IOP NEWSLETTER 23

INTERNATIONAL ORGANIZATION OF PALAEOBOTANY

INTERNATIONAL UNION OF BIOLOGICAL SCIENCES
-SECTION FOR PALAEOBOTANY
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MARCH 1984

PLEASE MAIL NEWS AND CORRESPONDENCE TO YOUR REGIONAL REPRESENTATIVE OR TO THE SECRETARY FOR THE NEXT NEWSLETTER 24. The views expressed in the newsletter are those of its correspondents and do not necessarily reflect the policy of IOP.

IOP NEWS

ANNUAL REPORT & FINANCIAL STATEMENT 1983
Copies of these two documents are being submitted to IUBS and are available to individual members from the secretary.

NEW REGIONAL REPRESENTATIVES
These IOP officers help to encourage members in their region submit items for inclusion in the newsletter, some reprint and distribute the latest edition, and help with the collection of membership dues. They are an essential adjunct to an international organisation such as this. Most of the Regional Representatives serving in 1983 (listed on page 14 at the back of IOP Newsletter 22) had served in this often genuinely laborious role since 1978. Our Constitution says that they serve "at the pleasure of the Secretary" and so each was given a chance to resign, after such a long period of service, at the end of last year. A list of the current Regional Representatives is printed on the back page of this newsletter. Thanks are due to the resigning holders of the job, Prof E. Boureau, Dr B. Thomas and Prof B. Trivedi who served this role during the formative years of the newly constituted IOP. Of course, Prof E. Boureau, who actually played a major role in founding the original IOP, will continue to serve on the Executive Committee as a Vice President.

ADDRESS LISTS
There has been a new compilation of the IOP members' addresses during February 1984 and print-outs are available to paid up members on request to the secretary. Except for members in North America the print-out includes the year to which

each member is fully paid, according to IOP records. This date appears on the address label of the envelope which brought you this newsletter 23. Please inform the secretary of important errors and pay US$8 of £4 for each year outstanding.

IOP AT THE NEXT BOTANICAL CONGRESS

Dr F. Schaarschmidt, Forschungsinsitut Senckenberg, Senckenberganlage 25, 6000 Frankfurt 1, West Germany is the Congress Member of IOP's Executive Committee and has special responsibility to represent the interests of IOP members through the organisation and operation of the Congress. This will take place in West Berlin in the last two weeks of July 1987. The Organising Committee is proposing the following symposium titles which are of particular interest to palaeobotanists. Friedeman Schaarschmidt asks for comments on these proposals before the end of April 1984.

Symposium 17: Biology, ecology and evolution of early land plants
Symposium 18: Evolution of early seed plants
Symposium 19: Early evolution of angiosperms
Symposium 20: Modern techniques in palaeobotany
Symposium 11: How to correlate the systems of fossil and recent ferns.

In addition, one of the seven "General lectures" that have been proposed by the Programme Committee is entitled: "Early land plants - the saga of a great conquest".

There is also a suggestion to propose another symposium on: "Changes of floras and vegetation zones during the Cenophytic".

A field trip for palaeobotanists will be organised by Professor H. Schweitzer.

APPRECIATIONS OF THE LATE T.M. HARRIS

Yet one more appreciation has been received and a copy can be obtained from the IOP secretary, or from its author, Dr Georges Barale, Laboratoire de Paléobotanique, Université Claude-Bernard, 43 boulevard du 11 Novembre 1918, 69621 Villeurbanne, Lyon 1, France.

REPORTS OF RECENT MEETINGS

GEOPHYTOLOGICAL MEETING, LUCKNOW, INDIA, November 14 - 16th 1983

The first day of this meeting concentrated on the life in Cambrian and Precambrian of India. Dr P.K. Maithy reviewed the existing data on the Precambrian biota of India. Definite evidence of eucaryotes of the plant kingdom is lacking. He stressed the importance of relating radiometric dating to biostratigraphy.

Dr Rajagopalan and Mr Srivastava have developed a new technique for dating rocks older than 600Ma bearing life forms. This is known as Fission Track Dating and uses glauconitic samples.

Dr Anshu Sinha of the Wadia Institute of Himalayan Geology reported and reviewed the occurence of stromatolites from Shali and Deoban, near Garhwal in the lesser himalayas, and from the lowest part of the Simla Flyshoidal Formation. The stromatolites continue in the carbonates of Shali and Deoban from the Lower Riphean to the Lower Cambrian.

Dr Indra Bir Singh and Mr Vibhuti Rai have found fossils of the earliest carbonate secreting organism, Archaeocyatha, as well as walking, burrowing, swimmingtrails of early orthopods, worms and molluscs. The rocks containing them were thought to be only 100 - 150 Ma but their work suggests a much older age, about 550Ma.

The second day continued with the Cambrian and Precambrian theme. The lecture by Dr Raha, Trivandrum Centre for Earth Science Studies, was particularly useful. He described the stromatolites of the Jammu limestone and other carbonate formations and has established four stromatolitic assemblage zones which are traceable all along the carbonate belts of the sub- and Lesser Himalayas. The fossils are of an Upper Riphean to Vandian age.

Other lectures that day concerned fossil woods, leaves, fruits and seeds, algae, fungi and bryophytes from a whole variety of deposits of different ages. There were also many lectures on pollen, spores and dinoflagellates. For instance, a

re-evaluation of the dinoflagellate cysts from the Sangchamalla Formation of Malla Johar in the Higher Kumaon Himalayas by Drs Jain and Garg has revealed that the reported Palaeogene forms are altogether lacking in the assemblage. Instead it is dominated by Upper Cretaceous forms.
On tracing the history of the Sal, a very important timber tree of the country dominating the Sidhi Forest, Dr Vishnu-Mittre and his associates found that the Sal tree is a very high pollen producer and that there was no Sal in the area before 1,000 radiocarbon years B.P. In another important contribution with one of his students Dr Mittre reported the discovery of Eleusine africana (Ragi) in India, and discussed its biogeographical implications.
The third day included lectures on coal and lignite biostratigraphy. Dr Kar presented his extensive work on the palynology of the Tertiary of Kachchh. There is evidence from the pollen that the climate was more humid than at present. Drs Tripathi and Singh have built a palynostratigraphy of the Palaeocene and Eocene sediments from the Jaintia Group. They recognise 5 palynozones which are also found in the north east of India.
Drs Khandelwal and Gupta traced the history of vegetation and various phases of pollen deposition during the Holocene of Naukutchiya Tal in the Nainital District of Utter Pradesh. Drs Pal and Banerji have divided the Triassic of Peninsular India into three divisions on the basis of important megafossils.
Dr Guleria reported the discovery of the first temperate dicotyledon wood belonging to the genus Prunus, recovered from an altitude of 5,500m from the Miocene beds of Ladakh. The fossil provides evidence of a considerable uplift of the Himalaya (about 3,400m) since the time of its deposition. This confirms that the northern temperate element started establishing in North India during the Miocene. In general, the fossil suggests a warm-temperate climate in Ladakh during the Miocene as compared to the present cold desert conditions there. An account of the study of the history of fossil woods in China was given by Mr Nai-Zheng Du of the Academy of Sciences, China. For the first time a small assemblage of fossil leaves belonging to Dillenia, Syzygium and Anogeissus has been reported from the Lower Siwalik Beds of Koilabas in Nepal by Mr Mahesh Prasad and Dr U. Prakash.
Drs Patil and Biradar from Poona gave a detailed account of the architecture of leaf venation in about 70 species of palms and showed that leaf venation is an important tool in assessing the phylogenetic and taxonomic position of palms. Such studies are essential for comparing and identifying fossil palm leaves.
H.P. SINGH, Lucknow.

PALAEOBOTANICAL PROFESSIONAL COMMITTEE, Sian, China, May 24 - 28th 1983
This was the inaugural meeting of this group, part of the Palaeontological Society of China, and was the first symposium on palaeobotany to be held in Sian, Shaanxi.
Over 108 palaeobotanists attended the meeting, and represented research institutes, universities and geological surveys. At the meeting Professor Li xingxue (H.H. Lee) was elected chairman and Professor Xu Ren (J. Hsu) was elected as Honourary Chairman of the Committee.
More than 118 papers were received and 63 were read. They dealt with morphology, anatomy and phylogeny of fossil plants, palaeoclimate, palaeoecology and the geographical distribution of fossil floras, as well as new research methods.

ZHOU ZHIYAN, Nanjing.

PALAEOBOTANICAL EXCURSION, X-ICC, Spain, September 1983
This excursion was organised for the tenth International Congress of Carboniferous Stratigraphy and Geology, its field trip G, which was actually undersubscribed and was finally run privately for a few enthusiasts. Bob Wagner and Manuel Lemos de Sousa showed Sergio Archangelsky, Hans Kerp and Hermann Pfefferkorn around in Puertollano, Peñarroya-Belmez, Valdeinfierno, Berlanga, Guadalcanal, Bucaco, Ciñera-Matallana and La Magdalena. This covered a large area of the western Iberian Peninsula. Hans Kerp got a good specimen of Spongiostrobus preserved in tuff from Puertollano.

PALAEOPALYNOLOGY MEETING, Cambridge, England, 5th December 1983
There were seven speakers, about 20 poster exhibits and more than 50 participants at this meeting organised jointly by the Department of Earth Sciences and the British Micropalaeontological Society. There were talks on dinoflagellates, pollen and spores and palynodebris.

6TH NORTH EAST PALEOBOTANICAL CONFERENCE, Harvard Forest, Massachusetts, November 4 - 6th 1983
There were more than 35 palaeobotanists at this conference and there were 11 papers, 2 demonstrations and a round-table discussion.
Patricia Gensel (University of North Carolina) gave the Friday evening talk, summarising the main features of herforthcoming book with Henry Andrews, "Plant Life in the Devonian". It promises to be a critical summary of this active period of plant evolution and the material presented by Pat gave rise to discussions that lasted late into the night.
Christopher Wnuk (University of Pennsylvania) started the next morning with a report on an in-situ lycopod-pteridosperm forest from a Pennsylvanian clastic swamp. The deposit gives a fascinating insight into the structure of this community, as it preserved nearly entire trunks of two species of lycopods, at least two species of tree ferns, and other associated plants. Apparently, the community was flooded by a small pond which caused the death of the plants. These subsequently blew or fell over in situ, leaving a very localised fossil record. The reconstruction of this community suggests a canopy of lycopods over 60 feet high, a shrub layer of 12-15 feet high seed ferns, and a herbaceous layer dominated by Sphenophyllum. Some evidence suggested that different branching patterns observed in the seed fern fronds were associated with different foliage taxa. Hermann Pfefferkorn (University of Pennsylvania) followed with a discussion of Carboniferous biostratigraphic practises, and the problems inherent in lithostratigraphy, biostratigraphy and chronostratigraphy. He noted that the use of organisms as time markers is fraught with confusion, as biogeographic considerations dictate that they only rarely evolve and/or become extinct simultaneously in all places. He concluded with the suggestion that palaeontologists, while continuing to select specific sites for stratigraphic boundaries, consider stating the precision of the boundary; is it really exact, or are we really simply indicating that the boundary lies within 10, 50 or 100 feet of the selected point?
Patricia Gensel described a new and anatomically complex plant from the Lower Devonian of the Gaspe, Canada. The overall morphology of the plant suggests a Trimerophyte, but the anatomy reveals a 3-lobed axial stele which emits elliptical traces in a spiral order. The characters are different from those of zostererophyllophytes and rhyniophytes, and from those of the only known Lower Devonian trimerophyte, Psilophyton. They are similar to those of Upper Devonian aneurophytes, save for the trace morphology and absence of secondary growth. Tony Swain (Boston University) gave a survey of the phylogenetic occurence of major plant hormones such as IAA and the gibberellins, suggesting that all save gibberellins occured in the predecessors of land plants. This led to a brief discussion as to whether one could deduce the presence of hormones in a plant from its morphology. Karl Niklas observed that some bryophytes synthesise the precursor to IAA and release it into the soil, where bacteria transform it into IAA which is used by the bryophyte. This adds a new dimension to the question of the importance of coevolution in the origin of the land flora. Peter Crane (Field Museum of Natural History) provided a phylogenetic summary of the relationships among major groups of seed plants. While his goal was to elucidate the potential ancestors of the angiosperm, his contribution was to emphasise the fact that the solution to this perennially vexing question lies in sorting out the relationships of the numerous antecedent gymnosperm groups. The myriads of details were relegated to a hand-out, and Peter concentrated on what he considers central points. In particular these involve the distinctions between platyspermic and radiospermic seeds and conditions of the ovule in the seed ferns. The most significant interim conclusions were that (1) there are at least two major

groups of pteridosperms, (2) that cycads and cycadophytes are really quite distinct, and (3) that morphological convergence may haunt our present concepts of phylogeny to a greater degree than we realise.

Paul Strother (Boston University) reviewed the scattered evidence on the identity of Nematothallus. The fossil-remains assigned to this genus encompass (a) little chunks of 3-dimensional material, (b) small compressed axes of filaments, and (c) lobate to ellipsoid thalloid structures with uneven surfaces and composed of filaments sometimes of two sizes. The last is the most common morphology, but none of these types appears to represent the whole plant. The filamentous nature of types (b) and (c) hints at an alliance with Prototaxites, but no evidence was adduced to suggest the relation of the two genera. Henry Andrews noted that some of the Nematothallus material reminded him of the basal portions of Sporogonites. Alfred Traverse (Pennsylvania State University) and Ronald Litwin presented their studies of the fern Wingatea plumosa (Daugherty) Ash from the late Triassic of the American Southwest. Only the apical portions of the frond are known, but these bear well-preserved multi-serrate rings of annulate sori, apparently protected beneath an indusium. The spores are circular, 25-50um in diameter, possessing a trilete mark and being enclosed within a perispore. The latter fact aroused considerable interest, and Alice Tryon noted that contrary to general supposition perispores may be the rule and not the exception in ferns. James Walker (University of Massachusetts) then addressed the evolutionary implications of the ultrastructure of early Cretaceous angiosperm pollen, largely using material from the Potomac Group of eastern North America, examined with light, scanning and transmitting electron microscopes. He was concerned with the systematic affinities of six common taxa of pollen of Albian age and with the affinities of pollen from upper Barremian - lower Aptian sediments. The answers to the first question had fascinating implications for angiosperm phylogeny. Three fossil taxa closely match the extant pollen of the Chloranthaceae: Clavatipollenites hughesii is very similar to the pollen of Ascarina, and Asteropollis to that of Hedvosmum. Stephanocolpites fredericksburgensis is similar to the pollen of several chloranthaceous genera, but clearly fits within the modern family. Liliacidites is well-named and is clearly allied with the monocots, while Retinomonocolpites is most likely a monocot and Stellapollis barghoorniana remains problematical, as it possesses a crotonoid surficial pattern on a monocolpate grain. Pollen from preceding late Barremian/early Aptian sediments is still under investigation, butsem has revealed what appears to be a limited range of angiosperm pollen morphologies under light microscopy is really a diverse array of morphological types nearly 50% of which are allied with the monocots. Further, all of this pollen may clearly be distinguished from coeval gymnosperm pollen, with sem.

Volkan Ediger and Al Traverse spoke on the use of a vacuum filtration system in cleaning up palynological preparations. The approach is simple and involves sieving the organic-rich residue from standard pollen preparation through an SiO_2 filter. This is placed in a standard Buchner funnel and vacuum is gently applied. When the solution is completely sieved, the filter is flushed back into a receptacle for final centrifugation. The result is a concentration of larger organic particles without the obscuring "fur" of fragmentary organic matter resulting from oxidation or physical disturbance. Elizabeth Wheeler and Ron Pearson (North Carolina State University) described how they are adapting keys for the microscopic identification of wood to a computerised format. This represents a major advance over the old stacks of punch-margin cards. Steve Manchester reviewed the fossil history of the Juglandaceae. The family has a fine fossil record and the fruits, wood, pollen and leaves give a fine suite of characters. It appears to have arisen from Normapolles bearing ancestors (c.f. work of E.M. Friis) and to have attained its modern form in the early Tertiary when it radiated dramatically apparently from a European/North American origin. The initial history of the group in the Tertiary involved a wide range of abiotically-dispersed winged forms many of which are now extinct. By the late Eocene and the Oligocene a trend was witnessed towards biotic dispersal and the appearance of the dominant genera of the present day such as Carya and Juglans.

The saturday night discussion concerned the purpose and content of courses about Devonian plants, and other demonstarations and exchanges were established. Next year's conference will include sessions on the application of computers to research and teaching in palaeobotany.

BRUCE TIFFNEY, Yale University

16TH NORDIC GEOLOGICAL WINTER MEETING
S. Funder, G.S. Mogensen and O. Bennike from Copenhagen gave presentation of the Kap Kobenhavn Formation situated north of Greenland at a latitude of 82 - 83½ N. According to O. Bennike, Larix, Picea, Betula, Taxus and Thuja were found in strata of Pliocene age.

FORTHCOMING MEETINGS

14TH INTERNATIONAL BOTANICAL CONGRESS, Berlin, 1987
The First Circular is now available and should be returned before March 31st 1984 to: XIV International Botanical Congress, Konigin-Luise-Str 6-8, D-1000 Berlin (west)33, Germany.

EVOLUTION & ENVIRONMENT IN THE LATE SILURIAN & EARLY DEVONIAN, London, May 2 - 3, 1984
This aims to review evidence from physical geology (palaeogeography, palaeoclimatology, sedimentology) of the nature of the environment at that time, and to survey its significance in the evolutionary changes, both structural and physiological, taking place in plant and animal life associated with colonisation of the land. There will be 14 principal speakers, 4 from the USA and one from France, and ample time will be allowed for discussion. All students of geology, palaeontology and biology are welcome to attend at The Royal Society, and there is no charge for admission. The full programme can be obtained from the Executive Sectretary, The Royal Society, 6 Carlton House Terrace, London SW1Y 5AG, England.

OBITUARY

JANINA JENTYS-SZAFEROWA, 1895 - 1983
Professor Szaferova died on January 16th 1983. Her main interests in palaeobotany were the variability of recent and fossil plants studied with biometrical methods and she was involved with dendrology too. She was the widow of the well-known Polish geobotanist, palaeobotanist and Nature Conservancy worker Professor Wladyslaw Szafer. She was born in 1895 in Krakow and studied there at the Jagiellonian University and led her investigations at the Botanical Institute from 1918 - 1939. In 1931 she received her doctorate by presenting a thesis of the structure of pollen grains of Corylus, Myrica and Betula and their recognition in the fossil state. She did work on Betula for the Forestry Institute and also did much for the popularization of biology and Nature Conservancy in schools and youth and workers organisations. During the Second World War she helped Professor Szafer, then Rector of the Underground University, with his work.
Later she worked for a period at the University and from 1953 until her retirement in 1965 she was Head of the Department of the Variability of Plants at the Institute of Botany of the Polish Academy of Sciences. In 1951 she became a docent, in 1954 Extraordinary Professor, and in 1962 Ordinary Professor.
Her original contribution to science is the graphical method of comparing the shapes of plants (1952, 1959), used in Poland and several other countries. Her papers on recent plants deal with the genus Betula, section albae, and the variability and origin of the endemic taxon Betula oycoviensis Besser. Her main palaeobotanical papers concern the variability of nutlets of Ostrya and Carpinus (with M. Bialobrzeska, 1953), the variability of Menyanthea since the Pliocene (with J. Truchanowicz, 1953) and the variability of Carpinus (1958, 1960, 1961, 1964 & 1975).
Professor Szaferowa took part in many meetings and conferences, including the International Botanical Congresses at Edinburgh and Montreal where she presented papers. She supervised the work of many other students for the magister and doctor degrees and her own work is continued by these students. She was kind, helpful, and gave much time to her students. She is remembered with love and respect.

MARIA REYMANOWNA, Krakow.

REVISION OF INDIAN SPECIES OF Glossopteris - A REPLY

In 1979 S. Chandra and K.R. Surange published their book: " Revision of Indian Species of Glossopteris". It was reviewed in IOP Newsletter 14, in February 1981, all of three years ago. The last IOP Newsletter, number 22, included a comment on this review from Dr E. Kovacs-Endrody, of Pretoria. Here is a reply to this comment from the authors of the book:

"Leaves of Glossopteris belonging to a taxon, which we believe is of the rank of a species, show the same type of venation pattern. It is not an assumption. The idea came to us when we found that the Glossopteris leaves bearing the same type of female reproductive organ showed the same type of venation pattern, indicating thereby that the venation pattern is of SPECIFIC VALUE in Glossopteris. On this basis it was deduced that even the sterile leaves displaying similar venation patterns belonged to one species, or what we prefer to call a taxon because obviously we have no indisputable proof with us for sterile leaves. Therefore, the venation pattern displayed by the holotype or the lectotype of a species was taken as a specific character for that species. The venation patterns of other leaves included under that species by other authors were matched with the venation pattern of the holotype or the lectotype and accordingly the other leaves were either retained under the species or transferred or kept in a new species. The restorations were based on the holotypes or lectotypes and the missing portions taken from similar leaves in the collections as explained in the monograph. Our emphasis is on the venation patterns and not on the restorations. In this way we have included only one type of leaves under one name and thus the Indian Glossopteris taxa described in our monograph belong to the lowest rank, namely the species. If this is not a revision, we do not know what it is.

"We have retained the specific epithets as we think it is the best way available at present to classify the sterile leaves of such extremely artificial genera such as Glossopteris. The method of study suggested by us is useful in correctly identifying the species of Glossopteris which is essential for solving the problems created by wrong identifications.

"The venation patterns in Glossopteris, like the epidermal characters, certainly help in grouping them in what we can call taxa of lowest rank, namely, species. At the same time it must be added that the vegetative characters such as venation patterns do not help in grouping of Glossopteris leaves at the generic or family level. From our experience of Indian and Australian species of Glossopteris, we can say that it provides a definitely better method of classification of Glossopteris leaves as they are found in different countries of Gondwanaland.

"It was clear to us from our study of Indian material that the venation patterns in Glossopteris have the same utility as the epidermal characters in providing a readily available criterion, where compressions are not available, for correct identification of Glossopteris leaves, which we believe, is a good break-through in clearing the confusion in speciation of Glossopteris. If by this method one is able to circumscribe correctly to the lowest rank, the utility of the Glossopteris leaves in local stratigraphy within a basin or between different basins in the country is self evident. Indian species of Glossopteris, except a very few, have a definite stratigraphical range. The formations such as Karharbari, Barakar amd Raniganj can easily be identified by the particular species of Glossopteris present in them. It is wrong to say that the species were arranged horizonwise. It is the other way around. Our method is being found useful in India and now in Australia also.

"We are quite certain that there are no Australian species in India as far as our knowledge goes at present. Similarly, we have now examined all the Australian Glossopteris by this method in collaboration with John Rigby and we are certain that there are no Indian species in Australia, either. Any similarities may be at the generic and family level. Such diversification is not at all surprising when we take into account the time and space when Glossopteris plants were flourishing and the fact that the form-genus Glossopteris possessed a generalised type of deceptively similar-looking net veined leaves which belonged to different genera, families and even orders as shown by the different types of reproductive organs discovered attached to different Glossopteris leaves.

"It would be premature to say that detailed and deeper knowledge of Glossopteris plants will not be useful for intercontinental correlations. It may be mentioned that

although no Indian species is found in Australia and vice versa, we did find at least a few Indian species in Antactica in a small collection we have been able to examine. During the Permian there must have been different floral provinces in Gondwanaland at different times and they are bound to leave a record in the fossils. There were present many more species of Glossopteris plants in the different countries of Gondwanaland than are generally known. At least, a better knowledge of Glossopteris species will avoid wild correlations and misinterpretations of geological and palaeobotanical evidence, leading to the wrong conclusions. This is by no means a small gain."

HUNTING AFTER SAHARAN PLANT FOSSILS

Geological mapping expeditions in Libya have a strong tradition, and now for the first time a palaeobotanist has been included within the S.P.L.A.J. service operation team for 1981-3. As a specialist appointed for this position I spent five months in the amazing environments of the Sahara and worked at sites near Sabhá, Brák, Edri, Tamánhint, Tamahmu, al Fuquahá, Wau an Námus, Waddan, Hun, Zallah, Marádah, Ajdabiyah, Zaltan and Raguba. There were about 100 localities in all over an area of about 380,000km^2 and the age of the deposits varied from Middle Devonian to Pleistocene. Within central Sahara, in the vicinity of Brák, Tamánhint and Edri, there are Middle Devonian to Lower Carboniferous iron bearing formations, fully exposed. In several horizons of the deposits, ferruginous sandstones and claystones are overfilled with the remains of lepidophytes. The abundance as well as the evident predominance of protolepidodendropsids and other ancient lepidophytes is very striking. Some layers exposed for tens of kilometers of the desert and escarpments are literally covered by fragments of stems, shoots and decorticated impressions. I observed basal parts of cyclostigmataceous-like trees in situ covering a surface of about 5 km^2. They are preserved in their entirity with mineralized inner structure. Some of the stumps are 15cms in diameter and there are indications that the original trees were up to 3m high. It is clear that the Late Palaeozoic flora of the North African maritime areas were rather monotonous and composed mainly of lycopods. It was hardly comparable to the contemporaries in Europe, for example. It seems to me that Mme Annie Lejal-Nicol's suggestion is quite correct: North Africa must be considered a very important place when lycophyte evolution, specialisations and radiations are taken into account.

Mesozoic floras from the Sahara have rarely been found and my own intensive searching for Lower Cretaceous plants in the continental deposits of the M'sák Formation's Nubian Sandstones met with no success. On the other hand, Jurassic claystones from near Sabha and Jarmah in the Wádí Ajál Valley presented us with a collection of fossils from a rather uniform fern association composed of many mattoniaceous-like fern pinnae as well as brachyphyllous conifers and bryophytes.

Cenophytic plants, especially leaf taphocoenosas, are rather rare in the predominantly marine and sea-shore sediments of Libya. But some leaves were found and are being studied now by Zlatko Kvacek. A very special problem concerns the numerous finds of silicified woods in the Sahara, They have been known from the beginning of the 19th Century (Newbold, 1847). In areas of the Mesozoic and Cenophytic rock exposures these petrified wood fragments occur in their hundreds. Different parts of tree trunks and shoots, up to 20m long and 0.5m in diameter lie disordered on the surface of the desert. Our colleague Drahomira Brezinova tried to identify some of the specimens we collected, and makes comparisons to several living families: Bombacaceae, Sterculiaceae and the Viciaceae. The Mesozoic woods from the M'sák Formation are very difficult to identify but they may belong to some coniferous groups. An interesting preliminary paper on Tertiary woods from Libya has been published by R. Deschamps in 1982. In my opinion these fossils are not so hopeless for Libyan stratigraphy as some authors have previously thought.

ANTONIN HLUSTIK, Slaný, Czechoslovakia

A PROPOSAL TO FORM A STUDY GROUP ON Neuropteris ovata

During the 1983 meeting of Schlotheimiana (The International Working Group on Carboniferous and Permian Compression Floras) one of the problems discussed as the taxonomic confusion surrounding the form-species Neuropteris ovata. This is one of the most important species in upper Westphalian biostratigraphy, being used to indicate the Westphalian C - D boundary, and a thorough understanding of it is of some considerable importance. The traditional view has been that this distinctive type of foliage belongs to one or two form-species, referred to as N. ovata and/or N. flexuosa. Paul Bertrand (1930) and Knut Saltzwedel (1969) have both suggested that this was an oversimplification, but since their proposals were based on minor variations in gross morphology they have not been widely adopted. During my investigations on the Westphalian floras of Saarland I found similar minor variations in gross morphology allowing two groups to be recognised. These groupings seemed to be confirmed as distinct species when it was found that they had quite different epidermal characters.

Having now looked at specimens belonging to this group from several other areas, I am quite convinced that a number of different species are present within what has been called 'N. ovata'. However, to delineate these species properly would require more time and travel than I, and probably most palaeontologists, can afford. I therefore propose that a study group be established under the auspices of Schlotheimiana to gather together as much detailed information as possible and then to discuss the implications of the results. Tom Taylor and Hermann Pfefferkorn have asked that I co-ordinate such a study group, and so anyone interested in joining should contact me. Full details of the type of results I have found will be sent to anyone interested in helping. Among the features that I find important are: nervation density (both the mean value and the pattern of distribution), lateral pinnule size, apical pinnule shape and size, shape of the epidermal cells on the adaxial surface of the pinnules, and stomatal distribution on the abaxial surface. Other features, such as the form and epidermal structure of the associated cyclopterid pinnules, may be worth investigating in some detail as the study progresses.

C.J. CLEAL, Nature Conservancy Council, Geological Conservation Review Unit, Pearl House, Bartholomew Street, Newbury, Berkshire, RG14 5LS, UK.

A PROPOSED SYMPOSIUM ON FERN TAXONOMY

The time seems ripe for an attempt to establish a connection between the taxonomy of extant ferns and of their fossil relatives, especially from Mesozoic and Tertiary strata. In the past, the specialists working in these two aspects of botany have tended to keep to themselves, to the detriment of the realm of fern taxonomy as a whole. For example, see the statements made by T.M. Harris (1973) in his contribution to "The Phylogeny and Classification of the Ferns" (J. Linn. Soc. (Botany) 67, Suppl. 1, 41-44). We think it is time that palaeobotanists and searchers of the taxonomy of extant ferns get together to compare notes, methods and ideas. The International Botanical Congress at Berlin in 1987 (we are both members of the Taxonomy Section in the Programme Committee) seems to offer a good opportunity for such a meeting. It is intended to organise a symposium devoted entirely to this topic: the connection between the taxonomy of extant ferns and of their fossil relatives.

All palaeobotanists with an interest in this field, currently working or intending to work in the near future, on questions relating to the subject, and who may be willing to contribute in one way or other to this proposed symposium, should write to the convenors F. Schaarschmidt or K.U. Kramer.

DID FOSSIL MANGROVE FORESTS EXIST?

This irritable question has haunted me for a couple of years. To Tertiary palaeobotanists it probably sounds naive, but in the range of their palaeofloristic experience the question may not be nonsensical. The problem, as I see it, takes into account

both Palaeophytic and Mesophytic environments: for example, did mangrove-like stands of conifers exist in the Mesozoic?
It is, of course, rather difficult to limit a boundary between 'swampy' and 'mangrove' in the fossil record. But I think that some of the Mesozoic assemblages monotonous as they are were composed of qualitatively poor and quantitatively rich "xeromorphous" taphocoenoses, and that these can represent mangrove-like thanatocoenoses. With respect to a specific energy and nutritional regiment of such a type of recent vegetation, it seems very probable that many tidal sediments with roots in situ, bearing no animal remains, and a mass of monotonous heavily cutinized gymnosperms, did originate in conditions comparable to those biotypes.
Take for example the interpretation as "xeromorphic" given to those Mesophytic conifers found in near-shore sediments; there is no reason to explain it except to be a product of an inland dry climate. However, as can be seen in modern deserts and sub-deserts, really xeromorphic plant remains cannot be deposited in the marine environment very often. In Africa, I studied desert plants comparable in morphology and probably in their living conditions too (xeromorphic) with the cheirolepidiaceous-like conifers of the Mesozoic. Living tamarix and other xerophytes with segmented axes completely decompose at the end of their life. The fragments are dried by the wind and burnt by the sand - nothing more and nothing less. In slightly wet situations all the fragments are destroyed by penetrating and reacting salts. Neither on the sea shore nor on maritime salinas or sabkhas have I ever met with the remains of such plants preserved.
Living Tetraclinis articulata is likely to have some similarity to fossil frenelopsids. The former belongs to a rare vegetation type in Algeria and Tunis. But it is very hard to suppose that their segmented shoots can be found in Mediterranean Sea deposits. Such preservation in the modern situation, so analagous to the accepted theories in the fossil situation, just cannot be envisaged. The nearest I have seen to this is at Cyrenaica where there are many conifers forming the vegetation cover on the limestone cliffs above the sea. When plant fragments drop down the cliffs the conifers are destroyed by the surf at the foot of the rocks.
From this point of view I suppose that not all 'xeromorphous' conifers belonged to dry climate vegetation in the geological past. In recent mangrove vegetation there are angiospermous elements only. When their morphology is examined we can see very strong 'xeromorphy' too. Adaptations to high temperatures, high evaporation and to rapidly flowing tides are excellent. But the epidermal structure and the organisation of the stomata can be practically identical to those in frenelopsid and some brachyphyllous conifers of the Cretaceous. And conifers as "physiological xerophytes" have a handicap in their vascular system; everytime they have had the only way to protect against extinction - to minimalise their own microphylly. I think that many of the cheirolepidiaceous plants did it through the same way as, for example, cuppressaceous ones or even recent angiospermous halophytes. But there could be another reason: the invasion into tidal areas of tropical seas. There are, of course, many other details which lead me to this sinful meditation.
There are probably other palaeobotanists with similar ideas. As I remember, Dr David Batten also suggested such an interpretation of some cheirolepidaceous, Classopollis producing, conifers from the English Wealden, several years ago. In my opinion there is no reason to exclude it a priori. Since plants inhabit all possible environments today, why should they not have done the same millions of years ago? I would welcome some informal discussion on this maybe interesting topic.

ANTONIN HLUSTIK, Slaný, Czechoslovakia.

THE CONEPTS OF ASSEMBLAGE-GENUS AND ASSEMBLAGE-SPECIES

Our growing study of fossil plants result in the increase of knowledge of the initial associations of dispersed leaves, fructifications, miospores etc. In some floras, for example the Yorkshire Jurassic Flora after Harris' work, many dominating plants are already known in such associations. Clumping together dispersed organs and recognising their belonging to the same plants always gives the same problem: how such assemblages of the hitherto independent taxa are to be named.
In his well-known monograph on the Palaeozoic conifers (1938 - 1945), Florin

introduced the term "Kollektiv-Gattung". Each such Gattung covers 'Organ-Gattungen'. For instance, the Kollectiv-Gattungen Lebachia established for entire plants, covers Organ-Gattungen Walchia (p.p.), Gomphostrobus, Walchiopremnon, etc. Krassilov (1969) suggested to select for a reconstructed plant just one of the generic names entered into the reconstruction. The selected name is to be added with a suffix 'rest.' (restitutio), for example, Nilssonia Brongniart 1825 rest. Harris 1941 (for the association of Nilssonia, Beania and Androstrobus).

Both these methods are applicable only when the established association of parts remains valid within the whole selected nominated genus. Unfortunately many genera may enter simultaneously into different life-time associations, and none of the genera can be selected safely to name the reconstruction. For instance, leaves of the genus Callipteris associate with the female fructifications Autunia and Peltaspermum, as well as with the male fructifications Pterispermostrobus and Callipterianthus. Also, Pterispermostrobus-like synangia associate with the leaf genera Eremopteris and Dicksonites, and with different pollen belonging to several form-genera. Some of the pollen genera, for example Vesicaspora, were found in other microsporangiate genera. It even happens that the foliage ascribed to a single fairly narrow species associate with different fructifications. Sterile fronds uniformly named Dicksonites pluckenetii associate in the Westphalian D with non-modified seed bearing fronds, and in the Stephanian with strongly modified ones deserving separation into an independent genus. (Unfortunately the type material of the species comes from the Lower Permian!)

In the cases of intricate combinations of the constituent genera and species, we need for reconstructed plants a more sophisticated nomenclature than merely one generic or specific name. I believe that the best and easiest way is to call the reconstructed plants by the names of the associated taxa, omitting the author's surname, e.g. Callipteris conferta - Autunia sp. - Pterispermostrobus gimmianus - Cyclocarpus cordai - Vesicaspora sp. When such a compound name can be repeatedly used in a text some of the constituents can be abbreviated or deleted depending on the context (e.g. "C. conferta - Autunia - P. gimmianus" or "C. conferta - Autunia") I propose such collective taxa to be called 'assemblage-genera (as in Nilssonia - Beania - Androstrobus) or 'assemblage-species' (as in Callipteris conferta and its associates). Both the terms and the proposed procedure need not be incorporated into the I.C.B.N. They may be used informally in texts on systematics, phylogeny, ecology, geographical and stratigraphical distributions etc. Such texts sometimes require this kind of more precise approach to the reconstructed plants.

S.V. MEYEN, Moscow

NEWS OF OTHER ORGANISATIONS

BIRBAL SAHNI INSTITUTE OF PALAEOBOTANY

This institute is devoted to research on the varied aspects of plant fossils, both applied and fundamental. The scientific activities are organised in eleven well-established departments and efforts are being made to establish a potassium-argon dating laboratory in the near future.

There have been a number of highlights in our research activities recently. A new type of possible seed-bearing fertile organ and a new ginkgoalean leaf have been reported from the Handappa Beds. On the basis of lithology and its fossil assemblage, a new formation, the Pachwara Formation, has been recognised. The Barakar assemblage revealed the dominance of Glossopteris with narrow mesh forms, while the Pachwara Formation is characterised by the open mesh forms of Glossopteris and diversified pteridophytes. One new species of each of Sphenobaiera and Yabiella have been described from the Tiki Formation. A podocarpaceous wood has been recorded for the first time from the Deccan Intertrappean beds of the Malabar Hills. This shows that this family was present during the early Tertiary period in the Indian subcontinent. The prominant occurence of the genus Densipollenites in the Madhuban area sediments reveal a relatively earlier deterioration of climate during the later Permian in the Peninsular India. The study of Arabian Sea surface sediments indicate that the recovered fungal fruiting bodies were the common parasites on the tropical forests

along the western coast of India. Palynological studies of the Tertiary sediments of Lower Assam suggest that a warm and humid climate prevailed during Palaeocene-Eocene times. The nannoflora and the sedimentological parameters of a middle Eocene section in Kachchh area revealed extremely high hydrocarbon potential. Seven palynozones have been recognised in the West Bokaro Coalfield.

H.P. SINGH, Lucknow, India

BRITISH GEOLOGICAL SURVEY
This is the new name of what was formerly the Institute of Geological Sciences. From February 1984 the palynologists on the staff of the B.G.S. have moved from their Leeds offices to the new headquarters at: Keyworth, Nottingham NG12 5GG. The telephone number is 060776111.

ASSOCIACAO LATINAMERICANA DE PALEOBOTANICA E PALINOLOGIA
Volume 5 of the ALPP Circular was published in November 1983 and contains 20 pages of abstracts from the meeting in Sao Paulo in December 1983. Copies can be obtained from: Oscar Rosler, Instituto de Geosciences, Universidade de Sao Paulo, Cx Postal 20.899, Cep 01.000, Sao Paulo, Brazil.

NEWS OF INDIVIDUALS

M.N. BOSE, Director of the Birbal Sahni Institute of Palaeobotany visited Japan on a scientific exchange programme. He has also been invited to visit China for two weeks

NAI-ZHENG DU of the Academia Sinica, Peking, is working at the Birbal Sahni Institute for two years to study Tertiary woods.

W.G. CHALONER visited India in November 1983 and travelled to Lucknow, Allahabad and Calcutta to deliver lectures. He was presented with the Palaeobotanical Society International Medal and gave the 13th Sahni Memorial lecture.

M. KONZALOVA, Z. KVACEK (Praha) and L. STUCHLIK (Krakow) have been awarded the prize of the Czechoslovak and Polish Academy of Sciences for their palynological and palaeobotanical work on Neogene Floras, particularly in the Cheb basin.

A. HLUSTIK successfully defended his CSc doctorate thesis at the Czechoslovak Academy of Examiners. The work is on frenelopsid conifers and will be published as soon as possible.

K. ASAMA of the National Science Museum of Japan visited China in 1983 to discuss the phylogeny and evolution of plants with Chinese palaeobotanists at Lanzhou, Beijing and Nanjing.

Y. LEMOIGNE of the Claude-Bernard University, Lyon, France, visited the Nanjing Institute in September 1983. He tried to explore the possible ways for more Sino-French cooperation in palaeobotany.

R. WAGNER has officially retired from his post at the University of Sheffield. For about 6 months a year he is at: E.N. Carbonifera del Sur (ENCASUR), Penarroya-Pueblonuevo (Cordoba), Spain.

BIBLIOGRAPHY

BIBLIOGRAPHY & INDEX TO PALAEOBOTANY & PALYNOLOGY 1971-1975
This second part of the bibliography produced by palaeobotanists from Stockholm is now available. It contains about 15,000 literature references and is arranged like the first part in two volumes. It costs 250 Swedish kroner, which at present is about US$30 or about £20. Pay in Swedish kroner and add money for postage: 53 kroner surface mail or 83 kroner (68 inside Europe) air mail. Address your order

to: The Publishing House of the Swedish Research Councils, FRN, Box 6710, S-113 85 Stockholm, Sweden.
As a special offer you can purchase the first and second parts together for 500 Swedish kroner, and for the same postage charges to be added.

INTERNATIONAL BIBLIOGRAPHY OF PALEOBOTANY & PALYNOLOGY, 1982
This is compiled by W.L. Crepet, G.E. Dolph, H.W. Pfefferkorn and W.H. Gillespie and became available in December 1983. Write to H.W.P. at the Department of Geology, University of Pennsylvania, Philadelphia, PA 19104, USA.

5TH SUPPLEMENT, ANNOTATED REFERENCES, PRECAMBRIAN TO TERIARY PALYNOLOGICAL LITERATURE
This is volume 20, number 2, 1983 of the Paleo Data Banks series, compiled by G.O.W. Kremp, Department of Geosciences, University of Arizona, Tucson. It lists 200 publications received by PalynoData during 1982. The references are listed alphabetically by author and include excerpts from abstracts and summaries in those instances where information additional to that of the data sheet is thought to be helpful. There are 62 pages.

RECENT PUBLICATIONS

PALAEOFLORA OF SOUTHERN AFRICA volume 1 The Triassic Molteno Formation
A review copy of this new work has been promised to IOP but has not yet arrived. A notice will be appearing in a future newsletter. Meanwhile, the publisher, A.A. Balkema, P.O. Box 1675, 3000 BR Rotterdam, Netherlands, has offered a special discount price to IOP members. Orders must be sent directly to Balkema's Rotterdam address; they will pay the postage. Personal cheques in £, US$, eurocheque, Hfl or credit card numbers will all be accepted. THE SPECIAL IOP PRICE IS US$25.00 (£17.50 or Hfl 75) instead of the normal US$45.00 (£31.50 or Hfl135).

WHAT FOSSIL PLANT IS THAT?
This 86 page guide to the ancient floras of Victoria, Australia, is written by Dr J.G. Douglas, and will be reviewed in a future IOP newsletter. The book costs $A9.95 and postage is extra. Write to: Book Sales Officer, Field Naturalists Club of Victoria, National Herbarium, Birdwood Avenue, South Yarra, 3141 Victoria, Australia.

GEOLOGY & ENOLOGY OF ALSACE VINEYARDS
This book is written by the Tertiary palynologist Claude Sittler (and R. Marocke). Send 39 F to:Regisseur Bibliotheque, Institut de Geologie, 1 rue Blessig, 67084 Strasbourg Cedex, France. It is published in Sci. Geol. Bull., 34, 3, 1981 and has 35 pages, 15 figs., 5 tables and 1 plate.

BOOK REVIEWS

PALEOBOTANY AND THE EVOLUTION OF PLANTS Wilson N. Stewart, 1983. Cambridge University Press, 405pp., £17.50, US$29.95.

This book is intended as a textbook for undergraduate students in palaeobotany - in the Preface Professor Stewart suggests that "the text includes more than adequate material for a twosemester course in paleobotany". There must be many palaeobotanists who would like to teach such a course rather than to squeeze fossil plants in where possible. This must be the basic text-book in either case.
The book has 28 chapters with a Preface and an index. Each chapter is subdivided sometimes taxonomically and sometimes on theoretical grounds. Most chapters conclude with a summary and a short discussion on the evolution of the group. The arrangement of the chapters is traditional - three introductory chapters cover fossils, preservation, techniques of study, dating, systematics and nomenclature. These are adequate although the classification used in which 11 classes are recognised within the Tracheophyta seems a bit reductionist. This has the effect of including 12 orders within the

Gymnospermopsida within which are the Pteridospermales, Cycadales, Caytoniales, Glossopteridales etc. Another interesting feature is the use of the Asteroxylales (including Asteroxylon, Sawdonia and Kaulangiophyton) as an order of the Zosterophyllopsida, and also the recognition of the Drepanophycales as a separate order within the Lycopsida.

The next three chapters cover Precambrian organisms, the fungi, algae and related plants (including nematophytes and Protosalvinia). The next three chapters have the main title "How the Land turned Green" and deal with life cycles, bryophytes (from Pallavacinites of the Upper Devonian to Marchantites of the Eocene) and primitive vascular plants (rhyniophytes). The rest of the book is organised on a systematic basis, either with individual chapters covering particular aspects of one or more groups (eg 17, The beginnings of Ferns) or as a more traditional survey of a group (eg 26, The diversification of conifers and taxads). The book ends with a 4½ page chapter summarising major evolutionary trends.

Pteridophytes take up 12 of the 28 chapters, gymnosperms (including seed ferns) 8, and angiosperms a single one of 28 pages. Coverage of the angiosperms is therefore rather limited, particularly since variations in Tertiary and later floras are not included,and very few extant families are mentioned. The emphasis is largely on early angiosperm fossils and to a greater extent on possible evolutionary trends. Only 8½ pages actually describe the fossils and the rest is discussion of the evolution of carpels and ovules etc. While this is all very well done and the problems are clearly explained, I am not sure that the angiosperms are adequately covered, given their present dominance of world vegetation and the extensive angiosperm floras known.

Coverage of the other groups is adequate and even, the examples are well chosen and well illustrated with a greater emphasis on drawings than photographs. Very few of the illustrations are original, most being taken from the original papers (either 'straight' or 'redrawn'). Reproduction of the photographs is very good but, oddly, they lack scales or magnification factors, apart from those in chapters 4, 5 and 6 where some of the line drawings do have scales.

This is a book written in the classical style. Palaeoecology, palaeoclimatology and palaeogeography are hardly covered at all, as acknowledged in the Preface, and the main concern is the evolution of the different groups. In this context Professor Stewart relies heavily on theoretical and conceptual interpretations of morphology - the telome theory for instance is introduced in chapter 9 and the concepts referred to in each of the succeeding 11 chapters apart from that on the extant ferns. I like this approach and use it myself for teaching but I'm sure that some could question the very strong emphasis on theoretical morphology, which is after all very largely hypothetical. Similarly, diagrams of evolutionary relationships may be frowned upon by some palaeobotanists but they are extremely useful as teaching aids, providing their limitations are realised, and their use in this book seems quite justified. It is a pity that palaeogeography is excluded to such an extent; Gondwanaland is mentioned once (page 305) and not indexed and the Angara flora is not mentioned at all.

The text is printed in double columns and is well laid out but a larger type would have made reading easier. There are too many typographical errors which suggest that the final proof-reading may have been hurried (eg Drapanophycus, p127; dehiscense,p131; Shani, p289; Gwynne-Vaugn, p205; Cordaianthus is pelt variously as Cordainthus, Cordianthus or Cordaianthus, p330). It is difficult to comment on errors of fact but I noted that Nothia is a petrifaction fossil and not a compression fossil (p78) with lateral and not terminal sporangia and Hicklingia, included as 'Questionable Rhyniopsida' by Stewart (p78) has been shown to have lateral sporangia rather than terminal ones and thus is more akin to the zosterphylls. As an aside, Lycopodium selago is now known as Huperzia selago. The book is extensively and well-referenced with bibliographies at the end of each chapter. The references are up-to-date, the most recent being 1982, though there are quirks - I was amused to note on page 125 that Magdefrau's (1956) suggestion about the reduction series of the arborescent lycopods was accepted by Stewart (1947): an extreme case of deja vu?

Palaeobotanists have been well served recently by the publication of two good text-

books, T.N. Taylor, 1981 "Paleobotany - an introduction to Fossil Plant Biology" and now this one. Of the two, Taylor's is a more comprehensive reference book but Stewart's is more suitable for undergraduate teaching. It must be recommended as the basic text-book for all palaeobotany courses, with recourse to Taylor's book at the more advanced level.

D.S. EDWARDS, Cape Coast, Ghana

PALAEONTOLOGICAL ATLAS OR PERMIAN DEPOSITS OF THE PETCHORA COAL-BEARING BASIN. V.A. Molin , A.B. Virbitskas, L.M. Varjuchina, N.V. Kalashnikov, S.K. Pukchonto, L.A. Fefilova, V.A. Guskov & G.P. Kanev, 1983. 318 pages, "Nauka", Moscow. 2.50 roubles.
The Permian flora of the Petchora basin was described in the works of C.R. Dombrovskaja, M.D. Zalessky, S.V. Meyen, M.T. Neuburg and others. This Atlas intends to show the current state of knowledge of both fauna and flora of the Permian deposits of the Petchora basin. The palaeontological descriptions are preceded by a brief sketch of the stratigraphy of these strata. The separate tables contain a list of the taxa on the major stratigraphical divisions. Plant megafossils are described by L.A. Fefilova and S.K. Pukchonto. The authors have made use of the volume mainly for the publication of new taxa. The new species of Hepaticites, Prynadaeopteris, Pecopteris, Phylladoderma, Wattia and Rufloria are described, and some species are described in an open nomeclature. Well-known taxa are presented only in part, in some cases without the description, which is substituted by the reference to the corresponding articles or monographs. The chapter "Miospores" was written by A.B. Virbitskas and contains an original classification of the palynomorphs in which the representatives of 33 form-genera are described. From the animal fossils only brachiopods are present.
There are seven separate tables in the supplement to the atlas: 1 is a correlation of the stratigraphical schemes of the Permian of the Petchora coal-bearing basin. 5 is the stratigraphical distribution of the plant megafossils, and 6 shows the distribution of the miospores.

I.A. IGNATIJEFF, Moscow and E.I. POLETAEVA, Syktyvkar

DIE FOSSILEN FLOREN IM NAMUR DES RUHRKARBONS K.-H. Josten, 1983. Fortschritte in der Geologie von Rheinland und Westphalen, Band 31. Geologisches Landesamt Nordrhein-Westphalen, Krefeld. 327pp.112Abb., 10 Tab., 56 Taf. DM55.(-Postfach 1080, D-4150 Krefeld 1, West Germany.)
In the last 20 years this series from the Geologishes Landesamt in Krefeld has carried a number of noteworthy palaeobotanical, palynological and coal-petrographic volumes. The pattern is continued in this latest item in the series. For those not familiar with the European Carboniferous, it might be remarked that the relative paucity of coals in the Namurian has left the flora there generally less well-studied than that of the overlying coal-rich Westphalian.
Josten's book maintains the best traditions of German stratigraphic palaeobotany, as represented by the research of C.E. Weiss, Walter Gothan and Henry and Robert Potonié. The book opens with a brief account, with maps and tables, of the stratigraphy and location of the fossil plant localities of the Namurian of the Ruhr. The bulk of the text consists of descriptions with brief synonomies of the 81 species known from the Ruhr Namurian, illustrated in some 200 photographs. These are backed up by line drawings giving details of venation and other features which are particularly helpful when, as so frequently, one is comparing fragmentary borehole material with species based on large 'museum specimens'. Josten also gives comparative tables of the features distinguishing the Namurian species of several genera (Annularia, Asterophyllites and Sphenophyllum foliage). My only regret here is that there are not more. I would particularly like to have seen a tabular comparison of the five species of Sigillaria reported within the Namurian. Our knowledge of variation within those few cases where a wide range of leaf scars occur in a single specimen at least raises a suspicion that they might all be accomodated within the limits of one species.
The book ends with a helpful comparative review of floras of each of the three sub-divisions of the Namurian for the Ruhr, Holland and Belgium. This is summarised in tables showing the time ranges and abundance, assessed subjectively, of the species reported

Four new species are described. Probably the one of greatest general interest is a member of the enigmatic genus Eleutherophyllum, a plant which disconcertingly shares features of both lycopsids and sphenopsida, although generally regarded as belonging to the former. While Josten's new species, E. hamatum, makes at least as good a lycopod as its fellow species in the genus, it still seems to leave open the possibility of its being a misundertood sphenophyll, with its apparently whorled appendages, distally divided leaves and sporangia well removed from the leaf axil.
The one item of which I regret the absence from this admirable book is a broader look at Namurian floras within the biostratigraphy of the Carboniferous as a whole. Josten records that a "continuous development to the Westphalian flora" can be distinctly recognised "from the Namurian B at latest". Indeed about a third of the species present within the Ruhr Namurian continue into the Westphalian. Kidston's "floral break" (at the ostensible Upper to Lower Carboniferous boundary, but actually drawn between the Namurian A and B) gains little support from Josten's data, since all the Namurian A species apparently occur in earlier Carboniferous floras. Is this due to lack of continuity of records between these and earlier compression floras, or to ecological control? Or was there some extensive extinction of earlier Carboniferous species? Josten avoids such speculative contemplation. But his book is none the less undoubtedly an important, scholarly and very well-illustrated addition to palaeobotanical literature. It is good to be reassured that the study of Carboniferous plant fossils is still so alive in Krefeld!

W.G. CHALONER, London

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