



IOP NEWSLETTER 47

JULY 1992

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SECRETARY FOR THE NEXT NEWSLETTER 48.

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spondents and do not necessarily reflect the policy of IOP.

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REGIONAL REPRESENTATIVES

These posts are of central importance to the efficient and productive operation of our organisation. The officers collect news from their region to submit for the newsletter, they collect membership dues and distribute the newsletter.

Dr Tatsuaki Kimura has done this work for Japan over many years and finally resigns. He is replaced by Dr Kazuhiko Uemura, Department of Palaeontology, National Science Museum (Research Division), 3-23-1 Hyakunin-cho, Shinjuku-ku, Tokyo, 169 Japan.

A NEW E-MAIL NEWS SERVICE FOR PALAEOBOTANISTS

This new facility is to help palaeobotanists keep in touch to discuss their latest ideas and discoveries. Meetings and conferences can be advertised too, book reviews can be exchanged, gossip and items of high intellectual endeavour can be presented to the international palaeobotanical community. When all IOP members have this IT medium the IOP newsletter will be unnecessary.

To subscribe send an E-mail message to **ListServ@Uk.Ac.RHBNC.Vax** in the following format:

Subscribe Palaeobotany <given name> <sur-name>.

Until the facility is readily available to all IOP members publicly useful items received will be included in this printed form of the IOP newsletter. So this may be an easy way to submit items for publication in the newsletter.

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REPORTS OF RECENT MEETINGS

LINNEAN SOCIETY PALAEOBOTANY SPECIALIST GROUP, LONDON 31ST MARCH 1992

It was with a little trepidation that I arrived for this meeting. Having left the British Museum (Natural History) eight months ago I had not had much contact with other Palaeobotanists and was attending a meeting for the first time as a private individual. I need not have worried as I was warmly welcomed on the door by Bill Chaloner and soon settled into the session.

The meeting was titled 'New thoughts on old plants' and was the group's first meeting for some time.

Dr Nick Rowe (Royal Holloway and Bedford New College, UK) described new material of winged gymnosperm ovules from late Famennian (Upper Devonian) rocks in Germany. They are contemporaneous with several other ovules previously believed to be ancestral. Whole plant reconstruction was the core of Dr Richard Bateman's talk (Dept. Earth Sciences, Oxford, UK). A Protocalamites plant (Archaeocalamitaceae) was displayed, derived from anatomically preserved material of Lower Carboniferous age from Scotland. Several features were shown for the first time in Archaeocalamitaceae; heterospory, sporangiophore opercula, adventitious roots, and tuberoid stem-bases. Bateman suggests that Archaeocalamitaceae is the sister group of Equisetaceae. Dr Phil Holmes (London, UK) explained the current state of The Plant Fossil Record. It currently stands at 10,468 records but these may vary in content and accuracy but are still useful. Holmes identified the need for specific occurrence records as the next stage of the project but asked if this was feasible with current financial and organisational constraints. Christopher Berry (Dept. Geology, Cardiff, UK) showed a diverse assemblage of Devonian plants from Venezuela. At least some were anatomically preserved. Prof Bill Chaloner (Royal Holloway and Bedford New College, Egham, UK) reviewed arborescent lycopod leaf cushions and their application to taxonomy. Changes during ontogeny and variation in mature form of these interesting plant fossils need to be more fully understood before a more natural classification can exist.

After a break for lunch the afternoon session commenced with Imogen Poole (Royal Holloway and Bedford New College, Egham, UK) who talked about her study of London Clay angiosperm twigs (Early Eocene) and their palaeoecological value. Comparative difficulties existed for this study due to the small amount of work done on Recent twig wood and in establishing anatomical variation between root, trunk, branch, and twig wood. Poole has completed such a study on three temperate woods and will be looking at tropical wood to help conclude this project. Dr Warren Kovach then explained further uses for Information Technology from the palaeobotanists' point of view. He detailed the value of global computer networks and electronic mail (E-Mail)/

messaging/view data services over more conventional means of communication. Dr Jim Penny's (Elstree, UK) interest was in the palaeolatitudes of angiosperm origins and proceeded to plot recent finds onto a map of the Lower Cretaceous world. An equatorial origin for angiosperms is not unequivocally supported by the new material. Dr Hanna van Cittert (Castricum, The Netherlands) revealed what I thought some amazing scanning micrographs of "an enigmatic Liassic microsporophyll yielding Ephidripites pollen". The fossil is a possible ephidrean and covered with synangia. Taxonomy and distribution of neuropterid foliage was discussed by Dr Chris Cleal (National Museum of Wales, UK). Studies by Cleal with Cedric Shute (British Museum (Natural History)) of frond and cuticle structure has led to a revised classification for these plants. Some of the genera are possibly climate controlled whilst evidence of floral provinces is detectable within the European Carboniferous.

A general discussion followed mainly on the organisation and direction for the newly revitalised palaeobotany group. Thanks are due to Alan Hemsley for taking on the secretaries mantle and organising this meeting.

M. CRAWLEY, London, UK.

RECENT PUBLICATIONS

ADVANCES IN LEGUME SYSTEMATICS PART 4 THE FOSSIL RECORD

EDITED BY P.S. HERENDEN & D.L. DILCHER.
THE ROYAL BOTANIC GARDENS, KEW

The contents of these studies of specific fossil taxa are:

A reevaluation of the fossil genus *Podogonium* Heer.
P.S. Herenden

Fruits of "*Pterocarpus*" tertiary Weyland from the North-Bohemian Basin, Czechoslovakia. C. Buzek

Fossil *Acacia* flowers with attached anther glands from Dominican Republic amber. D.L. Dilcher, P.S. Herenden and F. Hueber

Papilionoid flowers from the early Eocene of southeastern North America. W.L. Crepet and P.S. Herenden

Early caesalpinoid fruits from the Palaeogene of southern England. P.S. Herenden and P.R. Crane

A synopsis of the fossil record of mimosoid legume wood. J.P. Gros

The volume also includes regional summaries of fossil legumes:

The fossil history of the Leguminosae from the Eocene of southeastern North America. P.S. Herenden

The current status of the legume fossil record in the Caribbean region. A. Graham

Distribution of legumes in the Tertiary of Hungary. L. Hably

Leguminosae species from the Tertiary of Abkhazia. A.K. Shakryl

The megafossil legumes from China. Guo S.-x. and Zhou A.-k.

Indian fossil legumes. N. Awasthi

Fossils of Leguminosae from the Miocene Manuhirika Group of New Zealand. M. Pole

Finally there are chapters on evolutionary patterns and mechanisms:

Climate pulses, a major factor in legume evolution. D.I. Axelrod

Fossil wood of the Leguminosae: a case study in xylem evolution and ecological anatomy. E. Wheeler and P. Baas

The fossil History of the Leguminosae: phylogenetic and biogeographic implications. P.S. Herenden, W.L. Crepet and D.L. Dilcher

The paperback edition is reasonably priced at £24.00 from The Royal Botanic Gardens, Kew, Surrey, UK. ISBN 0 947643 40 0.

**PALAEOVEGETATIONAL
DEVELOPMENTS IN EUROPE
PROCEEDINGS OF THE PAN-EUROPEAN
PALAEOBOTANICAL CONFERENCE,
VIENNA, 19 - 23 SEPTEMBER 1991
PUBLISHED BY THE MUSEUM OF NATURAL
HISTORY, VIENNA, LATE 1992
360 PAGES, 80 TEXT-FIGURES, 30 TABLES, 25
PLATES, LINEN BOUND;**

This volume will comprise 61 articles concerning the palaeovegetational development in Europe and areas relevant for its palaeofloristic evolution from Palaeozoic to Cenozoic time:

13 articles deal with Quarternary (Pleistocene/ Holocene) vegetational changes and climate in Northern Italy, Austria, CSFR, Poland, Bulgaria and the Ukraine. The Tertiary vegetation and climate in Europe, Kazakhstan and Mongolia are subject to 25 contributions.

The Mesozoic vegetational history of Europe and Siberia is dealt with in 13 articles.

6 contributions concern the Palaeozoic vegetational history. Finally 4 articles refer to aktuopalaeontological topics and, therefore, are of general interest.

Price of subscription until August 31, 1992 ATS (Austrian Schilling) 650.- (postage costs included). After this date the official price will be ATS 750.-.

Write to Dr. Johanna Eder-Kovar, Geologisch-Paläontologische Abt., Naturhistorisches Museum, Burggring 7, A-1014 Vienna, Austria.

THE ESTABLISHMENT OF A EUROPEAN PALAEOLOGICAL ASSOCIATION

On July 2, 1991, in Strasbourg (France), under the patronage of the Secretary General of the Council of Europe, 14 palaeontologists of the main palaeontological societies in Europe and different European countries, met to create the European Palaeontological Association

The goal of the EPA is

- to foster cooperation among palaeontologists from different countries of Europe and to promote teaching and research in palaeontology;
- to organize scientific meetings in order to highlight discussions on current topics and future aims;
- to strengthen and to protect the palaeontological heritage of Europe.

The headquarters of the EPA is to be at Strasbourg: Laboratoire de Paléontologie et de Sedimentologie Université Louis Pasteur, 1 rue Blessig F - 67084 STRASBOURG CEDEX
FAX 88 36 72 35; TELEX ULP 870260 F; TEL. (33) 88 35 85 68

The executive committee comprises 12 members:

President : Jean-Claude GALL (Strasbourg France)
Vice Presidents : Mireille GAYET (Lyon France); John William MURRAY (Southampton UK)
Secretaries : Daniele DECROUEZ (Geneve Switzerland); Eva PAPROTH (Krefeld Germany)
Treasurer : Lea GRAUVOGEL-STAMM (Strasbourg France)
Advisors : Jean-Pierre BERGE : Rogerio E BORDALO DA ROCHA (Lisboa Portugal) : Franz T. FURSICH (Wurzburg Germany) : Arie W. JANSSEN (Leiden The Netherlands) : Giovanni PINNA (Milano Ital) : Luis SANCHEZ DE POSADA (Oviedo Spain)

The first scientific meeting of the EPA, the "First European Palaeontological Meeting" will be held in Lyon (France) March 1993. The theme is "Organism-palaeoenvironment interactions". The 3 day meeting will include presentation of papers and poster displays, preceded or followed by excursions. Date and details of the formalities of the meeting will be published in a forthcoming announcement.

The membership fees of the European Palaeontological Association is 30 FF.

The EPA intends to publish each year two to four issues of a Newsletter titled "EUROPAL". The subscription of the 1992 Newsletter is 90 FF.

To make the first issue of "EUROPAL" available to interested members by very early in 1992, we encour-

age payment of the membership with subscription of the newsletters before April 1992, at the reduced rate of 60 FF.

At the time of the first General Meeting, June 1992, in Strasbourg, we will discuss the opportunity to reduce these rates for colleagues already members of national palaeontological societies.

All payments should be made by using the enclosed registration form.

Sponsoring from individuals or societies for the issue of EUROPAL are welcome.

There is also the creation of A NEWSLETTER OF THE EUROPEAN PALAEOLOGICAL ASSOCIATION. Each issue will include (non restrictive list) information on various topics such as:

European research in Palaeontology
Teaching of Palaeontology (from High School to University)
Conservancy of the European palaeontological heritage
Palaeontological collections in Europe
A scientific paper of general interest (on the editorial board's request)
Book reviews
Schedule of forthcoming international symposia, colloquia, meetings etc...
Proceedings of scientific meetings
News on the palaeontological associations and societies of Europe
Information about research program related to Palaeontology (e.g. PIGC)
Reports on major collective fieldworks
Any other informations, requests, suggestions or inquiries to be submitted to the editorial board.

An editorial board together with associated members (e.g. Heads of European Palaeontological Associations) will be responsible for the publication of Europal.

Information will be delivered through our European correspondants, the national associations and societies and all the members of Europal.

Europal will be published at least twice per year but we plan eventually to establish a quarterly news letter for the same price. Contributions should be written in one of the following languages: English, French, Spanish, German, Italian.

Deadline for submission of announcements (with illustrations, if possible) will be: February 15, 1992, for the first issue.

Please send the information directly to:

Dr. Mireille GAYET
Université Claude Bernard de Lyon,
Centre des Sciences de la Terre,
27-43 Boulevard du 11 novembre,
F-69622 Villeurbanne Cedex

THE END OF AN ERA IN EAST EUROPE

The journey of the palaeobotanical exhibition, 350 million Years of Forest History, which began in 1986 finished in December 1991 after more than 6 years of permanent presentation. 871,000 visitors have seen this show of fossil plants at different presentations in Vienna, Salzburg, Styria (Austria); Dresden, Görlitz, Berlin, Münster, Mainz, Oldenburg, Bielefeld, Freiburg and Karlsruhe (Germany), and finally in Hradec Kralove and Prague (CSFR). The concept of this project has been developed by Harald Walther (Dresden) and Johanna Eder-Kovar (Vienna).

The development of forests in geological time was demonstrated by the most beautiful plant fossils out of the collections of the Museum for Mineralogy and Geology Dresden and the Vienna Natural History Museum. Paintings of plant-reconstructions, fotos of recent forests and recent stands to some degree comparable to fossil sites were presented in addition to offer a better understanding of the fragmentary fossil record. Two editions of the exhibition guide had to be printed.

I am thinking of a new topic to prepare another palaeobotanical exhibition which may be as attractive as this one has been. Perhaps you have something in mind. I feel this way of cooperation is of crucial importance to make palaeobotany known to a broader public. If you would like to share such a project I would be glad to get in contact with you.

J. EDER-KOVAR, Natural History Museum Vienna, Palaeontological Department, Burggring 7, A-1014 Vienna, Austria.

NEWS OF INDIVIDUALS

JIM CANRIGHT,

retired from the Department of Botany, Arizona State University, Tempe, AZ 85287, USA has been elected President of the International Federation of Palynological Societies and assumes office at the Aix-en-Provence Congress in September 1992.

MARK CRAWLEY

left the Palaeobotany section, British Museum (Natural History) in July 1991. In the meantime he has completed his MSc studies at the Polytechnic of East London with Mike Boulter and is currently doing computer studies and mathematics prior to entering teachers training school in October this year. His studies on Palaeogene angiosperm wood continue.

DIANNE EDWARDS

now has a Personal Chair in the University of Wales.

MICHAEL BOULTER

has been awarded a Senior Research Fellowship by the Leverhulm Trust for a year from October 1992. This means that the Trust pays his salary to his college and he has no teaching or administrative responsibilities. It will also mean that the IOP newsletter will be edited more carefully and that the IOP PFR database project will be given more energy.

SO MANY OTHER PALAEOBOTANISTS have become so dependent and introverted that they do not send news of themselves or of their palaeobotanical thoughts for inclusion in the newsletter. They also grumble that the newsletter is boring and lacks interest.

OBITUARY

JAMES DOUGLAS GRIERSON JR.

Palaeobotanist and Professor of Biological Sciences at the State University of New York at Binghamton, died, after a long illness, on September 28, 1991.

Doug was born on July 15, 1931 in Dayton, Ohio. His BA was received from Hiram College, Hiram, Ohio, where his interest in Botany was nurtured by Professor Dwight H. Berg. This tradition was continued at Cornell University, Ithaca, New York, where his attention was focused on Palaeobotany under the guidance of Harlan P. Banks. This broad education produced a classical scholar whose profound wisdom and wide ranging interests were reflected by the courses he taught such as: Introductory Botany, Plant Anatomy, Plant Morphology, Palaeobotany, Economic Botany, Grasses and Civilization, Insects and Plants, and Fossil Spores interdisciplinary studies collaborating with colleagues in botany, Zoology and geology to introduce the students to organismal - environmental interrelations with courses such as General Biology, Paleobiology, History of Terrestrial Communities and Functional Anatomy of Plants and Animals.

His academic career was distinguished by his two loves: the lycopods and an extraordinary dedication to students.

Doug's PhD dissertation "Lycopods of the Devonian of New York", published in 1963, was the first in a series of studies that helped turn the Devonian lycopods from a group of indistinguishable form genera into a flora made up of whole plants, and giving an insight into the early evolution of the Lycopsidea. His insistence on wrenching the most evidence from particularly recalcitrant specimens brought him to the development of new techniques yielding an understanding of pyrite petrifications which in turn revealed the previously hidden anatomy of the plants. These studies revealed the previously hidden anatomy of the plants. These studies were supported in part from several sources such as the Research Foundation of the State University of New York, the National Science Foundation and the Power Authority

of the State of New York. Some examples of his collaborative publications are: "Devonian lycopods from Northern New Brunswick", 1967; *Leclercqia complexa*, gen. et sp. nov., a new lycopod from the late Middle Devonian of Eastern New York", 1972; "*Leclercqia complexa*: (Lycopsidea, Middle Devonian): Its anatomy and the interpretation of pyrite petrifications", 1976; "A new genus of lycopods from the Devonian of New York State", 1983; "Early land animal in North America: evidence from Devonian age arthropods from Gilboa, New York", 1984; "The flora of the Catskill clastic wedge", 1985; "New terrestrial arachnids from the Devonian of Gilboa, New York (Arachnida, Trigonotarbidia)", 1987; "*Leclercqia*, *Haskinsia* and the roles of leaves in delineation of Devonian Lycopod Genera", 1988; "Oribatid mite fossils from a Terrestrial Devonian deposit near Gilboa, New York", 1988; "Devonobiomorpha, a new order of centipeds (Chilopoda) from the Middle Devonian of Gilboa, New York State, U.S.A., and the phylogeny of the centiped orders", 1988.

His strength and vigor allowed years of collecting and the establishment of a research collection of over 370 separate collections totalling several thousand research specimens. His untiring search for new localities and better lycopods led him to discover the Blenheim - Gilboa locality with its wealth of well preserved Devonian plants. His broad intelligence allowed him to grasp the significance of minute pieces of arthropod cuticle mixed among the plants, and his tenacity and foresight led to the assemblage of interdisciplinary collaborations in the revelation of the "Gilboa Story", an amazingly diverse plant and animal community.

Doug began his teaching career at Cornell where he was Instructor, then assistant Professor for 2 years, followed by 22 years at the University Centre at Binghamton. He was always at his best when surrounded by his students. His genuine affection for them, his enthusiasm for his subject, his commitment to excellence for them and from them and his insatiable appetite for trucking them all in the field to see, for example, rare ferns, a particularly good fairy ring of *Lycopodium* or a good fossil lens resulted in many good memories that instilled a love for the subject in the student and the making of many fine botanical colleagues dispersed throughout the country.

He was unstinting in his service to the University and his Department where he served on or chaired many committees. He helped win a significant "Departmental Improvement Grant" from the Department of Health, Education and Welfare in 1968, and was particularly instrumental, as chair of the "new building space and equipment committee", in designing, planning and equipping the new Science III Biology building during 1970 - 1974.

He was an outstanding teacher, a generous, giving colleague and a dedicated and discerning collaborator. Most of all Doug engendered affection. His quiet, gentlemanly demeanour, his meticulous professionalism, his caring temperament, and his rapier wit, with a penchant for "pun"-ishment, won him a cherished place in the

hearts of his family, his students, his colleagues; all who had the good fortune to know him. We all miss him.

A memorial prize, in Doug's memory, will be established for graduating seniors achieving the excellence in Botany that Doug so ably fostered. Contributions may be made payable to the "James D. Grierson Memorial Fund, Foundation Account # 730", and sent to Dr. Patricia M Bonamo, Department of Biological Sciences, State University of New York at Binghamton, P.O. Box 6000, Binghamton, New York 13902 - 6000.

P.M. BONAMO & G.J. SCHUMACHER, Binghamton, NY 13902-6000, USA

BOOK REVIEW

P.D. MOORE, J.A. WEBB, AND M.E. COLLINSON. POLLEN ANALYSIS.

BLACKWELL SCIENTIFIC PUBLICATIONS, 1991. 216 + VII PP., 71 PLATES. £39.50.

I well remember teaching myself the basics of pollen analysis twenty years ago. I read Fægri & Iversen's *Textbook of Pollen Analysis*, then I spent the Christmas holiday alone in an icy building with two lovely Wild microscopes and a comprehensive reference collection of British pollen types. I went through the entire collection twice over, and then, using the keys in Fægri & Iversen and the pollen reference collection, I settled down to count a fossil preparation. Maybe it wasn't the best way of learning, but it suited me. I couldn't afford Fægri & Iversen, so I photocopied the keys: indeed I still have that heavily annotated photocopy. I remember wishing that the keys were backed up by good illustrations: they wouldn't have replaced the reference slides, but they would have been far faster and more convenient to use - and not everyone has instant access to a large reference collection.

Eight years or so later, Moore & Webb's book was published. Apart from the fact that it used a different terminological system, it was the answer to the British pollen analyst's dream. It was comprehensible, fairly comprehensive, furnished with excellent diagnostic keys, copiously illustrated, AND CHEAP. What more could one reasonably ask for in an imperfect world? True, there was nothing on the peculiarities of soil pollen analysis; and the photograph of *Taxus* pollen was a grey blob that would hardly have helped with the identification of this difficult pollen type - but these were trivial quibbles. I bought a hard-backed copy for the princely sum of £8-50, and warmly commended the book to every batch of palynology students that subsequently passed through my hands.

My copy is now the academic equivalent of a much-loved nursery teddy-bear: a trifle battered, and showing every sign of fervent handling by an eighth of a century's worth of students. The new edition, apart from adding a distinguished carpologist to the authorship, is rather more than 50% fatter than its predecessor. That's

not necessarily a good thing; but there are 50% more photomicrographs, and as they're carefully chosen ones, there's certainly grounds for rejoicing. Indeed, the refinements in the keys (*Compositae*, *Umbelliferae*, *Ericaceae*, *Leguminosae*, *Liliaceae*) and the improved photographic coverage (or should I be calling them *enhancements*?) would by themselves earn this book a place on any serious European palynologist's bookshelf. In fact, the whole book has been re-arranged (slightly) and all the photographs are new - so think twice before disposing of your copy of the first edition.

The new edition, though different in many points of detail, is very similar in 'flavour' to the first edition. Thus, if the geographical range covered is wider (Central Europe [*Consolida*, *Adonis*, *Nigella* but not *Loranthus*] and aspects of North American palynology), it is still northern European in focus; so the Mediterranean, and the traces of Near Eastern and Central Asian ecology that impinge on European palynology during glacial times, are out of bounds. Nothing here, therefore, on *Noxa*, *Artemisia* or *Calligonum*; nor mention of Bottema's work in Greece, or Brande's investigations in Dalmatia.

Archaeological palynology, and soil pollen analysis, do get a brief mention; but Moore, Webb, & Collinson maintain the blinkered traditions of traditional British pollen analysts and totally ignore the magnificent work done by Leroi-Gourhan, Paquereau, Planchais, and their colleagues in full-glacial cave deposits in the Dordogne, southern France, and the Pyrenees.

Pollen analysis in pursuit of archaeological problems is not just a specialist interest. Virtually everything we know about the botanical history of the calcareous and circum-neutral regions of southern Britain is the result of archaeological studies. We know that parts of the Wiltshire downs four thousand years ago looked as they do today, and that parts of the Weald were still primeval woodland two thousand years ago - because of the pollen analyses carried out in association with the excavations at Silbury Hill and Caesars Camp, Keston. It's both stupid, and bad ecology, to ignore such evidence; and to judge by the statements of some pollen analysts, one would be forced to conclude that the entire chalk downland ecosystem had evolved within the last three thousand years. I, for one, don't believe it for a moment. Something analogous must exist in a pre-agricultural environment, and if we are going to understand more about it, appropriate studies must be done. On current form, it is archaeologists, inadvertently repaying some of the debts they owe to the Natural Sciences, who will produce the necessary evidence.

Another of my hobby-horses that Moore, Webb, and Collinson neglect somewhat, and one that is of considerable significance to the general palynological community, is the meaning of absolute pollen concentrations. Pollen analysts often seem to carry out A.P.F. determinations as a Pavlovian reflex, or as a matter of ideological faith, but without conveying any idea of the purpose. In peats (other things being equal) the pollen concentration will reflect the balance between peat for-

mation and compaction: Dabrowski's idea of pollen-based chronologies is potentially relevant here. In water-laid sediments, pollen is part of the sedimentary load and pollen concentrations are almost entirely explicable in sedimentological terms.

These, however, are mere quibbles. Any active research worker will have their own pet obsessions; and they won't (necessarily) be the same ones. Moore and Webb was excellent: Moore, Webb, and Collinson is, with one crucial reservation, even better. Moore and Webb was marvellous, and cheap as well. This isn't. Lecturers can shell out £40 and it's a legitimate tax-deductible expense. One can only hope that Blackwell's will have the sense to produce a paper-backed edition at the lowest feasible price, as Hodder & Stoughton did for the first edition. A little market research has confirmed my suspicion that the new version is twice the maximum price that an undergraduate will consider paying, even if they're interested in the topic. I decline to believe that such a state of affairs makes good commercial sense. It would certainly be a tragedy for palynology if this book were not to achieve the largest possible sales.

R.N.L.B. HUBBARD, London, UK.

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