The Palaeontology Newsletter

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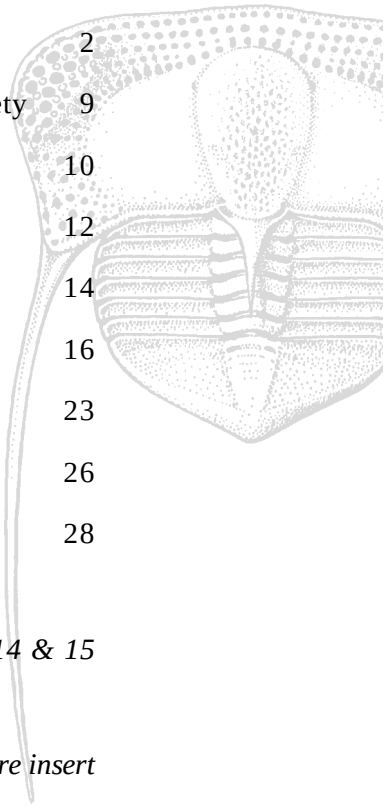

Reminder: The deadline for copy for Issue no 43 is 20th January 2000

On the Web: http://www.palass.org/

news

Remembering Joachim Barrande, 1969

At the 23rd International Geological Congress, held in Prague in August 1969, it was intended that two memorials to Barrande should be unveiled, one at Skryje, the other at the house in Prague where he lived. But the invasion of Czechoslovakia by Russian forces disrupted the Congress and these plans had to be postponed. The next year, an International Colloquium was organised by the National Museum and the committee of Czechoslovakian palaeontologists, and held at the chateau at Liblice of the Czechoslovakian Academy of Science, 17-20 May 1968. The meeting was arranged by B. Boucek and L. Marek, and a very well-prepared and enjoyable occasion they made on the 170th anniversary of Barrande's birth. The foreign delegates, from France, Britain, West Germany, the Soviet Union, Poland, the United States, Yugoslavia, Austria, Sweden, Belgium, Denmark, Israel and East Germany, met with Czechoslovakian palaeontologists on the 17th at the chateau. I well recall strolling in the spring sunshine in the grounds of the chateau, and meeting such luminaries of our science as R.F. Gekker, A. Martinsson, G. Regnell, P. Sylvester-Bradley, C. Teichert, and H. Termier, among many others. The talks at the Colloquium that day paid honour to Barrande, discussing his personality, his early life in France, the scientific climate of his times, his relationships with palaeontologists in Sweden, Russia, Britain, the U.S.A., the importance of his work on cephalopods, echinoderms and graptolites, and his extensive field work.

On the following day we were taken to Skryje for the dedication of the memorial to Barrande and a visit to the small museum established there. This was followed by an afternoon at Cambrian localities made famous by Barrande's work. On the 19th we also enjoyed going to similar localities in younger rocks, returning to Liblice for the closing ceremonies.

A full account of the Colloquium by Boucek and Marek, with the text of the talks (in French and English), enlivened by Mrs Bulman's sketches of some of the participants and excellent photographs of the memorials and the participants in the field and at the ceremonies, is in *Casopis pro mineralogii a geologii*, volume 15, pp 1-79, 20 pls., 1970. This is an important reference for palaeontologists and historians of our science. A new booklet (R. Horny and V. Turek, 1999, *Joachim Barrande (1799-1883), his life, work and heritage to world palaeontology*, Národní muzeum, 115 79 Praha 1, Václavské námestí 68, 56pp., Czech and English, French summary) was issued at the meeting in July, 1999, on the Ordovician System, held in Prague. The booklet does not include a reference to the publication resulting from the Colloquium of 1969.

H.B. Whittington
University of Cambridge

New Editor for EON

The Editorship of *EON*, the newsletter of the Paleontology Division of the Geological Association of Canada, has been assumed by Dr Mike Melchin of Antigonish, Nova Scotia. Dr Melchin's full address and contact information are as follows:

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Henceforth all correspondence regarding *EON*, including newsletter exchanges, should be directed to Dr Melchin.

James Haggart

New publication from Palaeontographica Canadiana

Palaeontographica Canadiana is a monograph series of major contributions to Canadian paleontology that is dominantly, but not exclusively, systematic in content. The series is sponsored jointly by the Canadian Society of Petroleum Geologists (CSPG) and the Geological Association of Canada (GAC).

Palaeontographica Canadiana No. 16. Silurian (Wenlock) demosponges from the Avalance Lake area of the Mackenzie Mountains, southwestern District of Mackenzie, Northwest Territories, Canada by J.K. Rigby and B.D.E. Chatterton. August 13, 1999. 43 pp. (including 10 pls., 2 text-figs.). ISSN 0821-7556, ISBN 0-919216-67-6. CSPG price $28 CAN$ + $3.75 CAN$ shipping + 7% GST in Canada, $28 CAN$ + $7.50 CAN$ shipping in USA. Elsewhere, contact CSPG. GAC price in Canada $35 CAN$, $35 US$ elsewhere.

Summary

Platform-margin strata of the Avalanche Lake area in the Mackenzie Mountains of the Northwest Territories have yielded a fabulous diversity of silicified and non-silicified fossils, including Silurian (Wenlock) sponges. The demosponges include a new epipolasid species, an abundant and diverse group of anthaspidellid orchocladines, and a rhizomorine. Three orchocladines are identified as new species. The faunas also include astylospongiid sphaerocladines, a tricranocladine lithistid, and permosphinctid demosponges.

This is one of the most diverse Silurian assemblages known from North America, and certainly the most diverse assemblage from northwest of the Transcontinental Arch in the western United States and northwestern Canada. Diverse assemblages dominated by orchocladine lithistid sponges characterize faunas from northwest of the arch, while those from southeast of the arch are dominated by sphaerocladine and tricranocladine lithistids and astraeosponge heteractinids.

Publication Distribution Offices

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Readers from outside of Canada who wish to order copies should check latest prices through the home pages of both GAC and CSPG. In general, the CSPG price may be less than the GAC price for orders from the United States (due to CAN vs. US exchange rate), and perhaps for orders from elsewhere (cf. above prices).

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PalAss AGM

10 May 2000

University of Leicester

The speaker will be Professor Dieter Walossek, Centre for Biosystematic Documentation, University of Ulm, Germany, on "Crustacean Origin and Phylogeny in the Light of its Cambrian Record". The talk will cover the exquisite soft-bodied preservation of the highly spectacular Orsten fauna, and will discuss the evolution of Crustacea along their stemline toward the Eucrustacea, embracing all extant groups. Professor Walossek will discuss his work on the innovations along the Crustacean line and other views of what it is to be 'crustacean'. The validity of such views impacts upon the current arguments that relate to the origin of the group and the reliability of a 'Cambrian explosion'.

Further details will be posted on the PalAss Web site (http://www.palass.org/) nearer the time (under "meetings").

Mark Purnell
University of Leicester

GEOSCIENCE 2000

17-20 April 2000

University of Manchester

Geoscience is generally not well attended by palaeontologists. Here to tempt you is the full programme…

The Geological Society, with the Mineralogical Society, The Palaeontological Association and the British Geophysical Association, will be hosting the third Biennial Geoscience Conference in Manchester on 17 - 20 April. *Geoscience 2000* aims to bring together the UK geoscience community and to provide a platform for presenting cutting edge Earth science and discussion of topical issues in a multidisciplinary and international context. Geoscientists from industry and academia are invited to participate and contribute to making the Geoscience Conference the premier scientific meeting of the Society and its kindred organisations.

Registration details can be obtained on the *Geoscience 2000* Web site at http://www.geolsoc.org.uk/gs2000.htm

Conference Structure

There will be six parallel sessions held over a period of 3.5 days. Each symposium will contain both oral and poster presentations. Field Trips may be held the weekend before the Conference.

Lyell Lecture and Reception (7.30pm Tuesday 18th April)

Participating organisations

¤ BRIDGE ¤ British Geophysical Association ¤ British Micropalaeontological Society ¤ ¤ Engineering Group ¤ Environment Group ¤ Environmental & Industrial Geophysics Groups ¤ ¤ Geochemistry Group ¤ Geological Remote Sensing Group ¤ Hydrogeological Group ¤ ¤ Marine Studies Group ¤ Metamorphic Studies Group ¤ Mineral Deposits Studies Group ¤ ¤ Mineralogical Society ¤ NERC's URGENT Programme ¤ Palaeontological Association ¤ ¤ Petroleum Group ¤ Tectonic Studies Group ¤ Volcanic & Magmatic Studies Group ¤

Palaeontological Association Symposia

History of biodiversity (G200011)

The fossil record contains a unique statement of the diversification of life tracked through almost 4,000 million years of earth history. This multidisciplinary symposium will address assessments of the quality of the fossil record and discuss the development and interrogation of large data bases. Patterns, rates and timings of diversifications and the role of ecological factors such as competition will be investigated through palaeontological, molecular and biogeochemical data and techniques.

Contact Convenor: Professor David Harper, Geological Museum, University of Copenhagen, Østervolgade 5-7, 1350 Copenhagen K, Denmark, tel: +45 35 322371, fax: +45 35 322325, e-mail: dharper@savik.geomus.ku.dk

See further details in following item.

Palaeoclimate reconstructions from fossils (G200018)

Fossil plants and animals can provide important evidence for past palaeoclimates, crucial for evaluating climate models. Presentations are welcome on methods used to reconstruct ancient climates from both plant and animal fossils, and on case studies of climate change for specific times in the geological past.

Contact Convenor: Dr Jane Francis, Department of Earth Sciences, University of Leeds, Leeds, LS2 9JT, tel: 0113 243 1751, fax: 0113 233 5259, e-mail: j.francis@earth.leeds.ac.uk

See further details in following item.

Plankton Evolution and Climate Change (G200020)

This symposium, organized by the British Micropalaeontological Society and incorporating the Lyell Lecture, will consider the evidence for the climatic controls on plankton evolution, and to what degree plankton have influenced climate change.

Climate modellers and plankton specialists will be invited to contribute to this important and exciting sphere of research.

Contact Convenor: Dr James Powell, Dinosystems, 105 Albert Road, Richmond, Surrey TW10 6DJ, tel: 0181 948 6443, fax: 0181 940 5917, e-mail: ajp@dinosystems.co.uk

See further details in following item.

Symposium G200011: History of Biodiversity

Wednesday 19th April 2000

The fossil record contains a unique statement of the diversification of life tracked through almost 4,000 million years of earth history. This multidisciplinary symposium will address assessments of the quality of the fossil record and discuss the interrogation of large databases. Patterns, rates and timings of diversifications and extinctions together with large-scale numerical models for changing diversity will be investigated. The symposium will comprise four sections: Development of biodiversity, Marine diversity, Diversity on Land, and Extinction and Survival, each with a keynote speaker.

Keynote speakers:

- Sir Robert May FRS (Chief Scientific Advisor to the UK Government and Head of the UK Office of Science and Technology): 'The modern diversity crisis'
- Peter Sheehan (Milwaukee Public Museum, Milwaukee): 'The evolution of marine biodiversity'
- Peter Crane FRS (Royal Botanic Gardens, Kew, London): 'The history of plant diversity on land'
- Andrew Smith (Natural History Museum, London): 'Marine invertebrate mass extinctions: What do we really know?'

Further details from the conveners.

Symposium G200018: Palaeoclimate reconstructions from fossils

Wednesday 19th April (pm) and Thursday 20th April (am)

Convenors: Jane Francis (University of Leeds) & Paul Smith (University of Birmingham).

The Palaeontological Association is sponsoring this session.

Fossil plants and animals provide important evidence for past climates, crucial for evaluating climate models and understanding environmental processes in the past. This symposium presents innovative techniques and new case studies for reconstructing ancient environments, from both animal and plant fossils, and for critical times in the geological past.

Offers of presentations are still welcome, especially as posters. The Palaeontological Association will cover the registration fee of presenters. NERC-funded students should also note that NERC will pay the registration of NERC PhD students who offer presentations. Please contact Jane Francis, Earth Sciences, University of Leeds, e-mail j.francis@earth.leeds.ac.uk

This session will include the following presentations:

KEYNOTE: Professor Russell Coope (University of Birmingham): 'The end of the last Ice Age – not with a whimper but a bang'.

Gordon B. Curry (University of Glasgow) & A.E. Fallick (SURRC, East Kilbride): 'The use of stable isotope determinations from brachiopod shells to reconstruct marine palaeotemperatures'.

Colin Osborne & David Beerling (University of Sheffield): 'Plant frost sensitivity in a CO_2-rich atmosphere: implications for palaeoclimate reconstructions'.

Jane Francis & Imogen Poole (University of Leeds): 'Reading the signals in fossil wood: Cretaceous and Tertiary climates of Gondwana'.

David Griffin (Western Australia): 'Aridity and humidity: two aspects of the late Miocene climate of North Africa and the Mediterranean'.

Paul J. Markwick (Robertsons Research, Wales): 'Terrestrial biodiversity as a palaeoclimate indicator?'

Gary Wilson (University of Oxford), David Harwood (University of Nebraska) & Rosemary Askin (Ohio State University): 'In-situ and recycled flora and fauna in different formations of the Sirius Group – evidence for late Neogene tectonic and climatic reorganisations in Antarctica'.

Richard Hunt (University of Leeds): 'Biodiversity and palaeoclimatic significance of Early Tertiary fossil floras in Antarctica'.

Howard Falcon-Lang (British Antarctic Survey): 'The relationship between leaf longevity and growth ring anatomy in modern conifers: implications for palaeoclimatological and palaeoecological studies'.

David Beerling (University of Sheffield) & K. Briffa (University of East Anglia): 'Sensitivity of tree growth to increased CO_2 and global warming and its consequences for interpreting fossil wood characters'.

Simon Cummings, C. Gately & I.G. Doran (Queens, Belfast): 'Difficulties in using palynology to assess the depositional environment of a clay deposited 13000 B.P. in Lough Foyle, N. Ireland'.

Jenny McElwain (University of Sheffield): 'Fossil plants indicate 'super-greenhouse' conditions at the Triassic-Jurassic boundary'.

Symposium G200020: Plankton Evolution and Climate Change

Wednesday 19th April 2000

This symposium, organized by the British Micropalaeontological Society, 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. Contact Convenor: Dr James Powell, Dinosystems, 105 Albert Road, Richmond, Surrey TW10 6DJ, tel: 0181 948 6443, fax: 0181 940 5917, e-mail: ajp@dinosystems.co.uk

Hans Thierstein (Geological Institute, ETH-Zentrum, Zürich): 'The climate-plankton link: when models confront evidence'.

Symposium speakers (to be confirmed):

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 offer from the Geological Society Publishing House

The following Geological Society Publications are available to Palaeontological Association Members at Geological Society Member's prices until the end of December 1999!

1. *Biostratigraphy in Production and Development Geology*.
   Edited by R. W. Jones (BP Exploration, UK) and M. D. Simmons (University of Aberdeen, UK).
   Geological Society Special Publication no. 152. Published August 1999
   318 pages, hardback, ISBN 1-86239-031-2
   List price £70.00 / US$117.00
   Geological Society Member price / OFFER PRICE: £35.00 / US$58.00
2. *James Hutton – Present and Future.*
   Edited by G. Y. Craig & J. H. Hull (Royal Society of Edinburgh, UK).
   Geological Society Special Publication no. 150. Published January 1999
   192 pages, hardback, ISBN 1-86239-026-6
   List price £59.00 / US$98.00
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3. *Lyell: The Past is the Key to the Present*.
   Edited by D. Blundell and A. C. Scott (Royal Holloway University of London, UK).
   Geological Society Special Publication no. 143. Published October 1998
   376 pages, hardback, ISBN 1-86239-018-5
   List price £79.00 / US$132.00
   Geological Society Member price / OFFER PRICE: £39.00 / US$65.00

Full details and contents of the above books can be found on the Geological Society Internet Bookshop (http://bookshop.geolsoc.org.uk/). *However*, orders for the Special Offer must be placed by fax, post or phone, not via the Internet bookshop.

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Please contact Dawn Angel, Sales Department, Geological Society Publishing House, Unit 7, Brassmill Enterprise Centre, Brassmill Lane, Bath, UK BA1 3JN (tel: +44 1225 445046, fax: +44 1225 442836, e-mail: angeld@geolsoc.org.uk).

There is no postage to UK addresses; overseas postage please add 10% of order total.

Marketing queries to Fran Clarke, Marketing Executive (clarkef@geolsoc.org.uk).

Association Meetings Programme

43rd Annual Meeting

University of Manchester 19 - 22 December 1999

The booking form and the abstracts for this meeting are included in this issue of the *Newsletter*, as the coloured centre inserts.

Progressive Palaeontology 2000

University of Birmingham 14 - 15 June 2000

This informal meeting is particularly intended for postgraduates, and first-year postgrads are encouraged to join in.

Full details on the next page.

Joe Botting, Nick Clack, Jo Snell and Rosie Widdison
Progressive Palaeontology 2000

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Web: http://www.bham.ac.uk/EarthSciences/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

This is 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

No End to Palaeontology

The turning of a century provides an irresistible opportunity to assess the state of our subject and consider what remains to be discovered. Last time around, the task was undertaken by Ernst Haeckel (an early convert to Darwinism and the first person to sketch out the universal tree of life) who reviewed the totality of nineteenth century science in his "Riddle of the Universe". To Haeckel, the discovery of evolution was the crowning achievement of that century, and geology and palaeontology had played an important role in establishing it. Interestingly, he was of the opinion that science was approaching a state of completion, with only the fundamental nature of matter and energy remaining to perplex us.

Predicting the impending end of science can be a dangerous thing, because it is difficult to distinguish what we know from what we just think we know. For example, the fundamental discovery of nineteenth century geology, according to Haeckel, was that the Earth was gradually and continuously cooling from a molten state, and shrinking as it did so, thereby explaining the formation of mountains over millions of years. Now we know about plate tectonics and radioactive heat sources within our planet, and we have a history of billions, not millions, of years to play with. The revolution in geophysics of course depended on the wonderful discoveries on the nature of matter and energy that came thick and fast just a few years after Haeckel was writing.

Nevertheless, we must admit that science is a relatively recent invention, and the pace of fundamental discovery that has characterised the last few hundred years surely cannot be extrapolated indefinitely into the distant future. So as we approach another century's end it has again become popular for books and articles to speculate that the end of knowledge is now almost upon us. There is even some concern that when all solvable problems have been solved, science will begin to lose its appeal, except as the basis for a stagnant technology.

Science, however, consists of explaining both generalities and particulars. Even if the predicted "Theory of Everything" is discovered, unifying all the forces of nature in a single explanatory framework, it will hardly be the end of knowledge as some seem to be claiming. For one thing, in learning as in evolution, ontogeny recapitulates phylogeny (well, sort of, in both cases). Each and every one of us experiences the thrill of original discovery when we appreciate some well known fact for the first time – just as when we find some fossil that is new to us, but not to the world.

We can not claim that palaeontology has underpinned a great revolution in human thought in this century, although of course it was important in the discovery of plate tectonics. Our science is essentially a nineteenth century one. If Haeckel or some other practitioner from a hundred years ago was transported to the present, and perused our libraries and museums, he would not require fundamental re-training to understand the questions that are being asked and the methods in use (the revolution in dating rocks excepted). In all likelihood, the same will be true a hundred or even a thousand years hence.

Let us fantasise that we could resurrect our friend in this way. Which twentieth century palaeontological discoveries would we most want to tell him about? Everyone's list would be

different, but for me the most amazing finds have been the Plio-Pleistocene African hominids, the earliest microbial fossils from the Archaean, the enigmatic Ediacarans, and recently the beautiful Mesozoic birds from China and elsewhere. These finds have been accompanied by an ever-increasing sophistication in understanding the fossil record, the preservation biases involved, and the practical uses fossils can be put to. One important leap forward that is particularly dear to me has been the successful coring of deep-sea sediments, with a microfossil record of astonishing continuity.

So progress has mostly been in the steady flow of new finds, combined with a growing theoretical basis for using and interpreting fossils and the use of innovative techniques. The rate of new and surprising discoveries shows no signs of slowing down as yet, which means there are many wonders to look forward to in the coming century. However, as we look further into the future, it seems inevitable that the surprises will slowly thin out. The good news, however, is that they will never cease altogether. Just as the cliffs of Lyme reveal new fossils with every rock fall, so the pace of palaeontological discovery will ultimately become dependent on the geological cycle itself. There will always be new finds to make as long as there are intelligent beings to appreciate them. The price for this is that our knowledge of the past will never be complete.

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Museum Corner

Museu de Paleontologia da Universidade Regional do Cariri – A museum of Santana fossils

To have one fossil *Lagerstätte* in your parish is lucky indeed, but to have two could be considered plain greedy. The town of Santana do Cariri, nestled in the fertile valley of the Rio Carius in southern Ceará, Brazil, can indeed claim two *Lagerstätten*. Sitting on a spur between the Rio Carius and the Riacho Butiti in the shadow of the Chapada do Araripe, Santana do Cariri is built on the Crato Formation, an Aptian limestone rich in fossil insects, fishes and pterosaurs. Above the town, on the forested slopes of the chapada, are the Romualdo Member nodule beds of the Santana Formation. These fossil-rich deposits have been yielding fossil fishes since the early part of the 18th century, but in the last 20 years have become better known for their exceptionally well-preserved pterosaurs, crocodiles, turtles and other reptiles, including the bizarre spinosaurid dinosaur *Irritator challengeri*. Between these two famously fossiliferous formations lies the Ipubi Formation, a unit with commercial quantities of gypsum that is quarried locally and provides employment in an otherwise agricultural region.

A museum to celebrate the town's palaeontological and geological wealth was opened in 1988 under the directorship of Dr Placido Cidade Nuvens. In its early days the museum was a medium for the display of the region's fossil heritage, but now the museum has come of age. As a department of the University Regional do Cariri (URCA) with headquarters in the nearby City of Crato, this year the University and Museum have played host to the 16th Brazilian Paleontological Congress. Construction of the Louis Agassiz Lecture Theatre to host a session of the congress at the museum was finished ahead of schedule and a palaeontological laboratory and preparation area equipped with microscopes is now also complete. Thus the museum is able to offer facilities for students and researchers from the University as well as for visitors from elsewhere. At the time of writing, a room is being furnished so that scientists working in the area can have accommodation at the Museum. In addition, a tract of land on which the nodule beds crop out has been generously donated to the University in order that scientific excavations can be conducted.

The museum has excellent relations with the local office of the Departmento Nacional Producao Mineral (DNPM), and local officer Dr Artur Andrade. It is therefore now possible to arrange to undertake palaeontological and geological fieldwork while based in Santana, and to receive logistical support and advice from the local experts. The museum staff certainly will welcome international visitors working in the region.

Don't let the museum's location put you off. Travel to the region is easy from any of the international airports in Brazil. Long-distance buses serve the nearby town of Nova Olinda from Rio de Janeiro, while it is possible to fly to Juazeiro do Norte/Crato from the international airport at Recife. Travel in the region is safe, and the food is excellent and plentiful. But more importantly, fossils are incredibly abundant and are exceptionally preserved. Commercial extraction of the fossils has declined in recent years, and it is likely that the supply of Brazilian fossils to the rock and mineral shops of Europe, Japan and the USA will soon dry up as new laws to protect them are enacted during 1999. What better place could there be to see such fantastic fossils as in a museum built on the outcrop?

The museum's displays are elegant in their simplicity. Wall and floor cabinets show off some of the very best fossils from the region's Crato and Santana formations. They include beautiful dragonflies, spectacularly preserved fishes, including coelacanths, frogs, turtles, pterosaurs and plenty of pretty plants. There is something for most Mesozoic palaeontologists.

And while there, take in the wildlife. An astonishing variety of birds, reptiles, butterflies and other insects abound. Much of the region is part of the Araripe National Forest, a small relict forest watered by springs and surrounded by semi-arid caatinga full of cacti.

The museum is open on Friday and Saturday from 8 a.m. to 6 p.m. and on Sunday from 8 a.m. to 2 p.m., but the staff are happy to open the museum at other times for visits by parties.

For more information and a flyer, simply e-mail fosseis@urca.br. If you would like to visit or wish to undertake fieldwork in the region then make contact at the following address:

Museu de Paleontologia da Universidade Regional do Cariri
Rua Dr José Augusto Araújo 326
63190-000 Santana do Cariri
Ceará, Brazil

Dave Martill
University of Portsmouth

Meeting REPORTS

Progressive Palaeontology
Bristol
April 1999

It seems incredible to me that it's only about five years since I gave my first 'grown up' talk at Progressive Palaeontology in Birmingham. That's not just because I aged rapidly during my PhD, but also because of the really impressive advances in both the standard of presentation, and also the amount of work that people seem to be capable of early in their careers (and I mean no disrespect to any of my colleagues at the Birmingham meeting).

Progressive Palaeontology is now firmly established as a successful annual meeting, providing a valued opportunity for young palaeontologists (predominantly PhD students) to present and discuss their work in an informal and relaxed setting. As the speakers and the audience are drawn from many institutions throughout the UK and elsewhere, Progressive Palaeontology can be a great social event, a good chance to find out who's doing what, where, and with whom… This meeting, the 16th Prog. Pal., and one of the largest yet, continued this fine tradition.

Aaron O'Dea (Bristol)

The meeting was opened by Mike Benton, then the floor was passed to Joanna Snell from the University of Birmingham who gave a thorough and extremely competent paper on the palaeobiology of Wenlock Bryozoa, particularly focusing on a detailed taxonomic review, setting the platform for future phylogenetic and ecological research. Next up, and first of the home team, was Byron Blessed, presenting a cross-disciplinary taxonomic study of Upper Triassic cave deposits from south-west Britain. Byron has used sedimentological,

taphonomic and geochemical methods to separate a mixed cave fauna into three distinct vertebrate assemblages, and presented his complex arguments well. Keeping to a vertebrate theme, the next speaker was Stig Walsh from the University of Portsmouth speaking about an exotic Mio-Pliocene avian assemblage from Chile. If, like me, penguins aren't the first animals that spring to mind when you think of fossils, talk to Stig. He has assembled a unique collection of primarily marine birds from a phosphatic bone bed, and is revealing fascinating information concerning the evolution, ecology, and palaeoenvironment of South American Neogene avifaunas.

Next, Emmanuel Fara from Bristol raised a question that vexes many palaeontologists, and sets us sabre-rattling every now and again, namely: who is right – the molecular biologists, who would have us believe that we are missing almost 70 million years of vertebrate evolution in the Cretaceous fossil record, or palaeontologists, who don't really like to believe that we could miss this much? Emmanuel's work looking at the fossil record of Cretaceous vertebrates sets out to test the quality of the fossil record, and how this relates to the recorded diversity. To investigate these issues, he is compiling a large database of Mesozoic and Cenozoic vertebrate genera, and will use this to (no doubt) put those molecular biologists in their place.

Jenny Cripps (Open University) was next, and provided a truly fascinating introduction to her palynological work on the environmental impact of 'Deccan traps' volcanism in India. If Deccan volcanism really was implicated in global faunal turnover at the end of the Cretaceous, then evidence should be present in contemporaneous, regional fossils. Jenny presented results from a recent field trip where palynomorphs were collected from 'intertrappen' sediments between successive lava flows. These may then be used to chart the succession of plant communities, and thus the impact of volcanism on floral ecology throughout the period of Deccan volcanism. Leslie Noe (Derby) gave a novel paper, addressing the question of diet in pliosaurian plesiosaurs. If, he argues, pliosaurs had a diet composed predominantly of marine invertebrates, then they would have had to deal with an increased salt load. Leslie discussed various potential osmoregulatory mechanisms, and the evidence (or lack of) for these in three Callovian pliosaur genera.

After such a stimulating morning, lunch was called, and gratefully received, before returning for the second session. This was kicked off by Michael Boniface, continuing the Bristol assault, with a taxonomic re-evaluation of a Triassic rhynchosaur from Madagascar. Michael gave a cautionary tale about the difficulty of working with fragmentary vertebrate remains. Marco Signore (Bristol again) pointed to a possible future for palaeontological presentations with a slick computer-aided presentation on the beautiful fossil dinosaur *Scipionyx samniticus*. Exquisite preservation of both soft and hard parts of this animal has allowed Marco and his colleagues to investigate questions of theropod dinosaur metabolism and biology, and Marco's team have developed new ideas about the nature of the theropod breathing apparatus. Darren Naish (Portsmouth) followed, with an intriguing intrusion into the Victorian world of Richard Owen and William Fox. Darren neatly explored a convoluted and nightmarish problem concerning Wealden theropod diversity, namely the supposedly synonymous genera *Calamospondylus* and *Artiosuchus*. By resorting to Owen's and Fox's original correspondence, Darren was able to show that separate

specimens were involved in the description and re-description of *Calamospondylus*, showing that confusion in theropod systematics is not a new invention.

Sarah Tibbs (Bristol again) introduced more geochemistry to the proceedings, investigating the mineralisation of the fossils in the Hunsrück Slate. The Hunsrück slate is of course famous for beautifully preserved fossils, typically preserved in pyrite, and revealed in X-ray plates. However, the Hunsrück fossils are in fact preserved in a variety of fashions, with phosphate, calcite and quartz present as well as three generations of pyrite growth. Sarah will use a range of analytical and observational tools to investigate mineralisation processes, using materials from a large block of slate excavated specifically for palaeontological studies.

After yet more coffee and biscuits, Howard Falcon-Lang (BAS) began the final session of the day investigating the palaeoecology of Cretaceous fossil forests in high palaeo-latitude (72ºS) environments from the Antarctic Peninsula. These broad-leaved araucarian trees experienced warm conditions, but with months of unbroken darkness every year. A fascinating part of Howard's work involves looking for evidence of these extreme environmental conditions in the anatomy and histology of fossil plants.

Emily Rayfield (Cambridge) followed with an elegant paper describing the use of finite element analysis to study theropod functional anatomy. Emily builds a computer model of a theropod skull, and uses finite element analysis programs to simulate the stresses and strains developed within the skull on application of a biting force. This approach allows Emily to 'play' with skulls, seeing how different skull architectures affect the dissipation of stress and strain within the skull. This is a particularly pleasing method as it is experimental, and allows Emily to make testable predictions about theropod skull morphology.

Kate Harcourt-Brown (Bristol) followed with a presentation on cladistic tree shape. Now I have to admit that I am bewildered by this, but Kate managed to give a very clear account of a complex topic. Kate argues that as phylogenetic trees are diagrams that depict the evolutionary history of a group, then the shape of those trees may give us important macroevolutionary information. To test this, she has analysed the shape of 100 published trees, and compared these to theoretical statistical models. Worryingly, her initial results seem to suggest that most published trees are produced by systematists testing *a priori* assumptions of phylogeny and choosing characters to fit these assumptions. Be warned!!

Eko Lelono (Royal Holloway) reminded us that we can and should apply our studies to industry. Eko has been working on palynology of the Eocene of Indonesia. Eko's aim is to interpret vegetational change throughout the Eocene, to consider timing of plant 'migration' from India to Java, and to establish a high resolution palyno-zonation for the Eocene. The work has a spin-off for the oil industry, as it will create a reliable tool for correlation of Eocene marine to non-marine sediments.

The final talk of the meeting was appropriately enough given by Huw Boulton from Bristol. Huw is working on the Jurassic Karabastau Formation from Kazakhstan. This formation is famous for the exceptional preservation of insects, fish and rarer tetrapods (including *Sordes*, the 'hairy' pterosaur). Huw presented a thorough review of the formation, and known taphonomic conditions, prior to extensive field and museum work later this year.

The meeting was wrapped up by Euan Clarkson, who noted (but I think forgave) the Bristol vertebrate and/or taphonomic influence, and commended the many different approaches used by today's crop of palaeontologists. However, Prof. Clarkson also pointed out that taxonomy appears to be undervalued (possibly as a result of funding difficulties). We should remember that however cross-disciplinary our studies become, most will be meaningless without solid taxonomic foundations.

The following day's field trip to the pub took in two sites on the way, the Lower Lias of Blockley brick pit with its abundant mud (and mollusc fauna), and the Upper Triassic Aust Cliff bone bed.

I would like to take this opportunity to thank the organisers (Trevor Cotton, Aaron O'Dea, Lucy McCobb, and Gareth Dyke) for producing a smooth and successful meeting, and I hope and trust that next year's Progressive Palaeontology will be even bigger and better.

Clive Trueman
University of Bristol

The origins of animal body plans and their fossil record
Hot Spring Hotel, near Chengjiang, southern China
20 - 25 June 1999

The origins of anatomical organisation and the sudden appearance of animal phyla in the fossil record (the "Cambrian explosion") were the themes of an international symposium on "the origins of animal body plans and their fossil records", held in June near Chengjiang, in southern China. This forum provided an excellent opportunity to bring together palaeontologists and evolutionary, developmental and molecular biologists, providing an integrated, interdisciplinary approach to the review of recent advances and the evaluation of the broader significance of research in these fields.

The setting was idyllic, on the shores of Lake Fuxian, and its proximity to various fossil sites of the Lower Cambrian Chengjiang fauna allowed the delegates, predominantly from China and the U.S.A. (with others from Germany, France and the U.K.) to visit some of the localities in the region, in between the days allocated for the talks. The Lower Cambrian Maotianshan Shale of eastern Yunnan has produced several sites which yield spectacular fossils; most notably the outcrops at Mt. Maotian, near Chengjiang (the Chengjiang fauna) and at Haikou, near Kunming (the Haikou fauna). Slightly younger is the early Middle Cambrian Kaili *lagerstätte*, of eastern Guizhou Province, which has produced around 80 genera of Chengjiang-type and Burgess Shale-type faunas.

A pre-symposium excursion (not attended by the reporter) was organised to the Precambrian fossil site at Weng-an and the Lower Cambrian fossil site at Zhijing, in Guizhou province. On the first day of the symposium the delegates attended the opening ceremony of the Chengjiang field station, an excellent new facility providing accommodation, meeting rooms and laboratories for visiting scientists to study the local fossils (complete with roof tiles depicting *Fuxianhuia*). This was followed by visits to

outcrops of the Chengjiang fauna at Mt. Maoian, Mt. Ma'an and Haikou, allowing some delegates to add some rather spectacular specimens to their collections. Later in the week, delegates visited the Early Life Research Centre at Jinning, the Precambrian-Cambrian Chinese type section at Meishucun, and outcrops of the Maotianshan Shale. During the symposium some of the delegates visited the horticultural exposition in Kunming, providing a relaxing interlude to the proceedings. The post-symposium excursion to Dali and Lijiang, in north-western Yunnan, provided an attractive setting for participants to unwind amongst the rich culture of the Bai, Naxi and other minority peoples of this region.

The presentations included many talks of palaeontological interest (reviewed here under themes). Gerd Geyer (Univ. Würzburg) wondered whether the Cambrian explosion may, to some degree, reflect an artefact of sampling, noting that the composition of Lower-Middle Cambrian faunas strongly depends on environmental constraints; faunas thought to indicate provincialism being merely a product of the biofacies. If faunas are reduced to equivalent biofacies, their differences become insignificant. Additionally, Gerd suggested that the long time span of the Lower Cambrian, relative to the Middle and Upper Cambrian, may have exaggerated our assessment of the pace of the Lower Cambrian radiation.

David Bottjer (Univ. Southern California) set the "ecological stage" for the Cambrian "evolutionary play", illustrating the "Cambrian substrate revolution" with a cast of early molluscs. Ichnological evidence (for example *Trochtichnus*) indicates that early in their evolutionary history some molluscs grazed upon semi-lithified microbially bound sediments. Following the "agronomic revolution" (that is, a change from late Neoproterozoic microbial matgrounds to modern soft substrates with more homogenous food source distributions (mixgrounds) in the Lower Cambrian), burrowing benthic organisms created a substrate revolution for those organisms that did not burrow. The increased diversity at the Cambrian explosion may, in part, be due to the co-occurrence of metazoans adapted to matgrounds and those adapted to mixgrounds.

Chen Jun-yuan (Nanjing Inst.) reviewed the importance of the Chengjiang fauna and suggested that it supported a "top-down" view of evolution (that is, after the explosive appearance of body plans, later history involved mass elimination of body plans and a continuous generation of new body plans from surviving body plans), as opposed to the conventional 'bottom-up' view of gradual and increasing complexity.

Michael Steiner (Tech. Univ. Berlin) asked "What are the Ediacara-type fossils?" and speculated that at least some forms may represent colonial prokaryotes or symbiotic organisms involving prokaryotes. Recent Myxobacteria illustrate the structural complexity that bacterial colonies can achieve. Chia-Wei Li (Inst. Life Sciences, Taiwan) cast light on the Precambrian world, as illuminated by the Weng'an biota from 580 my old phosphate deposits, which includes metazoans (sponges), eggs and embryos, mostly phosphatized by early diagenesis and preserved in sufficient detail to reveal developmental patterns. Fungi (Chytrids) evolved in late Precambrian marine environments with hosts including sponges, eggs and embryos of unknown metazoans, and organic debris. Weidong Yang (Inst. Geochemistry, Chinese Acad. Sci.) highlighted the palaeoenvironmental context of the

Weng'an biota, suggesting that the phosphates were deposited in a hydrothermal submarine setting, enhancing the preservation of the biota by the high hydrothermal sedimentation rate.

Arthropods were featured in many talks. Jean Vannier (Univ. Lyon) discussed the anatomy and mode of life of the bradoriids, as exemplified by *Kunmingella*, which was reconstructed as an epifaunal, dorsoventrally flattened arthropod, superficially similar to the Extant ostracod *Manawa*. *Kunmingella* shows almost no limb specialisation, although several features indicate that bradoriids derived early from the stem Crustacea. Nigel Hughes (Univ. California) tested developmental constraints in the aftermath of the Cambrian radiation by using trilobite thoracic segmentation as a case study. Derived trilobites that converted to a segment rich morphotype, more characteristic of basal trilobites, displayed a high degree of variation in segment numbers, as in basal trilobites. This may have been due to ecological factors selecting segment-rich morphotypes, rather than developmental constraints.

Dieter Walossek (Univ. Ulm) assessed the significance of Orsten-type fossils to crustacean phylogeny, noting that some forms share characters with some Eucrustacea (for example Maxillopoda and Branchopoda), and predicting that other eucrustacean groups (for example Malacostraca and Cephalocarida) must have occurred in the Upper Cambrian. Cambrian crustaceans were critically reviewed, revealing that some forms were not true Crustacea, or were of uncertain affinity. Berndt Weber (Tech. Univ. Berlin) was our '*Fahrtleiter*' for his intrepid adventures in the Shackleton Range of crustacean fauna, comprised of trace and body fossils attributable to Phyllocarida and Branchiopoda. Simon Braddy (Univ. Bristol) discussed the implications of recent work on eurypterid palaeobiology (reproduction and respiration), to the origin of the scorpion body plan.

The affinities, evolution and/or palaeoecology of other groups were also presented. Heyo Van Item (Hanover College, U.S.A.) discussed the phylogenetic affinities of conulariids, concluding that gross anatomical similarities support a relationship with scyphozoan cnidarians. The affinities of putative early Cambrian conulariids, such as the *Carinachites*, are supported by synapomorphies, such as the presence of four sulcate corners and transverse ridges, and dark penetrative colour bands (indicating that the test was originally apatitic). Mao-yan Zhu (Nanjing Inst.) discussed the anatomy and affinities of *Rotadiscus*-like forms from the Kaili Lagerstätte, concluding that these medusiform animals are systematically most closely related to lophophorates.

Jean-Bernard Caron (Univ. Lyon) discussed the enigmatic animal *Banffia constricta* from the Burgess Shale, based on more than 300 recently collected specimens, some of which show internal organs. While this form was probably an epibenthic gregarious deposit feeder, its affinities remain unclear (Problematica), despite previous suggestions of annelid or arthropod affinities.

Gou-xiang Li (Nanjing Inst.) presented early Cambrian bifid tubular fossils, from the Lower Cambrian of Shaanxi Province. These "early skeletal faunas" were morphologically and chemically different to *Byronia*, and represent partly mineralised tubes of sessile tube-dwelling organisms, although their affinities, even to a Phylum, remain unclear.

Di-Ying Huang (Nanjing Inst.) illuminated the origins of the craniates, via *Hunnanozoon* and *Haikouella*, both of which reportedly show a large subventral notochord, about two dozen myomeres, and a pharyngeal cavity with six pairs of branchial arches. *Haikouella*, now known from over 300 specimens, also has filamentous branchial arches, a globular heart and a distinct head with a brain and lateral eyes.

Shou Hwa Chuang (Singapore) reiterated his views on the Cambrian radiation of brachiopod body plans, suggesting that five different variants (lingulid, discinid, acrotrepid, craniid, articulate) appeared during the early Cambrian. Although the origins of brachiopods pose a question requiring more material, the lingulid body plan was presumably the most primitive. Stephen Dornbos (Univ. Southern California) gave an excellent presentation on the palaeoecology of helicoplacoid echinoderms, showing that their bizarre appearance was due, in part, to their adaptation to low vertical bioturbation substrate conditions. Based on sedimentological (including x-radiography) and functional arguments, helioplacoids were reconstructed as suspension feeding mud stickers, in a vertical position. Their morphology is inconsistent with muddy seafloors, however, so the substrate must have been fairly firm.

At the end of the meeting, an open forum for discussions revealed some of the tensions that had developed amongst certain delegates concerning the attendance of several creationists, some of whom gave talks presenting 'evidence' for design. In conclusion, this symposium was a valuable forum for the review of previous approaches and the exchange of ideas for future research. Although most of the presentations centred on the view that the Cambrian explosion was an actual biological event, some talks highlighted the fact that the sudden appearance of forms may be due, in part, to the advent and development of predation leading to the evolution of mineralised skeletons, larger sizes and burrowing strategies. Further clues, therefore, may await us in an (as yet undiscovered) Precambrian soft-bodied meiofauna. Rather than a single 'biological big bang' of metazoans in the basal Cambrian, I prefer to view a series of preceding 'Precambrian Chinese firecrackers'; the so-called 'Cambrian explosion' explained by the widespread skeletonization and evolution of large size among forms which were preserved for the first time in the fossil record.

Simon J. Braddy
University of Bristol

>>*Future* Meetings of Other Bodies

International Conference: Where Worlds Collide
UNE Asia Centre *29 November – 1 December 1999*

Where Worlds Collide: Faunal and floral migrations and evolution in SE Asia-Australasia will be held at The University of New England, Armidale, Australia.

The conference will be structured into themes. Suggested themes are: Palaeozoic/Mesozoic geology and biogeography; Cenozoic geology and biogeography; Primate evolution and biogeography; Hominoid migration and dispersal; Plant evolution and dispersal in the region; Wallace's Line; and Human dispersals, cultural contacts and change.

Further details from A/Prof Ian Metcalfe, Convenor, Where Worlds Collide Conference Asia Centre, University of New England, Armidale NSW 2351, Australia.

GEOSCIENCE 2000
Manchester *17 – 20 April 2000*

The Geological Society, with the Mineralogical Society, The Palaeontological Association and the British Geophysical Association, will be hosting the third Biennial Geoscience Conference in the University of Manchester on 17 - 20 April. *Geoscience 2000* aims to bring together the UK geoscience community and to provide a platform for presenting cutting edge Earth science and discussion of topical issues in a multidisciplinary and international context. Geoscientists from industry and academia are invited to participate and contribute to making the Geoscience Conference the premier scientific meeting of the Society and its kindred organisations.

Registration details can be obtained on the *Geoscience 2000* Web site at http://www.geolsoc.org.uk/gs2000.htm

5th International Meeting of the Society of Avian Palaeontology and Evolution
Beijing *June 2000*

For information contact: Huiling Wu or Yonghong Zhang, 2000 SAPE meeting, P.O. Box 643, Beijing 100044, China, fax 86-10-68337001.

Millennium Brachiopod Congress
The Natural History Museum, London *10 – 14 July 2000*

The 4th International Brachiopod Congress – sponsored by The Palaeontological Association, The Systematics Association, The Geological Society and The Paleontological Institute – will include the themes Living Brachiopods and Palaeobiology, Evolution and Phylogeny, Palaeoecology and ecology, Palaeobiogeography and Biostratigraphy, and Molecular Analyses. The Congress will provide an opportunity for scientists from around the world to discuss current research and debate questions stimulated by the present revision of Part H of the Treatise on Invertebrate Paleontology.

There will be pre-Congress excursions to the Palaeozoic of Wales and the Welsh Borderland, and to the Dunstaffnage Marine Station near Oban (for living brachiopods and faunas off the West coast of Scotland), and post-Congress excursions to the Lower Carboniferous, Late Visean "Reefs" of Derbyshire and to the Jurassic and Cretaceous of South-East England. Organised by Robin Cocks, Howard Brunton, Sarah Long and Alwyn Williams.

Further information and registration forms are available from Sarah Long at The Natural History Museum, Cromwell Road, London, SW7 5BD, UK (e-mail sll@nhm.ac.uk, tel +44(0)171 938 9448, fax +44(0)171 938 9277).

IV Congreso del Terciario de España
IV Congress on the Tertiary of Spain
Tremp *19 – 21 September 2000*

The Unitat d´Estratigrafia (Departament de Geologia) of the Universitat Autònoma de Barcelona, the Ajuntament de Tremp, the Institut d´Estudis Il.lerdencs and the Consell Comarcal del Pallars Jussà are organizing the IV Congreso del Terciario in Tremp (Lleida province), from 19th to 21st September 2000, together with ceremonies in honour of Dr. Joan Rosell Sanuy organized by the Ajuntament de Tremp.

The address for correspondence is Eudald Maestro Maideu or Eduard Remacha Grau, Secretaría IV Congreso GET. U. d'Estratigrafia, Dep. Geologia. Fac. de Ciències, Universitat Autònoma de Barcelona, 08193 Bellaterra, Spain (tel 935 81 16 03 (E. Remacha) or 935 81 10 85 (E. Maestro) or 935 81 16 09 (Secretaría de Geología), fax 935 81 12 63, e-mail iget3@cc.uab.es or Eudald.Maestro@uab.es)

This First Circular, the forthcoming Second Circular and other useful information are available in the Web page of the Congress, at http://www.catalunya.net/gettremp2000

Precambrian-Cambrian International Seminar – Field Meeting

NW Himalayas *30 September – 9th October 2000*

This meeting is being arranged under the co-convenorship of Dr O. N. Bhargava and Prof S. B. Bhatia, by Dr Arun D. Ahluwalia, Principal Investigator, DST Project Terminal Proterozoic-Early Cambrian (Krol Belt-Spiti Himalaya), Geology Department, Panjab University, # 2114, Sector 15-C, Chandigarh 160014, India (tel 541740, fax 541409, e-mail ada%phys@puniv.chd.nic.in).

Funding is expected from a number of sources once response is known. Your suggestions and good wishes are solicited. If you are interested please indicate by e-mail and in writing, as a document signed by you would be most helpful for obtaining support. Your passport details etc. will be required to get clearance.

An earlier National Meeting on Mega Events from Blaini to Tal was held from 7th to 10th August, 1998. A brief review of this meeting is published in *Journal of Geological Society of India*, January 1999 (author Vibhuti Rai). Dr O.N. Bhargava gave a keynote address. Other participants were S.V. Srikantia (Secretary, Geological Society of India); B.S. Tewari (President of the Pal. Soc. India); S.S. Kanwar (Deputy Director General, Geological Survey of India); D.K. Bhatt (Director, Pal. Div, Geological Survey of India, Jaipur (India)); Arun Sharma and Jaitinder Sud Simla; Ravindra Kumar (GSI, Jaipur); Nawal Kishore Sharma; D. Ahluwalia (Convenor, RituRaj); Anjali Mehra (Chandigarh); K. Bassi, K.C. Prashra: InderSingh (GSI, Chandigarh).

Abundant help came from the Mine Owners' Association, Sirmaur (H.P.) to all participants, and is also expected for this meeting.

Third International Conference on Trilobites and their relatives

Oxford, UK *2 – 6 April 2001*

There will be a pre-conference field trip to Scotland and Northern England, and a post-conference trip in Wales and the Welsh Borders. Organiser-in-chief: Derek Siveter (Oxford).

Book Reviews

Molecular Evolution: A Phylogenetic Approach

R. D. M. Page and E. C. Holmes. 1998. 352pp. Blackwell Science.
ISBN 0-86542-889-1. Paperback.

The study of evolution at the molecular level has undergone a revolution in recent years, initiated by the invention of the polymerase chain reaction in the mid-1980s and the subsequent widespread availability of sequence data, and driven by the development of more and more accurate models of molecular evolution and, most recently, the adoption of phylogenetic trees as a means of organising and understanding sequence evolution. As a result of these developments, gene sequence data can now provide insights into not only phylogenetic relationships and divergence times, but evolutionary and population processes. Whilst previous books have covered at least some of these areas, in the form of more technical (and rather less focused) volumes (e.g. Avise, 1994; Harvey et al., 1996), Page and Holmes provide the first introductory text to cover these methods, and the first on molecular evolution to adopt a consistently phylogenetic framework.

The first three chapters consist of basic introductions to trees and their terminology, gene structure and function, and population genetics. Whilst these areas are certainly important to understanding the later parts of the book, these introductory chapters are something of a disappointment – often complex terms and concepts are introduced too briefly for those without previous knowledge, and in too little depth to be useful to those wishing to catch up with recent advances in these fields. Fortunately, anyone with a recent biological background will be familiar with the vast majority of this material, and a number of much larger and more specific textbooks cover all of these areas extremely comprehensively.

A chapter on measuring genetic change and sequence alignment, and two lengthy chapters on reconstructing phylogenies from sequence data, and models of molecular evolution, form the core of the book. All three strike a good balance between introducing concepts and adequately covering major debates, and providing sufficient detail to allow the reader to feel comfortable with the specific methods and models. Each chapter is followed by lengthy suggestions for further reading, and the numerous worked examples are genuinely helpful. It would certainly prove very difficult to get a good understanding of much of the content of these chapters on the basis of the primary literature and other texts.

The final chapter covers some of the applications of molecular phylogenies. The relevance to palaeobiologists of many of the concepts and techniques covered is underlined throughout by the authors' choice of examples, many of which, such as the "out of Africa" hypothesis of human origins and speciation in West African lake cichlids, are also amenable to palaeontological analysis. Palaeontologists will increasingly encounter alternative phylogenetic and evolutionary hypotheses derived from molecular studies. It is important that they understand these alternative approaches and make palaeontological evidence and

methodology readily understandable to molecular biologists. To this end I would encourage all evolutionary palaeobiologists seeking a quick and easy introduction to the methods and applications of molecular evolution, and anyone else with an interest in modern evolutionary biology, to read Page and Holmes' book.

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