IOP NEWSLETTER 15

INTERNATIONAL ORGANIZATION OF PALAEOBOTANY

INTERNATIONAL UNION OF BIOLOGICAL SCIENCES
-SECTION FOR PALAEOBOTANY
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Dr. S. ARCHANGELSKY, ARGENTINA
Dr. S.V. MEYEN, USSR

Secretary: Dr. M. C. BOULTER
N. E. London Polytechnic,
Romford Road,
London, E15 4LZ, England.

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PLEASE MAIL NEWS AND CORRESPONDENCE TO YOUR REGIONAL REPRESENTATIVE OR TO THE SECRETARY FOR THE NEXT NEWSLETTER 16. The views expressed in the newsletter are those of its correspondents and do not necessarily reflect the policy of IOP.

IOP NEWS

THANKS TO RETIRING OFFICERS

This is the last newsletter being produced by IOP with its Executive Committee elected at Leningrad in July 1975. The retiring members of the committee are Professor T. Delevoryas, Dr D. Dilcher, Dr S.G. Zhilin, Dr R. Weber and Dr J. Douglas. Great thanks are due to them all especially since they saw IOP through the difficult transition to implementing its new constitution. David Dilcher also retires as the Regional Representative to North America: a job involving the separate duplication and distribution of the newsletter to the 150 members there, and the collection of their dues. So he has been particularly busy and should be thanked specially.

1981 ELECTION PROGRESS

Mail votes can be received by the secretary up to the end of July as an alternative to the ballot at Sydney in August. Details were attached to newsletter 14. More than 100 votes have been received by this method; in early July the regional sources of these votes counted as follows: North America 55, U.K. 12, Northern Europe 11, France Spain and Italy 5, Australasia 4, Eastern Europe 2, Africa 2 and Japan 1.

1981 DUES

Your address label shows the year for which the last payment to IOP has been received by the London office. The computer data was revised in July 1981 but may still contain errors. Please send £3 or $6 for each year that is unpaid to your regional representative or the secretary.

IOP CIRCULARS

This is the new formal name given to the documents which are produced through IOP and which are available free to members on request to the secretary. The current list of circulars available is given below:

1. Computer print-out of July 1981 IOP membership list. This is a useful and up to date list of palaeobotanists' addresses.
2. T.A. Sprague, 1948 A reprint of "International Rules of Botanical Nomenclature, supplement, embodying the alterations made at Amsterdam in 1935".
3. Abstracts of the First International Palaeobotanical Conference, Reading, England, 1980.
4. International Association of Angiosperm Paleobotany Bibliography 1979 compiled by G. Dolph.
5. International Bibliography of Palaeobotany & Palynology for 1980 compiled by H.W. Pfefferkorn & W.H. Gillespie (write for your IOP copy to H.W. Pfefferkorn, Department of Geology, University of Pennsylvania, 240 S 33rd Street, Philadelphia, PA 19104, USA).
6. C.R. Hill, 1981. The Cladistics-Museums Controversy, a personal review and outline of a theory of evolutionary cladistics. (see page 7 of this newsletter for details of this circular).

Send suggestions for additional circulars to the secretary. Guidelines describing the scope and content of future circulars will be devised by the new IOP Executive Committee and will be included in a future newsletter. One thing is clear already - they are not to be seen as formal publications; they are not to be refereed and are not to contain matter normally included in scientific articles. But IOP does have funds to assist with their printing and distribution.

REPORTS OF RECENT MEETINGS

2 USSR CONFERENCE OF THE SYSTEMATICS OF THE GUIDING FORMS OF UPPER PALAEOZOIC PLANTS

The conference was held on 20 - 23 January 1981 in the Geological Institute of the USSR Academy of Sciences in Moscow, and 27 palaeobotanists from different laboratories attended. The chairman was S.V. Meyen and the secretary was A.V. Gomankov. The conference was organised within the framework of the project "Correlation of coal-bearing formations". The programme included both oral papers and the examination of collections brought by the participants.

S.V. Meyen reviewed the modern state of systematics of the major plant groups of Angaraland: lycopsids, sphenopsids, ferns, pteridosperms and cordaites. He stated that Devonian lycopsids of the Donets basin have proved to be very similar to Carboniferous forms from Siberia: Tomiodendron and Ursodendron. Among sphenopsids the overall organization of fructifications of Equisetinostachys and Sandersonia is quite different, though their sporangiophores and sterile shoots are identical. The name Tchernovia is proposed to be applied only for isolated sporangiophores. In the Kuznetsk basin a true Calamostachys was found in association with Annularia. A new generic name is proposed for Prynadeopteris-like ferns from Kuznetsk and Pechora. Their sporangia are similar to those of Euramerian zygopterids. Pinnate leaves of Angaridium and Paragondvanidium form a single group presumably belonging to the Pteridosperms. Pteridosperms of Angaraland refer mostly to the order Peltaspermales in which three families are distinguished: Peltaspermaceae, Cardiolepidaceae and Corystospermaceae. The Peltaspermaceae of Angaraland include leaves called Tatarina, Callipteris subgenus Feonia, Compsopteris, Comia, Glossophyllum (pars), Rhaphidopteris

and Mauerites, female fructifications Peltaspermum, Stiphorus (- Leuthardtia sensu Mogutcheva) and Biarmopteris and male fructifications of Permotheca. Leaves of Glossophyllum (pars) and Mauerites were previously referred to the Ginkoales. The latter order may be placed among the Pteridosperms. Cordaites (order Cordaitanthales are divided into three families: Cordaitanthaceae (equatorial), Vojnovskyaceae (female fructifications - Vojnovskya, seeds - Samaropsis (pars) and Sylvella, male fructifications - Pechorostrobus and Kuznetskia, Cordaites-like leaves) and Rufloriaceae (female fructifications - Krylovia, Gaussia and Bardocarpus, seeds - Bardocarpu and Samaropsis pars, male fructifications - Cladostrobus, leaves - Rufloria). Most of the Upper Palaeozoic plants of Angaraland have a very 'old fashioned' countenance which must be taken into consideration in evolutionary and stratigraphic speculations.

M.A. Senkevich spoke about ligulate lycopsids from the Devonian of Kazakhstan. She recognises 5 genera and 7 species of such lycopsids and believes that the presence of a ligula is not obligatory for heterospory and that the descriptive terminology used for the Lepidodendraceae cannot be used for most of the Devonian lycopsids.

The paper by G.N. Sadovnikov was devoted to some lycopsids from postpalaeophytic (Permo-Triassic) floras of Siberia. They are assigned to the genera Pleuromeia and Tomiostrobus, the latter genus being initially considered as a conifer. The similarity between these genera and the Australian Skilliostrobus is striking.

A.L. Yurina made a morphological and taxonomical analysis of the Devonian genua Barrandeina. She confirmed its assignment to the lycopod and rejected its possessing digitate leaves besides simple linear ones. Her new species B. orlovii has numerous small projections on the stems and leaves.

V.I. Burago gave an account of her revision of the genus Psygmophyllum and allied genera and told about two species of the genus from the Far East which had a very peculiar form of basal pinna. Syniopteris and Iniopteris were merged by her with Psygmophyllum.

S.G. Gorelova described the sequence of Carboniferous and Permian flora in the Gorlovka coal basin. This sequence, consisting of 9 assemblages, is the same as that in the Kuznetsk basin. The most striking change in the assemblage corresponds to the Carboniferous-Permian boundary where cordaites dominate instead of the pteridosperms. The Carboniferou floras yield many Euramerian forms such as Neuropteris, Pecopteris, Annularia, Sphenophyllum etc

Y.G. Gor paid attention to the implications of ecological data for stratigraphy. Among the Upper Palaeozoic floras of Siberia he recognise four types of ecological systems according to their stability. He holds that the type of the system must be taken into account when using plant for straticraphical aims.

M.V. Durante brought the data on the succession of the plant assemblage at the Middle-Lower Carboniferous boundary in Mongolia. The Lower Carboniferous assemblage dated by goniatites consists of lycopods which are like Tomiodendron but never demonstrate ligulas. The assemblage corresponds with the Evseevsky one of Kuznetsk. The Upper assemblage, which is Middle Carboniferous, corresponds to the Kaiozovsky part of the Kuznetsk basin and yields mostly pinnate leaves belonging to Abacanidium and Chacassopteris. The changes between these two assemblages finds its parallel in Kidston's 'floral break' (Gothan's "Florensprung') caused by a general fall of temperature in the extra-tropical biota.

A.V. Bogov made an announcement about the colloquium on the genus Phylladoderma held in Kazan in April 1980 (see the report in IOP newsletter 12, pages 3-4).

In the second part of the conference the participants examined collections brought by V.A. Ananiev (thin sections of anatomical structure of Lower Carboniferous lycopsids of Siberia), S.K. Batiaeva (impressions from the eastern edge of the Kuznetsk basin), A.V. Bogov (cuticle preparations of Phylladoderma from the Upper Permian of the Russian platform), V.I. Burago (Psygmophyllum from the Far East), M.A. Senkevich (Devonian ligulate lycopsids from Kazakhstan), I.M. Tarakanova (compression and impression floras from the Tunguska basin), G.N. Vasilieva (Lower Carboniferous lycopsids from the Urals) and V.G. Zimina (compression and impression floras from the Permian of the Far East). The collections kept in the Geological Institute were also inspected.
The conference promoted the unity in classification of Upper Palaeozoic plants throughout Angaraland. It was decided to hold such meetings on an annual basis, and the next one will take place in 1982 at Karaganda.
A.V. GOMANKOV, MOSCOW.

CORRELATION OF COAL BEARING FORMATIONS (C.C.F.) PALAEOBOTANICAL COLLOQUIUM, Vorkuta, March 1981.
This colloquium was organised as part of the work of the IGCP project "Correlation of Coal Bearing Formations". The participants were S.K. Pukhonto (organiser), G.G. Manaeva (Vorkuta), A.V. Bogov, N.K. Esaulova (Kazan), H.G. Smoller (Ukhta) and S.V. Meyen (Moscow). Pukhonto's collections come from boreholes drilled in the Pechora basin and were inspected by the participants. The work was aimed at a common treatment of the plant assemblages and their changes near the boundary between the Vorkutskaya and Pechorskaya series. Besides, some specimens of general interest were seen. Pukhonto demonstrated Peltaspermum fructifications associating with Callipteris. Smoller showed fossils obtained by systematic bulk maceration, among them, needle shaped spore masses composed of both monolete and trilete spores. Monolete spores are extremely rare in Angaraland. The spore masses seem to belong to marattialean sporangia. She also demonstrated microscopic coprolites of arthropods(?) composed of the mixture of different miospores.
S.V. MEYEN, MOSCOW.

RECONSTRUCTING COAL MEASURES VEGETATION, Manchester March 1981.
This meeting was the third in a series of Palaeontological Association Review Seminars and attracted more than 60 participants from the UK. Barry Thomas was chairman and quoted Williamson (who had worked in Manchester) by drawing attention to the fact that no details or observations are too small to be insignificant. Broadhurst (Manchester) described some geological aspects of coal measures sedimentation. Bivalve mussels, able to migrate upwards, keeping pace with sedimentation, were shown to provide a time scale for the rapid sedimentation which is indicated by the numbers of upright in situ tree trunks. The 'pure palaeobotany' of the coal measures, the coal, represents only 2 or 3% of the sediments and is considered to represent a larger proportion of the period of coal measure deposition. Lacey (Bangor) set the botanical scene with a review of plant life from the Precambrian algae to the Permian glossopterids. His representation of almost all aspects of the plants, including the various organs, preservation types, nearest living relatives, methods of reconstructing whole plants, colonisation of the land and evolution of the seed, was a remarkable achievement in the time available. He

also showed a series of reconstructions of coal measure vegetation from both northern and southern hemispheres. The major criticism given to these was the inclusion of every possible plant in the one environment represented by the reconstruction. Butterworth (Aston) reviewed coal measures palynology and discussed the affinities of dispersed spores, the use of morphologically based form taxa, the occurence of more than one form taxon in a single cone and the bias caused by differential preservation and different preparation methods. An overall picture of spore assemblages and their associations within various coal petrological types was presented for crassidurain, which is characterised by densospores whose parent plants grew on the drier swamp margins. Also, vitrain is characterised by lycospores whose parent plants grew on the wetter central swamp. The dominance of Lycospora and hence of arborescent lycopods during the Westphalian and their replacement by monolete spores (eg Punctatisporites) and tree ferns in the later Carboniferous, was emphasised. Scott (London) discussed the problems involved in sampling and interpreting data from fossil plant bearing sediments. He emphasised the value of comparisons with modern peat forming environments, the importance of detailed and precise sedimentological observations and the necessity to separate data from interpretation, thus allowing future reinterpretation. Coal swamps dominated by lycopods, calamites around lake margins and on river point bars and Pteridosperms on levee banks are some of his initial interpretations.

Some personal comments on the major points raised at the meeting are not inappropriate. The first of these is that such a complex matter as vegetation reconstruction is considerably helped by Williamson's advise that no detail is too small to be ignored. This applies not only to the details of anatomy and morphology themselves but also to the sediment in which they are contained and their associations within this sediment. The second relates to reconstructions themselves. One purpose of reconstruction is to represent the fossil plants which were growing during a certain and probably long period of time. It includes, in one image, plants from a diversity of habitats and should not be treated as if it were an example of palaeo-vegetation. Another is to present the same fossil plants in the integral associations in which they grew. It may thus represent only a very brief period of time and will need more than the one image to represent different plant communities. Both these types of reconstruction have great value in providing a visual representation of the plants, their relative sizes, habitats and the niches they were likely to have provided for animal life.

The meeting was well organised by Joan Watson and Dianne Edwards.

M.E. COLLINSON, LONDON.

NATIONAL REPORTS

PALAEOBOTANY IN ROMANIA

Dr Ovidiu Dragastan, Laboratory of Palaeontology, University of Bucharest, Bd. N. Balcescu 1, 70111 Bucharest, Romania has written with details of palaeobotanical work publishedin his country during 1980. This includes 12 articles published in scientific journals and a list of these is available from Dr Dragastan or form the IOP secretary.

Also, two textbooks have been published recently: Plante Fosile by I. Petrescu & O. Dragastan, 1981, Editura Dacia, Cluj-Napoca, 471pp. This costs 27 Lei and details are given on page 12 of this newsletter.

The second is Palinologie by O. Dragastan, J. Petrescu & L. Olaru, 1980, Editura Didactica si Pedagogica, Bucharest, 419pp. This costs 21.80 Lei. There is no English language abstract though details can be obtained from the senior author at the address given above. Enclose a suitable amount of money to cover postage if you are ordering a copy directly from him.

PALAEOBOTANY IN CHINA

Professor Shanzhen Zhang of the Nanking Institute of Geology and Palaeontology at the Academia Sinica has provided the following report Professor Li Xing-xue, Dr Song Zhichen and Yao Zhaoqi attended the ICP and IOP meetings in England last year.
In the scientific conference held in Beijing last year Prof D.I. Axelrod and Dr H.J. Schweitzer delivered lectures and then discussed interesting problems with Chinese palaeobotanists. They then left for Tiebet to join the field trip organised by the Academia Sinica. Relevant papers will be issued in Chinese and English.
Prof J.E. Conkin of the University of Louisville studied Devonian and Carboniferous stratigraphy in Southern China.The fossils collected were prepared and studied in the institute with Chinese palaeobotanists
Prof P.E. Cloud visited China for a month and gave a series of lectures about research on the Pre Cambrian; he also travelled a lot.
Dr R.J. Helby of the University of Sydney and Dr C.B. Foster of the Queensland Geological Survey studied the famous Permo-Carboniferous stratigraphy of Taiyuan, Shansi, and the Carboniferous deposits in southwest China.
Prof W. Schopf has been invited by the Institute of Geology and Palaeontology and the Institute of Botany, Academia Sinica, to revisit China in April and May 1981, accompanied by Dr Jane Schopf. They will deliver a series of lectures and study in the field and the laboratory.
Prof W.G. Chaloner and Prof R.G. West of the UK will visit China by arrangement between the Royal Society and the Academia Sinica in the autumn of 1981 for three weeks. A field trip will be organised by the Institute of Geology and Palaeontology.
Selected papers from a conference held by the Palaeontological Society of China in 1979 is being prepared for publication by palaeobotanists at the Institute of Geology and Palaeontology. It is expected to be available later this year.

THE 'ENGLAND FINDER'

From many recent conversations with palaeobotanists from overseas I have gained the impression that this useful devise is not well known internationally. I have been asked to give it some publicity, due to the increasing use of inferior and more complex alternatives.
The England Finder is a glass slide marked over the top surface in such a way that a reference position can be deduced by direct reading, the relationships between the reference pattern and the locating edges being the same in all finders. The object of the Finder is to give the microscopist an easy method of recording the position of a particular field of interest in a specimen mounted on a slide, so that the same position can be re-located using any other England Finder on any microscope.
The citation of England Finder reference points for specimens on microscope slides is clearly more accurate and efficient than the use of coordinates from the stage of a single microscope.
Further details can be obtained from the manufacturer, Graticules Ltd, Sovereign Way, Tonbridge, Kent, England.
M.C. BOULTER

TOPICS FOR DEBATE

CLADISTICS AT THE BRITISH MUSEUM

Inevitably, Chris Hill of the British Museum (Natural History) - which Nature 292 July 2 says should change its name - has responded to the item in IOP Newsletter 14. He has written a 16 page article entitled "The Cladistics-Museum Controversy, a Personal Review and Outline of a Theory of Evolutionary Cladistics" which is available free to IOP members as IOP Circular number 6 (see page 2 of this newsletter) on demand from Chris Hill or the IOP secretary. The first paragraph of the article states: "IOP newsletter 14 included extracts from Bryan Silcock's article about cladistics, marxism and the British Museum's exhibition policy. Readers may have followed the controversy over these subjects - together with an earlier exchange about Karl Popper - which continues to occupy the pages of Nature, Science, and The Biologist. Since IOP's view was apparently that the Palaeobotany Section at the BM(NH) is not yet involved, which is not quite correct, it seems appropriate to declare my own, inevitably personal, views." Dr Hill has written to the IOP secretary with an introduction to his article for inclusion here in the newsletter:

Three views on phylogenetics

IOP Circular 6 tries to provide some perspectives on the squabble about phylogenetics at about March this year. It is neither faultless nor comprehensive. Parts were even written in unmitigated anger, directed mainly at some cladist colleagues who have seemed to wish to divorce cladism from evolutionary theory. A big trouble with cladism, of course, is that people do get angry about it. After the casualties have come home one can only reflect sadly on why so much bad feeling could be generated by so few very simple ideas. I think the main reason is that there is still some residual confusion between cladograms and trees, despite Gareth Nelson's considerable and pioneering efforts at pointing out the differences. I will try here to sum up my little paper with this difference in mind.

The central idea of cladistics is that taxa should be disjunctively defined, by more or less imaginative reference to so-called "derived" characters i.e. characters judged homologous and shared uniquely by each member of a taxon. Thus all members of the taxon "seed plants" have seeds. In this manner cladistic taxa correspond to so-called "proper" sub-classes of sub-class logic. Since no other system of grouping is so clean and tidy one wonders why some traditional taxonomists have been vehemently opposed to it. However, the disagreements really start (and end) with the proper extent to which a cladistic classification is phylogenetic. It is taking phylogenetics in general a long time to realise that cladistics represents a relativistic approach to phylogeny. Cladistics thus represents an approach familiar in several other areas in science but as yet unfamiliar in biology. As such, cladism is both radically different from traditional phylogenetics and is enormously exciting. It is radically different because it does not aim for the relatively absolute reconstruction of the evolutionary tree which has traditionally been the practical aim of phylogeneticists. (For the cladist this aim remains solely as an heuristic, idealistic, aim.) Cladistics, rather, is concerned with ancestry, not with actual ancestors, more precisely with relative recency of common ancestry, as Hennig wrote. This is exciting because cladistics still enables us to say something about phylogeny. Many palaeobotanists have long been doubtful about whether the fossil record of plants is sufficiently dense to permit 'absolute' tree construction, and some have therefore tended to give up hope. Palaeobotanists really can now say something about the evolution of plants.

A strength of such a relativistic approach is its generality. Cladistic phylogenies can be proposed for any set of three or more species, regardless of whether the fossil record is complete or not, or even when no fossils are available. The phylogeny is then open to simple tests. If no fossils are available the results may be compared with hybridisation or DNA sequencing information. When fossils are available we can go to the rocks to test the notion that the sequence of internested taxa in a cladogram represents a sequence in time. Relatively "derived" taxa should be relatively young if evolution has occurred. Likewise we may expect distributions through time to have become more provincial.

I believe this is all there is to cladistics. Confusion has caused anger because of "all or nothing" arguments: Hennig and early cladists wanted cladograms to be trees despite the lack of identified ancestors, which was plainly absurd, whilst others have wanted cladograms to have nothing whatsoever to do with the evolutionary tree, which is simply dull. In the final analysis I believe there is scope for both relativistic and "absolute" approaches to phylogeny reconstruction to coexist and compete.

To sum up there appear to be three approaches to phylogenetics.

1. "Absolute" phlogenetics aims to discover and reconstruct the one particular true tree of evolution rather than test general laws. This is limited when fossil evidence is limited and by the limitations in our knowledge of past processes.
2. "Relativistic" phylogenetics (evolutionary cladistics) aims to explore general laws rather than reconstruct the tree in full detail. →This is limited by narrowing down the empirical field of enquiry.
3. Pure taxonomy (phenetics, or "transformed" cladistics). In attempting to produce the most objective and empirical approach this becomes so bogged down in its own "operationalist" metaphysics that it ceases to be part of empirical science. Transformed cladistics speak of "natural" groups, meaning only cladistic groups. I am not against pure taxonomy but it is not empirical science; it is the methodological basis for the science of phylogenetics.

THE STARTING POINT OF PALAEOBOTANICAL NOMENCLATURE

In response to Dr D. Storch's item on page 5 of IOP newsletter 14 Professor Henry Andrews, New Hampshire USA has written:

"The legal details of botanical nomenclature have had very little interest for me - one does have to have a special bent for this sort of thing and I appreciate the efforts of those who do. I tend to feel about it in the way Seward expressed - we should not have to follow the rules slavishly! I think this infuriated Jim Schopf who did have so much interest in the rules, and we probably should be grateful to him for it. I write about this at the moment because of the comment on page 5 about Schlotheim's work. When I did The Fossil Hunters I had occasion to look into his work and life more carefully than I had ever done before. His work was, I believe, of excellent quality and I would tend to support Storch's proposal. However I don't know all the details that are involved, and I wonder how many members do? Perhaps it would be appropriate to have more discussion about this in future newsletters."

THE LOCATION OF CURATED *Glossopteris* SPECIMENS

Dr Manju Banerjee, Department of Botany, University of Calcutta, 35 Ballygunge Circular Road, Calcutta 700019, India has written:

My recent paper on the stratigraphic significance of *Glossopteris* from India was published in Bull. Botan. Ser. Bengal, 32, 81-125, 1978.

"In the paper *Glossopteris* species recorded up to 1968 have been listed. 71 species have been listed along with detailed information about the locality of the first specimens described, references of the original

description, holotype number if mentioned by the author, lectotype number and at which museum each specimen is presently kept. But I could not trace quite a number of species despite enquiries to the authorities of a large number of museums throughout the world. So the revisional study of these species is held up.
"I need information about the rest of the species which I could not trace and seek help from IOP members who may have information about the place where the specimens are stored at present."

Ginkgo - A LIVING PTERIDOSPERM

During December 1981 in Moscow, the 6th Conference on Plant Phylogeny will be held, and Dr S.V. Meyen will read a paper on the affinities of the Ginkgoales. A translation of the abstract appears below:
Having been originally placed among the conifers (particularly taxads) ginkgoaleans are still affiliated with coniferopsids, i.e. Coniferales and Cordaitanthales ("Cordaitales"). Their common features are pycnoxyly, secondary wood structure, platyspermic seeds with the integument vascularised by two bundles, etc. But ginkgoaleans lack a coniferopsid axillary female complex, and their seeds are subtended by a collar, the homology of which is still enigmatic.
Some pteridosperms described in detail during the last decades differ from well-known lagenostomans and trigonocarpaleans in having the same set of coniferopsid characters as ginkgoaleans possess. In the Callistophytaceae the secondary wood structure is so similar to that of cordaitanthaleans that their petrified stem fragments (Poroxylon) were initially placed among the Cordaitales. Seeds of the family are platyspermic, non-cupulate, with non-vascularized nucellus, and free integument vascularized by two bundles; pollen have an intrareticulate saccus. In the Calamopityaceae the seeds are also platyspermic (Lyrasperma) and the stems (Calamopitys) are composed of the coniferopsid secondary wood. Arberiales (Glossopteridales) show such coniferopsid features as platyspermic seeds, protosaccate pollen, pycnoxylic stems with secondary wood as in coniferopsids.
Latest studies have widened our knowledge of the order Peltaspermales which includes at least three families - Peltaspermaceae, Cardiolepidaceae and Corystospermaceae. New data show similarities between the Peltaspermales and the Ginkgoales in a wide range of characters. In theCorystospremaceae (Rhexoxylon) vascular strands entering the leaf base come from different primary stelar strands as in Ginkgo. Some peltasperms (e.g. Tatarina) were leptocaulic plants with alternation of long and dwarf shoots producing simple leaves. The dwarf shoots bore cataphylls. Some genera with entire leaves had parallel venation e.g. Phylladoderma (Cardiolepidaceae) and Maria (Peltaspermaceae). Leaves of Mauerites combine palmate and pinnate segmentation, some of the leaves (or pinnae) being gross-morphologically identical to Sphenobaiera. These leaves were treated as typically ginkgoalean when associated fructifications were unknown.
In the male fructification (microsporoclad) structures, the Peltaspermales (Antevsia, Permotheca) vividly resemble those plants which are traditionally attributed to ginkgoaleans e.g. Sphenobaiera furcata Krausel and Antholithus wettsteinii Krasser (associating with Glossophyllum). These microsporoclads have nothing in common with coniferopsid ones. The pollen of the Ginkgoales and some Triassic Peltaspermaceae are indistinguishable under the light microscope.
The female fructifications of the Peltaspermales are very diversified: leaf-like seed-bearing organs (cladosperms), open or semi-closed peltate organs, cupulate receptacles etc. The extreme types are connected by gradual transitions, and their attribution to one large

natural group (order Peltaspermales) is supported by associated organs. This diversity well covers fructifications of Ginkgo, the collar being homologous with seed-bearing organs of the Peltaspermales e.g. with cupule-like structures of the Coryatospermaceae.
The planated cladosperms of some peltasperms are comprable with modified seed-bearing fronds of Biarmopteris (sterile leaves of the same plants belong to Mauerites) and Callipteris (as described by G. Roselt). The homology between fertile fronds of Callipteris, Tinsleya and the Callistophytaceae (if Medullopteris does belong to the family as suggested by G.J. Retallack) seems evident. Thus both the seed bearing organs of the Peltaspermales, including cupulate ones, and the collar of Ginkgo differ in the origins of the cupules of lagenostomalean pteridosperms. The lagenostomalean cupules are of telomic origin and cannot be interpreted as strongly modified seed-bearing leaves.
As early as at the end of the Devonian and beginning of the Carboniferous the pteridosperms diverged into two lines. One had radiospermic cupulate seeds and gave rise to the Lagenostomales (Lyginopteridales) and Trigonocarpales (Medullosales). Another line had platyspermic seeds and other coniferopsid characters resulted first in pteridosperms like Lyrasperma and Calamopitys. Their non-cupulate seeds were born, as in all earlier pteridosperms, by leafless branches. Microsporoclads were leafless as well.
The most important step in the pteridosperm (and fern!) evolution was the transfer of fructifications onto photosynthetic trophophylls. The transfer seems to have happened very rapidly by means of the homeosis (saltational recombination of ontogenetic programmes known in many living plants). The resulting fertile fronds are known in both the evolutionary lines, namely the Callistophytaceae and Trigonocarpales (but not in the Lagenostomales which retained leafless microsporoclads and compound polysperms). The transfer of fructifications provoked the steady transformation of their bearing fronds. In the Lower Permian Callipteris- and Biarmopteris-like pteridosperms the seed-bearing fronds are increasingly modified. The fronds producing synangia also underwent the transformation into leafless microsporoclads. The genus Callipteridanthus (male fronds of Callipteris naumannii) resembles microsporoclads of the Peltaspermaceae. Some Autunian Callipteris probably produced Vittatina-like pollen (as evidenced by their stratigraphical and geographical distribution) as did certain Upper Permian Peltaspermaceae (A.V. Gomankov & S.V. Meyen). The Early Permian Callipteris is closely similar to the Peltaspermaceae in the frond construction and epidermal characters (M. Barthel & H. Haubold).
In the Permian and Triassic there are plants (e.g. Glossophyllaceae) which combine features of Ginkgoales and Peltaspermales so that their placing into a certain order meets difficulties (some leaves which are gross-morphologically similar to Glossophyllum have proved to possess typically peltaspermaceous epidermal structure). This fact, together with the other observations, suggest that during these periods the divergency of the orders proceeded. Another group showing resemblances with the Permo-Triassic Peltaspermales is the Mesozoic order Leptostrobales (Czekanowskiales) whose bivalved capsules are easily derived from paired cladosperms of some recently discovered Permian peltasperms.
The phylogenetic analysis shows that the orders Ginkgoales and Leptostrobales are closely related to the Peltaspermales and can be placed among pteridosperms having coniferopsid characters i.e. together with the Calamopityaceae, Callistophytaceae, Arberiales (Glossopteridales) and may be the Caytoniales. Correspondingly, Ginkgo can be treated as a living pteridosperm. This explains such peculiar non-coniferopsid characters as the presence of motile sperms, pollen structure, occasional appearance of seeds on leaves in the marginal position, etc.

These phylogenetic conjectures need support from fuller studies of the Peltaspermales, Leptostrobales and fossil Ginkgoales, particularly of the vascularisation of their fructifications; the more so as both the Peltaspermales and Leptostrobales were regarded as possible

NEWS OF OTHER ORGANIZATIONS

BRITISH MUSEUM (NATURAL HISTORY)
This institution celebrates its centenary this year and invites "the adult 'specialist' visitor" to its Open Days on 18 & 19 November 1981. There will be "over 100 exhibits, and staff will be on hand to talk about their research and services." "....those who wish to attend are asked to inform the 'Open Days Office'. Some light refereshments may be bought at the Museum and there are restaurants and pubs in the area."

INTERNATIONAL UNION OF BIOLOGICAL SCIENCES
A representative of the IOP Executive Committee will attend a meeting of the "Board of Division" on the occasion of the 13 International Botanical Congress on Sunday 23 August 1981 at the Hilton Hotel, Sydney, at 20.00hrs. the Agenda includes:
1. Reorganisation of the Board of the Division.
2. Future organisation of botanical activities within the IUBS.
3. Further Botanical Congresses.
Please contact the IOP President, Professor Ted Delevoryas, with any views you wish to express at the meeting.

ASSOCIACAO LATINO-AMERICANA DE PALEOBOTANICA E PALINOLOGIA
The third reunion of palaeobotanists and palynologists will take place at Sao Paulo on 10 - 12 December 1981. Write for details to: Mary Bernardes de Oliveira, Instituto de Geosciencias - USP, Caixa Postal 20.899, 01000 Sao Paulo, SP Brazil.

INDIAN ASSOCIATION OF PALYNOSTRATIGRAPHERS
The third newsletter of this organisation was published in April and includes a bibliography of palynological papers published in India through 1980 and early this year. Write to Janki Bhawan, 41/417 Narhi, Lucknow 226 001, India.

NEW PUBLICATIONS

PLANTE FOSILE by I. Petrescu & O. Dragastan (see page 5)
The English language abstract of this 1981 text states:
"Fossil Plants is the result of the collaboration work between Prof. I. Petrescu at the University in Cluj-Napoca (specialist in upper plants) and Prof. O. Dragastan at the University of Bucharest (specialist in lower plants). The book follows generally on the schedule of the palaeobotany course of lectures delivered by the authors to the students of geology from the two universities.....The introduction presents some general problems regarding the object, the importance and the branches of palaeobotany, the historical evolution of the science all over the world and in Romania etc.
The first part (pp. 13-130) is devoted to palaeobotany and palynology and the practical studies. It includes the basic notions of the morpho-anatomical study of algae, the morpho-anatomy of foliage remains, the anatomy of ligneous remains as well as those regarding the palynological and carpological researches.
The second part (pp. 131-452) includes the fossil plant systematics (Thallophytes and Cormophytes). The main known representatives of different deposits in the world as well as on Romanian territory are described and figured within each group. As regards the upper plants, the different genera of each family have been thoroughly presented in terms of the study of the morphology (anatomy) of foliage and ligneous remains, of pollen and possibly of fossil seeds and fruit. The systematics we adopted does not include the less important groups nor those lacking from Romanian formations.

The final part (pp. 453-463) puts forward two basic problems. The first regards the fossil flora evolution during geological periods. Thus, the general features of old vegetation on the earth are pointed out stressing on those aspects characteristic of the European continent. The second problem presents a discussion of the lithogenetic role of fossil plants. On this background, the palaeobotanic aspects of fossil coal genesis are minutely treated and examples of different peat bogs are also given. The oil and natural gas genesis is explained in terms of the original material (mostly of an organic nature). The lithogenetic role of certain groups of plants (especially Thallophytes) in the formation of certain calcareous and siliceous rock rocks is also pointed out. Finally the importance of palaeobotanic researches for different stratigraphic rocks is pointed out. Fossil Plants is the first palaeobotany book printed in Romanian and addresses the students of geology and biology."

FOSSIL POLLEN RECORDS OF EXTANT ANGIOSPERMS

This compilation by Jan Muller is published in Botanical Review 47, July 1981, and represents an updated and expanded version of an earlier paper by the same author (Biol.Rev., 1970). It contains a discussion of records for 185 families of which 139 are accepted as reliable. The results are summarised on two charts, one in stratigraphic, the other taxonomic order.
Reprints may be obtained from: Publications Office, New York Botanical Garden, Bronx, New York 10458, USA. The price, including postage etc is US$8.75, though for non-U.S. orders it is $9.50 in U.S. currency drawn on a U.S. bank.

INDEX OF FIGURED PLANT MEGAFOSSILS Permian 1971-1975

This latest volume by M. Boersma & L.M. Broekmeyer was published by the laboratory of Palaeobotany and Palynology of the University of Utrecht in January 1981.

BIBLIOGRAPHIES

INTERNATIONAL BIBLIOGRAPHY OF PALEOBOTANY & PALYNOLOGY FOR 1980

Since IOP has helped finance this first International Bibliography one copy is available free to all IOP members on personal application to the senior compiler, H.W. Pfefferkorn, whose address appears on page 2. A two page letter which outlines the aims and objectives of the project is also available from him.
Since future IOP funds are likely to be requested to support this project it is important that IOP members have a chance to express their opinions on the priority of this facility. The assumption is that since bibliographic service forms a major function of IOP itself such financial support should be encouraged by us. There is even a view that the revised constitution of IOP should include a post for a Bibliography member in the same way as the present one allows for a Congress member as well.

BOOK REVIEWS

THE STRATIGRAPHIC POSITION OF TRIASSIC PLANT-BEARING BEDS OF EURASIA

I.A. Dobruskina, 1980. Trudy Geol. Inst. Akad. Nauk. SSSR. 346, 163pp. 32 pls., 42 text-figs., 2 roubles 60 kopeks.
Part 1 of the book includes an analysis of the stratigraphic position of plant-bearing beds of western Europe, Spitzbergen, Greenland, the European part of the USSR the Mangyshlak peninsula, the East Urals, south west Asia, Middle Asia, Siberia, north Kazakhstan, central Asia, south east Asia, the Far East and India. For each region, diagrammatic maps and stratigraphic columns are given. Plant-bearing beds of the

area are grouped into major stratigraphic intervals and are correlated throughout Eurasia. Part 2 contains descriptions of Lepidopteris remota, L. haizeri, L. heterolateralis, L. microcellularis, Maria synensis (the new genus comprises leaves previously placed into Glossophyllum but proved to belong to the Peltaspermaceae) M. chalyshevii, Peltaspermum usense, P. madygenicum, Aksarina meridionalis, A. kipievica, Kalantarium kraeuselii, K. prosundum. The material described comes from the Triassic of the Pechora basin, Fore-Urals and Middle Asia. An analysis of the Triassic cordaite-like and zamiopteroid leaves is given.

BIOSTRATIGRAPHIC ASPECTS OF PALYNOLOGY (methods of interpretations). Abstracts of papers of the 4th all-union palynological conference, Tyumen, 1981, 165pp. 1 rouble 89 kopeks.
The conference was held in March in Tyumen in West Siberia's Research Oil Institute (ZapSibNIGRI) with several hundred palynologists from nearly all the USSR laboratories. The volume includes abstracts of 224 papers related to all fields of palynology.

LOWER CARBONIFEROUS OF MIDDLE SIBERIA V.N. Dubatolov (Ed.),1981. Trudy Inst. Geol. i Geofiz. SO AN SSSR, 432, 208pp, Novosibirsk, "Nauka", 3 roubles 30 kopeks.
The book is devoted to the stratigraphy, lithology, palaeogeography and palaeobiogeography of the Siberian platform and Sayan-Altai mountain area. The main sections of the Siberian platform are described. The palaeontological part of the book includes descriptions of new species and genera of miospores and acritarchs by L.L. Dryagina, N.G. Pashkevich and L.N. Peterson.

NEW SPECIES OF ANCIENT PLANTS & INVERTEBRATES OF THE USSR. I.N. Srebrodolskaya (Ed.) Trudy Vses. Nauch.-issled. Geol. Inst.(VSEGEI), n. ser., 204, 125 pp, 17 pls., Leningrad, "Nedra", 1rouble 10 kopeks.
In 27 short articles new species and genera are described of algae, mosses, articulates, ferns, gymnosperms and angiosperms ranging from the Precambrian to the Oligocene. Unfortunately most of the comparisons with hitherto described taxa are very sketchy and the photographs on the plates are strongly retouched. This often prevents a clear understanding of some of the taxa, particularly the Palaeozoic ones.

THE LOWER CAMBRIAN & CARBONIFEROUS BIOSTRATIGRAPHY OF MONGOLIA
The joint Soviet-Mongloian Scientific Research Geological Expedition; Transactions, 26, 192 pp., Moscow, "Nauka", 3 roubles 20 kopeks.
The volume consists of two parts. The second is entitled "The stratigraphy of the Carboniferous deposits of Mongolia" and was written by M.V. Durante in coauthorship with eleven geologists and palaeontologists. The first version of the text was originally written for "Lexique stratigraphique", but has not been published in this edition. Detailed descriptions of the main sections together with lists of plant megafossils and other organic remains are given. Correlations of the sections, their dating and the general palaeogeography of the area of Mongolia in the Carboniferous are outlined. The text is profusely illustrated by stratigraphical columns, correlation charts and palaeogeographic maps.

S.V. MEYEN, MOSCOW

PALEOBOTANY an introduction to fossil plant biology. T.N. Taylor, 1981. 589 pp., McGraw-Hill, New York. US$35.00.

It is now 20 years since the last major palaeobotany text-book was published in English. During this time there has been an explosion of palaeobotanical knowledge following an equally dramatic increase in the number of active palaeobotanists. I would guess that the next decade might well see further advances although they will produce more consolidation of ideas than fundamentally new concepts. Taylor's book has been published at just the right time.

The author's remark "The principal aim of the paleobotanist is to attempt to reconstruct the history of the plant kingdom." emerges loud and clear throughout the book. His chapter layout is traditional but it is difficult to see how it could have been otherwise in a book that sets out to be botanically oriented. There is a short introduction dealing with fossilisation, methods of studying fossils, geological time, biological correlation and the classification of plants. It is brief and to the point and should satisfy the needs of the average reader. This is followed by a series of chapters dealing with the major groups of plants and there are also chapters on Precambrian Biology and the Origin and Evolution of the Seed Habit. Each chapter gives a good resumé of the available evidence and the current ideas of morphology and evolution, followed in most cases by a useful conclusion The illustrations are plentiful and mainly taken from published works although of course there are some new ones as well. Photographs of the more eminent palaeobotanists are sprinkled throughout the book, resting comfortably alongside the plants that these people studied. Taylor has mercifully not included a section on palaeobotanists, which usually only merits a cursory glance by the less dedicated reader.

Knowing Taylor's interests it is not surprising to find a large section of the book dealing with the seed habit and the pteridosperms. Here the coverage of the fossils changes from more than adequate to excellent. I was, however, initially taken aback to see that the chapter dealing with the angiosperms was shorter than the one on lycophytes. Not that I am complaining about the excessive length of the latter of course, but rather that I thought the angiosperm coverage might prove to be disappointing. Instead I found it to be well written and its length seems to be the result of a rather different approach. There is no attempt to divide the chapter taxonomically and the angiosperms are considered in a much broader manner. After explaining the difficulties in identifying primitive characters and looking at some putative pre-Cretaceous angiosperms, Taylor traces trends of change in pollen and leaves throughout the Cretaceous and discusses the usefulness of analysing morphological and anatomical features in localised Eocene assemblages. The problems of identifying pre-angiosperms are pointed out to the reader as is the fact that the unique angiosperm features of double fertilization and endosperm development may never be identified in the fossil record. But the book does not end on a note of finality or despair of never fully understanding the evolution of angiosperms. Rather it encourages the reader to read further. If that is the result, I am sure it will please the author.

There are some limitations of course, although these seem to have been deliberately self-imposed by Taylor. There is little in the way of plant palaeogeography and virtually no palynology.

This book is a good one, being pleasantly produced and having few typographical errors. I have no hesitation in recommending it although I am not fully sure to whom I am recommending it. Everyone reading this review would do well to have access to a copy, even if they do not intend to own one. Teachers of palaeobotany can now be up to date,

much more easily, in fields outside their expertise; indeed I suspect some may be in for a shock. On the other hand, first degree students might be put off by its very size and thoroughness, if not by its price. However, if they can be induced to read it as a reference or a source book they will find its information both digestible and invaluable.
B.A. THOMAS, LONDON.

BIOSTRATIGRAPHY OF FOSSIL PLANTS: Successional and Paleoecological Analyses. Edited by D.L. Dilcher & T.N. Taylor, 1980. 272 pp., Dowden, Hutchinson & Ross, Stroudsburg, distributed by Academic Press. $27.50.
The genesis of this book was a symposium by the same name organized by the editors for the second North American Paleontological Convention held at the University of Kansas in August 1977. Authors of seven of the nine chapters in this volume presented their original research reports at this symposium and for the most part, confined themselves to a discussion of the utilization of plant megafossils in biostratigraphy in horizons ranging from the Silurian/Devonian to the Tertiary. The two papers added to this volume prior to publication - "Vegetation Change in the Miocene Succor Creek Flora of Oregon and Idaho" by Taggart & Cross, and "The Chemistry of Fossils" by Brooks & Niklas, although interestingly written, depart considerably from the major theme. The former paper concerns a palynological and paleoecological analysis of a well-known Miocene flora, whereas the latter paper essentially represents a brief review of the rather esoteric field of phytopaleobiochemistry.
Harlan Banks, the author of the chapter entitled "Floral Assemblages in the Siluro-Devonian" has long been a leader in the establishment of precise stratigraphic information concerning the earliest land plants. In the present work he tentatively establishes seven successive plant megafossil generic assemblages from Zone I (Cooksonia) in the late Silurian to Zone VII (Rhacophyton) near the top of the Devonian. Banks not only outlines the geographical occurence of these assemblages, but also includes the major morphological features of the plants that evolved with each successive zone.
The significant and meticulous contribution by Tom Phillips concerns the stratigraphic and geographic occurrences of permineralized coal swamp plants from the Upper Carboniferous of North America and Europe. The author records the stratigraphic position of genera and species of anatomically-preserved vascular plants and discusses the importance of these assemblages as ecological indicators. A measure of the comprehensive treatment of this subject is seen in the list of some 375 references, including many of the lesser known (to this reviewer, at least) Russian publications.
Hermann Pfefferkorn and William Gillespie present a biostratigraphic and biogeographic treatment of compression-impression plant fossils from the Pennsylvanian rocks of North America. A tentative correlation of North America megafossil floral zones is suggested with those established for the Upper Carboniferous of western Europe.
The zonation of both Permian and Triassic plant mega- and microfossils of Gondwana continents is treated in the chapter by James M. Schopf and Rosemary Askin. Because vertebrate fossils of these ages are relatively scarce in the predominantly non-marine sediments of the southern Hemisphere, the authors point out that plant fossils have become extremely important for interregional correlations in these areas.
In the chapter "Upper Triassic Floral Zones of North America" Sidney Ash outlines the geographic location and stratigraphic ranges of over 100 species of plant megafossils. Furthermore, the author establishes

three distinct zones (Eoginkgoites, Dinophyton and a yet unnamed uppermost zone) which he claims can be correlated with Triassic stages in Germany by means of associated palynomorphs.
Robert Spicer emphasizes the importance of depositional sorting to the biostratigraphy of plant megafossils. He points out that this factor may cause plant fossil assemblages to reflect highly biased sample source which, in turn, may modify concepts about the ecological and evolutionary history of a particular assemblage.
The contribution by Frank Potter and David Dilcher deals with the problems of precise age assignment of the abundant plant fossils recovered from disjunct clay and lignite lenses of middle Eocene age (Claiborne Formation) from 25 loclities in western Kentucky and Tennessee of the southeastern U.S.
In view of the fact that this volume represents a modern assessment of the value of plant megafossils to biostratigraphy and paleoecology, it should be read by most professional paleobotanists. However, when one notes only 6 half tones included in the nine chapters, the cost of the volume may be considered somewhat excessive.
Fittingly, this volume is dedicated to James M. Schopf, the eminent paleobotanist who served as President of IOP from 1975 until his untimely death in 1978.
J.E. CANRIGHT, ARIZONA, USA.

QUATERNARY PALAEOECOLOGY H.J.B. Birks & H.H. Birks, 1980. 289 pp., Edward Arnold. £28.00
I reached for this book with the enthusiasm usually reserved for a giant gin at the end of a long hot day, or a Bruckner Symphony after a couple of months of field work. If I put it down with a certain feeling of disappointment, it was mainly attributable to the unrealistically high expectations aroused.
Many pollen analysts seem to regard palaeoecology and palynology as synonymous: not so the Birkses. While the book as a whole reflects their preoccupations with peat bogs and lakes, pollen analysis and plant microfossils, and has a strong North American flavour, thirty or so pages are devoted specifically to molluscs, insects and vertebrates. Simple inorganic chemistry of lake sediments, diatoms and even archeology also receive attention. As one would expect of these authors multivariate statistics and methods of numerical classification loom large, but are treated with a clarity that will drown the counter-suggestible and encourage the hesitant.
At all points the Birkses concentrate on the fundamental principles involved to great effect. As the illustrative examples are chosen to demonstrate the wide range of possibilities, the book is absolutely stuffed with interesting information. The references are grouped by topic and are listed at the end of each chapter: I personally greatly prefer to deal with one great big bibliography in one place rather than 12 scattered smaller ones.
In a book like this almost everyone will go first to examine the coverage of their pet topics. Lakes and peat bogs sample a very selected group of environments, and studies of them leave many important ecologies undocumented: thus recent palynological studies of small mires in the south east of England have produced quite different ecological pictures to the hallowed stereotypes. Similarly, when the Birkses stress the interest and importance of coordinated palaeoecological studies, it is disappointing to see no mention of the cave sites in France and elsewhere that afford splendid opportunities for such investigations. Having applied Birks-like methods myself to the study of mammal ecologies, I find this section of the book less satisfactory than others. But these are mere quibbles.
If this book were to be judged on its contents alone it would get a warm welcome; but it earns loud criticism for the publisher. The first

is for the layout and typography which is of a cryptically malignant mediocrity, stimulating sleep rather than interest. The second and more important censure is for the price. This is a very good book, but it isn't entirely without competition; and at nearly thirty pounds I cannot recommend it to the students for which it is intended.
R.N.L.B. HUBBARD, LONDON.

THE PRE-GLACIAL PLEISTOCENE OF THE NORFOLK & SUFFOLK COASTS R.G. West, 1980. 131pp., 36 pls., 49 tables, 54 figs. Cambridge University Press, £40.00.
Professor West is without a doubt one of Britain's most distinguished students of the Quaternary, and any publication by him commands attention and interest. His palynological studies have led him to a fundamental re-assessment of Clement Reid's chronological framework, with the Weybourne Crag, Lower, and Upper, and Arctic Freshwater Beds, and the Forest Bed being exploded as comprehensively as Bunbury, and re-assembled in a far from simple fashion into three glacial and interglacial stages. There can be little doubt that this book will remain the definitive work on the British Lower Pleistocene for a great many years. But it is not the last word on the subject for even before this book appeared Professor West published evidence for a further glacial-interglacial cycle to be inserted above the bottom of the sequence propounded here.
Correlations within Britain and between Britain and the continental sequences, are dealt with in three and a half pages. This part, which for many people is the most interesting section to which they will turn first, is disappointing for the simple reason that the only correlation that Professor West can make with any conviction is the equation of the Cromerian (sensu stricto) with the continental Cromerian IV interglacial. Several possible correlations of the earlier interglacials and glacials are compatible with the exiguous palaeomegnetic evidence, but none is more convincing than the others. The geological record of course, and not Professor West, is responsibl for a state of affairs where at least two chronologies , one twice the length of the other, can accomodate the four identified glacial-interglacial cycles with equal success. There is no comparison with the marine record from oxygen isotope analyses: Professor West appears to feel that to do this would be to try to fit facts to a theory. If that were the case, he would be correct; but the oxygen isotope record is as factual as the palynological record and is, moreover, continuous suggesting the existance of about 10 interglacials in the relevant period. While Professor West might retort that the result would be a speculative bubble piling Pelion on Ossa, the fact remains that if speculation is unavoidable it is best done by those with the best command of the subject.
Professor West's book is prepared to the high standards that one generally associates with Cambridge University Press. The absence of an index is partially compensated for by an unusually detailed tabulation of the chapter contents. All the text figures are collected into a separate leaflet, stored in a slip box on the back cover - making an awkward binding. Anybody seriously interested in the palaeobotany of the European Lower Pleistocene will wish to buy this book almost regardless of price.
R.N.L.B. HUBBARD, LONDON.

PHYLOGENETIC PATTERNS AND THE EVOLUTIONARY PROCESS. N. Eldredge & J. Cracraft, 1980. Columbia University Press, New York. US$34.40.
This is one of a number of books on cladism now available or in press. A previously published, inexpensive and readable source is the paperback version of Phylogenetic Analysis and Palaeontology, also issued by Columbia University Press and excellently reviewed by D.L. Hull, 1980, Paleobiology 6, 131-6. Yet to appear in the bookstalls are

works by E.C. Wiley, by N.I. Platnick & G.J. Nelson and by S. Farris. Eldredge and Cracraft try hard to give a balanced summary at a difficult time of divergence in approaches towards cladistics. For taking on such a formidable task they deserve a medal. Chapter 5 on classification is thorough and particularly recommended, whilst chapter 2 on cladistic analysis is moderately clear, though unfortunately lacks a fully developed example. The opening page of text and the Preface make clear the important distinction of pattern from process that is so vital to a full understanding of what cladism is about. Several other important distinctions however are not wholly thought through and inevitably are therefore rather vaguely expressed. The book seems much longer, and far more expensive, than it might have been. Irritating points are the casual use of words with complex meanings such as ad hoc, trend phenomena, proselytised, epiphenomenon, hypothetico-deductive, experientially and ontological, which hardly indicate that the Columbia editors really helped the authors to keep the language "simple". Moreover, to the English ear "within-group", "among-group", "nonactinopterygian" and "reductionist transformational explanations" don't really mean much either, but then these are minutiae, irrelevant to the substance of the book. One of the few proof-reading errors perpetuates "historical biography" (page 121).

A disappointment to palaeobotanists will be the lack of botanical examples, and the fairly typical cladist view that information from fossils is so notoriously incomplete that one is left wondering just what fossils do in the authors' view contribute.

Wiley's book will be on a more straightforward evolutionary interpretation of cladistics and I suspect will be the best of the bunch. Platnick & Nelson's is on "transformed" cladistics, essentially the method developed with mainly method in mind, and Farris's on numerical versions of the method.

C. HILL, LONDON.

THE EVOLUTION OF PLANTS AND FLOWERS B. Thomas, 1981. 116pp, Peter Lowe, London, £5.95. (overseas £7.57 including postage from Peter Lowe Ltd, 49 Uxbridge Road, London W5 5SA).

When I said I would review Barry's book I did not know its title and for some reason, I imagined a treatise on the Lepidodendraceae. I may have been more wrong sometimes but not often. It is a jolly picture book unlike anything I have seen on palaeobotany but there are lots of books of glossy pictures on other things. It would not make a student a palaeobotanist but nor would it put him off becoming one. My copy is on the bookshelf in my guest room, not to put the guest to sleep, but to interest one who has not the first idea of what palaeobotany is about. It assumes no academic background and spends several pages sketching elementary plant biology. Here are some of the main chapter headings: What is a plant; Moving onto land; The great coal forests; The rise of seed plants; Flowering plants appear; Ice ages and after; Plant evolution and man.

Half the page surface is given to pictures so there are less than a hundred pages of print and since I skipped the elementary biology, the index and so on, I took just an hour to read it. I am sure the sentences were not meant to be poured over. Current ideas are offered lightly, for instance that plants were first able to colonise land when oxygen (and ozone) appeared in the atmosphere, cutting off lethal ultra violet light. For the kind of reader I imagine, scholarly hestitation over what is insecure would be out of place. Most of the illustrations are simple and lighthearted paintings (by Tony Swift)

and I enjoyed the restorations of past vegetation. They look as though they are based on real landscapes and are not like Botanic Garden beds. But one did bother me and I hope will bother the lay reader. The scene is pleasant, it might be an upland valley in north Scotland, sparsely covered with birches, alders and pines (all named). There are some unobtrusive exotics including Cercidiphyllum in the foreground. This is much like a gooseberry bush as indeed it is in suburban gardens and not a bit like a noble forest tree. We are told the picture is of 90 million years ago and that the climate was much warmer; unaccountably this picture appears in the ice age chapter. Something has gone wrong.

T.M. HARRIS, READING, ENGLAND.

EDITORIAL REQUEST

All IOP members, authors, reviewers and publishers are urged to respond to any item included in this newsletter, without prejudice, to contribute to positive intellectual debate.