



No. 27, Summer 1995

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## ASSOCIATION MEETINGS PROGRAMME

NB: Members are reminded that all our meetings are open to the public and should be advertised as such.

### **PALAEONTOLOGICAL ASSOCIATION REVIEW SEMINAR: Biomineralization -processes, patterns and phylogenetic implications in calcifying groups**

The Natural History Museum, London, UK

*8th November 1995*

Palaeontologists have long been aware that shell structure can be a character of considerable importance in understanding phylogeny and in recognizing affinities of extinct organisms. More recently biomineralization, the study of mineral formation by organic systems, has

developed into a dynamic field of multidisciplinary research. The first objective of this seminar is to explore how insights from studies of biomineralization processes can enlighten our understanding of shell structure and phylogeny in groups with calcareous skeletons. Conversely, a second objective is to see how knowledge of pattern and diversity of calcified skeletons can be used to constrain investigations of process.

The seminar will consist of a session on general principles (biomineralizing processes, mineralogy of calcite and aragonite, investigatory methods), followed by a session devoted to particular taxonomic groups (e.g. coccoliths, sponges, molluscs). Broad subject areas will be reviewed at a level understandable to the advanced undergraduate while introducing some of the latest developments. The seminar will be held in the Demonstration Room, Palaeontology, from 10.30 to 16.30; space will be available for poster displays.

*Provisional* speakers include Professor S. Mann (Univ. of Bath), Dr J. D. Taylor (NHM), Dr R. Wood (Univ. of Cambridge), Dr M. J. Weedon (NHM), Dr J. R. Young (NHM), Dr G. Cressey (NHM) and Dr T. Ehrendorfer (UCL).

Organizers: Paul D. Taylor (tel: 071-938-9409; e-mail: P.Taylor@nhm.ac.uk) and Jeremy R. Young (tel: 071-938-8996; e-mail: J.Young@nhm.ac.uk).

## **PALAEONTOLOGICAL ASSOCIATION ANNUAL CONFERENCE**

University College, Galway

*Saturday 16th December - Wednesday 20th December 1995*

Preparations are advanced for the annual meeting of the Association in the City of the Tribes. A range of accommodation has been reserved in the centre of the city, adjacent to a host of bars and restaurants and the main shopping areas, yet less than 10 minutes walk from the College. The city is busy in the weeks leading up to Christmas and you are urged to reply promptly to secure your preferred accommodation. All prices quoted are in **Irish Pounds**.

Payment by participants from outside the Irish Republic is simplest by Bankers Draft or Eurocheque. Official Carrier - Air Lingus.

## [Abstracts](#) now available!

### Provisional Programme of Events

#### *Saturday 16th December*

- 1500 Onwards - Registration in the James Mitchell Museum, Main Quad, UCG
- Assemble posters in Main Concourse, UCG
- 2000 Guinness and Oysters Reception in James Mitchell Museum, UCG

#### *Sunday 17th December*

- 0900-1700 Talks and poster session in Main Concourse, UCG
- 1900 Wine Reception followed by Annual Dinner in Aula Maxima, Main Quad, UCG

#### *Monday 18th December*

- 0900-1700 Talks and poster session in Main Concourse, UCG
- 1800 City Reception followed by tour of the Building Stones of Galway City

#### *Tuesday 19th December*

- 0900 Departure for field excursions from Main Quad, UCG. Choose from:
  1. Lower Palaeozoic rocks of the Kilbride Peninsula, Galway-Mayo Border
  2. Carboniferous rocks of NW Clare including the Burren and the Cliffs of Moher
  3. Shell fish laboratory at Carna, south Connemara

Full payment must be made with the booking form by October 1st 1995 (check you have included the compulsory registration fee of IR£15). Please make cheques payable to '**James Mitchell Museum**'. Any particular dietary requirements should be noted when booking.

THE BOOKING FORM CAN BE FOUND IN THE CENTRE OF THE PRINTED VERSION OF THIS NEWSLETTER OR OBTAINED FROM THE LOCAL SECRETARY.

Local secretary:

Dr David Harper, Department of Geology, University College, Galway, Ireland

Voice: 353-91-24411 ext 2351, Fax: 353-91-750533, e-mail:

David.Harper@ucg.ie

## **THE PALAEOLOGICAL ASSOCIATION AND THE NATURAL HISTORY MUSEUM PROGRESSIVE PALAEOLOGY WORKSHOP**

**Wednesday, 7th February, 1996**

**Computers in Palaeontology**

### **First Announcement**

Suggestions for abstracts requested for talks, posters and demonstrations in all fields of palaeontology; on how modern computers can be used for both research and publication

For more information contact Sian Evans or Neale Monks at the Department of Palaeontology, Natural History Museum, Cromwell Road, South Kensington, London, SW7 5BD. Telephone 0171-938-9007, Fax 0171-938-9277. e-mail: N.Monks@nhm.ac.uk

*Apple Macintosh and IBM-PC platforms are equally welcome, and can be provided for demonstrations*

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## **ASSOCIATION BUSINESS**

### **NOMINATIONS FOR COUNCIL 1996-97**

At the AGM in March 1996, the following vacancies will occur on Council: President, Vice-President, Editors (x2), Marketing Manager and Publicity Officer.

Nominations are now invited for these posts. Please note that each candidate must be proposed by at least two members of the Association and any individual may not propose more than two candidates. Nominations must be accompanied by the candidate's written agreement to stand for election and a single sentence describing his/her interests.

All potential Council Members are asked to consider that:

"Each Council Member needs to be aware that, since the Palaeontological Association is a Registered Charity, in the eyes of the law she/he therefore becomes a Trustee of that Charity. Under the terms of the Charities Act 1992, legal responsibility for the proper management of the Palaeontological Association lies with each member of Council".

The closing date for nominations is **Friday 29 September 1995**. They should be sent to the Secretary: Dr Paul Smith, School of Earth Sciences, University of Birmingham, Edgbaston, Birmingham B15 2TT.

## **SYLVESTER-BRADLEY AWARD 1996**

Applications are now invited for the award in 1996. The award is made annually to assist palaeontological research (travel, visits to museums, fieldwork etc.). Preference will be given to applications for a single purpose, rather than top-ups of other grant applications. No definite age limit is applied, but some preference may be given to younger applicants. The award is open to both amateur and professional palaeontologists, who need not necessarily be members of the Association. The award will be in the region of £300, and the closing date is **31 December 1995**. Application forms may be obtained from the Secretary: Dr Paul Smith, School of Earth Sciences, University of Birmingham, Edgbaston, Birmingham B15 2TT.

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## **ANNOUNCEMENTS**

### **PLEASE HELP SUPPORT THE PAL ASS: CALL FOR INTERESTING PHOTOS**

Council has agreed to fund production of a set of a dozen good quality colour postcards of interesting palaeontological subjects. They will be sold as sets at a price (probably about £3 or \$5) that covers production costs and makes a small profit, but the main reason for the exercise is to disseminate the name of the Association and to provide a service for members (useful for reprint requests, for example). They could also be used to produce teaching slides.

We are therefore looking for good quality colour prints or colour slides of interesting palaeontological subjects. We should prefer subjects that are of scientific interest or which tell a story, though pictures that are aesthetically pleasing portraits of high quality would also be welcome. If you have any likely candidates that you would be happy for us to use, please contact Tim Palmer, Institute of Earth Studies, University of Wales, Aberystwyth SY23 3DB, UK (e-mail [tjp@aber.ac.uk](mailto:tjp@aber.ac.uk)). We would ask you to sign over the copyright to the Association, as we do for published papers. We will, of course, let you have the originals back. Free set of the cards to go to all successful submitters!

## **FOUND**

A bunch of keys were left in the Ford Transit Van belonging to the Department of Earth Sciences, University of Sheffield, during the Christmas Pal. Ass. Meeting at Glasgow (1994). These are now with Mike Romano who can be contacted at Sheffield (tel: 0114 2824784; e-mail: [m.romano@sheffield.ac.uk](mailto:m.romano@sheffield.ac.uk))

## **PALAEONTOGRAPHICA CANADIANA NO. 12**

Westrop, S. R. 1995. Sunwaptan and Ibexian (Upper Cambrian-Lower Ordovician) trilobites of the Rabbitkettle Formation, Mountain River region, northern Mackenzie Mountains, northwest Canada. 80 pp., 15 pls. \$29.00 CDN/ \$29.00 US

This publication is now on sale from the Geological Association of Canada. For details of this and others in the Palaeontographica Canadiana series, contact: Geological Association of Canada, Publications Department G233, c/o Department of Earth Sciences, Memorial University of Newfoundland, St. John's, Nfld. A1B 3X5 Canada. Telephone: (709) 737-7660; Fax (709) 737-2532.

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## **Palaeo-Comment**

Interviews have played a large part in my life recently, having both given and received this exquisite form of punishment over the last few months. In both cases the question which most unsettled me was "What has gone wrong with palaeontology and how can it be put right" or words to that



effect. When asked to explain further, my interviewers amplified by suggesting that most geology departments regard palaeontology as a minority subject, that we don't have a high profile in science generally and that our applications for grants seem to be largely unsuccessful. At that stage I began to see the point.

After my nerves had returned to their normal condition and my stomach began to accept food again, my mind returned to this problem. Firstly, I wondered if my interviewers' assertions were true. Is palaeontology viewed in most departments as a minority subject - not in Leicester, certainly, and there are other exceptions. However, I think perhaps this point is widely valid. At BGS, the number of palaeontologists has more than halved in the past few years and now that mapping teams have to buy fossil services, they increasingly seem to manage without. How is palaeontology seen outside geology? A recent front cover of *Nature* can't have done any harm, but my perception is that most people in Universities don't regard most palaeontology as being at any sort of cutting edge. Finally, it is undoubtedly true that palaeontologists haven't been getting the grants they deserve from our funding councils recently, although whether this is a problem in presentation or in perception is questionable.

I wonder if we are in danger of being perceived either as curators of the distant past or as tellers of eclectic and ultimately pointless stories about dead invertebrates. If it is not in our stars, but in ourselves that we are underlings, to paraphrase the bard, then we are stuck with whatever reputation we have accrued over the years. Perhaps we can carry on regardless, doing what we ourselves know to be useful and valuable work. Publicity is facile and transient - why pander to other people's ignorance? Well, one good reason is to do with numbers. We need graduate students and post-docs, and we need lectureships to be filled as people retire. A department which misconstrues the scale and value of palaeontology will not hire a palaeontologist. The fallacy that we are a minority group will grow as our numbers decline and ultimately the perception will be self-fulfilling.

I think we need to combat our 'image problem' actively and effectively, before our numbers wane by attrition. When offered the job for which I had been interviewed I was told that I had been chosen because 'I knew a lot about oceanography'. I was taken on despite being a palaeontologist, not because of it. We all know people for whom their field has proved a stumbling block to success. It is up to us to help solve this image problem

before it is too late.

*Sue Rigby*

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## MEETING AND EXCURSION REPORTS

### LYELL MEETING 1995: SINGULAR PRODUCTIONS AND PARTICULAR STRATA

Burlington House, London

*22 February 1995*

Organized by Sue Rigby and Jan Zalasiewicz  
on behalf of the Joint Committee for Palaeontology.

How have the changing theoretical concepts of evolutionary biology influenced biostratigraphic practise? Certainly a reasonable and not insignificant question; a worthy subject, therefore, for the public ponderings of the international gathering of palaeontologists that was the 1995 Lyell meeting. The assembled cast comprised a good mixture of time-served and young-turk palaeontologists, with a range of expertise and specializations; this mixture was reflected in the presentations and more particularly in the interesting and entertaining discussions which generated a good deal of both heat and light.

The links between evolution and biostratigraphy were approached from a variety of different directions through the day: Adrian Rushton (BGS) and Stephen Jay Gould (Harvard) considered, among other things, the fundamental role played by fossils in unravelling the complexities of geological history and their key contribution in understanding the nature of time. Paul Pearson (Bristol) and Jeremy Young (NHM) each provided examples of the difficulty of recognizing fossil species. Richard Fortey (NHM), a "proud biostratigrapher", and an advocate of only the loosest of links between evolutionary theory and biostratigraphy, pointed out that too close a relationship could be bad for both; Adrian Lister (University College, London), on the other hand, suggested that biostratigraphy could not be done without a sound understanding of evolutionary theory. Nigel Hughes (Cincinnati Museum) used trilobite synonymy to illustrate the importance of sound taxonomy in biostratigraphy, and added a dash of taphonomy. Peter Allison (Reading) applied the taphonomy more liberally,

illustrating the preservational bias inherent in the fossil record and some of the problems this causes those who seek palaeontological patterns. Robin Cocks (NHM), faced with an unenviable task given the diversity of opinion expressed through the day, summed things up nicely.

Perhaps only one thing united all the speakers: their agreement that biostratigraphy is dependant on the fact that evolution has occurred. Unless the organisms of one time/rock interval are different from those of another, and unless each organism arose only once, then biostratigraphy would be impossible; the fossil content of a sediment would be more data for lithostratigraphy, nothing more. But apart from this it was apparent from the day's talks and lively discussion that biology or biological theory has really had very little direct influence on the practise of biostratigraphy. The details of evolutionary mode and tempo, so central to the evolutionary biologists' reading of the fossil record, are largely irrelevant to the pragmatic geological biostratigrapher. As with all good trends, however, one thing bucks it: taxonomy. Here, the extent to which biological concepts of species are applied to fossil taxa can have a very significant effect on stratigraphic ranges and hence a direct bearing on biostratigraphic resolution. It is here that the palaeobiologist and biostratigrapher can be at odds, each interpreting the distribution of morphological characters through time with different biases and preconceptions. This secondary theme was explicit in several of the day's talks, and proved to be the focus of much discussion. It is not a new debate, but as this meeting and recent discussions on PaleoNet testify, there is little sign of consensus. For those who have not heard it, the argument, at its most simplistic, is that palaeontologists with a biostratigraphic bent will divide a morphological continuum into finer and finer taxonomic entities with the intention of achieving finer and finer biostratigraphic resolution. Those of a palaeobiological persuasion, on the other hand, tend to recognize species that encompass a range of morphological variation, some forms of which may be quite distinctive. The problem is that both species concepts are applied by different people to the same fossils, each worker attaching a Linnean binomen to their carefully delimited taxon. The result of this dual philosophy is mostly confusion and frustration. I have to say that the discussion that took place on this occasion was made all the more interesting for the passions aroused, but as one might expect, the dispute was not resolved. But then again, that wasn't the purpose of this meeting.

Which brings me back to that original question: how have the changing theoretical concepts of evolutionary biology influenced biostratigraphic

practise?  
Not much.

*Mark Purnell*  
*University of Leicester*

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## **FUTURE MEETINGS OF OTHER BODIES**

### **International Council for Archaeozoology: Bird Bone Working Group**

Southampton, UK  
*25 - 28 September 1995*

The second meeting of the Bird Bone Working Group will be held at the University of Southampton. There will be lectures and posters on all aspects of bird remains in archaeology: the exploitation of wild and domestic birds, changes in bird distributions in the prehistoric period, and problems of identification and bone survival. The proceedings will be published, probably in a special issue of the International Journal of Osteoarcheology.

The programme will also include a one-day field trip to Dorset to visit a 600-year old swannery and other sites of ornithological and archaeological interest, a business meeting and a conference dinner. For information contact Dale Serjeantson, Faunal Remains Unit, Department of Archaeology, University of Southampton, Southampton SO17 1BJ, UK. Tel: (0) 703 676719, Fax: (0) 703 593032.

### **Annual Meeting of the American Association of Stratigraphic Palynologists**

Ottawa, Ontario, Canada  
*11 - 14 October 1995*

Symposia, Technical Sessions, Posters, Field Trip. Details: Ms Susan A. Jarzen, Canadian Museum of Nature, P.O. Box 3443, Station "D", Ottawa, Ontario, Canada K1P 6P4. Fax (613) 954-4724. Plans are underway for a full-day Special Session on Quaternary Palynology. For details contact Dr.

Pierre Richard, Laboratoire Jacques-Rousseau, Laboratoire de paléobiogéographie et de palynologie, Département de géographie, Université de Montréal, C.P. 6128, succursale A, Montréal, Québec, Canada H3C 3J7; Tel. (514)343-8023; Fax (514)343-8008. E-mail: richard@ere.umontreal.ca

## **British Micropalaeontological Society Silver Jubilee Meeting**

University College, London, UK  
*18 November 1995*

Six keynote reviews will be given by experts in the fields of calcareous nanofossils, conodonts, foraminifera, ostracods palynomorphs and radiolaria. The complete programme will be made available in the second circular, to be published in the Spring.

Registration fee: £5 to BMS members and £10 for non-members. There will be no registration fee for students (members or non-members). Palaeontological Association members will be especially welcome.

In order to help planning and bringing overseas speakers to London, please register your interest as soon as possible. Contact: J. B. Riding - Secretary, British Geological Survey, Keyworth, Nottingham NG12 5GG, UK

## **Fauna, Flora and Sequence Stratigraphy**

Museum of Paris, Paris, France  
*14 - 15 December 1995*

Organized by Association Paléontologie Française and Société Géologique de France. For further details contact: APF, Fauna, Flora and Sequence Stratigraphy Meeting, Laboratoire de Paléontologie, 8, rue Buffon, F75005 Paris, France. Tel: (33) 40793046; Fax: (33) 40-79-35-80.

The meeting is devoted to the interrelationship between palaeontological and biological processes and sequence stratigraphy. Presentations will be in English or French.

## **Congress 'Paleogene of South America'**

Santa Rosa, La Pampa, Argentina  
*14 - 18 May 1996*

Contact: Dr Silvio Casadio, Dpto. Ciencias Naturales, Universidad Nacional de La Pampa, Uruguay 151, 6300 Santa Rosa, La Pampa, Argentina. Phone: 54 954 33093; telefax: 54 954 33408; e-mail: RPMELCHO@ARCRIBA

## **Geological Association of Canada - Mineralogical Association of Canada, Joint Annual Meeting**

Winnipeg, Manitoba, Canada  
27 - 29 May 1996

For information contact: G. S. Clark, Dept. of Geological Sciences, University of Manitoba, Winnipeg, Manitoba, R3T 2N2, Canada. Phone: (204) 474-8857; Fax (204) 261-7581.

## **North American Paleontological Convention - VI**

Smithsonian Institution, Washington, D.C., USA  
9 - 12 June 1996

Final Announcement and Call for Abstracts available October 1, 1995. Abstract deadline: January 19, 1996. Contact: NAPC-VI, c/o Department of Paleobiology, Mail Stop 121, National Museum of Natural History, Washington D.C. 20560, USA.

## **Biotic Recoveries from Mass Extinctions, IGCP Project 335**

Smithsonian Institution, Washington, D.C., USA  
9 - 12 June 1996

A symposium on "Biotic Recoveries from Mass Extinctions" will be held during the Sixth North American Paleontological Convention (NAPC 96) 9-12 June 1996 in Washington DC. The first circular is now available from NAPC-96, Dept of Paleobiology, MRC-121, National Museum of Natural History, Washington DC 20560, USA.

Our recent meeting in Plymouth, UK was covered in *Science* magazine. Dick Kerr, a reporter for *Science*, attended the meeting and wrote a 2 1/2 page report in the 7 October 1994 issue. A longer report on the project has been written for the December issue of *Episodes*.

Contacts: Douglas H. Erwin, Dept of Paleobiology, NHB-121, Smithsonian Institution, Washington DC, USA 20560, Ph. (202) 357-2053, Fax: (202)

786-2832, email: MNHPB028@SIVM.SI.EDU; and  
Erle G. Kaufman, Sabbatical Address: Earth Systems Science Cntr, Deike  
248, Pennsylvania State University, University Park, PA 16802-2711, Ph:  
(814) 863-9663, Fax: (814) 865-3191, email: claudia@essc.psu.edu

## **Third Baltic Stratigraphical Conference**

Tallinn, Estonia  
*8 - 11 October 1996*

The Baltic Stratigraphical Association, uniting the corresponding commissions of Estonia, Latvia and Lithuania, has been regularly organizing joint meetings devoted to regional stratigraphy. The first true international conference took place in 1993 in Vilnius. The main topic of the next conference, to be held in Tallinn, will be 'High-resolution Biostratigraphy and Baltic Regional Stratigraphy'. Submissions of papers from across the topic are encouraged. The technical programme includes four days of sessions, and a two-day field excursion for the study of mainly early Palaeozoic around Tallinn will be run if there is a sufficient number of participants. The languages of the conference will be Russian and English. Russian presentations will be accompanied by English texts in writing.

The conference venue will be the Hotel EMI, which will provide meeting rooms, accommodation and meals. A single room now costs 390.- EEK, one bed in a double room 210.- EEK (breakfast included). The Estonian crown (EEK) has a fixed exchange rate against the Deutschmark: 1 DEM = 8 EEK. Inflation rate might be 20-30%.

The Second Circular will be distributed in December 1995, to those who have sent in a preliminary registration form. Contact: Dimitri Kaljo, Chairman, Institute of Geology, Estonian Academy of Sciences, 7 Estonia Ave, EE0100 Tallinn, Estonia. Phone 372.2.454653, Fax 372.6.312074. E-mail: kaljo@pzgeol.gi.ee

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## **BOOK REVIEWS**

*The enigma of angiosperm origins.*

Norman Hughes. 1994. Cambridge Paleobiology Series, 1. Cambridge University Press, Cambridge. 303 pp. ISBN 0-521-41145-9. Hardback.

Consider the palaeobotanical gauntlet well and truly thrown down! The question that must now be posed is: 'Is the palaeobotanical community equal to the challenge made?' Norman Hughes' last book before his untimely death last year is a most stimulating and thought-provoking volume which attempts to review our present state of knowledge concerning evidence for the rise of the angiosperms in a classificatory neutral manner. The tome also takes issue with many currently accepted working practices and offers alternatives which younger palaeontologists will see as not only refreshingly open-minded but philosophically sound; it will also probably be seen by others in a less favourable light and provoke calls for the resurrection of the Spanish Inquisition! Hughes sees the relative lack of progress in the elucidation of early angiosperm evolution as a problem of data handling and seeks to set this out in a clear and reasoned manner.

The palaeobotanical community has long been aware of the views held passionately by Hughes regarding the problems of handling the data extracted from the fossil record (e.g. Hughes, 1989), and he was a rarity in the palaeontological community in that he was prepared to fundamentally question the accepted dogma of nomenclatural codes and the methods of recording fossil occurrences. These subjects again form the basis for this polemic of fifteen chapters, arranged into three parts.

Part 1 consists of seven chapters which set out firstly to provide an historical review of the search for angiosperm ancestry, followed by a short synopsis of the various avenues that have been explored to date. Hughes really gets into his stride in Chapter 3, 'Challenges to customary procedures', in which he questions the relevance of such practices as using comparative morphology of Holocene plants in the interpretation of the evolution of the angiosperms excluding fossil data, the drive to 'identify' fossils with familiar recent taxa, and challenges the dogma of the 'assumption of a monophyletic origin of angiosperms'. The Hughesian philosophy pertaining to the recording of fossil data, from a taxonomic point of view (the 'paleotaxon') indicates that Mesozoic seed-plants would all be better treated neutrally as 'Pollenifera' rather than variously shoe-horning them into Holocene concepts such as 'pteridosperms', 'cycadophytes' or 'gymnosperms', etc. As an aid to better utilizing the fossil information, a 'period classification' of palaeobotanical information is



detailed, in which the data from particular time slices is collated and viewed only in the context of material from preceding and succeeding time slices. This part is concluded by an examination of Triassic to Cretaceous Hauterivian palynological evidence, in terms of the morphology and functional morphology of pollen, taking tilts at such windmills as cladism and the apparent rejection by some cladists of fossil (stratigraphic) evidence.

Part 2, of four chapters, assesses firstly the nature of the Mesozoic plant megafossil record, highlighting with great perception the fact that the majority of our knowledge of Mesozoic plants comes from relatively few well-preserved floras which have yielded even fewer 'whole plant' reconstructions. The vast majority of other records are shown to be of individual organ fossils, and thus known too incompletely to be referred to higher taxa erected from probably unrepresentative Holocene floras. After all, without evidence of the whole fossil plant, how can a worker state that a fossil 'fanleaf' was referable to the ginkgophytes on the basis of the leaf alone? Chapter 9 details the palynological work on the English Wealden that Hughes and co-workers had been conducting for the past few decades, describing many monosulcate columellate-tectate (MCT) pollen types and the successional stratigraphic entry of the various types into the fossil record on a global scale. Late Cretaceous angiospermous megafossils are then described in Chapters 10 and 11, with thought-provoking suggestions made for a polyphyletic origin of angiosperms and the possible development of palms from tree-ferns and pandans from lycophytes such as *Isoetes* and *Nathorstiana*.

The final part of the book briefly discusses such topics as the 'great radiation phenomenon' of Tertiary plant fossils and its probable climatic driving mechanism, plants and the K/T boundary and ways and areas in which new data should be sought to assail the still problematic question of angiosperm ancestry (including the introduction of stratigraphic prefixes to generic names, e.g. Eo-nipa, to separate fossil and Holocene plants). The final chapter provides an overview including an examination of our views of what constitutes an angiosperm. This section is particularly insightful, separating out those so-called 'angiospermous' characteristics which have a longer geological record in plants other than what we now perceive as 'angiosperms', and those 'newer' characters which have no geological record before Mid-Cretaceous times. As Hughes states (p. 250) 'The presence of leaves with reticulate venation, and some vessels in the wood, make *Gnetum* no more and no less remarkable than several isolated taxa

counted as angiosperms, although often with an 'incomplete' set of characters.

Some will say that this book is a controversial, even heretical review of the status of our search for the ancestry of the angiosperms. However, Norman Hughes was extremely proud and gleeful when talking of his heresies, and this addition to the palaeobotanical literature presents his views in the most lucid and 'reader-friendly' way of all his publications. I feel that not only palaeobotanists, but all palaeontologists, should be made to sit down and read this polemic with an open mind. Even if they do not agree with all of what is written, if the book serves to make people question the fundamental philosophical ways in which they approach their subject, Norman Hughes will have succeeded in his goal. Go forth, palaeobotanists, and search for the solution to this engima!

Hughes, N. F. 1989. Fossils as information. Cambridge University Press, Cambridge. 136 pp.

*Ian C. Harding*

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