in 1994, to break with this tradition, and publish the proceedings of the following Symposium as special volumes in internationally renowned peer reviewed volumes, at fist generated heated debate and criticism through the channels of the OSTRACON Listserver. The meeting was held in 1997 at the Medway Campus of the University of Greenwich, and now, the proceedings are appearing in the scientific press. The specified aim of the organising committee, to reach out to a wider scientific community, and show the palaeontological and zoological worlds what we ostracodologists are about, has now come to fruition.

The first two themes have been published, in Palaeogeography, Palaeoclimatology, Palaeoecology Volume 148, Issue 1-3, 01-April-1999, a special volume entitled Non-marine Ostracoda: Evolution and Environment edited by J.A. Holmes and D.J. Horne. The second theme has been published in Marine Micropaleontology, vol.37, pts 3-4. September 1999, a special volume entitled Marine Ostracoda and Global Change, edited by I.D. Boomer & A R.Lord. The contents of these two are listed below, while the third is currently close to completion, to be published by Kluwer in a special volume of Hydrobiologia, edited by D.J.Horne and K.Martens.

Theme 1

Special Issue: Non-marine Ostracoda: Evolution and Environment edited by J.A. Holmes and D.J. Horne. Palaeogeography, Palaeoclimatology, Palaeoecology Volume 148, Issue 1-3, 01-April-1999

Larry W. Knox, Elizabeth A. Gordon, Ostracodes as indicators of brackish water environments in the Catskill Magnafacies (Devonian) of New York State, pp. 9-22.

Dermeval Aparecido do Carmo, Robin C. Whatley, Simon Timberlake, Variable noding and palaeoecology of a Middle Jurassic limnocytherid ostracod: implications for modern brackish water taxa, p. 23-35.

Zhencheng Sun, Xiaojie Feng, Dongming Li, Fan Yang, Yonghong Qu, Hongjiang Wang, Cenozoic Ostracoda and palaeoenvironments of the northeastern Tarim Basin, western China, pp. 37-50.

B. Brandon Curry, An environmental tolerance index for ostracodes as indicators of physical and chemical factors in aquatic habitats, pp. 51-63.

F. Mezquita, G. Tapia, J.R. Roca, Ostracoda from springs on the eastern Iberian Peninsula: ecology, biogeography and palaeolimnological implications, pp. 65-85.

F. Mezquita, R. Hernández, J. Rueda, Ecology and distribution of ostracods in a polluted Mediterranean river, pp. 87-103.

Patrick De Deckker, Allan R. Chivas, J. Michael G. Shelley, Uptake of Mg and Sr in the euryhaline ostracod Cyprideis determined from in vitro experiments pp. 105-116.

Nigel D. Bridgwater, Jonathan A. Holmes, Sarah L. O'Hara, Complex controls on the trace-element chemistry of non-marine ostracods: an example from Lake Pátzcuaro, central Mexico, pp. 117-131.

Ulrich von Grafenstein, Helmut Erlernkeuser, Peter Trimborn, Oxygen and carbon isotopes in modern fresh-water ostracod valves: assessing vital offsets and autecological effects of interest for palaeoclimate studies, pp. 133-152.

Antje Schwalb, Stephen J. Burns, Kerry Kelts, Holocene environments from stable isotope stratigraphy of ostracods and authigenic carbonate in Chilean Altiplano Lakes, pp.153-168.

J.A. Holmes, M.J. Allen, F.A. Street-Perrott, M. Ivanovich, R.A. Perrott, M.P. Waller, Late Holocene palaeolimnology of Bal Lake, Northern Nigeria, a multidisciplinary study, pp.169-185.

Theme 2

Special issue: Marine Ostracoda and Global Change, edited by I. Boomer & A Lord. Marine Micropaleontology, vol.37, pts 3-4. September 1999.

Thomas M. Cronin, Dawn M. DeMartino, Gary S. Dwyer, Julio Rodriguez-Lazaro, Deep-sea ostracode species diversity: response to late Quaternary climate change, pp. 231-249.

Richard Ll. Jones, Robin C. Whatley, Thomas M. Cronin, Harry J.Dowsett, Reconstructing late Quaternary deep-water masses in the eastern Arctic Ocean using benthonic Ostracoda, pp. 251-272.

Michael E. Schudack, Ostracoda (marine/nonmarine) and palaeoclimate history in the Upper Jurassic of Central Europe and North America, pp. 273-288.

I. Mazzini, P. Anadon, M. Barbieri, F. Castorina, L. Ferreli, E.Gliozzi, M. Mola, E. Vittori, Late Quaternary sea-level changes along the Tyrrhenian coast near Orbetello (Tuscany, central Italy):palaeoenvironmental reconstruction using ostracods pp. 289-311.

Kristian Schoning, Stefan Wastegård, Ostracod assemblages in late Quaternary varved glaciomarine clay of the Baltic Sea Yoldia stage in eastern middle Sweden, pp. 313-325.

Robin Whatley, Richard Jones, The marine podocopid Ostracoda of Easter Island: a paradox in zoogeography and evolution, pp. 327-343.

Adrian M. Wood, Maria Inês F. Ramos, Robin C. Whatley, The palaeozoogeography of Oligocene to Recent marine Ostracoda from the Neotropics (mid- and South America) and Antarctica, pp. 345-364.

João Carlos Coimbra, Irajá Damiani Pinto, Norma Luiza Würdig, DermevalAparecido do Carmo, Zoogeography of Holocene Podocopina (Ostracoda) from the Brazilian Equatorial shelf, pp. 365-379.

Electronic access.

These papers may be downloaded in PDF format from Elsevier

For the P3 volume: <http://www.elsevier.com:80/inca/publications/store/5/0/3/3/5/1/>

For the Marine Micro volume: <http://www.elsevier.com/inca/publications/store/5/0/3/3/5/5/index.htt>

Meeting report - *Cambridge, 17th –19th September, 1999*

Mick Frogley hosted this years Autumn meeting for the Ostracod Group. In all 19 people attended the weekend which continues the record of high attendance at our 'talks and field collecting' weekends. Another tradition we maintained was to have a number of overseas speakers at these events, although thanks to the Channel Tunnel I'm not sure whether Belgium really is 'overseas' anymore! We even had a speaker who flew in from Akron, Ohio to address the meeting so the group appears to be alive and kicking.

The meeting was based around St John's College in Cambridge and the Saturday morning was taken up with a series of talks, most of which followed a theme of Ostracoda from non-marine settings.

Ian Slipper (Greenwich) *Revision of the Jones and Jones & Hinde collections in the NHM.*
During examination of the Cretaceous ostracod collections at the Natural History Museum, it became clear that a number of specimens which previously were thought to have been lost, were in fact still in existence. A revision of the marine Cretaceous Ostracoda by P. Kaye in 1964 gave a check list of species, stating their then current status. This current investigation shows that 4 species in the Jones collection, relating to the Monograph of 1894, and 17 species in the Jones & Hinde collection, relating to the 1890 Monograph, have now been found. This has significance, particularly in the case of *Cytherella williamsoniana* Jones 1849, which was taken by Alexander in 1929 as the type species of the genus *Cytherelloidea*. The specimen designated as lectotype by Howe and Laurencich was stated by Kaye to have been lost, and that no valid type existed for the genus. This situation can now be reversed on discovery of the lectotype. Other instances of taxonomic confusion can now be clarified in a similar manner.

Dave Horne (Greenwich) *When dinosaurs ruled the Earth, what were the ostracods doing?*

Ian Boomer (Newcastle) *An Early Jurassic oligohaline ostracod assemblages from the Venetian forealps, NE Italy.*
Micropalaeontological investigation of a Black Shale horizon within the carbonate platform sediments of the Calcari Grigi Formation (Trento Platform, NE Italy) has yielded the first unequivocal oligohaline, early Jurassic, ostracod assemblage. The shales, which are dated as Sinemurian on the basis of ammonites and foraminifera above and below, are devoid of foraminifera and ammonites, thus supporting a non-marine context. The ostracod assemblage is dominated (>87%) by a single taxon (to be erected as a new genus and species). The remaining ostracod taxa are assigned to *Limnocythere* and *Kliena*? The discovery of such an assemblage within an otherwise marine sequence indicates temporary, physical isolation from marine influence, possibly as a result of barrier formation and/or sea-level fall.

Ian Boomer (Newcastle) *Late Quaternary to Recent Ostracoda from the southern Caspian Sea*.

Koen Martens (Brussels) *Crustacean diversity in Ancient lakes.*

Isa Schoen (Brussels) Darwinula stevensoni *and Dolly – what do they have in common?*
Evolutionary theory states that ancient asexuals constantly accumulate genetic changes due to the absence of recombination (and meiosis). This will eventually lead to heterozygosity within the genome, as even the two alleles of the same gene will become very different. Although White already made a similar prediction about 20 years ago, this effect is commonly known as the 'Meselson Effect'. We will give an extensive introduction to our current project, which utilises cloning techniques to screen genetic diversity of *Darwinula stevensoni* and to test the Meselson Effect.

Lisa Park (Akron) *Ecology and speciation of the ostracod clade,* Gomphocythere*, in Lake Tanganyika, East Africa.*
Speciation in the East African lakes is remarkable, resulting in many endemic species flocks consisting of 10s to 100s of species. Lake Tanganyika, in particular, supports one of the most diverse faunas of any lake system. We integrated ecological and phylogenetic data sets of modern and sub-fossil samples of a clade of ostracods in Lake Tanganyika to examine the role of ecological variables in speciation. We found variability in the substrate and depth distributions of certain species and overall distributions supporting a metapopulation model of species distribution. When mapped onto the phylogeny, sister-groups appear to favour different environments with respect to either substrate or depth, suggesting that niche partitioning plays an important role in the speciation process. This niche differentiation, coupled with a series of lake level fluctuations as well as a patchy substrate distribution pattern controlled by the tectonic regime of the lake, is responsible for much of the diversity seen in this complex ecosystem. In addition, the high levels of homoplasy (CI=0.46) seen within the phylogeny suggest parallel acquisitions of character states as a response to the high habitat heterogeneity. The phylogeny reconstruction of this species flock of ostracods in Lake Tanganyika and the high homoplasy frequency revealed supports the importance of multiple radiations as a primary speciation mechanism in this system.

The field work

Saturday afternoon was spent a few miles to the north of Cambridge at Wicken Fen Nature reserve where we sampled a number of freshwater localities for ostracods. Mick Frogley had the map, and Koen Martens had the GPS, all we needed were some ditches with water in; those that the Nature Reserve Warden had directed us to remained stubbornly dry. However, Dave Horne soon found suitable sites, and several ostracods were instantly identified. We are waiting to hear from the intrepid collectors

as to exactly which species were present. The day was rounded off splendidly by an excellent meal at Efe's Turkish Restaurant in Cambridge, a meal not for the faint-hearted (or the vegetarian!), well done to Nicky Johnson for all her reconnaissance field work.

As usual, Sunday morning found us in the middle of a quarry, this time to look at and collect the Albian and Cenomanian Cretaceous sediments (Gault, Lower Greensand, Chalk Marl and Grey Chalk) at Barrington, where we were ably led by Ian Slipper.

Our thanks go to Mick and Ian for their work in putting together another successful meeting. We invite all ostracodologists , BMS members and friends to join us for our Spring meeting which (subject to confirmation) will be held in the Lake District on the first weekend in March next year (possibly the first ostracod meeting of the third Millennium!). Look forward to seeing you all there.

SPRING 2000 Meeting of the Ostracod Group

There was agreement at the autumn meeting (see report by Ian Boomer above) that the next, entirely field-based meeting, of the Ostracod Group, should be held in the Lake District. This would be lead by the combined team of D.J. Horne (Greenwich University) and J.A. Holmes (Kingston University). The traditional date of the spring meeting is the first weekend in March. However, due to the University fieldwork teaching having been moved to early March, it is suggested that we hold the meeting in the first weekend of April. This would mean meeting up on Friday 31st March to Sunday 2nd of April.

Anyone who is interested in attending this meeting, please contact me, Ian Slipper, at the address below.

Call for nominations

Matt Wakefield, our current chair, has now been in post for three years. Last year he was to stand down from the committee, but has continued for a further year. He again wishes to stand down. So please send nominations for the Ostracod Group Chair to me, Ian Slipper, at the address below.

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

Palynology Group

Members of the Palynology Group were active at several international meetings over the summer.

The "8th International Symposium on the Ordovician System" was held in Prague in June. Parallel sessions were run over 4 days, and it was refreshing that for an entire day one of the sessions was devoted to palynology. All aspects of Ordovician palynology were covered by more than 20 presentations. As a consequence of the strong palynological emphasis, a large contingent of palynologists attended, and Florentin Paris and Thomas Servais should be congratulated for organizing the palynological contribution. Extended abstracts for all of the symposium presentations are published in *Acta Universitatis Carolinae: Geologica*, 1999, Vol. 43, no. 1/2. It is planned that selected palynological papers presented at the symposium will be published in a special issue of *Review of Palaeobotany and Palynology*.

Also in June, a number of palynological talks were presented at a meeting in Gothenburg entitled "Early Paleogene Warm Climates and Biosphere Dynamics". These talks not only emphasized the biostratigraphical value of palynology in the Tertiary, but also demonstrated its use in reconstructing past vegetation and climate.

The "14th International Congress on the Carboniferous-Permian" took place in Calgary in August. The importance of palynology in Carboniferous biostratigraphy is well established, and an entire day was devoted to Upper Palaeozoic palynology. More than 20 talks with a palynological input were presented.

The next national meeting of importance is the annual one day meeting of the "Linnean Society Palynology Special Interest Group". In a break from tradition, the meeting will not be held in London, but in the Centre for Palynology of the University of Sheffield. The meeting takes place on Wednesday 27th October and commences at 10.30am. There is a full and exciting programme. Details are available on the University of Sheffield Web Site [http://www.shef.ac.uk/uni/academic/D-H/es/paly.html] and further information can be obtained by contacting Duncan McLean (<d.mclean@sheffield.ac.uk>; tel: 0114 222 3692).

Charles Wellman <C.Wellman@sheffield.ac.uk>

Silicofossil Group

This is our inaugural year and decisions have to be made about the direction of this multidisciplinary group, what meetings to organise, etc. As with Previous meetings, held under the auspices of the Foraminifera Group or as Miscellaneous Microfossils, the subject coverage of the Silicofossil Group is still very broad, encompassing radiolaria, diatoms (both marine and non-marine), sponge spicules and silicoflagellates - and how about phytoliths too?! This approach I feel adds to the interest at meetings, where people get the chance to hear about techniques from other fields than their own (biology vs geography vs Geology). So, if you are interested in attending the first meeting, please let us know and we will contact you once we have final details organised. We had an offer of a talk on radiolaria from Norm MacLeod before the meeting was arranged! For those who know Norm as a foraminiferal researcher, he started life working on North American Jurassic radiolaria! We will post details about the meeting on the website. As the opportunities of collecting fossil radiolaria and diatoms in the UK are somewhat limited, we will be exploring the possibilities of having a field meeting abroad next year (e.g. Portugal or Germany), maybe in conjunction with another BMS Group.

With regard to membership of the Silicofossil Group I appreciate that many siliceous microfossil workers are not necessarily aware of the BMS. Diatom workers are a good example, often working through Geography Departments. Could we take this opportunity to ask BMS members to spread the news of the existence of the Silicofossil Group? To this end, Jenny will contact various diatom groups and I have approached the International Association of Radiolarian Paleontologists (InterRad) to disseminate information about our group. Our meetings will be open to all, In fact at the last Siliceous Microfossil meeting I organised in UCL a few years ago, a palynologist managed to attend by evading the tight security and even wrote a report of the meeting for the BMS Newsletter (Bill Braham certainly gets around!).

John Gregory <john@jgregory.demon.co.uk>

The Living, the Naked, and the Dead

It is a commonplace in science to walk into your classroom/common room/seminar room and calmly announce to your students and colleagues that everything they thought they knew about a topic upon which they were supposed to be expert is actually quite wrong. It happens to all of us and it is one of the things that keeps science exciting. In biology one of the greatest recent sources of these types of advances has come from the combination of molecular biological data with quantitative methods of phylogenetic inference along with a new appreciation for the power of accurate phylogenetic trees to increase our understanding of life's history. However, whereas this phylogenetic revolution is well underway in most areas of systematics—and has been for some time now—micropalaeontology remains something of a systematic backwater in this respect. A depressingly large number of systematic studies are still grounded in outmoded assumptions (e.g., phenetic similarity can be used to reliably reconstruct phylogenetic relationships, the stratigraphical record can be used to reliably identify ancestors and descendants). Nevertheless, there is hope. Studies are now beginning to appear that demonstrate the power of new data types and new data analysis methods to micropalaeontologists in no uncertain terms. One of the most recent of these has been the work of Jan Pawlowski and colleagues on the molecular systematics of foraminifera.

Foraminifera, as we all know, are marine, testate, granuloreticulose sarcodines whose fossil record stretches from Cambrian to Recent. Wrong! As it turns out analysis of ribosomal DNA and actin gene sequences from *Reticulomyxa filosa* (a giant freshwater amoeba currently placed within the Class Athalamea) clusters within the Allogromiina when compared to homologous gene sequences from representatives of the Archaezoa, Euglenozoa, Foraminifera, Slime Moulds, Amoebae, Fungi, and Animalia (the latter including data from *Homo sapiens*, see Pawlowski et al. 1996; Pawlowski et al. 1997; Pawlowski et al. 1999). These data challenge accepted foraminiferal taxonomy and the observational basis for that taxonomy, as well as nicely demonstrating the power of new observations and analytic methods to breathe fresh life into old and somewhat stale systematic problems. While the Pawlowski groups' results will need to be confirmed by many additional analyses, present results suggest that foraminifera are neither necessarily testate nor marine. Because *R. filosa* is grouped within the thecate Allogromiida it probably represents a group characterised by secondary loss of the test. However, since its

sister groups (Euglenozoa and Slime Moulds) lack tests it is by no means certain that the ability to construct a shell is a synapomorphy for the group. Moreover, The position of the group containing foraminifera (there are conflicting results with respect to the issue of foraminiferal monophyly) below the Slime Moulds suggests that they diverged from the Euglenozoa well before Cambrian and possess a long evolutionary history (presumably as naked cells) prior to their first appearance in the fossil record. This, of course, also lends support to the hypothesis of a long Precambrian diversification history for most major organismal clades and supports the interpretation of the "Cambrian explosion" as an environmentally-mediated explosion of skeletonization—that, ironically, could signal an overall biodiversity crash—than a true diversification event.

Of more relevance to routine foraminiferal systematics, Pawlowski's data suggest that test-based morphological observations may not be adequate guides to foraminiferal phylogeny in the post-Cambrian fossil record. Certainly few would have identified *R. filosa* as an allogromid sister group on the basis of the standard test-based taxonomic criteria. Pawlowski's work with planktonic foraminifera also show interesting incongruences between the observed stratigraphical ranges of modern species and their pattern of first appearances as inferred by molecular phylogenetic data (see Pawlowski et al. 1997; MacLeod 1999a, 1999b). If neither test morphology nor the stratigraphical ordering of first appearances can be regarded as an appropriate basis on which to infer phylogeny and taxonomy, the path is opened for a through reappraisal of foraminiferal systematics (and perhaps even biostratigraphy) in the light of emerging molecular data. If foraminiferologists take an appropriately rigorous approach to this reappraisal—one that combines data from all sources and analyzes those data within an explicitly quantitative context—they can (1) dramatically improve the systematic basis for the application of foraminiferal data to a wide variety of important stratigraphical, ecological, geographical, etc. problems, (2) join their brethren at the forefront of contemporary systematic research, and (3) serve as an example to researchers in other micropalaeontological disciplines. Foraminiferal micropalaeontology will avail itself of the advantages of phylogenetic systematics sooner or later and it will be studies like those of Pawlowski and colleagues which will hasten that day.

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Norman MacLeod, The Natural History Museum <n.macleod@nhm.ac.uk>

From little forams, past climate models grow

Arguably the most significant geoscience papers published in the last two decades have been the contributions of Berner, Ruddiman *et al*. on the modelling of past climates. These papers have allowed the earth science community to tap into the consciousness of the public and wider scientific community, and to drive the global climate change debate. The fundamental role of the oceans as sinks for carbon dioxide throughout geological time (see for example, an excellent review by Raven & Falkowski 1999) and the fixing of marker elements and isotopes by organisms places micropalaeontology very much in the spotlight. Two recent papers in *Science* demonstrate this point.

Seawater pH controls the Carbonate Compensation Depth and moderates the dissolution of atmospheric CO_2 in the oceans. Therefore, proxies are required with which to study pH profiles in "fossil" oceans. Palmer *et al*. (1998) present an integrated study where foraminifera taxonomy and isotope geochemistry meet to assist the study of ocean states over the last 16 Ma. Using the link between boron distribution and pH, and the preferential fractionation of ^{10}B into $B(OH)_4^-$, the authors have been able to utilitze the incorporation $B(OH)_4^-$ into calcite of foraminifera tests in constructing five pH depth profiles the mid Miocene to the late Pleistocene.

In an allied study, Pearson & Palmer (1999)

use their calculations of mid-Eocene seawater pH to try and fill in some of the gaps present in atmosphere CO_2 estimates. This time interval is critical in any modelling of past climates as global cooling and the transition from the Cretaceous Greenhouse into the Cenozoic Icehouse occurred through this time.

In common with many of the best papers, these articles stem from basic scientific disciplines. Without the ability to discriminate between pelagic foraminifera species from mixed layer, intermediate, thermocline and deep calcification depths, these studies would never have been possible. Although taxonomy is perceived to be an unfashionable area of research, these studies demonstrate that taxonomy does have a central role to play in answering some of the 'big' questions in the earth sciences, and provide an excellent starting point to inspire the next generation of micropalaeontologists.

References

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<i.j.sansom@bham.ac.uk>

Forthcoming Meetings

Geoscience 2000 Manchester 17-20 April. Organised by The Geological Society, the Mineralogical Society, the Palaeontological Association, the British Geophysical Association and the British Micropalaeontological Society. See Secretary's report for further details, or <http://www.geolsoc.org.uk/gs2000.htm>

Palynology and Micropaleontology in Canadian Geoscience: Frontiers and Applications
One-day Symposium sponsored by the Canadian Association of Palynologists (CAP) to be held during GeoCanada 2000, Calgary, Alberta, May 29 - June 2 2000.

The GeoCanada 2000 event is Canada's millennium conference of the major geoscience societies, including the Geological Association of Canada, and will be held in Calgary, May 29 - June 2 2000. As part of this meeting, CAP will be sponsoring a one-day symposium, featuring both oral and poster presentations, on "Palynology and Micropaleontology in Canadian Geoscience: New Frontiers and Applications". For more information on CAP, please see the Association's website at <http://www.ualberta.ca/~abeaudoi/cap/cap.htm>

Palynology and micropaleontology contribute to many branches and aspects of geoscience: biostratigraphy, paleoecology, vegetational history, maturation studies, evolution, past biodiversity, isotope studies, limnology, oceanography, and many others. To capture fully the Canadian scene, we welcome contributions on any locality from those working within Canada, and on Canadian sites from those working outside the country.

At this time, we are requesting an expression of interest, and a paper title, from potential contributors. The one-day session can accommodate 14 oral presentations. The convenors reserve the right to assign presentations as posters. We would appreciate receiving your responses by **November 26, 1999**.

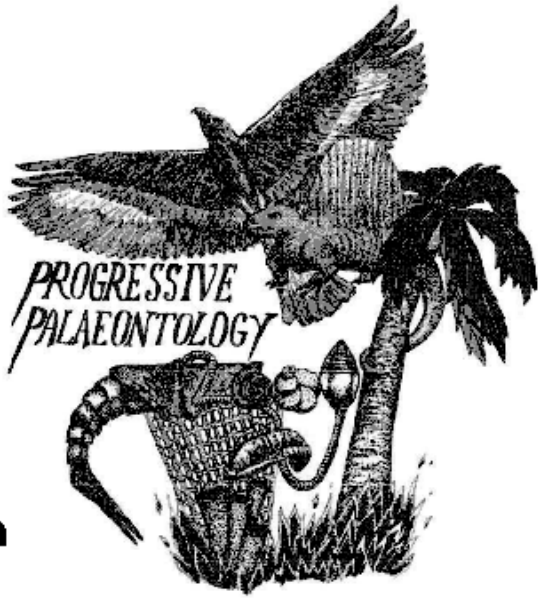
Abstracts must be submitted directly to the Conference Committee. Abstracts can be submitted electronically between October 22 1999 - January 7 2000.

Please note that the final abstract deadline is January 7 2000. The abstract form, submission instructions, and details of the meeting are available on the conference website at <http://www.geocanada2000.com>

If you are interested in contributing to this Symposium, please contact either of the convenors: Alwynne B. Beaudoin <abeaudoi@gpu.srv.ualberta.ca> or Martin J. Head <mh300@cam.ac.uk>

Progressive Palaeontology 2000 14th-15th June, University of Birmingham. Organised under the auspisces of the Palaeontological Association, an informal 2-day meeting intended for postgraduates to get together and present short talks, or posters, on their current research, but all are welcome to attend. For further details contact Jo Snell <j.f.snell@bham.ac.uk>, Rosie Widdison <r.e.widdison@bham.ac.uk> or url <http://www.bham.ac.uk/Earth Sciences/research/palaeo/index.htm>

Progressive Palaeontology 2000



14th-15th June 2000
The University of Birmingham

An informal 2-day meeting intended for postgraduates to get together and present short talks, or posters, on their current research, but all are welcome to attend. We are particularly interested in hearing from first year postgraduates. There will be a wine reception in the Lapworth Museum at the end of the first day, followed by supper in a local restaurant. The fieldtrip on the Thursday will visit some local palaeontological sites.

Registration is free.

To register, submit abstracts, or for further information about the meeting or accommodation, please contact Jo Snell or Rosie Widdison at:

J.F.Snell@bham.ac.uk
R.E.Widdison@bham.ac.uk.
Telephone: 0121 414 3486
Fax: 0121 414 4942

School of Earth Sciences,
The University of Birmingham,
Edgbaston,
Birmingham,
B15 2TT.

Deadline for abstracts: 31st March 2000

A meeting of the Palaeontological Association

Organised by:
Joe Botting, Nick Clack,
Jo Snell and Rosie Widdison.

http://www.bham.ac.uk/EarthSciences/research/palaeo/index.htm

Palaeontology Down-Under — Interlinked Meetings for the year 2000

Under the auspices of the International Palaeontological Association, the Australasian Association of Palaeontologists, the Macquarie University Centre for Ecostratigraphy and Palaeobiology and IGCP Projects 410 and 421.

Preamble:
Five interlocking events - 3 conferences, 2 IGCP meetings and associated excursions have been programmed to follow on from the Australian Geological Congress (3-7 July, 2000, University of Technology, Sydney). The conferences and meetings are:

1. **Australasian Palaeontological Convention-2000** (APC-2000) - including a celebration honouring Professor Barry W. Webby.
2. The **Third International Symposium on the Silurian System** (Sir Frederick McCoy Silurian Symposium).
3. The **Second Australasian Conodont Symposium** (AUSCOS-2).
4. **IGCP 410** Meeting (The Great Ordovician biodiversity event: implications for global correlation and resources).
5. **IGCP 421** Meeting (North Gondwana mid-Palaeozoic bioevent/biogeography in relation to crustal dynamics).

Venue:
Orange, NSW, 260 km west of Sydney, in the heart of the most instructive Ordovician, Silurian and Early Devonian sequences in eastern Australia.

Program:
Pre-Conference Excursion
Sat 8 July: Bungonia Group and the Silurian of the Yass Synclinorium.
Sunday 9 July: Wellington: Silurian (Llandovery-Wenlock): Quarry Creek, Borenore (graptolites/ conodonts/corals).
Monday 10 July: Wellington and Orange: Late Silurian-Early Devonian - Wellington, Eurimbla and Nubrigyn (autochthonous and allochthonous sequences: channel deposits, carbonate fans, intermittent platform exposure and grand-scale platform-margin collapse).

Conference
Tuesday 11 July: First day of papers - parallel sessions: APC-2000 - general themes; AUSCOS-2 - Cambrian, Ordovician and Silurian conodonts.
Wednesday 12 July: Second day of papers - parallel sessions: APC-2000 - general themes; AUSCOS-2 - Silurian, Devonian and younger conodonts.
Thursday 13 July:
Excursion interlude: Three alternatives will be offered: 1. Day trip to Cliefden and Bowen Park; Late Ordovician shelly faunas/ conodonts. 2. Day trip to Wellington. Pliocene-Holocene biodiversity: Wellington Caves phosphate mine / caves vertebrate fauna; Western Plains Zoo (Dubbo); Lake Burrendong Arboretum. 3. Wineries of the central western New South Wales.
Friday 14 July: Third day of papers - parallel sessions: APC-2000 (Mesozoic and Cainozoic papers); Sir Frederick McCoy Symposium papers. Evening: Conference Dinner
Saturday 15 July: Papers for APC-2000/AUSCOS-2/ McCoy Symposium continued and Meetings of IGCP410 and IGCP421.

Post Conference Excursion (Part 1)
Sunday 16 July: Tamworth via Scone, Timor and Nundle: examination of Timor and "Crawney" limestones, (shelly faunas, conodonts; autochthonous and allochthonous sequences).
Monday 17 July: Cambrian-Devonian of the Tamworth Belt: Woolomin, Loomberah, Tamworth Hospital Quarry (shelly faunas, conodonts, mainly allochthonous sequences).
Tuesday 18 July: Autochthonous Early and Middle Devonian limestones at Sulcor, Attunga and Yarramanbully (shelly faunas, conodonts; autochthonous and allochthonous sequences); Goondiwindi (via Moree Artesian Spa Baths).
Wednesday 19 July: Biloela. Mid-Palaeozoics at Monto (briefly) en route.
Thursday 20 July: Gladstone: Devonian-Early Carboniferous of Mount Morgan-Rockhampton-Raglan area (Mount Etna, Horrigan Creek, Mt Holly (conodonts, corals; autochthonous vs allochthonous stratigraphy.

Post-Conference Excursion (Part 2)
Friday 21 July: Depart Gladstone 11am for Heron Island by catamaran for Sir Frederick McCoy Symposium Carbonate/ Build-up Workshop - focussed on carbonate sedimentation and reef-structuring organisms.
Convenor: John Jell.
Saturday 22 July to Monday 24 July: three full days on Heron Island.
Tuesday 25 July: Depart Heron Island

PUBLICATIONS:
We are presently negotiating for a number of publications:

A festschrift in celebration of the contribution Prof. Barry Webby has made to Australian and international palaeontology, possibly combined with: 2. A collection of papers of a general nature (Contributions by young-career researchers are especially encouraged). 3. The AUSCOS-2 volume of conodont papers. 4. The Sir Frederick McCoy Silurian volume.

For those interested in attending one ore more of these events please register on-line at:
http://www.es.mq.edu.au/MUCEP/auscos/online_form1.htm
To receive the second circular (late 1999), please register as soon as possible, preferably before October, 1999. Details about the costs of conference and excursion packages can be found at the conference home page at: http://www.es.mq.edu.au/MUCEP/auscos/auscos.htm

Glenn A. Brock and **Peter Cockle**
<pcockle@laurel.ocs.mq.edu.au>

International Subcommission on Cambrian Stratigraphy (ISCS) Field Meeting , Argentina 2000. Precordillera and Eastern Cordillera of western and northern Argentina - August 18 - 25th, 2000.

First circular

During the last meeting of the Subcommission "Laurentia 99", Argentina was elected as the site for the first meeting of the next millenium for the Cambrian Subcommission. It will highlight important Cambrian sections of the Precordillera Basin (allochtonous / para-autochtonous?) and the Central Andean Basin (typical Gondwanan siliciclastics). The meeting is scheduled between the 18 and the 25 of August, and has been coordinated to start right after the IGC in Rio de Janeiro (for those travelling to that event).

Organising committee

Silvio Peralta (IGEO - Univ. of San Juan) <speralta@unsj.edu.ar> Guillermo F. Aceñolaza * (INSUGEO - Natl Research Council (CONICET) Univ. of Tucumán) * Corresponding member <eg17112@autovia.com> Franco Tortello (INSUGEO - Natl Research Council (CONICET), Univ. of La Plata) <tortello@museo.fcnym.unlp.edu.ar> Florencio G. Aceñolaza (INSUGEO - Natl. Research Council (CONICET), Univ. of Tucumán) <insugeo@unt.edu.ar>

With the support of the Argentine National Research Council (CONICET) and the National Universites of Tucumán, San Juan, Salta and La Plata.

Registration and costs

The registration fee for those attending to the Field Meeting has been provisionally set in $800 (one argentinian peso is equal to one US dollar). The price is "all included", and combines the special volume of the meeting (extended abstracts+ field trip guides), all hotels, meals and all air tickets for the flights inside Argentina. The booking form with final prices will be included in the next circular. Once we know the provisional number of participants, we will try to get lower prices by means of group discounts, as well as official subsidy. Some support has already been approved but we need to know the approximate number of participants.

We want to show the two very different areas with the thickest Cambrian development of Argentina to all the participants, and due to the long distances inside the country, travelling will be done by air (from Precordillera to the Eastern Cordillera is over 1200 km). The final price will include the air tickets from San Juan to Salta and from Salta to Buenos Aires (particular needs for special intineraries will also be arranged if you are not entering Argentina via Buenos Aires). If desired, travel arragements can be done individually by the interested people.

Preliminary schedule

The meeting will start in San Juan city (western Argentina) with a reception on the night of the 18th of August (rigth after Brazil IGC). For those traveling to Brazil, many daily flights connect Rio with Buenos Aires and Buenos Aires with San Juan. For those travelling from Europe, you will probably have to stop in Buenos Aires (most flights do so). If you are coming from the USA, you can either enter via Cordoba city or Buenos Aires to San Juan. An alternative route is to travel to Santiago de Chile and from there to Mendoza and San Juan (this alternative is not well connected - not recommended).

During the next morning (19 th) an introductory speech on the Precordillera will be held on the Instituto de Geología of San Juan University. After an early lunch (12:00) a visit to the Quebrada de Zonda is scheduled for the rest of the day. Quebrada de Zonda: 12 km west of San Juan, classical locality with outcrops assigned to Las Lajas Formation (500 m thick) showing the *Olenellus* Biozone and reaching up to the *Bolaspidella* Biozone (Marjuman Stage). Limestones, wackestones and mudstones are recognized, on an inferred subtidal environmental setting. Oolitic bars will also be seen (packstones and grainstones), and have been interpreted as deposited in a nearshore

environment. The last stop will examine the Zonda (350 m) and La Flecha formations, the latter characterized by biolaminated dolostones and stromatolites formed in a peritidal setting.

On the 20th, we will visit the Quebrada de la Flecha during the morning, and back in San Juan for a late lunch. Sessions of the SCS are scheduled during the afternoon. Typical dinner with folkoric music is planned after the sessions (San Juan Province is one of the main wine producers of Argentina). Quebrada de La Flecha: 90 km south of San Juan City, 400 metres of impressive stromatolite limestones deposited in a peritidal setting, characterized by shallowing upwards small cycles (<5 m). This unit is overlain by the Tremadoc La Silla Formation and the San Juan limestones also of an Ordovician age.

The 21 st will be devoted to the northern Precordillera, with a visit to Quebrada de La Silla and back to San Juan. On the late evening, a flight is planned to Salta city in northern Argentina. Quebrada de La Silla: The section is placed close to Jachal town (150 km north of San Juan). In this locality the transition of the Cambrian and Ordovician will be seen in the La Silla Formation (350 m), which is represented by thick packages of wackestones, deposited in a restricted subtidal rimmed shelf. This formation ranges from the *M. depressa* Subzone to the *Paltodus deltifer* conodont Biozone (Upper Tremadoc). In the lower levels the *Plethopeltis* biofacies has been recognized.

On the 22nd an introductory speech on the northern Argentinian Cambrian basins will be held in the Faculty of Geology of Salta University, visiting the Quebrada del Toro during the afternoon. Back to have dinner (typical food and music of Northern Argentina) and sleep in Salta city (city with well preserved Spanish Colonial Architecture). Quebrada del Toro: This classical locality of northern Argentina shows superbly the Puncoviscana Formation, represented by flysch-like turbidites, isolated limestones and conglomerates. These rocks have been interpreted as deposited offshore on deep fans with sporadic storm layers and a fairly good number of ichnogenera have been identified (*Oldhamia,Nereites, Neonereites, Protichnites, Planolites, Scolicia, Helminthopsis* and *Monomorphichnus*). Localities with trace fossils will be visited.

The 23rd is planned with a visit to the Quebrada de Humahuaca in Jujuy Province (north of Salta) with night in Tilcara town (3000 m above sea, ancient Indian fort). Typical dinner with live Andean music is planned. Quebrada de Humahuaca: In this locality we will see deeper facies of the Puncoviscana Formation, cut at the top by a major angular unconformity (Tilcarian Orogeny) that represents the base of the sparsely fossiliferous Mesón Group (Lizoite, Campanario and Chalhualmayoc formations) with quartzites, sandstones and very few shales. The latter is followed by the Santa Victoria Group, whose base shows the interval of the Cambrian-Ordovician Boundary, with *Parabolina* (*Neoparabolina*), *Jujuyaspis keideli* (the type locality of this important trilobite will be visited), *Rhabdinopora flabelliformis* and *Iapetognathus - Cordylodus*.

On the 24th we will go up to the town of Humahuaca (3600 m above sea level). A meeting of the SCS will be held during the afternoon. The flight to Buenos Aires is planned on the morning of the 25th.

Please note that we will be going up to 3600 m above sea level. Health insurance is highly recomended for all participants.

Publication

Contributions will be accepted for oral and poster presentations. Extended abstracts will be published in the form of short papers. The contributions should not exceed four A4 pages (font size 12 Times New Roman), including references and line drawings. One photographic plate per article will be allowed. Further information will be provided in the next circular.

The possibility of publishing the complete articles as a special number on a journal, with a maximum delay of one year, is being analysed (it will depend on the number of papers offered). The standards will meet the ones of Spain´s field meeting (1996). If this can be achieved, during the meeting we will publish only regular abstracts with the field guide. The final type of publication will be informed in the next circular.

Due to imperatives imposed on the organization, participants intending to present an abstract are encouraged to submit the provisional title (s) and author (s) before February 1st, 2000. These are needed to ask for financial support in different governmental and scientific institutions (see Provisional Registration Form at the end).

Expected weather

The second half of August is usually quite cold. Expect 5º to 15º Celsius and no snow. If we are lucky we will have between 15º to 20º degrees. Days are short (getting dark about 19:30) so we will try to use all the daylight in our activities. No rain is expected (dry season).

Important dates
1. Deadline to answer the first circular with suggested title(s) of your contribution(s): February 1st, 2000.
2. Distribution of the second circular with definitive prices, registration form and detailed instructions for abstract presentation: April 1st, 2000.
3. Deadline for abstracts, formal registration and payment: May 15th, 2000.
4. Last circular distribution with programme and final arragements: July 15th, 2000.

Correspondence

Please send all correspondence to the Secretary: Guillermo F. Aceñolaza, UEI Paleontología, Instituto de Geología Económica, Facultad de Ciencias Geológicas, 28040 Madrid, Spain. E-mail: <eg17112@autovia.com>

Application of micro-organisms to environmental problems. August 27-31, 2000, Winnipeg, Canada
Sponsored by: Avalon Institute of Applied Science Inc., Canada; Centre for Marine Geology- Dalhousie University, Canada; Geological Laboratory - University of Angers, France

This International Conference is the second in a series of conferences - the previous conference was held in Israel in 1997. The conference is organized by the Avalon Institute of Applied Science, Canada, the Centre for Marine Geology-Dalhousie University, Canada, and the Geological Laboratory-University of Angers, France.

The main aim of the conference is to present results of innovative multidisciplinary research in micro-organisms (e.g., bacteria, foraminifera, ostracoda, radiolaria, diatoms, calcareous nannoplankton, dinoflagellates, pollen and spores) and to show their significance in solving environmental/ paleoenvironmental problems in the fields of biosciences, geosciences and agriculture. In view of the success of the previous conference, it is expected that a large number of the Canadian and international environmental scientists specializing in micropaleontology and microbiology will take part in this event.

Main Conference Subjects
The conference will cover a wide range of topics, with special focus on the following: micro-organisms as indicators of past and recent environments; microorganisms as indicators of productivity; pplications of micro-organisms to industrial needs; taxonomy; assemblage structure and spatial distribution; density and diversity; biogeography; microhabitats of micro-organisms; symbiont-bearing micro-organisms; micro-organisms and the flux of organic carbon to the seabed; micro-organisms of oxygen-depleted environments; effects of pollution on micro-organisms; shell geochemistry - O, C, and Sr isotopes and trace elements; trace elements in shelled micro-organisms; preservation of micro-organisms; taphonomy and temporal resolution of fossil assemblages; biochronology and stratigraphic correlation; life history and ecology; pathology of soft tissue; morphology and construction of the shells; geochemistry of the shells; methodology and scientific devices; quantitative methods of data analysis in ecology of micro-organisms; bacteria in activated sludge Age and diversity

Important Deadlines:
Submission of Abstracts (up to 2 pages) 30 April 2000; Preliminary Acceptance 31 May 2000; Full paper submission 31 December 2000; Paper review and final acceptance 31 May 2001

Conference Languages
The official conference languages are English and French. There will be translation of the oral presentations from French to English. Papers presented in French must include an English summary. It is desirable that English papers include a French summary.
Dr. Irena Motnenko <irmot@ilos.net>

ICVM-6: 6th International Congress on Vertebrate Morphology, Friedrich-Schiller-University, Jena, Germany. Co-covened by J. Matthais Starck and Martin S. Fischer, July 2001. Details: <http://www.zoo.uni-jena.de/icvm-6.html>

Meeting Reports

Confessions of the Silicofossil Group

A select group of siliceous microfossil workers gathered at Bath Spa University College on 8th Spetember for the first meeting of the newly formed Silicofossil Group. The meeting kicked off with coffee and a lot of introductions as we all met each other, many for the first time.

After being welcomed by John Robb, Head of the School of Geography and Development Studies, it was straight down to business with Norman MacLeod (better known as the Chair of the Foraminifer Group!) talking to us about *Perispyridium* radiolarians, one of his dirty little secrets…Norman discussed phylogenetic versus phenetic morphological evolution within the genera, some work he did during his PhD research, and is now so inspired that he is going to publish the work – an early success for the forum provided by the Silicofossil Group! From Jurassic radiolarians to the Neogene. Simon Haslett talked about the use of radiolarian temperature indices in equatorial Pacific palaeoceanography, and also was revisiting old data and trying new analyses for his presentation. Debate ensued and continued onto the whiteboard with pens. Cathy Stickley took us away to chillier climes, the Antarctic, and from fauna to flora, as she talked to us about the use of diatoms as tracers for Antarctic bottom water in the Pacific Ocean around New Zealand.

A long, and very tasty lunch in the Globe Inn, set us up perfectly for the afternoon, and on to technological advances. The first talk of the afternoon had the shortest title and the largest number of authors (18!) as Micha Bayer demonstrated the strengths and potential of ADIAC, the Automatic Diatom Identification and Classification project, funded under the European Union 4th Framework. Micha told us that diatoms are very useful but the problem is that you need to identify them. How true! The aims of the diatomists and pattern-recognition experts involved in the project are to develop a system that automatically locates and identifies diatoms on slides, and also a stand-alone searchable database of diatom images…no more wading through all those systematics and taxonomy papers! Back to palaeoceanographic applications of siliceous microfossils, and into the Quaternary. Richard Pearce discussed a unique diatom record from a sapropel that is preserved in the moat of the Napoli mud volcano (Mediterranean Sea). The final talk of the meeting brought us almost to freshwater: Ian Burke, the sole postgraduate student speaker, discussed a Holocene palaeoceanographic diatom record from the Gotland Deep in the Baltic Sea. Unfortunately, there were no diatoms where the sediment core shows a freshwater influence into the Gotland Deep!

After travelling around the globe from Antarctic to the Baltic Sea and covering many analytical techniques from the traditional to the cutting edge of technology, we would like to leave all those who sent their apologies a message: don't miss out on the fun next time! John Gregory and I would like to thank Simon Haslett for convening the meeting, all our speakers and the School of Geography and Development Studies, for hosting us so hospitably.

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Lower Cretaceous of the Central North Sea: Regional Setting and Depositional Architecture

The meeting was held at the University of Aberdeen on May 18 and 19, 1999, under the auspices of the Petroleum Group of the Geological Society. Tony Atherton (Talisman Energy UK) and Steve Garrett (Britannia Operator Limited) organised a programme of high quality presentations and stimulating discussion sessions among the 130 delegates.

Most of the presentations focused on the Lower Cretaceous, in particular Aptian and Albian, sand deposits in the central North Sea. The presentations were given by specialists from industry and academia who are directly or indirectly involved in hydrocarbon exploration and development of these deposits. Emphasis was placed on sand body geometry, petrography, sedimentology and biostratigraphy. An informative core workshop was held on the afternoon of the second day.

One talk dealt exclusively with microfossils. Jim Cole presented for the first time the results of his doctoral research, undertaken at Aberdeen University in the mid-1980s. Jim showed a selection of non-marine algae/dinoflagellates that he discovered from the Lower Cretaceous Wealden deposits in southeast England, and discussed statistical analysis of associated palynological assemblages.

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1999 Pander Meeting and Huddle Huddle

The Pander Society meeting in Calgary took place this August in association with the International Congress on the Carboniferous-Permian. Godfrey Nowlan undertook the task of organising the sessions and looking after what was a very enjoyable few days. Two days of sessions and one day of "Huddling" were arranged around several social events, so we were all very entertained.

The Pander Society meeting 1999 was started off with a Huddle Huddle. This proved to be a very successful day, with conodont workers arriving through the day with conodont specimens, photographs, questions and ideas. Discussions carried on all day, only to be punctuated by the Pander Society Lunch and Business meeting which was held in the swanky University of Calgary Union building. There was a good turn out and I think most people enjoyed having salmon washed down with fizzy pop?!

Guillermo Albanesi had the unenviable task of starting off the sessions on Friday morning at 8.30am by presenting two talks! Both talks were very enjoyable and Guillermo showed us some very nicely preserved conodonts. The first talk (co-authored with Barnes and Hunicken) presented the results of detailed sampling and processing of the Volcanito Formation, Famatina Range, Western Argentina. This study has resulted in much more resolution about the Cambro-Ordovician boundary. The second talk showed us some new species of *Gothodus* and *Protoprioniodus*. Interestingly Guillermo reported finding new forms of *Erraticodon*, *Fryxellodontus*? *Microozarkodina* and *Trapezognathus* were also recovered, though too incomplete to support a full description.

The Barnes team dominated the next few talks. Lee Mckenzie, (co-authored with McNally and Barnes) delivered a very rounded confident report of the Lower Ordovician conodont faunas of the Upper Mckay group from the southern Canadian Rockies. Previously this group has been aged using sparse trilobite data, so Lee's work has been invaluable in providing some resolution for such a vast sequence. Leanne Pyle (co-authored with Barnes) presented a report of field work in northern British Columbia. Sampling and processing many samples has helped to resolve the Upper Cambrian to Lower Silurian stratigraphy and conodont biostratigraphy. The field area is in such a remote location that helicopters and guns, for access and safety are essential, so naturally the slides were pretty spectacular (well I was impressed anyway!). Chris Barnes' most recent student, David Jowett presented a preliminary report of the huge interdisciplinary project, based in the Canadian Arctic. David's conodont analysis of the Cape Phillips Formation will contribute to zones, climate/oceanic state models, sea level curves, carbon and oxygen isotopes and glaciation models.

Chris Barnes presented some collaborative work where he and Zhang have been working on early Silurian sections collected from Anticosti Island, Quebec. Three formations were expansively sampled for conodonts. The succession of faunas revealed a great concentration and diversity of species within which three clear cycles could be distinguished following the terminal Ordovician glaciation. The talk was clear and succinct and the conodonts beautifully preserved.

Sandy McCracken (co-authored with Armstrong) presented the results of some drill cores which he had the opportunity to sample and showed three diverse and interesting conodont faunas from three different cores ranging from Ordovician to Devonian in age.

Godfrey Nowlan (co-authored with Norford) showed the results of a biostrat study of the Glenogle Formation, southern British Columbia (Arenig to early Caradoc). Sampling this formation has produced collections of conodonts co-occurring with local shelly fossils and graptolites which could be correlated with Australia, New Zealand, Newfoundland and Spitsbergen. The specimens included some fine examples of *Phragmodus* and *Periodon* elements, thought to be shallow and deep water contemporaries, and some beautiful *Pygodus serra* elements.

A very interesting talk was presented by Wenzel (co-authored with Chernykh) entitled 'oxygen isotope composition of Lower Permian conodonts from the southern Ural Mountains - tracing Late Palaeozoic glaciations'. Wenzel and colleagues have continued working on isotopic analysis of conodonts and have overcome some of the major problems encountered when this technique was first attempted using specialised infra-red laser equipment. It is now possible to analyse extremely small samples of conodont elements (2 - 20 elements). Wenzel's results have suggested that ocean water chemistry during the Lower Carboniferous was depleted in O^{16}, which suggests that there were large continental ice sheets. According to the authors, this concurs with current theories that the late Palaeozoic ice age did culminate during the late Carboniferous/early Permian times. Wenzel did well with his talk, considering he arrived early for it to find a totally empty room (the previous talks were cancelled). However, we all arrived and Wenzel had to answer some lively interested questions at the end of his session.

Dick Aldridge concluded the days talk introducing current thoughts on conodont affinity in his very own session! The basis of the talk has derived from extensive work on *Promissum pulchrum* bedding plane assemblages, and the ozarkodinid assemblages from the Granton Shrimp Beds. Data derived from these assemblages and others have been used to build a new phylogenetic analysis. Unfortunately the time slot for Dick's talk did not allow time for elucidation of the coding used to come up with the analyses. This technique for studying condont affinities caused some concern amongst certain members of the audience due to its inaccessibility to conodont workers or palaeontologists who are not specialised in phylogenetic analysis. However it was clear that this is a way forward in conodont research and it certainly provides some extremely interesting results.

Friday evening was the big ICCP closing banquet which was held in Canada's largest living historical village, Heritage Park which is designed to recreate all the sights and sounds of pre 1915 life in Western Canada. The first hundred guests were treated to a trip on board the paddlewheeler SS Moyie, before heading to the 'village' for a huge banquet. We were also treated to a 'gun fight' where three characters acted out a Western brawl (much to our Canadian colleagues embarrassment!).

The following morning started off another day of talks covering Carboniferous and Permian conodonts, continuing with the high quality of the first day of sessions. Unfortunately the session clashed with the Canadian Palaeontology conference which was running with parallel sessions which caused some divided loyalties. However, there were several talks of interest, Peter Wagner (Belka) introduced his apparatus reconstruction of *Vogelgnathus postcampbelli* (Austin & Husri 1974). Peter von Bitter produced a very lucid account of conodonts of the Lower Carboniferous (Visean) *Diplognathus* Zone. Peter introduced the interesting idea that conodonts might have lived in an environment of low temperature, hydrothermal vent/seep deposits, at depths of at least 100m, contradicting ideas that these conodonts lived in shallow environments. Mike Orchard produced a very clear account of occurrence of conodonts within the Upper Carboniferous-Triassic from the Cache Creek complex Nechako Region, central British Columbia. Bob Nicoll presented two talks on Saturday afternoon, of particular interest was the genus *Vjalovognathus* Kozur. The P element of the apparatus which develops a platform, is always sharply truncated at its distal margin, regardless of size or stage of ontogeny that the element has reached. Nicoll suggested that for this element to grow from this margin of the element, the walls of the basal cavity would have to be dissolved to allow for expansion of the cavity... This is an interesting theory, and as these elements obviously have rather a unique morphology, it is important to try and understand how the elements are grown.

Saturday evening saw the end of the Pander Society Meeting at a 'Burger Burn' kindly hosted by Godfrey Nowlan. The evening was a great success and many burgers and salads were consumed. It was a great effort and a very enjoyable way to wind up a very long conference!

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4th European Ostracodologists' Meeting, Adana, Turkey, 5-8 July 1999

This meeting was held at the University of Cukurova in Adana, where I found myself to be the sole representative from the U.K. This was a bit disappointing, but on the other hand I had the opportunity of meeting up with colleagues who I had not seen for many years. I was especially pleased to meet with Nuran Sonmez-Gokcen who had worked on the London Clay ostracods so many years ago in the 1960s, I also found it very exciting, and very encouraging, to see how strong ostracod studies are in Turkey; there were workers from Ankara, Istanbul, Izmir, and Adana, with a strong emphasis on studies of living ostracods, as well as the Neogene.

My visit to Turkey started in Istanbul, where I met up with Qadeer Siddiqui from Halifax. We travelled together to Adana and back to Istanbul, giving us the opportunity to see some of Turkey as well as indulging in nostalgic memories of our time together as research students in Leicester. Our oddest experience took place somewhere in the centre of Turkey at some time in the middle of the night, when Qadeer and myself were stretching our legs during a coach stop, when we were approached by a stranger who asked if we were ostracod workers. It turned out that there were three other ostracod workers on our coach heading to Adana, and they had recognised us from pictures in "Cypris"! The stranger introduced himself as Cuneyt Kubanc from the Biology Institute at Istanbul University, and he and his wife became friends who later showed us around Istanbul on our return there.

The meeting was organised by Dr Atike Nazik of Cukurova University, and, although the overseas

delegates were few in number, we were treated royally and made to feel extremely welcome. It was a small meeting, with only about 30 attendees, but we came from ten different countries so it was truly international. The feeling of belonging to one big family was emphasised by the presence of Atike's two young daughters, who became the meeting's mascots, as well as providing translation services. The low turn-out was disappointing for the Organising Committee, and also for the university, which had pulled out all the stops for us. I do not know why so many stayed away, but they missed an enjoyable meeting. Perhaps it was because of the unfortunate news about terrorism in Turkey in the months leading up to the meeting, but I saw no evidence of this, as indeed I have never had any personal experience of IRA terrorism in Britain. The date of the meeting had been changed from May to July at the request of the International meeting for ostracod workers in 1998, and maybe this had some impact on attendence because Turkey is most definitely hot in July (although our accommodation was air-conditioned). The consolation was that it is much easier to meet everyone at a small meeting, and to have some genuine discussions about ostracods, and from this point of view I found it very worthwhile.

I do not wish to single out any particular papers presented at the meeting; we had 25 talks over two days, with ample time for discussion, and two sessions of very lively poster presentations. Topics covered a large range of subjects, although there was a concentration on Neogene and non-marine studies. The proceedings will be published so that full details will be available in the future. We also had a day field trip to the Neogene of the Adana Basin, led by Kemal Gurbz and Nuran Sonmez-Gokcen, with assistance from Atike Nazik and Cemal Tunoglu. I found this most interesting and could see so many similarities to the basins of southern Spain with which I am more familiar.

The meeting ended with a formal session at which I took the chair, as the only former President present. We elected Atike Nazik as the next president of the EO, with Dr. Angel Baltanas from Spain as Vice-President. It was decided that the next meeting should be held in 2003, following the consensus reached at Greenwich in 1998 to the effect that the EO and International meetings should be 2 years apart. Prof. Nick Aladin was asked to organise the next meeting at St. Petersburg, Russian Federation; however he was not certain that this would be possible, in which case the meeting would be organised by Angel Baltanas in Spain.

In conclusion, I should like to congratulate Atike and her colleagues for organising such a well run meeting and for all their kindnesses during the meeting. I am certainly looking forward to meeting up with them again in Turkey. I would also like to take this opportunity to wish all our Turkish colleagues well for the future, especially those who have been caught up in the recent devastating earthquake.

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International Code of Zoological Nomenclature. 4th Edn

adopted by the International Union of Biological Sciences

International Commission on Zoological Nomenclature 1999, International Trust for Zoological Nomenclature, ISBN 0 85301 0064, 306pp.

There are many books on our shelves which are not meant to be read, novel like, but are part of a reference collection, to be consulted and used as and when the need arises. You might think a book like the ICZN would fall into this category, a dry collection of semi-legal paragraphs outlining good practice in taxonomy. However, I think it would benefit all areas of palaeontological and zoological research if, before workers sat down to write their next taxonomic opus, were to go through this new edition of the ICZN, and become familiar with the set of articles that have been developed and honed since 1842, to avoid the sort problems which workers can get into if they don't use the code.

The new fourth edition will come into force with effect from January 1st 2000, and will replace all previous editions. Like its predecessor, the third edition, published in 1985, this is available in hard-back but now with a slightly larger format, which is a welcome change. Also aiding its readability is the decision to separate the English and French texts into separate portions of the book, English at the front and French at the back. The index, however, reverts to the parallel text style format, which is curious, since the previous edition had two separate indexes.

There are numerous minor changes, which increase the clarity of many points. The Article numbering system is now fully hierarchical, so it is much easier to locate specific paragraphs, for example, but it

is the more significant changes introduced into the new edition that I would like to highlight, since these will affect the way we work in the future.

After 1999, several requirement are needed for the introduction of new names: that an explicit use of one of the terms sp. nov., gen. nov., fam. nov., or nom. nov., must be used, (this was only suggested in the previous edition as part of the general recommendations, but now is enshrined as Article 16) and that an explicit fixation of the holotype or syntypes for new species must be made. Also family group names published as new must be accompanied by a citation of the type genus; similarly new genus group names for ichnotaxa must be accompanied by designation of a type species. One of the major changes in the thinking of the ICZN affects the formation of new family names. Due to the method of construction of family group names, by taking the stem derived from the Latin genitive of the generic name and adding the appropriate endings, it is possible to produce homonymy in the family group from distinct type genera. Article 29 offers an alternative to avoid this problem, it is now possible to form family group names by adding the appropriate ending to the entire generic name. The authors point out that this reduces some of the difficulties of those without knowledge of Latin, but in reality there are numerous instances were Latin grammar and construction are required, so don't throw away your copy of Kennedy yet. The Commission stepped back from more radical proposals, which would have allowed species names to be treated as arbitrary words, not having to agree in gender with the generic name, thus reducing the need for Latin still further. I think that there may have been advantages in that system, electronic searching for one, since the specific name would then be invariable, but the whole binomial system is based so firmly in Latin and latinization, that it would require a complete redesign, which would be unlikely ever to reach agreement. So we may see in future editions, these sorts of piecemeal changes becoming more prevalent.

Some changes in Article 74 covering designation of lectotypes are that after, 1999, the explicit use of the word "lectotype" must be used, "the type" is no longer sufficient, the purpose of the designation must be stated, and information is to be supplied to ensure recognition of the specimen designated.

One of the more exciting changes has come about from the remarkable development of information technology in the last 15 years. After 2000 it will now be acceptable, for the purposes of nomenclature, to publish works on CD-ROM. The provisions are that it must be deposited in at least five major publicly accessible libraries, which are named in the work itself. The wording is such that any durable and unalterable media may be used, thus allowing for future developments in the rapidly diversifying world of mass data storage. Other forms of electronic publication are, quite rightly not allowed as publications for the purpose of nomenclature, such as e-mail, or World Wide Web articles or downloads. I am also very happy to see the exclusion of abstracts of papers or posters which are issued at meetings, the recommendation is that any such book of abstracts should contain a taxonomic disclaimer.

Some of the most far reaching changes are those under the umbrella of 'self help'. Instances where previously one would have to apply to the Commission for guidance or an Opinion, there are now courses of action available to remedy a situation. These are designed to promote stability of the nomenclature, which is one of the principals of the Code. It is now possible, in several cases to set aside the Principal of Priority, when an unused but valid name is discovered, for example, which would displace a long used name. The worker may now suppress the original name as a nomem oblitum and use as valid the current name as a nomen protectum. Yes, this does preserve the stability of the nomenclature, but it also seems that if enough workers get it wrong for long enough, it becomes right. There is also a contradiction in this premise if one examines the new provision for neotypes. If a lost holotype, syntype or lectotype, subsequently replaced by a neotype, is rediscovered, that neotype is automatically displaced by the original type specimen. Other instances of self help include situations where a worker discovers that the type species has been misidentified when a genus or subgenus was established, it is now possible to fix the type species without having to apply to the Commission. Also an author will be required to maintain the particular spelling in prevailing use for a name, even if it is found not to be the correct original spelling. For example, the spellings of family-group names in prevailing use will be maintained even if formed from incorrect grammatical stems.

There has been much discussion recently about unifying the various codes, botanical, bacteriological and zoological into a grand Biocode. It seems at present that the systems have diverged too much to allow unification. A possible solution which has been set in motion is that of the adopted List of Available Names. Names within the scope of such an adopted list but not listed in it, will be treated as unavailable.

Article 79 set out the way that this is achieved; where an international body, such as an international society or a consortium of national societies, would propose that the Commission adopt, for a major taxonomic field, a Part of the List of Available names. The Part would consist of, for each name, details such as bibliographic reference, the type specimen(s), place of deposition of types. These proposed Parts would then be available for 12 months for comment, revised, made available again for comment, and then voted on for adoption. A similar system already exists with the field of microbiology. If this method is fully developed, and if registering of all new names is combined with listing all available names, the rules, such as the ICZN, would become unnecessary and a goal of single code is achievable.

The 4th edition of the ICZN costs £40.00, but members of the BMS can obtain a copy at the discounted price of £30.00, this discount price is also available to undergraduate and postgraduate students, and institutions purchasing 5 or more copies. It may be ordered from: ITZN (International Trust for Zoological Nomenclature), c/o The Natural History Museum, Cromwell Road, London SW7 5BD, U.K. <iczn@nhm.ac.uk>. The ICZN has a Web page at <http://www.iczn.org/index.htm> which gives information about the code, the Commission, and other related publications.

As I mentioned in the introduction to this review, I recommend you to obtain a copy of this new edition of the ICZN, and read it; forewarned is forearmed. The Code has been written by an international body, and it is up to workers everywhere to adopt the procedures. Quite simply, if you ignore it, the quality of science will suffer.

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Evolutionary developmental biology

Second edition by Brian K. Hall, 512 pp. Chapman & Hall, London (now Kluwer Academic Publishers). Hbk: ISBN 0-412-78580-3, £177.00. Pbk ISBN 0-412-78590-0, £44.00.

Origin of animal body plans

By Wallace Arthur, 352 pp. CUP. Hbk: ISBN 0521550149 (1998) £45.00; Pbk: ISBN 0521779286 (2000) £16.95.

Okay, lets overcome the tiresome comparisons between first and second editions right now: the second edition in fatter, wider, taller and heavier than the original. Perhaps more importantly, the second edition of *Evolutionary developmental biology* has been published at a time when the discipline is becoming extremely prominent in both public perception (witness the media attention surrounding the recent evo-devo meeting on early vertebrate evolution) and research (two new journals have been launched and BBSRC is currently considering funding a new multi-million pound initiative in the subject). No wonder Chapman & Hall commissioned the new edition, but the quantum speed at which this subject develops (no pun intended) makes it more surprising that it has taken this long for a revision to appear.

The genre of *Evo-Devo* texts is now mature, followed not only by Halls' first edition, but also by Rudi Raff's excellent *The shape of life*, Wallace Arthur's *Origin of animal body plans* and Gerhart & Kirschner's *Cells, embryos and evolution*. Hall's second edition follows suit (not surprising as he established the genre). The text is arranged hierarchically, starting with pattern: phylogenetic principles and the diversity of life, both extant and extinct, and the comparison between diversity and disparity. The rest of the book concerns process: the genetic and epigenetic basis of cellular, organ and anatomical development, albeit presented in a phylogenetic perspective.

In the cut and thrust of a field as competitive as developmental biology, it is refreshing to find a scientist who clearly concerns himself as much with the history of philosophical ideas as the latest paper on the deletion of gene *x* resulting in failure of organ *y*. But as Hall documents, 'evolutionary development biology' is an historic subject, albeit one that has lain dormant for the better part of a century. The remainder of the introductory section deals with phylogenetic principles, not only as a basis for understanding diversity, but also as a means by which the evolution of development can be elucidated. And it is diversity, as well as disparity, that *Evo-devo* seeks to explain; as a

review of extinct diversity and disparity demonstrates, many problems exist hitherto unforseen to strict neontologists.

The majority of the book is given over to process, again arranged hierarchically, from understanding development from early embryology through organ development, to their integration as animals. Development is subsequently placed in an evolutionary perspective in examining the developmental basis for major events in animal evolution, from the origin of multicellularity, to the origin of the Metazoa, to chordate, vertebrate, gnathostome, tetrapod, and higher tetrapod evolution. In line with the view that epigenetics has as much control over development as genetics (genetics proposes, epigenetics disposes), the penultimate section of the book deals with environmental controls on development and ultimately, evolution; in contrast to the rest of the book, this section draws most of its examples from the invertebrate world. While the majority of the book deals with what development tells us about evolution, Hall concludes with the implications of evolution (and evolutionary patterns elucidated) for development.

Does it work? Well, that depends on your perspective. For me, *Evolutionary developmental biology* is thoroughly representative of the discipline: we remain some distance from understanding the links between gene expression, gene networks, cell specification, organ development and the ultimately, the integration of organ systems into viable animals. Although the importance of palaeontology is noted, attempts to explain major innovations in animal evolution largely ignore palaeontological data; the vertebrate fin-limb transition being a notable exception. From my personal perspective, this is more the fault of palaeontologists than developmental biologists.

One obvious way in which the book is not representative of evolutionary developmental biology is in its chordate-centricity. One of the main 'model animals' of developmental biology is of course *Drosophila melanogaster*, an arthropod; arguably, more is known regarding the link between genotype and phenotype in this taxon, than in any chordate. Given that chordates are a minor twig in the tree of life, many invertebrate specialists will feel cheated. Such quibblers can rest assured that specialists of non-metazoans get a really raw deal: *Arabidopsis* is mentioned just once! But does the lack of an all-encompassing view of the evolution really matter? Again, form a personal perspective, I think that the excitement surrounding evolutionary developmental biology stems from the integrative approach that defines the subject; it aims to eke out the underlying principles and processes of organic evolution, to understand why the many facets of life are so similar and also why they are so different. The chasm between botany and zoology remains, even though resolution of the characters that unite and distinguish animals and plants represents one of the greatest challenges facing evolutionary developmental biology (this topic gets 2/3rds of a page in *Evolutionary developmental biology*).

Should you buy a copy? Well, no matter how good it is, as a text book it could not possibly be worth the official price. If I were a tart (which of course I am), I would complain about the poor quality of the paper on which the book is printed and poor reproduction of certain figures; the use of line-drawings in favour of halftones has clearly not kept costs down. On a more serious note, the quality of editing in the early chapters is not what might be expected: there are a number of irritating errors ranging from mis-citations (e.g a paper on Cambrian vertebrate remains cited in connection with debate over the affinity of vestimentiferans [p.23]; an atlas of the Burgess Shale cited in connection with the 'Silurian' Harding Sandstone [p.39]), to the mis-use of systematic group names (chordate in place of craniate, p.22, p.398). However, while some of the errors are irritating, others are quite entertaining: 'in palaeontology, evidence of absence is not absence of evidence' (p.46); 'Conway Morris & Peel (1990), who reported the first articulated specimens of a halkeriid, believe *Wiwaxia* to be a halkeriid (a group of organisms known only from isolated sclerites)' (p.49). And just to be picky, Hall sometimes mistakes genes for their orthologues. Nevertheless, Hall explains very complex topics in simple terms and often he is very successful in his attempts to integrate disparate sources of data; it is a pity that the book is not more original, that he did not seek to extend his cameos from developmental biology and integrate them with models of selection and palaeontological data. But yes, by hook or by crook you should get hold of a copy of this book; every university library should have a copy and it is unlikely that it will reside on a shelf long enough to gather a speck of dust. As evolutionary narratives become more intergrative, we palaeontologists can no longer afford to ignore developments in cognate fields and so anyone actively involved in research into evolutionary problems should really consider buying a copy. Despite the ungenerous cover price, Kluwer offer a (relatively) generous course adoption discount of 25%, which basically means that if you can get an order together for 6 or more copies, you qualify; take advantage.

You might summise from the title of Arthur's text that his subject is the origin of animal body plans, but it is not. Arthur appears to have used the body plan debate as an excuse to outline what he perceives as the aims and objectives of *evolutionary developmental biology*, and how he would like to see the discipline develop. The most significant way in which Arthur's text differs from any other that I have seen is that he attempts to be thoroughly inclusive; most other EVO-DEVOs have a background in developmental biology, and while they purport their subject to be inclusive, they are as guilty of excluding reductionism as the neodarwinists were of ignoring development. Thus Arthur's arguments for the origin of animal body plans are selection-based, but selection with development factored-in. He sees Whyte's internal selection, i.e., selection in early developmental stages where external factors have no influence, as one of the major factors for the establishment of new body plans early in animal evolution. Arthur thinks the chief factor constraining development and preventing the origin of new body plans after this period is the (theoretical) selection for increased interconnection within developmental programs and thus, complexity of developmental architecture. This is manifest in many experiments where the effect of a gene is determined by preventing its expression in development (the abnormality or failure of a structure to form is thus indicative of its function); the result is complicated by other genes whose expression also performs the same function. Is development primitively complex? Arthur argues that early in Metazoan evolution it was not, that the lack of complexity and thus stability in development would have lead to a greater number of mutations of varying magnitude, and against the Fisher principle (which defeated Goldschmidt), there is more likelihood of mutation-viability.

The great chink in this argument rests with the nature of body plans (of which, more later) and their equivalence to phyla. When phyla are arranged in some sort of phylogenetic consensus (for example, take Arthur's consensus of the ten most popular cladograms chosen by cat owners who expressed a preference) it is obvious that phyla, and thus bodyplans, are derived from other phyla (and thus...). So, if body plans are such stable, integrated entities, how can one evolve from another? It is possible to get around this issue by assuming that the developmental programs of these beasties were not so complex back in the Cambrian (or at 1200 Ma, if you prefer Wray *et al.*'s estimate), but then you return to Gould's aphylogenetic perspective (*Wonderful Life*) in which body plans are entities that can only be recognised retrospectively.

The best feature of this book is, however, Arthur's inclusiveness. As a self-confessed *ultra*, he is not plagued by wishing retribution on his own clan, as one perceives the developmental biologists would wish upon them. And so Arthur attempts not only to integrate developmental biology, developmental genetics, molecular genetics and palaeontology, all calibrated against a framework derived from phylogenetic systematics, but he also attempts to drag in selection-based arguments, and even a little palaeoceanography, palaeogeography and plate tectonics. Although I welcome this in principle, his inclusive reformulation of evolutionary developmental biology risks becoming unwieldy, and certainly beyond the scope of anyone conducting research alone. But this is no argument and it would appear that the timing and sequence of divergence of animal clades has remained so intractable to date principally because palaeontologists, developmental biologists nor the reductionist neodarwinians have all the answers. It is only through consilience that we can make progress.

The origin of animal body plans is a fun book for those who enjoy interdisciplinary research, but I'm not sure there is enough 'new' between the covers to warrant shelling out cash to read it. In my personal, libellous opinion, you would be better off buying a time share of Hall's *Evolutionary developmental biology.*

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Principles of Development

by Lewis Wolpert *with* Rosa Beddington, Jeremy Brockes, Thomas Jessell, Peter Lawrence and Elliot Meyerowitz. ISBN 0-19-850263-X. 1998. 484 pp. Current Biology Ltd, London & Oxford University Press, Oxford. £27.99. Hardback.

If your as thick as me, you'll be struggling with the new era of evolutionary biology: one minute you're dealing with appendage formulae for ostracods and bradoriids, the next your're struggling with limb development and positional patterning in *Drosophila*. Well, for those of us who don't know an imaginal disc from our elbow, Lewis Wolpert & Co. have produced an excellent introduction in the guise of an undergraduate text.

The book is constructed in such a way that the reader is virtually hand-held all the way through. The

book opens with an outline of general developmental principles, followed up by a crash course on the development of the 'model animals'. Almost all that is known about the phylogeny of developmental systems is based upon extrapolation between these animals; this is fortunate because we know much more about why animals are so similar because of the few intensively studied and distantly related model animals. However, it is also very unfortunate that we should rely so much upon such animals as they have often been chosen more for their ease of laboratory study than for their phylogenetic position. Thus, Wolpert's succinct idiots' guide to the idiosyncrasies of development in these taxa is very welcome. One can only hope that a new edition will quickly follow in which the development of a whole host of newly established model animals will be described. While I am sure that a new edition will appear swiftly, I will not hold my breath waiting for a model taxon representative of the superclade Lophotrochozoa, which includes annelids, molluscs, bryozoans, brachiopods amongst other groups so important to us palaeontologists.

The remainder of the book adopts a developmental rather than taxonomic approach, from morphogenesis to cell differentiation, to organogenesis. Development of the nervous system is followed by the sexual cycle of development, from determination of sexual phenotype, through germ cells, to fertilisation. The remainder of the book concerns regeneration, post-embryonic development and finally, evolution of development.

The concluding chapter is almost an apology for lack of coverage of the subject that Hall entertains for an entire text book. All the high profile debates are summarised including the influence of homeotic genes in development, dorso-ventral axial inversion in the establishment of the chordate 'body plan', and interphylum conservation of developmental mechanisms. While considering such issues as pan-metazoan conservation of developmental mechanisms one cannot help thinking back to the problem model animals, and the significance to conservation for the common ancestor of *Drosophila* and mouse; it would not take many taxa with supposed co-option of genes to different functions to fundamentally change our current concepts of conservation to homoplasy. For as much as this section is intended to deal with the evolution of development, it is not the kind of integrative 'evolutionary development biology' advanced by Hall (1998).

The book is well laid out and is dominated by hundreds of full colour pictures (most of which are original) and good quality half-tone electron micrographs of embryos and embryonic structures. The text is concise to the extent of over-generalisation, and the cited sources are limited to secondary articles and not the original sources. Given that it was written for biology undergraduates and not palaeobiologists, these limitations are not surprising. Nevertheless, *Principles of development* is an invaluable introductory text if you are trying to discover the caveats that lie between development-led hypotheses to explain the similarities of, and differences between, animals and plants.

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Numerical Palaeobiology:
computer-based modelling and analysis of fossils and their distribution.

David A. T. Harper (ed.) 1999. John Wiley & Sons: Chichester, England. £65.00. 468 pp. ISBN 0 471 97405 6.

Numerical Palaeobiology is another volume from the fecund pen of David Harper, this time in its red, editorial, guise, and fills an undoubted gap in the market. Following the optimism and (over-)ambition of the 1970s, numerical techniques in palaeobiology fell from fashion somewhat. Today, with powerful computers on most peoples' desks the pioneering techniques of two or three decades ago have come of age. The difference now, perhaps, is that numerical techniques are seen as a means to a palaeobiological end rather than as an objective in themselves. This charge has been led, to a large degree, by systematists, so it is appropriate that the book opens with a review of numerical techniques used in taxonomy. David Harper and Alan Owen examine quantitative techniques in taxonomy, tracing the progress from uni- and bivariate statistics through multivariate approaches to ordination techniques, phenetics and morphometrics. Sandra Carlson follows up with a review of cladistic techniques. There are of course a number of full blown text books addressing this theme, most notably Kitching *et al*. (1998), but Carlson's chapter benefits from being more approachable and less daunting for any novitiate into the grand order. Specific examples using *PAUP* and *MacClade* give a lucid introduction to what is possible, and to which sins should be avoided en route.

The second section examines techniques in recreating or restoring original morphologies. Malcolm Herbert's review of serial section restoration is an illustration of how the land of milk and honey has not yet been achieved in all areas. Notwithstanding the efforts put into software development by researchers such as Herbert, the hardware and rendering software available to academic mortals is not really up to producing hyper-real images of the sort we are accustomed to from more commercial sources. No doubt another decade will see dramatic advances. Nigel Hughes' chapter addresses statistical and imaging methods applied to deformed fossils, and is a very practical guide to dealing with biotas from tectonised terrains. The third paper in this section examines theoretical models of computer morphology. This was one of the early successes of numerical palaeobiology and Andrew Swan reviews Raup's (1966) work on mollusc growth, before going on to theoretical growth models of accretionary and branching organisms.

The remainder of the book is devoted to larger scale palaeobiological studies. Howard Armstrong gives an excellent introduction to the use of graphical correlation as a technique for improving the resolution of biostratigraphic correlations, working through a case study of Late Ordovician – early Silurian conodonts in North Greenland. Ken Johnson and Tim McCormack lead a pair of studies of large scale change, examining techniques for the quantitative description of biotic change, whilst Mike Benton reviews techniques for analysing large databases to extract information about large scale change.

Walter Etter moves the theme to palaeoecology with a long review of techniques of community analysis, utilising a case study from the Middle Jurassic Opilinum Clay of Switzerland. Similarly, Jim Smith uses a case study of Carboniferous palynomorphs from NW Ireland in a review of multivariate techniques applied to palynofacies analysis. Both are strengthened by the presence of real case studies rather than describing the concepts and techniques in abstract terms. The book closes with a statistical examination of ichnofossils by Paddy Orr and the description of a revised method of seriation, by Ryan *et al.*, which makes the technique more statistically secure.

Overall, this is an excellent volume which provides a theoretical review of the numerical techniques most likely to be used by palaeobiologists. This would be a significant contribution in itself, but the use of practical examples, often with a pithy guide to the appropriate software, makes the book an indispensable asset, particularly for introducing undergraduate and postgraduate students to the various themes. In micropalaeontological terms, many of the chapters adopt microfaunal case studies but the utility of the volume extends far beyond this and virtually every chapter has an application within the field – all micropalaeontologists will benefit from having access to it

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Calcareous nannofossil biostratigraphy

Bown, P. R. (Ed.) 1998, 320pp, *British Micropalaeontological Society Publications Series*, Kluwer, ISBN 0-412-78970-1. £79.00/US$127.00 (£59.00/US$95.25 to BMS Members).

To begin with, I asked myself "How did I, a foram. specialist, get the job of reviewing a nannoplankton atlas?" On reflection it's probably not such a ludicrous idea, particularly when the book concerned presents such an excellent introduction to the black arts of nannofossil alchemy aimed at a complete novice like myself.

The first sentence says it all "This book was primarily written as a practical guide to the use of calcareous nannofossils in biostratigraphy" - and that's exactly what it is. I started with the grand idea of reading the book cover to cover, but even I'm not quite so naive. Nevertheless, I did complete both the first two chapters and these provide probably the most comprehensive introduction to nannofossils I've had the privilege to read. Chapter 1, **Introduction**, covers the life cycle, morphology, function, ecology and even the rationale covering the taxonomy of coccoliths. My compliments go to Paul Bown and Jeremy Young for producing such a readable account.

The same two authors also collated Chapter 2, **Techniques**. Considering that my day to day contact with nannofossil preparations is witnessing the simple

process of crushing a minute piece of sediment on a glass and smearing the resultant suspension across the said slide, I hadn't realised there was quite so much to it all. Doctors Bown and Young appear to have considered every sample type from drill cuttings to living cultures with all the inherent subtleties of dealing with each. This chapter, unlike all the others, lacks any illustrations which is something of an oversight. In an extremely well illustrated book which contains 66 full page plates, including over 2000 individual specimen photographs in both transmitted light and SEM, I was surprised that there were no simple line drawings or photographs to enhance the text.

The next seven chapters, written by a range of authors, work systematically through the geological column from the Triassic (Paul Bown) to the Quaternary (Nicky Hine & Phil Weaver) and the basic format of each chapter is reassuringly consistent throughout. Each presents the important references, the Biostratigraphy, with full definition of zones, discussions of Global Correlation, Magneto-biochronology, Biogeography and an Atlas of Species.

Chapter 3, **Triassic** (Paul Bown) is of necessity short, given that nannofossils are first recorded from the Late Triassic (Carnian) and then only ten taxa are worthy of illustration from two well-defined zones. Nevertheless, all organisms have to have their origins sometime.

Paul Bown and Kevin Cooper provide a thorough review of **Jurassic** nannofossils, defining twenty zones with a further twenty-one subzones. It is in this chapter that the more "global" nature of this book becomes apparent, when compared with its predecessor (Lord, 1982), which was more an atlas of British nannofossils. Even by Jurassic time there is evidence of provincialism in the nannofloras described to date. It is obvious, however from this chapter, that the database on which nannofossil workers are dependent is somewhat thin. This book provides such a comprehensive picture that it is easy to make the mistake that every thing is now well-defined in terms of taxonomy and zonal schemes. This is certainly not the case and there is considerable room for further research. Paul Bown has used the opportunity of this chapter to include a description of the "Calcareous nannofossils from the Upper Kimmeridgian – Volgian of Gorodische, Russia". This section is the proposed lectostratotype for the Volgian Stage and therefore a detailed distribution chart for the nannofossils recorded is certain in time to be a well-thumbed part of the book.

A well-informed team of Paul Bown, Dave Rutledge, Jason Crux and Liam Gallagher have written a separate chapter on the **Early Cretaceous**, possibly the result of the nannofloras becoming so well-established in European carbonates at this time. Twenty seven zones have been defined, together with fourteen subzones (total 41 units) which leave the nannofossils providing slightly better definition than the thirty five ammonite zones. I would venture to add that I'm sure there are considerably more nannofossils than ammonites in most samples available for study (see p.88).

This is probably a good place to have one of my perpetual moans. If you're talking "time", you're dealing with a philosophical concept and you have got to use the terms "Early" and "Late". You should definitely not use "Lower" and "Upper". These are rock unit terms and should be kept as such. The editorial decision was obviously taken in this book to use "Lower" and "Upper" throughout. I'm sorry, but I just can't accept it. What is worse, there is a mixture of "Upper upper" and "Uppermost". The first looks and sounds like a misprint and the second is simply wrong, it should be "latest".

There is a curious mixture of regular print and italics in this chapter, with ammonites in the former and nannoplankton in the latter. Surely it is normal practice to put all fossil names in italics, so why are the nannoplankton singled out?

Having got those two comments out of the way I'll return to the Early Cretaceous with the observation that I would have expected to see some mention of the affinity of *Cyclagelosphaera margarelli* with the dysaerobic facies sporadically developed during the Early Cretaceous. This is well documented by Mutterlose and Harding (1987) and certainly known from the North Sea sections available to at least two of the authors.

As a final note on this chapter, I applaud the willingness of the authors to acknowledge "precise level uncertain" when it comes to defining the stratigraphic ranges of some species (see p.97). This is far better than making assumptions based on an insufficient database which imply a false accuracy and can hinder stratigraphic definition in the long term.

I had awaited the publication of a new zonation for the **Late Cretaceous** for a long time and the chapter presented by Jackie Burnett (with contributions by Liam Gallagher and Matt Hampton) was well worth the wait. There is an excellent review of past literature and a useful introduction to the global provincialism recognised in Late Cretaceous oceanic sediments. This has necessitated the definition of

zones applicable to "Boreal", "Tethyan" and "Austral" provinces making interpretation of the text occasionally difficult, nevertheless the provision of numerous well drafted zonal diagrams improves the ease of understanding zonal definitions.

It is within this chapter that the absence of plate numbers on the actual plates becomes a problem, with a large part of the description of Plate 6.2 opposite Plate 6.1. It's at this point that I reveal the one bit of informed assistance I had with this review. Looking carefully at Figures 1,2 and 3 (all *Amphizygus brooksii* apparently) on Plate 6.2 it's notable that the specimen in Fig. 1 is a different taxon to Figs. 2 and 3. I have to assume that the other 14 plates are free from inaccuracies, but I can't claim to be able to recognise this myself, a little inside information goes a long way.

Osman Varol authors the **Paleogene** chapter which is slightly shorter than most, but an excellent example of quality over quantity. It's the only chapter where I've actually spotted typing/printing errors (i.e. "PALEOGE" and *N. cruciatus* becoming extinct twice on Figure 7.3) which I regard as the deliberate errors included to keep reviewers awake.

It's inevitable that the "Thanetian" Stage remains unzoned due to the non-calcareous nature of the sediments and a well-defined zonal succession is presented for the Danian and Selandian Stages. However, why is it that it appears to be only nannoplankton workers who insist on using a Selandian Stage, when most other stratigraphers since Berggren *et al.* (1985) have successfully managed with only the Danian and Thanetian? Varol also uses the Latdorfian Stage for the earliest Oligocene or is it Lattorfian (p.205), or is this another deliberate typing error?

I recognise that most of Varol's database is derived from North Sea sections, as illustrated in the diagrams from this chapter, however it would have been useful to have had greater reference to the onshore sections on the margins of the North Sea Basin. There is a listing of the main references for the outcrops, but no comparison of nannofloral ranges as recorded in the offshore and onshore sections.

The **Neogene** chapter by Jeremy Young is satisfyingly concise and extremely well-constructed. The diagrams are to be congratulated on their clarity, showing as they do the evolutionary nature of the phylogenetic lineages. They are visually impressive and enhanced by the addition of the simple line drawings of the index taxa. Jeremy has introduced lettered intervals in an attempt to bring the succession into manageable units, particularly as the use of both Martini's and Okada & Bukry's zonal nomenclature to divide the text could have made life very complicated. The system works, however the addition of the letters in an unheaded column on the diagrams is a little unclear.

There is some very useful discussion on the taxonomic problems attached to certain groups and this, together with the 300 good quality photographs make this a major contribution to the book.

The last chapter (**Quaternary**) by Nicky Hine and Phil Weaver is suitably concise covering as it does only the last two million years. Nevertheless it provides a clear synthesis of the great amount of research that has been carried out into this Sub-era.

This chapter defines the standard Martini/Okada & Bukry/Gartner zones for the Quaternary, and in addition to this provides an enlightening description of the use of "Acme intervals" in various boreholes from the North Atlantic. The integration of the nannofossil stratigraphy and oxygen isotope data is not new, but it is certainly worth the update it is given and the comments on it's high level of stratigraphic resolution.

This "black book" finishes with an extremely comprehensive reference list (almost 900 references cited) and a clear taxonomic index for all taxa in the text and figured. It is a book long in gestation but well worth the wait. The fact that the first print run is already sold out speaks for itself. All I can do is to plead with the new publishers (Kluwer Academic Press) to move rapidly on to a second printing. Like many of its predecessors in the BMS publications series, this book has already become a "standard" for all micropalaeontologists, including those like myself, who believe that the best thing for nannoplankton is to rinse them off the outer walls of forams. in order to clean them up.

Go out and buy a copy, if you can find one.

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The Cretaceous-Tertiary Event and Other Catastrophes in Earth History

Edited by Ryder, G., Fastovsky, D. and Gartner, S. 1996. Geological Society of America Special Paper No. 307. ISBN 0-8137-2307-8 Price £89.25 (GSA/GSL discount £71.40)

It is always fascinating why the Cretaceous-Tertiary extinction event, or indeed any of the other major phases of extinction, are seen as catastrophes in earth history. Whatever the cause of the extinction, maybe it should be seen rather as a starting point for the often apparent rapid evolutionary response to the conditions afterwards? What are we, if not a direct consequence of the "catastrophe" which befell the dinosaurs and their ilk? The overriding feeling supported by this volume is that extraterrestrial impact holds sway, for the K/T event anyway. This also appears to be reflected in the general public's perception, what with the impact of the Shoemaker-Levy Comet into Jupiter in 1994 and two major Hollywood film productions covering this topic in 1998. I was going to take this as an opportunity to review the K/T controversy in general. However, this has already been carried out elsewhere and Galvin's (1998) essay review is a good starting point for the volcanism vs. bolide issue.

This is a rather large volume with 39 papers, most of which deal directly with extraterrestrial bolide impact. It was my understanding that the Snowbird 111 conference, from which this volume resulted, also included several presentations on the other possible causes, varying from volcanic to climatic changes, most of which do not appear here. Many of these theories held sway up to the mid-1980s and in terms of a sea-change it is fascinating to read how one theory (impact) has gained acceptance, whilst the leading theory has faded away (volcanism). As the editors point out in their preface at the initial Snowbird I conference (Silver & Schultz, 1981), the extraterrestrial impact theory of Alvarez *et al*. (1980) had been just published, but was not well received. Papers supporting this impact view were not excluded, so I am a little surprised that non-impact hypotheses for "extinctions" at the K/T are thin on the ground in this present volume. It must be said that there is much evidence for impact for the K/T alone, but surely there is still room for discussion and inclusion of diverse and presently unpopular ideas which could be causal for the other "catastrophic" periods in Earth history. After all, negativity was the initial reception to Alvarez *et al*. (1980) as discussed by various authors (Ryder, Glen and Jablonski) in this volume. The apparent sequence of development and replacement of theories can be seen as snapshots represented by the major Snowbird conferences. Initially in 1981 (Silver & Schultz; Snowbird I), the majority rejected mass extinction caused by a bolide impact, preferring the effects of volcanism. 1988 (Snowbird II; Sharpton & Ward) can be summarised by bolides vs. volcanism, but there was no generally accepted smoking gun (i.e. a crater); Chicxulub in Mexico had been suggested as an impact site as early as 1981 by Penfield & Camargo (1981). However, with the precise dating of that crater as occurring at the K/T boundary by Swisher *et al*. (1992) Snowbird III was convened in 1994 (this volume). The majority of papers presented reflected the bolide view, often citing evidence of the impact crater at Chicxulub, Mexico.

The first four papers deal with the general philosophy of mass extinction and boundaries and some are important for attempting a balanced view. The initial paper by Jablonski is a good all round debate on mass extinctions and highlights problems (generally related to resolution, correlation and sampling). It outlines a robust approach to resolution limitations and the problems of searching for extinction patterns amongst taxa of high rank (i.e. phyla and class level). He also examines the importance of survivorship as ecosystems disintegrate. Rampino & Haggerty probably go furthest of all the contributors, trying to correlate bolide impact and the evidence of elevated iridium levels and shocked minerals at the 24 nominated major Phanerozoic extinction peaks ("culled" from Sepkoski, 1993). They feel confident about six boundaries and extend the view that the relationship is a working hypothesis for the remaining extinctions. This will stimulate enough controversy to run on and on. Ryder's contribution presents the uniqueness of the K/T and also deals with the historical context and relevant burdens of proof. I feel that Glen's paper on observations on mass extinction debates is one of the best papers in the volume and deserves a wider readership. He compares the K/T with controversies surrounding the late 1960s and 1970s studies in continental drift and also charts the changing viewpoints and opinions of a range of scientists from the earth sciences, as well as from the other fields including cosmology. I include the best quote in the whole volume to illustrate the flavour of this paper "We might thus expect micropalaeontologists to be somewhat differently orientated than other kinds of palaeontologists....".

The next six papers relate directly to the impact crater at Chicxulub and show the scale of the impact basin by geophysical and well data (Sharpton *et al*.), the ejecta deposits in Belize (Ocampo *et al*.),the

implications of magneto-mineralogic characterisations (Steiner), the impact melt petrology from Chicxulub and the moon (Warren et al.), the sedimentary degassing due to impact (Ivanov et al.) and the trajectories of ejecta from the crater (Alvarez).

The potential resultant sedimentation (tsunami vs. other gravity emplacement methods) around the Gulf of Mexico impact site is examined in five papers. The important common feature of all the accounts is the same sequence of siliciclastic sediments which includes a bed of spherules and shocked minerals. The actual dating of this sequence leads to a fascinating insight into the polarisation of views of two groups working on exactly the same sediments. Thus, not only are differing views on the origin of the deposits expressed, but interpretation of the actual timing of events is significantly different. Micropalaeontology (planktic and benthic foraminiferids) is used in all of the contributions to a lesser or greater extent! Smit *et al*. and Bohor propose tsunami and/or back wash turbidite deposition related directly to a K/T impact around the Gulf of Mexico. Stinnesbeck & Keller look at the same site, but the micropalaeontological evidence presented is much more detailed and suggests that clastic deposition ended in northeastern Mexico well before the K/T event and also cannot be explained by single catastrophic event deposition. However, they indicate that the glass-bearing deposits in northeastern Mexico may relate to a pre-K/T event (impact or volcanic in origin). Adatte *et al*. (including further data from Stinnesbeck & Keller) take the origin of these same deposits one step further and suggest that the evidence precludes tsunami as the originator and that these pre-K/T deposits are a result of an intra-Maastrichtian eustatic sea-level lowstand, 200-300ky prior to the K/T boundary. Just in case these two papers had gone unnoticed, Lopez-Oliva and Keller additionally present high resolution and detailed biostratigraphical data (planktic foraminiferid) to further corroborate a multi-event depositionary regime occurring prior to the K/T boundary. In an interesting attempt to explain the apparent dichotomy in the sedimentary pattern of a spherule bed overlain by a "later" K/T iridium rich layer, Rocchia *et al*. propose fragmentary, and therefore sequential, multiple impact events.

Micropalaeontology, being directly involved at the forefront of the K/T issue, is further well represented in a series of six papers. Planktic foraminiferids still appear to be the favourite tool of most biostratigraphers working on the K/T. The only catch is that each group of authors appears to be using their data to support often conflicting points of view. Habib *et al*. use an integrated analysis of dinoflagellates, planktic foraminiferids and nannofossils from southern Alabama to correlate extinction caused by tsunami related to the impact at Chicxulub. This is also the conclusion reached by Olsson *et al*. looking at high resolution planktic foraminiferid data from the same locality in Alabama. D'Hondt *et al*. review planktic foraminiferid turnover at the K/T boundary of south Atlantic DSDP sites, which they relate to impact, and also discuss the slow re-establishment of post-impact assemblages on the open-ocean biosphere. Huber's account of planktic foraminiferids from high latitude immediate post-K/T boundary sections uses carbon isotope compositions to evaluate reworking vs survivorship. He suggests re-deposition was the main factor for post-boundary survivorship. Pospichal looked at calcareous nannofossils at 13 sites around the world and also concluded that K/T extinction of nannofossils was abrupt and synonymous with the anomalous iridium abundance levels over the same interval.

Perhaps my overriding feeling is that higher resolution sampling and a consistent statistical analysis will be the only way forward to try and resolve conflicting issues. The main problems often still to be addressed at many of the K/T sites under investigation are: the possibility and extent of hiatuses at the sections; the apparent slow decline and extinction of many groups prior to the impact and the issue of reworking vs survivorship of "Late Cretaceous" taxa into the Danian. All these issues are rationally discussed by N. MacLeod with reference to testing patterns of planktic foraminiferid distribution from the El Kef section in Tunisia. This data set appears to fail to corroborate the geologically instantaneous extinction requirement of impact, and is more suggestive of a progressive K/T biotic turnover over a relatively extended time frame. However, MacLeod also suggests that factors causing the K/T mass extinction remain open to further investigation.

Macrofossil groups are poorly represented in this volume, with only three papers. The first is an account of inoceramid bivalves by K.G. MacLeod which discusses the diachronous intra-Maastrichtian extinction of this group. Dinosaurs do make a brief appearance in two papers, the first by Culter & Behrensmeyer who argue that an absence of vertebrate bone beds at the K/T boundary is related to time-averaging of the inferred dinosaur population diversity. The second contribution by Russell looks at the significance of dinosaur extinction and suggests that bolide impact was less important than natural selection and the global physical environment. An up to date review of the majority of the floral and faunal fossil groups and the K/T issue has been recently produced by MacLeod, Rawson, and Forey *et al*. 1997.

The remaining K/T papers deal with various aspects of impact around the world and assorted geochemical evidence. Kyte *et al*. and Bostwick & Kyte investigate impact debris and shocked quartz from the Pacific basin. An interesting paper by Bhandari *et al*. looks at an alternative origin for high iridium levels within the Deccan volcanic traps in the Kutch, India. They suggest the source is actually extraterrestrial rather than volcanic. Geochemical evidence for extra-terrestrial origin of ejecta is investigated by: Gayraud *et al*. (formation conditions of oxidized Ni-rich spinel); Chaussidon *et al*. (Sulphur and Boron isotopes of impact glasses) and Oskarsson (iron oxidation in tektite glasses). Heymann *et al*. produce evidence for immediate post-impact wildfire based on the presence of carbon-based fullerenes in K/T boundary clays.

The title of the volume indicates that the "other" events in Earth history may also get an equal billing, but unfortunately this is not so. The granddaddy of them all, the Permian/Triassic boundary event, which did for over 95% of the Earth's biota, hardly gets a look in. It is mentioned by Jablonski in terms of mass extinctions, whilst Rampino & Haggerty look at the possibility of impact, and Ryder emphasises the problems of even defining the Permo-Trias event, which appears to be stepped. The paper on continental flood basalts by Courtillot *et al*. also mentions the Permian/Triassic in relation to the Siberian traps volcanic episode. Possibly this lack of interest in the Permian/Triassic relates to the lack of a cause celebre (i.e. the extinction of the entire dinosaur clan)? Courtillot *et al*. further suggest the correlation of flood basalts with mass extinctions and also conclude the K/T bolide impact merely completed what the Deccan volcanism had started. Other catastrophic events appear specifically in three papers: the first compares the biotic selectivity of the K/T and Late Ordovician events by Sheehan *et al*. They conclude that the K/T ecological signature equates with impact, whilst the Ordovician episodic extinction pattern does not. The Frasnian-Famarrian boundary in Belgium is discussed in terms of impact by Claeys *et al*. The Pliensbachian-Toarcian boundary in the UK and Germany is covered by Little, with little evidence for impact being found.

The final two papers relate to a previous candidate site for the K/T bolide impact in Manson, Iowa by Anderson *et al*. and a paper by Boslough *et al*. covers the effect of impact energies in the Earth's interior.

Overall, the observation should be made, that whilst the impact theory has a good chance of being associated with the K/T boundary, extraterrestrial impacts should not, therefore, be *a priori* accepted as the sole means of explaining all Phanerozoic extinction events. Unfortunately, the price of nearly £90 for a paperback will certainly limit the appeal of this text, however, it should certainly be in all institutional libraries for reference, as many of the papers are worth referring to and it is interesting to see so many opposing views expressed. If anyone is looking for an in depth treatment of the palaeontological aspects of the K/T, then it is probably best to supplement any deficiencies by looking elsewhere as well; there are many such volumes available (e.g. MacLeod & Keller, 1996).

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Phanerozoic Faunal & Floral Realms of the Earth: The Intercalary Relations of the Malvinokaffric and Gondwana Faunal Realms with the Tethyan Faunal Realm

Meyerhoff, A.A., Boucot, A.J., MeyerhoffHull, D. & Dickins, J.M. 1996. Geological Society of America Memoir No. 189. ISBN 0-8137-1189-4 Price US$40.00.

What is most remarkable about this volume, which covers a huge amount of the earth's surface (most of it) and geological time (Ordovician-Late Cretaceous), is its size. The purpose of this rather slim volume is to examine how geotectonics is related to the correlation of biogeographical realms (defined on biotic distribution). Most of the faunal and floral realm boundaries do not appear to coincide with plate tectonic barriers. This anomaly is initially posed as the problem which the authors wish to investigate. Often, as with many problems in geology, this appears to have resulted from an unwillingness of researchers to be aware of each others' work. For example, a rather sweeping statement is that global tectonic workers ignore biostratigraphy, or just mention it as a supportive generalisation with no detail cited. Could this, I wonder, also be due to a general insularity of palaeontological workers, who do not reach out of their small areas of knowledge to allow non-specialists to easily use their data? This volume does at least try to address a very real problem.

In detail, biogeographical principals, terminology and reproductive communication are all briefly examined, followed by the biogeographical definitions of the realms under examination. The palaeontological record of each realm is examined showing an intercalary (transitional) area, ranging from a few hundred to 5000 kilometres wide and separating the northern and southern biogeographical areas. This transition zone does not coincide with published plate boundaries. The authors attempt to show, with reference to published biotic distributions, the interaction of northern and southern faunal and floral taxa over the Ordovician to Late Cretaceous period. The southern area is represented initially by the Atlantic Realm (Mid-Late Cambrian) and is succeeded by two principal zones under investigation; the Malvinokaffric (Ordovician-Middle Devonian) and the Gondwana (Early Permian-Cretaceous) Realms. The northern area is generally represented by the Tethys Realm. The boundary selected by plate tectonic workers separating these biotic realms follows the Taurus-Zagros-Indus-Yangry Suture. Within the Malvinokaffric Realm there is no biotic change across the suture, which also does not appear to have an impact on younger Gondwana biota. Additionally, Tethyan biotas extend into southern environments e.g. into the Antipodean regions.

Such poor correlation between the intercalary zone and plate boundaries is shown by the use of generalised global biogeographical maps and is also supported with a discussion of palaeontological examples covering each of the main geological systems (pre-Carboniferous, Carboniferous, Permian and Mesozoic) of the main continental masses. The authors have selected some 600 interdisciplinary references covering fields as diverse as palaeontology, stratigraphy, structural and tectonic as well as geophysics to illustrate the depth of information available for study (most, however, appear to be palaeontological in nature).

The readership of this volume is potentially wide. It should also possibly be recommended as a reference source for undergraduate biogeography courses as an illustration of how a multidisciplinary approach should be used for delineating realms and their relationships to plate tectonics. This volume would also serve as a good starting point for workers wanting to source the main areas of published research in this part of the world. As for answering the authors main problem, personally I think it highlights very well the lack of integration in this field. The authors conclude, following Bucher (1964) that "ultimately the proof (of continental drift) must come from the geologic and palaeontologic record" and that biogeographical data should have a higher profile role in resolving geotectonic problems.

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Biostratigraphy, Phylogeny, and Systematics of Paleocene Trochospiral Planktic Foraminifera

Berggren, W. A. and Norris, R. D. Micropaleontology, Vol. 43, Supplement 1, 116p. 1997

Atlas of Paleocene Planktonic Foraminifera

Olsson, R. K., Hemleben, C., Berggren, W. A. and Huber, B. T. Smithsonian Contributions to Paleobiology, No. 85, 252 p. 1999

Both of these monographs consists of a taxo nomic, phylogenetic, geographic and biostratigraphic review-revision of Paleocene planktonic foraminifera including (cumulatively) representatives of over 70 species, 16 genera, and 6 families. Both publications grew out of the "Paleogene Planktonic Foraminifera Working Group (PPFWG)" which was an informal assembly of foraminiferal taxonomists, biostratigraphers and oceanographers who have occasionally met to discuss problems in Paleocene planktonic foraminiferal systematics since 1979. While the PPFWG by no means represented all active biostratigraphers working in this interval, it did represent an attempt by several more-or-less retired, but still active, workers to compare notes and summarize the taxonomic knowledge they have gained over an entire career of working (at least on and off) with these groups. Moreover, both publication have drawn heavily upon studies of Russian type material by W. A. Berggren, F. Rögel, and H. P. Luterbacher (the latter of which was apparently not a member of the PPFWG).

Aside from providing the most up-to-date descriptions and illustrations of essentially all biostratigraphically-important Paleocene planktonic foraminifera since Blow (1979) these two monographs—which really should be read together—form an interesting case study of tensions that must have arisen within the working group over differing standards of systematic practice as well as rather different approaches to systematic scholarship. Leaving aside the rather curious decision by Olsson *et al*. (1999) to redescribe and re-illustrate 37 species that had been exhaustively described and superiority illustrated by Berggren and Norris (1997) there is a schizophrenic element to these publications that seems very odd. For example, while Berggren and Norris (1997) include a cladistic analysis of their species based on 73 binary characters rooted by employing various outgroups the Berggren and Norris (1997) classification reflects none of these phylogenetic results. Meanwhile, the Olsson *et al*. (1999) treatments eschews the use of cladistics altogether and instead opts for the (now thoroughly discredited, see Smith 1994) "evolutionary taxonomy" approach to systematic analysis in which wall-structure forms their *a priori*-basis for planktonic foraminiferal taxonomy and phylogeny in spite of the clear character conflicts between wall structure and other characters inherent in the Berggren and Norris (1997) study and much recent molecular systematic work on planktonic and benthonic foraminifera (see MacLeod this newsletter and references therein).

While some attempts were apparently made to reconcile the differences between cladistic and non-cladistic results, these are among the least convincing parts of the studies. A good example of this are the sections on ancestry of the Paleocene planktonic foraminiferal fauna. Olsson *et al*. (1999) simply argue that all Paleocene trochospiral forms are descended from *Hedbergella* on the basis of (undocumented) "morphologically intermediate" forms and a strict assumption that the observed stratigraphic ordering of first appearances is sufficient to determine the polarity of character state changes. In fact, *Hedbergella* were not the only Cretaceous trochospiral survivors and there is actually more evidence that other trochospiral taxa survived the K-T boundary than there is for hedbergellid survivorship.

Berggren and Norris (1997) take a more analytic (and in my view a far more appropriate) approach and test the hypothesis of hedbergellid ancestry by a series of cladistic analysis in which Paleocene trochospiral character states are polarized by alternatively specifying *Hedbergella*, *Rugoglobigerina*, *Globotruncana*, *Globotruncanella*, *Abathomphalus*, and *Neogloboquadrina* as outgroups and comparing the resultant trees. [Note: members of the first four genera are routinely found in lower Danian sediments and have been proposed by several investigators as representing probable Cretaceous survivors, see MacLeod and Keller 1994 and references therein.] Although Berggren and Norris (1997) note that each outgroup produces the same monophyletic tree topology (though treelengths and consistency statistics did differ) when all 6 genera are combined into a single multi-taxon outgroup a non-monophyletic ingroup tree results. However, despite that. the more appropriate, multiple outgroup analysis (see Nixon and Carpenter 1993 for a discussion of multi-outgroup analytic strategies) led to an unambiguously ambiguous result, Berggren and Norris (1997) preferred to conclude that *Hedbergella* was the most likely ancestor because "the minimal-length trees constructed using *Hedbergella* illustrate all the major features of all the trees derived from the other

outgroups [when analysed separately]." This is not an appropriate conclusion based on these results and its acceptance suggests that the within-working group tensions between results derived from different analytic approaches were resolved for reasons other than the demands of the data. Another example of this curious type of conflict resolution can be seen in Berggren and Norris' (1997) final tree (Text-Figure 12) which is incongruent with the biostratigraphy/phylogeny presented in their Text-Figure 17 and that of Olsson *et al*. (1999), but whose incongruence is not discussed in either publication. The Olsson *et al*. (1999) approach to phylogenetic analysis can be best summarized by pointing out that they use the content-free "character" 'non-spinose wall' as a distinguishing characteristic (= synapomorphy?) of the paraphyletic group *Hedbergella-Acarinina-Morozovella-Globanomalina-Praemurica-Igorina*.

Given the presently uncertain status of modern systematic methods in contemporary micropalaeontology it is perhaps not unexpected that some amount of confusion would characterize any monograph that sought to combine cladistic and "traditional" approaches (though the stated purpose of the PPFWG should have worked against such obvious discrepancies making their way into print at this late stage in the group's work). Nevertheless, many interesting discrepancies are also evident in the text descriptions provided by these publications. Take the description of *Eoglobigerina edita*, for example. The Olsson *et al*. (1999) description is a complete translation of Subbotina's original Russian description. Although the original description is interesting from a historical point of view, it is not really pertinent unless the authors are either (1) accepting the original description unchanged or (2) changing aspects the original concept. Unfortunately, opportunity to make a point-by-point comparison of the original and modern descriptions is missed and we are left with an anecdotal recitation of some morphological characters in a "Diagnosis," which is neither a full description or a discussion of those character states unique to the species, in lieu of disinterested scholarly commentary. The Berggren and Norris (1997) volume follows the same general format, without the translated original description and often mentioning characters that are not mentioned in the Olsson "diagnosis" (e.g., the general shape of the spiral trace in umbilical/spiral view, the nature of the apertural margin, the symmetry of the apertural opening). It is exceedingly curious in that the laborious character analysis required for Berggren and Norris' cladistic study appears to have played little role in organizing their descriptions. Even more interestingly, while the Berggren and Norris (1997) "Discussion" section dwells on comparing what previous authors have said about *E. edita*—especially the contributions of Walter Blow (1979)—much of this material is repeated in diluted form by Olsson et al. (1999) with no indication that a more in-depth discussion is available in the former work.

In addition to the lack of bibliographic connection between what are obviously two very closely connected works, a lack of citation to other non-working group, but pertinent contemporary commentaries on topics discussed in the these monographs is evident in both works; especially the Olsson et al. (1999) monograph. To cite just one additional example, Stefan Revets' (1996) monograph on the Bolivinitidae—in which he disagrees with Huber and Boersma's (1994) interpretation of *Zeauvirgina* as a planktonic genus—is not even mentioned by Olsson *et al*. (1999) in the context of an otherwise exhaustive review of *Zeauvigerina* palaeoecological interpretations. It would not be too strong to say that the Olsson *et al*. (1999) monograph consistently, and the Berggren and Norris (1997) monograph to a lesser extent, attempt to shore up their arguments by ignoring pertinent references and discussions of non-working group critics. This style does not lead to systematic progress and seems to work against the spirit they were presumably striving for in establishing a "working group" in the first place.

In conclusion, biostratigraphers and systematists who need to deal with Paleocene planktonic foraminifera will find access to both of these publications helpful with respect to current species concepts, stratigraphical distributions, and nomenclature. Of the two the Berggren and Norris (1997) monograph is vastly superior in terms of the consistency of its coverage, depth of its discussion, summary of biostratigraphically, taxonomically, and oceanographically-relevant data, and (not in the least) its use of cladistic analysis to address important questions of planktonic foraminiferal systematics. While the Olsson *et al*. (1999) volume is notable for its translations of original species descriptions and illustrations of type specimens (many of which are of lamentably poor quality) its coverage of trochospiral taxa is virtually identical in scope, similar, though not identical, in terms of species "diagnosis," but markedly inferior in terms of discussion to that of the Berggren and Norris (1997) monograph. In addition the entire systematic approach of Olsson *et al*. (1999) is badly dated. There was an opportunity here to make a

decisive leap forward for systematic foraminiferal micropalaeontology in general and Paleocene planktonic foraminifera in particular. That opportunity partially fulfilled by Norris and Berggren (1997), but ignored by Olsson *et al*. (1999). It will be for others to learn and completely apply the lessons to modern systematics to foraminiferal studies, though the advantages of such an approach—had it been followed through—are plain to see in Berggren and Norris (1997).

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Sex and Parthenogenesis

Evolutionary Ecology of Reproductive modes in Non-Marine Ostracods

K.Martens (Ed.): Backhuys Publishers, Leiden, 1998, 336pp. ISBN 90-5782-017-X. $75.50/£45.

Generations of biology graduates have found little difficulty in memorizing isolated facts about ostracod reproduction, such as the great size of ostracod spermatozoa (up to five to ten times total body length in some freshwater candonid and cypridid ostracods) and the relative mass of the male intromittent organs (up to one third of body length and volume). However, the field has suffered from the lack of any overall synthesis of accumulated knowledge. This excellent book provides an overview of the more fascinating aspects of the reproductive biology of non-marine ostracods, including sex-determination mechanisms, morphology, the distribution of reproductive modes (sexual versus parthenogenetic) through space and time, mating behaviour, population dynamics, and the genetics and ecology of clones. The existence of ancient lineages, such as the darwinuloids, which have been obligate parthenogens since the Mesozoic, is critically discussed and confirmed. This is of particular interest since theoretical considerations might predict early extinction for such lineages. Although comprising 17 chapters authored or co-authored by a various combinations of 14 European specialists, the volume is remarkable in its consistency of style and terminology. It is also much more than the sum of its parts: the assimilation of all these various data having allowed the authors to ask penetrating questions concerning the more dynamic aspects of the trade off between sex and parthenogenesis through time.

The subject matter of individual chapters is so wide ranging that the authors have elected to provide a more or less extended introduction to each topic. It is difficult to do justice to the body of theory in each topic area in so little space, and in some cases these introductions appear naïve, but I suspect that most readers will appreciate this context setting effort, as I did. Fossil ostracod valves have much more information to reveal than mere stratigraphic position. This book demonstrates the suitability of ostracods as model animals, especially for addressing questions with a strong time dimension. It is also good value for money.

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Oligocene - Miocene foraminifera of the Central Paratethys

Ivan Cicha, Fred Rögl, Christian Rupp & Jirina Ctyroka (with the collaboration of the members of the "Working Group on the foraminifera of the Central Paratethys"), 1998, Verlag Waldemar Kramer, Frankfurt-am-Main, ISBN 3-7829-2552-1, 325pp. [Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft, 549: 1-325. ISSN 0365-7000].

The idea for an Atlas of Forminifera of Central Paratethys was instigated as a result of collabora tion between scientists of thirteen nations and has matured over a period of many years. The excellent and comprehensive volume now published (ably edited by the Czech-Austrian team of Cicha, Rögl, Rupp & Ctyroka) finally bears tribute to their labours.

The book begins with a 5-page overview of Oligo-Miocene Stratigraphic Correlation within Paratethys (calibrated to standard stage terminology and the revised biozonation of Berggren *et al*., 1995) by Rögl. Then follows a number of sections under the umbrella title Regional Geology, Basin Development and Stratigraphical Concepts (55pages), covering: the Bavarian-Austrian Molasse Basin (by Reiser, Rögl, Rupp & Wenger); the Carpathian Foredeep (by Cicha & Ctyroka); the geology, stratigraphy and palaeoenvironment of the Southern Moravian Flysch Belt (by Krhovsky); the Oligocene of the Polish Carpathians (by Olszewska); the marine Miocene of the Paratethys of Poland (by Luczkowska); the stratigraphy of the Oligocene and Miocene of the Western Ukraine and Moldavia (by Bobrinskaya, Gruzman, Krasheninnikov, Serova & Venglinkyi); the Vienna Basin (by Cicha); the Danube Basin (by Cicha & Ctyroka); the South Slovakian Basin (by Cicha); the East Slovakian Neogene Basin (by Cicha); the Styrian Basin (by Rögl); the Palaeogene and early Miocene in Hungary (by Baldi); the Lower and Middle Miocene formations in Hungary (by Halmai); the Oligocene and Miocene of the Transylvanian Basin (by Popescu); the Neogene in Northwest Bulgaria (by Darakchieva); and finally, the southern part of the Pannonian Basin and its borderland (by Bajraktarevic & Kalac). Each part is well illustrated with maps, correlation charts and the ranges of key foraminifera.

Some 78 pages are then devoted to the taxonomy of the foraminifera. First, the description of one new family (the Colominellinae), 6 new genera, *Colominella*, *Paragaudryinella*, *Geminiella*, *Porosolenia*, *Lapugyina* and *Neugeborina* (attributed to Popescu), and seven new species (attributed to various authors) are given. Fred Rögl has kindly placed the paratypes of his three species, *Gaudryinopsis austriacus*, *Uvigerina popescui* and *Cassigerinella spinata*, in the Natural History Museum, London. Then follows the painstaking systematic treatment by Rögl of about 600 of the most important species, illustrated by 79 plates of the highest quality. Two things I particularly liked about the plates were, first, the illustration by good optical micrographs of certain taxa where SEM photography would fail to show or indeed, mask the diagnostic features, and secondly the plate explanations that cleverly include range charts of each of the species. The book concludes with a comprehensive reference list and two indices (a stratigraphical/geographical index, and a systematic index).

This is a definitive work. The "Working Group on the foraminifera of the Central Paratethys", and the editors in particular, can be justifiably proud of finally attaining their dream. They are also to be congratulated on having the courage to produce it in the English language (the scientific lingua franca of today), which amongst other things should encourage the widest possible readership.

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Palaeocene - Pliocene deltaic to inner shelf palynostratigraphic zonation, depositional environments and palaeoclimates in the Imperial ADGO F-28 well, Beufort - Mackenzie Basin.

Geological Survey of Canada Bulletin 523, 1997

This 71 page publication in the GSC Bulletin series builds on the work of Norris (1982, 1986) to present a palynostratigraphy and palaeoenvironmental interpretation for the Palaeocene to Pliocene interval of the Beufort - Mackenzie Basin. It includes some useful diagrams and seven plates, part of the text deals with the stratigraphical and environmental aspects, balanced by an accompanying taxonomic section.

The approach taken by the author is to use presence/absence palynological data based on a suite of 100ft spacing ditch cuttings from the Imperial Adgo F-28 well to erect an interval zonation. The

palynofloras throughout the interval are heavily dominated by terrestrial forms, with a limited number of dinoflagellate cysts reported, reflecting the deltaic to inner shelf setting of the sedimentary environments. Bearing the depositional environment and nature of the original material in mind, this kind of first downhole appearance, presence/absence based zonation is not the most appropriate approach to a stratigraphy. Compounding the limitations imposed by these factors, the author does not take into account the heterogeneous nature of parent plant distributions in deltaic palaeoenvironments. Parent plant ecology is a fundamental part of understanding the stratigraphical distribution of the dispersed pollen and spores in any past terrestrial system. Botanical affinities, or a multivariate statistical approach using PCA or DCA would have given the author some indication of environmental controls operating on both the higher plant pollen and spores and dinoflagellate cysts. Although the nature of the samples mitigates against the use of an assemblage based zonation, the interval zones used could not be relied upon to reflect true stratigraphical time lines because of ecological limitation. The reader is left thinking that any attempted stratigraphy, based on one well, is best described by a local assemblage biozone, a form preferred by many workers studying Tertiary and Quaternary non-marine palynofloras.

The taxonomic section contains some useful descriptions of new species of fungal spores, and descriptions of new species of pollen grains, that all palynologists dealing with the region will find valuable. It is complemented by plates illustrating a variety of pollen, spores and dinoflagellate cysts. These are clearly reproduced and of good quality, although the pollen and spore photographs could have been a little larger, and the dinoflagellate cyst photographs are far too small to be of value.

Overall, the reader is left with the impression that the volume was published utilising work done some time ago, as the approach is not what would be expected from a recent study. However, as a volume, it is worth considering purchase if you are interested in the recognition of Tertiary palynomorphs.

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Treatise on Invertebrate Paleontology. Part L, Revised. Mollusca 4, Volume 4 (Cretaceous Ammonoidea)

xx + 362p., 2,070 illus. On 216 fig., 1996. Dr C.W. Wright. HBK. University of Kansas, Lawrence & Geological Society of America, Boulder ISBN 0-8137-3112-7. Price £45.00.

This book reminds me of the best apple crumble and custard that I have ever tasted. Why? - Well as an undergraduate who was extensively collecting in the Cenomanian of Devon and Dorset I had amassed a number of specimens that I couldn't identify (it was before publication of the Palaeontographical Society monographs on the Chalk). I wrote to Willy Wright and he invited me to his home in Dorset. I duly took my specimens (mainly heteromorphic ammonites and some echinoids) which he rapidly identified being a world authority on both. At lunchtime he and his wife fed me the most sumptuous meal capped with the best apple crumble and custard ever (sorry Mum!).

This book, like the apple crumble, is excellent. For a single author to be able to distil and précis the enormous amount of literature on the subject of Cretaceous ammonites is to be praised to the fullest. I am not the only one who regards this as a major achievement because in the editorial preface Roger Kaesler states; ' Few palaeontologists have such an all-encompassing command of a major group of fossils as Dr Wright has of the Cretaceous ammonoids. We are indeed privileged that he has found both the time and the energy over the years to compile this information and share it with the paleontological and geological communities.'

What Roger Kaesler doesn't mention is that Dr Wright has the command of two other groups of major fossils as he is also a world authority on Cretaceous (especially Chalk) echinoids and also Cretaceous crabs! Dr Wright in his preface states that he produced this volume working as an amateur dependent on private resources except for a six year spell as a research fellow at Wolfson College, Oxford, again showing the remarkable dedication and energy needed to produce such a *magnum opus*. Also in his preface he acknowledges that J.H. Callomon co-authored the Craspeditidae, and M.K. Howarth provided text on the Tetragonitaceae and lists of the Cretaceous Phylloceratina and Lytoceratina. He has reflected this input by giving these two people co-authorship on the volume.

Having lauded the author we should really turn our attention to the content of the book. As with the entire Treatise series the book follows a standard

pattern of systematic descriptions of Cretaceous ammonoids with descriptions of all of the known genera. Each description is supported with either an illustration or photograph of the genera. The illustrations/photographs often include various views of the genus and also where available line drawings of suture patterns are presented.

I do have a couple of criticisms about the illustrations/photographs. Firstly the figures could be placed better within the volume. They are referred to in the systematic description and the editors have tried to place them as close as they can to where they are mentioned in the text. However this means that as more and more genera are described the figures become more and more distanced from the text to which they belong. This leads to the reader flicking backwards and forwards between pages. This editorial style of insertion of figures goes back to the inception of the Treatise series. With revisions continually happening to the Treatise volumes maybe it would be better either to devise a way of having a page of text with the accompanying figures opposite or to have all of the figures at the end of the volume. Either way would be better for the majority of users of the book, who after all are only interested in identifying specimens to generic level.

Secondly the photographic components of the figures are not as good as one might like. Current journals such as Palaeontology and the Monographs of the Palaeontographical Society place much emphasis on the quality of their figures enforced by strict editors and copy editors. It seems that the overall quality of figures in the Treatise series hasn't improved since the mid 1950s. This may be in part due to the reproduction of figures from the original literature, some of which date back to the 18th Century. Therefore it would be timely, especially with all of the modern technology available to the publishers, to make sure the figures are the best that can be produced. For example re-photographing of the specimens (where possible) should be undertaken, as it has to be remembered that this volume will be the standard work in this field for at least the next twenty years.

The systematic description of the ammonites is concise and yet brings forth the important salient points. Dr Wright has chosen to follow the classic classification system and has, correctly in my opinion, decided not to follow the plethora of new cladistic higher taxonomic names until a fully cladistic revision of the whole ammonites can be undertaken which will reconcile the current system with the new. The descriptions also include useful geographical range information as well as stratigraphical ranges for each genus. References on nomenclature are given within the text as well as information on evolutionary relationships (and their relevant supporting references) e.g. *Hypengonoceras*.

At the end of the book there are useful appendices and a glossary of morphological terms (essential for the non-ammonite specialist). Two particularly useful appendices are the correlation chart for the Cretaceous giving ammonite zones for the Mediterranean and Submediterranean, Northwestern Europe (the Campanian and Maastrictian in this faunal realm are zoned with belemnites), Volga and Russian Platform, and Northern Siberia. In future revisions it would be useful to include other areas such as North American, Asian (especially Japanese) and other southern Hemisphere correlations, although as a *caveat* in the explanation of the correlation chart the author states that these areas were chosen to explain the system of stages in the classic areas in which most of the genera and families were identified.

Also much liked by this reviewer is the stratigraphic range chart of the taxa, which stretches for 20 pages! It could be improved however by the simple addition of the page number (where the taxon is described) next to the taxon. This prevents you having to flick to the index every time you need to find on what page the Barremian genus *Silesites* is described or figured for example. To further enhance this Treatise volume (and for that matter further volumes) as an identification reference tool, charts or lists of the taxa that occur in each stage would be useful. For example if you had no knowledge of ammonites whatsoever and wanted to identify a specimen from the British Lower Chalk you would only have to quickly glance down the list for the Cenomanian and then use the text and figures to identify your specimen. I have produced such lists for the Albian and Aptian in pencil in the blank front and end pages of my copy.

So should you or your institution buy a copy? Well of course you/they should, basically because the Treatise is the standard reference work for all invertebrate fossils. If you spend any time at all teaching palaeontology, curating fossils or dealing with public inquiries and identifications the volume is invaluable and indispensable. It is particularly useful if, like me, you have large amounts of Cretaceous outcrop rich in ammonites on your doorstep.

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Tooth enamel microstructure

v. Koenigswald, W. & Sander, P. M. (eds). A. A. Balkema 1997. ISBN 90-5410-667-0 (hbk). £66.00

Dental enamel

Ciba Foundation Symposium 205, edited by D. J. Chadwick & G. Cardew. John Wiley & Sons Ltd, 1997. 284pp. US$ 128.00

Why on earth would any micropalaeontologist give one, let alone two, hoots about a couple of books on anything as dull as tooth enamel? The answer to such an irreverent question lies with conodonts, their vertebrate affinity and the homologies of the hard tissues from which they are composed. Thirty years ago the best reconstruction available of a conodont was Lindström's (1976) infamous bog-roll animal; with the benefit of soft tissue remains (and only through this data) we are now able to recognise conodonts as chordates, craniates, vertebrates, and possibly even gnathostomes. This systematic framework has provided a long awaited constraint on which to base comparative histology of the hard tissues from which conodont elements are composed. Many of us are more than aware of the pioneering work of Dzik (1986), Sansom *et al*. (1992, 1994), Smith & Hall (1990, 1993), Smith *et al*. (1996), and to an extent my own dabblings (Donoghue 1998), all of which combine to force even conodont specialists to review their conception of conodont palaeobiology. No longer can we be satisfied with documenting stratigraphic ranges and describing new species, as conodonts no longer exist *in vacuo*; discovery of conodont affinity is the single most important change in early vertebrate research for many, many decades and it will take many more before all the implications of this revolution have been felt.

Amongst many other firsts, conodont elements are the most primitive known form of biomineralised skeleton amongst vertebrates. Conodont elements are also dominantly composed from a tissue which represents the earliest expression of enamel amongst vertebrates and its recognition amongst the component tissues has required some authors to identify enamel as a synapomorphy of vertebrates (Smith 1995), although it is hardly this. Conodont specialists should, therefore, be as familiar with vertebrate hard tissue histology, and its relationship to phylogeny, as they are to the evolution of the posterior process of elements in Sa positions, or to the homoplastic evolution of platform elements in Pa positions. Unfortunately, however, most conodont specialists are geologists by training and entrance into the field of comparative histology does not come easy. There are few texts on the subject and most of those are extremely out of date. These two new texts are, therefore, extremely welcome, particularly as conodont elements are thought to be dominantly composed from enamel.

Tooth enamel microstructure is ideal for palaeontologists because it deals almost exclusively with structure (or pattern, rather than process), although there is a useful introductory chapter on the ontogeny of enamel development. This is a good place to start because it is difficult to understand changes in structure without knowledge of process. Furthermore, development is the appropriate place to start for a book which compares enamel microstructure at a series of progressively more inclusive levels of organisation, from crystallites, through prisms to enamel-types and ultimately comparison of enamel structure at the dentition level. This is a highly meritable approach that is as applicable to description and comparison of enamel as it is to the mineralised tissues of any group, be they ostracods, forams or molluscs.

Little is provided in the section on 'crystallite level', probably because crystallites represent the basic unit of organisation in mineralised enamel, and all variation amounts to variations in the organisation of cystallites into prisms, and the subsequent relative arrangement of the prisms. It is not surprising, therefore, that 'prism level' organisation constitutes the text's core and represents the book's 'coming-out' as a text on the origin of enamel microstructure in mammals, and subsequent evolutionary patterns. Much of this section is concerned with the origin of mammalian-grade prismatic enamel (that is, enamel prisms surrounded by a prism-sheath or inter-prism matrix) and whether or not this was achieved once and subsequently lost in a number of primitive and derived mammals, or else independently achieved in a number of early mammal groups. These authors (Sander, Wood & Stern) appear to be fighting a rear-guard action against colleagues who discount the importance of enamel-characters in resolving the relationships of primitive mammals, and I am left wondering why they have not questioned the motives of their detractors in making *a priori* judgements over the importance of such characters in resolving relationships. The importance of the topology of relationships output from a cladistic analysis surely rests with what it tells you regarding the sequence of changes in the evolution of anatomy; if prismatic enamel has evolved independently in a number of different groups, that is an interesting and important conclusion that can be drawn *a posteriori*. The concluding chapter by Bill Clemens is a welcome

breath of fresh air in a debate which otherwise pivots around hunches and abdominal sensations.

Development is an important factor in explaining systematic diversity of enamel microstructure and many of the chapters concentrate upon this (e.g. Sander). However, resolving which factors are responsible for the selection of any one of a number of enamel microstructures is possibly of greater importance. John Rensberger provides an excellent chapter on mechanical adaptation in enamel, and means by which it is possible to resolve function from the enamel microstructure of teeth in extinct taxa. Unfortunately, this chapter is little different from one published by the same author in a book on functional morphology in vertebrate palaeontology (Rensberger 1995); clearly within the intervening time the principles have not changed! v. Koenigswald & Sander provide a useful example of how these methods can be employed to resolve fine details of the feeding process. The book is wrapped up with a glossary of redefined terms for the classification and description of enamel microstructures.

The greatest weakness of *Tooth enamel microstructure* is the failure to consider enamel in anything other than crown-group tetrapods. A brief survey of the literature shows that there is a great deal of variation in the enamel of living sarcopterygians and stem-tetrapods (Smith 1992), and even actinopterygians (Smith 1989). As for the origin of enamel, a short mention is given of conodonts in the chapter by Clemens, but surely the origin of the tissue deserves some greater discussion.

Surprisingly, there is almost no overlap between *Dental enamel* and *Tooth enamel microstructure*. Although the entire volume is tailored towards tooth morphogenesis, *Dental enamel* concentrates almost exclusively upon development of structure at the level of gene expression and protein activity, rather than the direct formation of structure itself. As such it forms an apparently unplanned but, nevertheless, direct complement to *Tooth enamel microstructure*, expanding the earliest level in the hierarchy that is largely ignored. Typical of texts resulting from workshops organised and sponsored by the Ciba (now Novartis) Foundation, the chapters are arranged as in the meeting, with presentations followed by open discussion (a harsh form of peer-review in real-time!). This makes the texts even more useful than otherwise, and often the transcripted discussions are more interesting than the presentations they follow.

The symposium on dental enamel was held at the Ciba Foundation in April 1996, and bears no connection to v. Koenigswald & Sander's *Tooth enamel microstructure*, other than in its subject matter. The main differences between the two volumes is immediate: most of the authors of *Dental enamel* are dentists, whereas the authors of *Tooth enamel microstructure* are palaeontologists or zoologists. There is, therefore, a concomitant shift in focus from the mineralised tissues, to the genetic, developmental and biochemical basis of dental enamel. As a result, many of the individual chapters will not be of direct interest to palaeontologists, other than as background knowledge, but many chapters will be of great interest to those involved in the vertebrate skeletal research. For instance, Irma Thesleff and Thomas Åberg provide a summary of the genetic basis of tooth morphogenesis, as understood by the date that the volume was produced. I add the caveat because research into the basis of tooth morphogenesis is moving apace as those who seek to understand the genetic basis of vertebrate organ development have shifted focus towards this 'simplest' of all organ systems. More up-to-date summaries are now available (Tucker & Sharpe 1998), but Thesleff & Åberg with its ensuing discussion, nevertheless provides a short, sharp summary of what is known.

Alan Boyde provides a history of his research career under the title 'Microstructure of enamel'; half of the references cited are authored by Boyde and this is no unfair measure of his contribution to the subject. Boyde gives a short summary of the developmental basis of enamel microstructure, albeit restricted to mammals. Indeed, this mammalocentric view pervades the book (which is not surprising given the authorship), but the paper by Hal Slavkin and Thom Dieckwisch provides a refreshing phylogenetic perspective of the molecular basis of tooth development. Conodont workers should pay more than a little attention to this chapter because Slavkin & Dieckwisch pick up the thread laid earlier by Slavkin *et al*. (1983) and Kresja *et al*. (1990): hagfish toothlets express proteins of a comparable molecular weight to the enamel proteins of vertebrates and, thus, possibly represent a plesiomorphic stage in the origin of a vertebrate mineralised skeleton. Slavkin & Dieckwisch have extended this work by identifying amelogenin immunopositive sites in the pokal cells and surface layer of the keratinous cap of hagfish (*Eptatretus stoutii*) toothlets. However, further attempts to corroborate this hypothesis by identifying homology between amelogenin and hagfish mRNA have more recently been discredited, the results attributed to PCR

contamination (Girondot *et al*. 1998). Nevertheless, the available evidence appears to suggest that hagfish toothlets have more relevance to our understanding of the origin of a mineralised skeleton than some (e.g. Smith & Hall 1990) would have us believe. If Slavkin & Dieckwisch's suspicions are correct, conodont elements may well prove to be homologous to hagfish toothlets, though not necessarily for the same reasons or at the level initially proposed by Krejsa *et al*. (1990).

The remainder of the book resumes a mammalocentric (lack of) perspective, covering topics including enamel and dentine proteins, maturation, and the causes of enamel defects.

I don't imagine for one moment that many members of the BMS are going to rush out to order a copy of *Dental enamel*, but it will prove an important reference text for those conodont and (other) microvertebrate workers who want a simple, concise introduction to the developmental and molecular basis of enamel development. In contrast, *Tooth enamel microstructure* is a book by palaeontologists for palaeontologists and it contains a number of very important documentary and conceptual papers. Nevertheless, neither book deserves to sit your shelf unless you are directly interested in the development, function and evolution of enamel and even then I doubt that anyone would need to refer to these texts at a frequency greater than that provided by your friendly university library.

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Arthropod Fossils and Phylogeny

Edited by G. D. Edgecombe. 1998, 347 pp, Columbia University Press, New York. £100.00 (or £79.50 from Amazon.co.uk). ISBN 0-231-09654-2.

Arthropod Relationships

Edited by R. A. Fortey and R. H. Thomas. Systematics Association Special Volume Series, no. 55. 1998, 383 pp, Chapman & Hall, London. £126.25 (from Kluwer Academic Publishers). ISBN 0-412-75420-7.

In 1975 the proceedings of an Oslo based confer ence on trilobites and related arthropods was published in *Fossils and Strata*. Nearly twenty-five years on, we are treated to two more multi-author volumes that again have the arthropods as their theme. Notwithstanding Sidnie Manton's (1977) seminal text on *The Arthropoda* and Gupta's (1979) discourse on *Arthropod Phylogeny*, the wait for a compendium of current ideas about the relationships and evolution of fossil and Recent representatives of the most species-abundant animal group has ended with two splendid publications.

The twenty-six papers in *Arthropod Relationships* result from a highly successful international meeting which was organised by Richard Fortey and his colleague Richard Thomas and held at the Natural History Museum, London. In another timely but more narrowly based compilation - *Arthropod Fossils and Phylogeny* - Greg Edgecombe (Australian Museum, Sidney) has assembled seven invited papers (Chapters) which present overviews of the systematics and phylogeny of selected major groups of arthropods. Both of these meaty volumes are soundly recommended, if you can stomach the cost (when will publishers take the point that students, academics and the public at large are far from routinely in the market for £100 books, no matter how important). Both will become standard references on the history of the Arthropoda.

What these volumes bring home in striking fashion is the shift that has occurred in palaeontological methodology and communication in the last 25 years. The volumes are by no means replete with photographic illustrations of the fossils themselves, whilst almost without exception each of the combined total of 34 papers are either centred on cladistic analysis or include the obligatory cladogram(s). Reassuringly for at least this palaeontologist, both volumes also convincingly show that alongside molecular, genetical and other types of recently developed methods of analyses, meticulous observation of the morphology of the fossils themselves is still an indispensable key to unraveling and testing the complexities of arthropod relationships and evolution. This craft is apparent, for example, in *Arthropod Relationships,* in the contributions of Budd on the Sirius Passet (Greenland) Lower Cambrian macrofossils and Walossek & Müller on the superbly preserved 'Orsten' (Baltic) Upper Cambrian microfossils.

Following Greg Edgecombe's introductory section, in which he extols the role that study of extinct representatives can play in elucidating arthropod phylogeny, *Arthropod Fossils and Phylogeny* has excellent accounts of molecular (Wheeler's paper) and essentially morphologically (Wills and co-authors) based phylogenetic systematics of the Arthropoda. Other authors in that volume demonstrate once more the fundamental impact that study of fossils from Cambrian Konservat-Lagerstätten, such as the 'Orsten' (Walossek & Müller) and the Burgess Shale and Chengjiang (Ramsköld & Chen; Bergström & Hou), have made to our knowledge of early arthropods and our understanding of the evolution of the group. The remaining chapters offer detailed analyses of the interrelationships within the crustaceans (Schram & Hof) and the Chelicerata (Seldon & Dunlop).

A bonus of the more comprehensive nature of *Arthropod Relationships* is the treatment therein of the position of the Arthropoda within the Metazoa (papers by Valentine & Hamilton and Neilsen) and in particular their affinities to annelids (papers by Dick and Eernisse). This Systematics Association volume also allows fuller consideration of how insights into relationships are achieved via knowledge of minor but nevertheless phylogentically important groups such as the tardigrades (Dewel & Dewel), and via a wide range of non-palaeontological forms of evidence such as molecular approaches (Spears and Abele on crustacean phylogeny), embryology (Schultz), details of the central nervous system (Whittington & Bacon) and beautifully documented comparative limb morphology (Boxshall). It is a stimulating mix, with neontological and palaeontological data sets often providing conflicting arthropod phylogenies (contributions by Wills *et al*., Emerson & Schram, Wheeler, and Zrzavy *et al*.). One of the main messages which Manton championed was that arthropods are a polyphyletic group, representing more a grade of organisation rather than descendants from a common ancestor. Though that view is still defended by some (e.g. Fryer's paper in *Arthropod Relationships*) the current, cladistic-induced climate clearly favours a reversion to the classical view, that the group is monophyletic.

Not unexpectedly, there are several cases of double exposure, where the same authors and general themes feature in both volumes. However, of the two volumes only *Arthropod relationships* will provide you with the latest small print on the fossil record and evolution of myriapods (paper by Shear) and insects and their relatives (papers by Rasnitsyn, Kukalová-Peck, Willman, Kritiensen, Kraus, and Dohle).

There is no doubt that these are heady times for aficionados of the Arthropoda: tackling exciting fossil discoveries, often involving exceptional (soft-part) preservation; holders of the possible answers to much of the current sexy debate on the validity of the Cambrian 'explosion' and the origins of the Metazoa. Lucky people indeed – dip into these two volumes and witness for yourself.

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Profile of the Society

The British Micropalaeontological Society (BMS) is a registered charity (No. 284013) founded in 1970, originally as the British Micropalaeontological Group (BMG), through the initiative of Professor Leslie Moore of Sheffield University. The original aims of the BMG were to promote micropalaeontology in the UK, to encourage the multidisciplinary study of British type sections, and to provide a means of communication.

The constituted objectives of the BMS is "the advancement of the education of the public in the study of Micropalaeontology". Although primarily aimed at the inhabitants of the U.K., membership is "open to all persons and organisations engaged or actively interested in the science of Micropalaeontology in the British Isles or in the British geological sequence".

The society currently has 689 members, of which 515 comprise individual members. According to the 1994 Directory of membership, 52% of the individual members were resident in the U.K., 20% in the rest of Europe, 14% in the U.S.A., and 14% in the rest of the world. In addition, the Society has 174 Institutional subscribers from around the world (32% U.S.A., 31% Europe, 19% U.K. and 18% rest of the world).

The BMS is organized and operated "exclusively for scientific and educational purposes and not for profit". Most activities of the society are organized by specialists groups (there currently five groups: Conodont, Foraminifera, Nannofossil, Ostracod and Palynology) and members may be associated with more than one group if they choose. Group meetings are held regularly throughout the year and the Annual General Meeting takes place in November (usually in University College London). Special meetings are held irregularly and have a multidisciplinary and/or international flavour.

The Main Committee of the Society is drawn from the membership. The posts of Chair, Secretary and Treasurer carry a three year term of office. Secretaries and treasurers may seek re-election for a second term of three years. Other members of the committee (including group representatives) are elected for a two year term of office and are eligible for a second term. The committee also includes the editors of both the Journal and Newsletter, as well as the Publicity Officer (position vacant) and Membership Treasurer.

The first committee meeting was held in 1971 (Leslie Moore as Chairman and Bernard Owens as Secretary/Treasurer), and the inaugural meeting took place in association with the Geological Society in Sheffield ('Microfossils and British Stratigraphy') during March of that year.

The BMG became a Society in 1975 under the chairmanship of Dr. Bob Cummings. A circular was produced until 1976, when the newsletter was inaugurated, as *The British Micropalaeontologist*, first edited by P.J. Bigg. The newsletter was renamed *Newsletter of Micropalaeontology* in 1995. The first BMS publication (apart from *A Stereo-Atlas of Ostracod Shells*) was *A Stratigraphical Index of British Ostracoda* (edited by Ray Bate and Eric Robinson) which appeared in 1978 and was published as a Special Issue of *Geological Journal*. Subsequent volumes have been published as a series, commencing with the *Stratigraphical Atlas of Fossil Foraminifera* (edited by Graham Jenkins and John Murray) in 1980. Since then, ten further special publications have published for the BMS by Ellis Horwood Ltd., and since 1990, two by Chapman and Hall. During this time, stratigraphical indices or atlases have been produced for ostracods, foraminifera (2 editions), nannofossils, conodonts and dinoflagellate cysts, as well as a number of thematic volumes. These are available to BMS members at discounted rates.

Since 1977, the Society has published, biannually, its own micropalaeontographical series: *A Stereo-Atlas of Ostracod Shells* (first produced in 1973, edited by Professor Peter Sylvester-Bradley and Dr. David Siveter of Leicester University) which ceased publication in 1999, and occasional field guides. The year 1982 was a milestone in BMS history as this saw the initiation of the society's own journal, the *Journal of Micropalaeontology* (first edited by Lesley Sheppard). The Journal was initially produced once a year, but since 1984 has become established as a twice yearly publication of growing international repute. The editor and the editorial board will consider for publication original papers and review articles dealing with all aspects of micropalaeontology.

BRITISH MICROPALAEONTOLOGICAL SOCIETY

Membership Application Form

Membership is open to individuals and to libraries on the payment of the appropriate annual subscription. Rates for 2000 are:

Library membership:	£70.00 per annum
Ordinary membership:	£25.00 per annum
Student membership:	£15.00 per annum
Retired Membership:	£15.00 per annum

NAME (Prof. / Dr / Mr / Mrs / Miss / Ms)

ADDRESS

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I am interested in receiving details of meetings of the following specialist groups

☐ ☐ ☐ ☐ ☐ ☐

☐ I would like to become a member of the British Micropalaeontological Society

☐ I would like to become a BMS Foundation member (suggested minimum donation £25)

☐ I enclose a cheque / money order / bankers draft for the some of

Issue No.

☐ I wish to pay by credit card (£1 surcharge) Total Sum

Visa / Mastercard / Switch No.

Expiry Date

Cardholder's address (if different from above)

Signed Date

Student's supervisor

Alternatively, non-UK applicants may pay directly into the BMS bank account:

Please make all cheques payable to "British Micropalaeontological Society" and send with this application form to: James B. Riding, Treasurer, British Micropalaeontological Society, British Geological Survey, Keyworth, Nottingham, Nottinghamshire NG12 5GG, UK.

ADVERTISING IN BMS PUBLICATIONS

Commercial and 'situations vacant' advertisements may be placed in all BMS publications. The rates for 2000 are as follows:

Newsletter of Micropalaeontology:
£75.00 per full page advertisement or £125.00 for a year (2 issues); half pages at proportional rates (£37.50 and £62.50 respectively).

Inserts in **Newsletter of Micropalaeontology:**
£100.00 per issue (A5 flyers, or A4 folded to A5).

Journal of Micropalaeontology:
£160.00 per full page advertisement or £250.00 for a year (2 issues).

For further details, please contact the Treasurer, Jim Riding, on Tel: 01159-363409; Fax: 01159-363437; Email: j.riding@bgs.ac.uk, or James B. Riding, British Geological Survey, Keyworth, NOTTINGHAM, Nottinghamshire NG12 5GG.