INTERNATIONAL UNION OF BIOLOGICAL SCIENCES SECTION FOR PALAEOBOTANY

IOP NEWSLETTER 57

APRIL 1996

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PLEASE MAIL NEWS AND CORRESPONDENCE TO YOUR REGIONAL REPRESENTATIVE OR TO THE SECRETARY FOR THE NEXT NEWSLETTER 58.

The views expressed in the newsletter are those of its correspondents and do not necessarily reflect the policy of IOP.

IOP NEWS

ELECTION OF OFFICERS

Following the announcement in September 1995's Newsletter 55, three nominations were received for the post of President and four for that of Secretary. For each post the nominations were for the same person. Dr J. Galtier is elected President, unapposed. Prof M.C. Boulter, is re-elected Secretary, unapposed.

PALAEOBOTANY IN PALAIOS

In August of this year, Bob Gastaldo and Chuck Savrda, Auburn University, AL, USA, will assume the editorial position for PALAIOS. PALAIOS is a bimonthly journal published by the Society for Sedimentary Geology (SEPM) emphasizing the impact of life on Earth history. This journal is devoted to paleontological research in a broad spectrum of subdisciplines. Each issue features several comprehensive articles, as well as numerous short papers, book reviews, relevant news and announcements, invited editorials, and provocative essays. The editors seek to provide authors and readers with timely publication of significant research that stimulates new developments in paleontologic research.

We would like to expand the contribution of paleobotanical research to the pages of this journal and, as such, are soliciting manuscripts that take an integrative approach to paleobotanical research. PALAIOS has published manuscripts focusing on plant taphonomy, plant paleoecology, and the application of plants to solving larger-scale problems (such as the use of fossil plants in paleoclimatological investigations). A detailed style brochure is available upon request. You can e-mail either Bob Gastaldo (gastara@mail.auburn.edu) or Chuck Savrda (savrdce@mail.auburn.edu) for a brochure. The editorial Office is at

PALAIOS
Department of Geology
210 Petrie Hall
Auburn University, AL 36849-5305
USA

We look forward to a more active role for paleobotany in this journal over the next several years. Please give due consideration when writing manuscripts that approach paleobotanical applications to solving geological problems.

R.GASTALDO, Alabama, USA

NEW MUSEUM EXHIBITIONS

THE EVOLUTION HOUSE AT KEW GARDENS

Modern air travel makes it easier for many people to understand how far continents are away from one another, to better visualize large distances. Under the main flightpath east of Heathrow, aircraft nearly touch the roof of the newly designed Evolution House which, similarly, is trying to help visitors put geological scales of time into a human context.

We expect to see such glasshouses at Kew Gardens display particular plant groups or vegetation of particular climates, so it is something new for a scientific concept to be the focus of an exhibition there, sponsored by Enterprise Oil plc. As with most innovation, there have been difficulties with this exciting and challenging project, but they should have been sorted out by now, after the first year. The aim is to use real and model plants in an artificial landscape to allow visitors to walk through the evolutionary changes of geological time, and learn something of how plants have adapted to changing environments through 3500 million years. It uses modern methods of reconstruction and display to show how things have changed.

First through the entrance, there is water vapour, pools of bubbling mud and plastic stromatolites. The evolution from procaryote to eucaryote cells in the Precambrian is followed by well-tended (living) mosses and liverworts. These are planted beside reconstructions of a few early vascular plants on land, described as 'One Giant Leap for Plant Kind'. Then come more charts of the 'Generation Game', explaining heterospory in lycopods and horsetails. Round the first bend in the path you trample over a rubber carpet (to simulate a swamp) surrounded by models to show you the specialist that he/she is standing in a Coal Measure forest. Just to satisfy any doubts by those who know what to look for, leaf impressions are casted (allegorically) into the artificial rock. The next few paces, over concrete with dinosaur footprints, switch on crunching sounds of plants being chewed near some living cycads, and the final steps lead to simple angiosperms ('Say it with Flowers') at the bottom of the palaeo-garden. You then pass through a poster display of pollination mechanisms, angiosperm morphology and methods of fossilization, and end up outside the Evolution House shop (which sells imitation fossils of animals).

At a slow walking pace the journey through 3500 million years lasts about a minute, in a greenhouse measuring 30 × 10 metres. Those measurements gave the designers severe constraints on top of the even more difficult task of suddenly educating the public about the environmental and biological changes that have taken place. During my two visits, most children walked (or ran - one group took 10

seconds) straight through the exhibition, quite unaware of what was going on. Others looked at the old fashioned textbook diagrams about life cycles, or glanced at the glossy handout available at the entrance before putting it in their pocket. Most of them looked confused. (The handout has a drawing of microscopic *Spirogyra* cells which is larger than that of a whole cycad plant; with no scale, Kew should be ashamed). Each visit I ask ten people, individually, how they have seen the changes through millions of years: 20 blank responses - none had even realized that they had been walking through a time machine. Of course, it's very difficult to get over the concept of geological time in such circumstances, but here there are no real attempts to do so. The original plan for loudspeakers to give dates was too cacophonous, the glossy brochure is too complex, there are no notices showing time change clearly, not even clocks or colours for eras.

I'm sure that a greenhouse is not the right place for this kind of thing. Also, I think that the horticultural and ordered culture of a Botanical Garden is the wrong place for the theatre of nature's animal and plant interactions in untidy environments. On the other hand, educating the public about active evolutionary processes must be the responsibility of such institutions. How might Kew improve its contribution? In the Evolution House, some clear and easy guide to the Phanerozoic time-scale is essential. I think the notices could be less like conflicts between old-fashioned text-books and television on Saturday nights and try to give what Kew's customers want, some indication of where they are in time and in the process of plant evolution. I think some real attempt should be made, if safety regulations allow, to slow people down and give them a chance to realize that they are walking through time at a different speed than normal. And, of course, the Kew gardeners could try not so hard and let it get messy and stinky, as long as they keep weeding the angiosperms out of the first 3,350 million years.

M.C. BOULTER, London, UK

[This review first appeared in GEOLOGY TODAY, September–October 1995, Blackwell Science Ltd.]

NATURHISTORISKA RIKSMUSEET, STOCKHOLM

This new permanent exhibition is entitled "4½ Billion Years ago - earth and life's history". Its designers have faced up to some of the problems that have befuddled Kew. They've had a head start with a proper building and they're allowed to have lots of animals (one moves and winks); I suspect they had more money as well. But the Swedish Museum only partly succeeds in portraying the concept of geological time. In the six Cambrian - Permian displays each Period is highlighted on a 4½ thousand million year scale, and palaeogeographic maps refer back to the plate tectonic displays at the entrance to the exhibition. It's a neat a simple idea and the visitors I saw did notice. But round the corner from the Permian that guidance stops and we're lost in the Mesozoic darkness.

For each Period there is a diorama with impressive paintings and models of fauna, flora and landscape. The Devonian has most plant taxa (*Drepanophycus, Cyclostigma, Sawdonia, Pseudobornia, Archaeopteris, Tetraxylopteris* and *Elkinsia*) and the South African Permian the most aesthetically pleasing *Glossopteris* I have ever seen. The Early Tertiary, on the other hand, has a horrible science-fiction landscape and some dog-like horses in a warm forest with dry oak leaf litter.

There are two things about the exhibition that I liked particularly, but neither quite succeed. The door frame leading from the Mesozoic room to the Cenozoic has a grey iridium layer of the K/T boundary, with abundant marine fossils below and none above. There are no labels, no clues, it is a clever twist lost to all but the knowing. Then, hidden behind a screen at the entrance I found a pile of "Tipspromenad" (quiz-walk forms). Each has 13 multiple-choice questions about the exhibits and will slow down those hurried students for sure.

So, please, explain the K/T boundary and keep taking the quiz sheets.

M.C. BOULTER, London, UK.

THE DEVONIAN GAMETOPHYTE DEBATE

A block of Rhynie Chert was presented to me by Professor Lemoigne in 1973 and I have prepared more than one hundred slides out of it. I have already published papers on the sporangium of *Horneophyton* (Phytomorphology 1985) and the existance of VAM in the underground portion of *Rhynia* (Phytomorphology 1993). On the basis of my examination of several sections cut in various planes of *Rhynia* underground (with mycorrhizae) and aerial portions (without mycorrhizae and the presence of stomata in the epidermis) I find the existance of distinct vascular systems in both portions. The conducting strand has a central core of thick walled dark stained elongated cells with faint thickenings of various types. In a cross section distinct mesarch/ centarch protoxylem (?) is seen. In some of the underground portions archegonia-like structures are seen, as figured by Professor Lemoigne. (Fortunatley I have also seen the original slides of Professor Lemoigne.) However, a sporophyte originating through the archegonial neck cannot be seen in any of the slides.

I do not agree with Bierhorst, Edwards, Remy, Gensel and Hass that the archegonia-like structures might be 'secretory formations or hydathodes'. The archegonium structure definitely has a raised neck and an embedded venter. The gametophytes recently described from the Rhynie Chert (Banks 1992 - Geophytology) may not be directly related to *Rhynia*. I support the concept that *Rhynia* was a pteridophyte with an underground portion (probably a gametophyte) and an aerial sporophyte.

B.D. SHARMA, Jodhpur, India.

FOSSIL RUBBER & LATICIFER CELLS

"I wish to collaborate with individuals who have collected fossil rubber or laticifer cells. Such material appears as long, hair-like, strands. Samples, related to angiosperms, have been collected from brown-coal deposits (Eocene and Miocene) in Germany. Although rare at present, it is most probable that these materials have been preserved in similar deposits elsewhere."

P.G. MAHLBERG, Department of Biology, Indiana University, Bloomington, Indiana 47405, USA.

[Mahlberg, P.G. & Storr, M. 1989. Fossil rubber in brown coal deposits: an overview. *Z.Geol.Wiss.* Berlin 16, 475-485.]

OBITUARIES

WINFRIED REMY (1924-1995)

On December 31th, 1995 Prof. Dr. Winfried Remy peacefully passed away after a long illness. He was born on March 21, 1924 in Breslau, Silesia (now Wroclaw, Poland) but grew up in Berlin. He began studying geology in 1946 at the Humboldt University in East Berlin. Walther Gothan, who gave him a student assistantship in 1948, aroused his interest in palaeobotany. Because of the political climate, Remy who lived in West Berlin but worked in the East, received his Ph.D. in 1952 in Tübingen from Schindewolf and Zimmermann on a study of Late Palaeozoic pteridosperm fructifications. Three years later he received his habilitation.

After Gothan's death Remy became the leader of the research institute of palaeobotany and coal science in East Berlin. In the 1950s and early 1960s he authored numerous publications, primarily on Carboniferous and Permian plants. Apart from the more classical biostratigraphically oriented papers, he also published a series of contributions on fructifications, on in situ spores and pollen, and cuticular analysis. Many of these papers were written together with his wife Renate. In addition, he published two richly illustrated books on Palaeozoic floras: the first with Gothan on paralic coal basins (1957) and the second with his wife Renate on limnic coal basins (1959). A synthesis on Devonian, Carboniferous and Permian floras was published by Remy and Remy in 1977.

The construction of the Berlin wall in 1961 forced the Remy's to leave their work in the Berlin institute and move to Münster where Winfried was offered a lectureship in the geology department. In 1965 he became professor, and in 1968 head of the newly founded 'Forschungsstelle für Paläobotanik', a position he held until his retirement in 1989. For nearly thirty years, and without a permanent staff, he managed to develop a well-equipped, internationally recognised palaeobotanical institute. Although he rarely left Münster until a few years ago, he continued to be an active researcher as is well documented by his numerous publications. In 1968 he and his wife started the journal 'Argumenta Palaeobotanica' of which eight issues have been published.

In 1978 Winfried Remy published the first of what would become a long series of papers on the Rhynie Chert flora, and in so doing returned to a subject that he had briefly addressed early in his career (1952). Although he continued to publish on Carboniferous and Permian floras, his interests had clearly shifted to the earliest land plants, thereby concentrating on the anatomically preserved material from the Rhynie Chert, and on compression floras from the Lower Devonian of western Germany. Although the Rhynie Chert flora was discovered and first described in the beginning of this century, Winfried Remy, his wife Renate and colleagues were responsible for a series of important new contributions. They described several types of anatomically preserved gametophytes of the earliest land plants, including examples still showing exceptional details such as sperm preserved in antheridia, and neck and egg cells of archegonia, which are documented by numerous specimens of each taxon. The Rhynie Chert plants possessed gametophytes and sporophytes which were in many respects very similar in organization and size, but unlike those found in modern vascular plants. Various stages in the life cycle of these Early Devonian Rhynie Chert plants were demonstrated, ranging from the sporogenesis, dispersal of spores, germination to the various growth stages showing the development of the vascular system and the formation of the gametangia. As a result of these investigations the life history biology of these 400 million year old plants is now better documented and understood than for many extant plants. In addition to the detailed work on gametophytes, other aspects of the Rhynie Chert flora were studied as well. Some of these include the general and functional morphology of the sporophytes, various in situ algae and fungi, and the

general ecology of the Rhynie Chert biotope. Noteworthy in Remy's Rhynie Chert studies are fungi, illustrating several stages of the life cycle, examples of parasitism, and the recent discovery of the oldest anatomically preserved lichen. With his work on Devonian compression floras, e.g., the discovery of gametophytes in the Lower Devonian of Germany and one of the earliest Trimerophytes which still shows anatomical details, Remy demonstrated that even 'ordinary' compression floras can, if they are carefully studied, yield much more information than is commonly believed.

Remy continued his research after his formal retirement in 1989. In his later years he developed successful cooperation with several North American palaeobotanists. Highlights of this later phase in his career included visits to the United States in 1991 as the guest of the Botanical Society of America, to Argentina in March 1994 where he participated in the Symposium on 'The Paleobiology of Fossil Plants: New Insights and Perspectives', and the International Workshop on Early Devonian plants held in September 1994 in Münster which attracted specialists from all over the world. Although he was increasingly slowed by his illness, he continued to work and visited the institute he founded until a very few days before his death.

Winfried Remy never promoted himself or his work; for a long time he even refrained from attending scientific meetings, but when he reappeared on the congress scene a few years ago many were thrilled to meet the author of these meticulously documented papers, that showed incredible details such as germinating spores. He had a very broad, interdisciplinary and flexible approach to his science that integrated biological and geological information that was directed at understanding the functional morphology of fossil plants, their ecology and role in the community structure, and the mutual influences that existed between plants and their environment millions of years ago. He was not hampered by dogmatic concepts and theories, and often challenged traditional views by showing the botanical and geological communities the exciting potential of fossil plant studies. His innovative work on Lower Devonian floras has had an impact reaching well beyond the limits of our discipline. He was elected a corresponding member of the Botanical Society of America in 1994 and in that same year was awarded the W.J. Jongmans Medal at the 4th European Palaeobotanical and Palynological Congress in Heerlen.

His friends and students will remember him as an original and devoted scientist, a warmhearted colleague and an enthusiastic, inspiring and often thought-provoking teacher. Winfried Remy had a passion for palaeobotany that is reflected in his work, and that will be greatly missed by his colleagues. His contributions to the discipline he so greatly loved will serve as an inspiration for those that follow.

H. KERP, H. HASS and T.N. TAYLOR

CHARLES JACK SMILEY (1924-1996)

On the first day of 1996, the geology and paleobotany community lost a friend and an eminent scientist. Professor Dr. Charles "Jack" Smiley died of a sudden heart attack in his country home in Moscow, Idaho at age 71. He was known by the members of IOP due to his pioneer work on Cretaceous plant fossils and biostratigraphy of Alaskan northern slope, Tertiary floras and paleoclimate in the U.S. Pacific Northwest, and his recent involvement in ancient DNA research based on material from the *Clarkia* Miocene deposits in northern Idaho. At the time of his death, he was an emeritus professor of geology and the director of Tertiary Research Center at the University of Idaho.

Jack began his scientific career shortly after the World War II. As a NSF predoctoral fellow, he worked with Prof. Ralph W. Chaney at University of California at Berkeley examining the Ellensburg and Selah Miocene floras in his native state of Washington. His first major publication was a monograph published in 1963 (The Ellensburg Flora of Washington, Univ. Calif. Publ. Geol. Sci., 35) linking the vertical succession of the Ellensburg plants with paleoclimatic transition of central Washington as a result of the elevation of Cascade area. From the Ellensburg flora, he described the first Paulownia record in the Tertiary of North America (AJB, 48:175-179). Between 1956 and 1967, he participated in geology field studies in the northern slope of Alaska spending five summers in the arctic at latitudes above 70°N. A series of papers dealing with Cretaceous biostratigraphy, macrofossil floras, and paleoclimate of Alaskan high latitudes was published (GSA Bull., 77:1-13; AAPG Bull., 51:849-863, 53:482-502, 53:2079-2093; 24th IGC Proc., 7:413-421; USGS Cir., 794:89-111). His interpretations of arctic floral sequences and correlation of Cretaceous rocks spanning from Albian to Maestrichtian were mainly based on plant macrofossils collected from Kuk river area (40 localities), Chandler-Colville region (55 localities), Kukpowruk river and Corwin Bluff areas (140 localities). The extensive collection of plant macrofossils from these regions, that are difficult to access even by modern standards of transportation, provides critical information for examining the transition from gymnosperms to angiosperms at high latitudes. These data still hold a key to our understanding of ancient vegetation and paleoclimate in the Northern Hemisphere, especially in the polar area, during the Cretaceous global warming period.

Jack spent one year (1968-69) as a Fulbright professor in southeast Asia (mainly in Malaysia, but

also carried out research and lectured in Thailand, India, and Pakistan). This gave him an opportunity to study Mesozoic plant fossils from lower latitudes. His publications dealing with geology and Cretaceous floras from west Malaysia are rare English references available to western readers (Geol. Soc. Malaysia Newsletter, 16:1-2; Geol. Soc. Malaysia Bull., 3:77-88, 3:89-113). As a NSF visiting scholar, he spent half a year (1973) in Japan studying Japanese Mesozoic and Tertiary floras, and also in Australia and Dominican Republic examining museum collections and fossil sites. His knowledge and global view of Mesozoic and Tertiary paleobotanic record allowed him to reconstruct global phytogeography and paleoclimate based on plant fossils. These data provided evidence for him to challenge the conventional ideas of plate tectonics - especially as they relate to significant large-scale continental drift (AAPG Mem., 23:331-360; In: Gray, J. and A. Boucot, eds: Historical Biogeography, Plate Tectonics, and the Changing Environment: pp311-319; In: Chatterjee, S. and N. Hotton, eds: New Concepts in Global Tectonics: pp241-257). While these controversial conclusions made him a well known "dissident" among earth scientists, especially geophysicists who believe that large-scale continental drift is the strongest evidence for global tectonics, he was respected by his colleagues for his beliefs that empirical data must precede theoretical models.

Jack was a hard working scientist as well as an original thinker. This is well illustrated in his efforts to develop the *Clarkia* project into an international-renowned interdisciplinary program during the past two decades. In the first report dealing with the *Clarkia* deposit and its fossil biota, Jack and his colleagues pointed out the significance of the diversity and the excellent preservation of plant fossils (J. Paleont., 49:833-844). He invited taxonomic experts across the country to study the diverse fossil biota, while he himself was looking at the plant fossils and paleoecology of the ancient lake ecosystem (In: Gray et al., eds, Communities of the Past, pp551-590). As a result of the team research, a AAAS symposium on *Clarkia* fossils was held at the University of Idaho campus in 1980. Dr. Smiley organized the symposium and edited the symposium papers into a book compiling data from the *Clarkia* site as well as elucidating the importance of the *Clarkia* flora in understanding of Neogene vegetation and ancient climate in the Pacific Northwest region (Late Cenozoic History of the Pacific Northwest, AAAS Pacific Division, 417p). Based on venation clear leaves prepared from *Clarkia* fossils, attached fruits, and biochemical evidence, Dr. Smiley and his colleagues established *Pseudofagus* as a new genus of Fagaceae (AJB, 68:741-761). The potential of high quality preservation of *Clarkia* fossils was soon realized by plant taxonomists, biochemists, and molecular geneticists. As a result of his effort and collaboration, a number of reports about the extraction of a variety of ancient biomolecules from *Clarkia* fossil leaves appeared in international journals. In 1990, the *Clarkia* research reached a climax, when the first (by then the oldest) Tertiary fossil DNA record - a 820 base pair chloroplast DNA sequence from *Clarkia* fossil *Magnolia* leaf was reported (Nature, 344:656-658). Later, another group independently obtained an ancient DNA sequence from *Clarkia* fossil *Taxodium*, confirming that genetic material can survive over millions of years (PNAS, 89:449-451). These results have drawn scientists of different disciplines from over the world asking for *Clarkia* samples, earning him the title of "the grandfather of the *Clarkia* site." It was he who put *Clarkia*, a small Idaho town, on the world map scientifically. Without Dr. Smiley's vision and restless efforts on the *Clarkia* fossils, genetics would have not entered into the field of paleobotany so soon.

Dr. Smiley started his teaching career in 1956 as an assistant professor at Macalester College in St. Paul, Minnesota. After spending a year at the Harvard University as a postdoctoral fellow, he joined the University of Idaho geology faculty in 1962. He became a full professor in 1967 and held the professorship until his formal retirement in 1990. He served as an associate dean of the College of Mines and Earth Resources during 1976-1980. He was recognized by the university for excellence in both research and teaching. During the tenure of his professorship at the University of Idaho, he supervised many graduate students, of whom I was the last one. While he had dual interests in both geology and biology, he insisted that a student in the field of evolutionary biology and paleontology must have a broad training. I found that his supervision style promoted independent thinking by the students. In my student years, he remained a close contact with me to develop a general approach for a research project, but he also gave me the freedom to use my own imagination to come up with methods to test my hypotheses. He enjoyed friendly arguments with his students over broad issues ranging from paleontology to politics, which had the effect of improving my English tremendously. From him, I learned that a graduate student and his professor can be good colleagues and at the same time enjoy a very close friendship. Through our interaction, he developed a strong interest in Chinese geology and paleobotany in his late years. The fossil record of China added another dimension to his view of phytogeography and paleoclimate of the Pacific rim. Not long before his sudden death, he decided to donate his personal library to the Nanjing Institute of Geology and Paleontology, Chinese Academy of Sciences, where he believed that English references are very much needed.

Jack is survived by his wife Peg, his strong supporter and companion of more than 40 years, and a son and a daughter in Idaho. For all his achievements, Jack was a modest person. One of my fondest memories of him was the little gracious smile that would appear on his face just before he was about to make an unexpected joke. Without a doubt, his scientific influence and warm personality will remain long after his death.

HONG YANG, Ann Arbor, Michigan, USA

PUBLICATIONS

A JAPANESE JOURNAL

The Association was established in 1986 under the leadership of Dr. Seiichiro Tsuji (Osaka City University, Osaka; recently moved to National Museum of Japanese History, Sakura) and his colleagues. More than 350 members includes students in interdisciplinary fields of research, such as palaeobotany, palaeopalynology, archaeology, palaeo- and modern plant ecology and forestry. IOP members, Drs. Mitsuo Suzuki, Mutsuhiko Minaki and Arata Momohara, are very active in this Association.

The Japanese Journal of Historical Botany is a journal of the Association since its establishment, and has been published biannually since 1992. Although the articles are written in Japanese and the major focus of interest is on later Quaternary plants and vegetation, the journal is the only palaeobotanical serial in Japan. For many IOP members a bibliography on Japanese Cenozoic megafossils by Dr. Toshimasa Tanai may be important, which appeared in this journal and was written in English: Bibliography of Cenozoic palaeobotany in Japan through 1992 (exclusive of the Holocene and palynological articles), vol. 2, no. 2, pp 63-92 (1994). Those who are interested in Tanai's bibliography, write to T. Tanai, 23-546, Dailand, Kannami-cho, Shizuoka Pref., 419-01 Japan.

TWO VOLUMES ON RUSSIAN ANGIOSPERMS

The following two classic monographs from the Russian literature are now easily available. To order the volumes contact:

David Dilcher,
Florida Museum of Natural History,
University of Florida,
P.O. Box 117800,
Gainesville, FL 32611-7800.
E-mail address: dilcher@flmnh.ufl.edu ;
Telephone- 352-392-1721 (museum),
- 352-392-6560 (office);
FAX: 352-392-2539.

Price per volume US$98.00,-plus shipping/handling per volume, -in North America US$7.00, -overseas US$10.00. Make checks payable to "David Dilcher".

Fossil Flowering Plants of the USSR volume 2. Ulmaceae, Moraceae, Cannabaceae, Urticaceae, Fagaceae and Betulaceae. A.Takhtajan, editor. Ivan Fedorov Printing House, 1982. (In Russian).

This volume presents fossils known from remains of leaves, fruits, seeds, flowers and wood. Over 40 genera in the families covered in this volume are described in 215 pages of text and line drawings and illustrated in 172 plates. Illustrations include 132 text figures of leaves, fruits, seeds, flowers and approximately 1700 photographs of specimens. Geographic and stratigraphic distributions are given for each species as well as their synonomies and important features. Type material is illustrated for each species. This volume also contains a comprehensive list of known fossil records of extant/extinct genera of these six families, locality maps, stratigraphic tables and pertinent literature for each species.

Fossil Flowering Plants of Russia and Adjacent States Vol. 3 Leitneriaceae, Myricaceae and Juglandaceae. Lev Budantsev, editor. Ivan Fedorov Printing House, 1994. (In Russian).

This volume presents fossils known from remains of leaves, fruits, seeds and wood. Each of 133 species of the Leitneriaceae, Myricaceae (fruit remains only) and Juglandaceae is described and illustrated. Illustrations include 84 tables and 700 photographs of specimens. Geographic and stratigraphic distributions are given for each species as well as their synonomies and important features. Type material is illustrated for each species. A comprehensive list of known fossil records of these three families, locality maps and pertinent literature for each species are also included.

PLANT FOSSILS OF WEST VIRGINIA: A NEW INTERNET HOMEPAGE

I have produced a new homepage titled Plant Fossils of West Virginia. It features images, geologic in formation, and geographic locations of specimens. It is an evolving page and its URL is: http://www.clearlight.com/~mhieb/WVFossils/HOMEPAGE1.html.

I have a very sizable collection to work from. It is the result of 10 years of collecting in surface mines in central West Virginia.

MONTE HIEB
E-mail: gsa00175@mail.wvnet.edu

TEA TOWEL REVIEW

EVOLUTION OF PLANTS. A tea towel. Royal Botanic Gardens, Kew. £4.15.

This tea towel, produced as a souvenir of the new Evolution House is illustrated by a drab mixture of drawings of living plants and plant fossils. It uses the standard set of moss, fern, clubmoss, conifer, cycad, *Ginkgo* and *Magnolia* with limited and ineffectual labelling. Around the edge are sketches of fossil leaves with a curious mixture of geological terminology. Three of the eight have been given wrong or outdated names, one has no indication of its age, and there is no help for the casual user in distinguishing between the terms Carboniferous, Upper Carboniferous and Palaeozoic. Most of these fossil leaves are also duplicated which suggests a rushed design stage in its production. The central pride of place goes to an unname "Fossil of 50 million year old leaf" which demonstrates both a lack of thought about the needs of the reader and bad usage of the English language. The information portrayed certainly tells you nothing at all about The Evolution of Plants so do not buy the tea towel for hanging on the wall and do not show it to your students. If you do find yourself the owner of one, use it for its intended function of drying your dishes. In a random test, ten out of ten of my colleagues found it very effective for this purpose.

B.A. THOMAS, Cardiff, Wales

BOOK REVIEWS

FOSSIL FLORAS THROUGH THE GEOLOGICAL AGES. Editor in Chief: Li Xingxue (1995)

You, an eternal mystery, a beautiful myth,
You persistently question. You, a flash of golden light
An intimate meaning, a burst of flame,
An elusive cry from afar.....on, what are you?

All I ask now is how to hold you tightly.....
You, so barbaric, yet so utterly beautiful!

"One Concept", Wen Yiduo (1899-1946)

So barbaric, yet so utterly beautiful. Like Wen Yiduo, we may be musing lovingly over those earliest ancient Chinese odes in "The Book of Songs", or like Sun Ge we may be musing over the earliest known angiosperms from the Lower Cretaceous of Jixi in North East China, or like Cai Chongyang it may be over *Pinnatiramosus*, the earliest known possible vascular land plant, from the Lower Silurian of Fenggang South China.

Barbaric, primitive, ancient, pioneering, a burst of flame, a fountainhead; new songs for posterity, new trails in the evolutionary network.

Till so very recently China has been largely inaccessible behind the veil of her beautiful, elusive script. Her huge fossil wealth was shrouded in eternal mystery. Now, in one flash of golden light, the windows have been opened wide. With Li Xingxue's "Fossil floras of China", the enormous global significance of China's fossil-plant deposits has been explicitly set before us. Like so many of the fossils described and discussed, this most welcome volume must take its place on the bookshelf marked for pioneers.

Though we may introduce this fine work through quarrying the poetic words of Wen Yiduo, it stands firm in the realm of science. It is clearly and succinctly arranged and written; each chapter gives a concise account of the known fossil floras of the successive geological periods as exposed in China. For each period a brief history of discovery and literature is followed by a chronological account of the sequence of assemblages encountered in the major floristic subregions of the country. Clear correlation tables and locality maps indicate the stratigraphic and geographic occurrence of the sampled floras. A wide selection of the megafloral taxa are portrayed in 144 sharply-defined photographic plates.

It is, I think, true to say that this book is unique. It is the first of a genre which is vitally necessary and which will surely become more and more prevalent. It is the only comprehensive fossil flora published for any country; and it is a vast tract of country akin in extent to Australia or Africa south of the Sahara, or Europe or the USA. And the book is all the more valuable in that the flora was previously so unknown to the rest of the World.

One striking anomaly is evident. The Triassic is dealt with less comprehensively than any other period. But this is perhaps only striking to a Triassic specialist - like myself - who is keenly lobbying for the stakes of a period which is coming to appear of supreme interest in terms of diversity rates, of speciation, gymnosperm richness, the origin of the angiosperms (as of the mammals and dinosaurs), the modernity of insect faunas. The Chinese Triassic is obviously as rich as anywhere and will add strikingly to our perception of these issues.

Palaeobotany has found itself in something of a vacuum over the past couple of decades. Palaeobotanists have been searching for relevance in an ever-faster spinning world of exploding humanity. The business world, the legal world, the political world, the religious world, the art world, even the scientific world have been looked upon us dubiously as a marginal discipline feeding unnecessarily on

dwindling resources. But we are hugely relevant and it is for us to shift consciousness to that awareness. Mother Earth is being savagely raped by the blinded billions of our brash species. Mother Earth is a creature of unsurpassed beauty with an infancy, childhood, and adulthood. How is it that we feel free to molest her so indiscriminately? Only through knowledge and love can we learn to cherish our Mother. Only with a sure awareness of her biography - her past, present and future - will we afford our Earth the fullest respect and wonder she merits. If the mountains and the valleys and the oceans are her skin and bones, the flora and fauna are her exquisite attire. The evolving flora is a fundamental theme that runs through the biography. The flora is the kingpin in the ecosystem; the flora is the basis of biodiversity, of the richness of life. It is for palaeobotany to elucidate in the evolving biodiversity patterns and to take a central role in its understanding and in the preservation of the extant flora.

"Fossil floras of China" is enormously timely. It hints at the great wealth of floral biography waiting to be tapped in China through all the periods form the Silurian to present; and shows that China is quite probably second to none in regard to palaeobotanical riches. Chinese palaeobotanists have a role to play that is of deep concern to all of us.

And this role was admirably demonstrated at the "International Conference on the Diversification and Evolution of Terrestrial in Geological Time" hosted at Nanjing, China, from September 4-8, 1995: at which the "Fossil Floras of China", was launched. It is extraordinary that this book, written from June 1993 to September 1994 was steered through to publication with such efficiency and timing; considering the heavy, simultaneous load of organisation towards the Diversification and Evolution Congress. Both book and congress, a tandem pair, were accomplished largely by the staff members of the Nanjing Institute of Geology and Palaeontology; and they were equally successful. I am confident that I speak for many palaeobotanists from around the world in claiming that Nanjing 1995 (congress and post-congress excursions) was one of the happiest most effectively run and fruitful of gatherings in our field.

Li Xingxue, Sun Ge, Cai Chongyang, Zhou Zhiyan, Wu Xiuyuan, Shen Guanglong, Li Haomin, Liu Yusheng and their colleagues in Nanjing and elsewhere in China are to be warmly congratulated. Their massive 695 page (plus 44 plates) "Fossil of China", enthusiastically researched and splendidly produced, opens the window wider for us all on the eternal mystery, that elusive cry from afar; our buried past.

JOHN ANDERSON, Pretoria, South Africa

If you are interested in the book, please send a check for $100 (U.S.), postage included, to:

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Chi-Ming-Ssu, Nanjing 210008.
P R China.

and please make check payable to Mr. Li Gejun. After receiving your payment, the book will be sent to you immediately. A receipt may be attached with if requested.

EVOLUTIONARY CHANGE AND HETEROCHRONY Ed K. J. McNamara, Wiley, London, New York, £50 ISBN 0471958379

There have been a number of books in recent years about the applications of ideas of heterochrony to the fossil record. Kenneth McNamara, editor of the present volume, has been an enthusiastic promoter of the notion.

Heterochrony is the link between changes in developmental timing and the ways in which these may be seen in evolution. In a way, the idea is marvellous, since it shows how major changes in adult form during evolution may be caused by small changes in the developmental programme. The problem with many purely fossil-based studies is that the identification of heterochrony, and of a particular mode of heterochrony, is merely a matter of description and assertion. There is no test unless one has some living representatives. The book contains only one botanical chapter, in which Volker Mosbrugger (Tuebingen) outlines 'heterochrony and the evolution of land plants'. The chapter is more suggestive than conclusive, and deals only with general issues. Some detailed case studies of heterochrony in plants would be interesting, but they would suffer from the untestability of the rather more numerous published animal examples.

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