PALYNOS

Volume 17, No. 2 - December, 1994

The NEWSLETTER of the INTERNATIONAL FEDERATION of PALYNOLOGICAL SOCIETIES

IFPS Councillors

The Palynological Society of Japan has appointed two new IFPS Councillors:

Takashi Uchiyama, Chiba Economic College
Primary Educational Institutions,
Kujukuri-cho, Katagai 6731
Yamatake, Chiba, JAPAN

Masako Sado, Toho University
Faculty of Pharmacology
Inage-Konakadai 7-8-28-1306
Chiba City, JAPAN

Position Available

Lectureship in Palynology

Aberystwyth
The University of Wales

Applications are invited for a Lectureship in Palynology in the Institute of Earth Studies. The lectureship requires demonstrated research excellence in any branch of Palynology or a related field, including Marine Palynology, Cenozoic/Quaternary Palynology, Archaeological Palynology, Dinoflagellate or Diatom studies. Teaching responsibilities will also include providing courses on Policy, Planning and Management Issues concerning the Earth and its Resources. The lecturer will play a central role in the further development of the Earth Studies degree, as well as contributing to programs in Geology, Geography, and Environmental Science. Evidence of research grant/contract acquisition and high quality teaching carried out in a busy university environment would be particularly welcome.

The Palynology Research Centre was established at the beginning of 1990 in order to create, along with the existing Micropalaeontology Group, a centre of excellence in the study of plant and animal microfossils of all ages. The staff primarily concerned with Palynology in the Institute are Professor David J. Batten (Head of the PRC) and Dr. Henry F. Lamb (Lecturer), Mrs. Lorraine Morrison (Technician), and Mrs. Lorraine Hill (Technician, part-time).

Further details and application forms may be obtained by writing to:
Staffing Officer
University of Wales, Aberystwyth
9 Laura Place
Aberystwyth, Dyfed Sy23 3DB
Wales, U.K.
Fax. (UK) (0)970 622975
Forms should be returned to the Staffing Officer, together with supporting statements from three referees, to arrive before January 31, 1995.

Informal inquiries should be directed to Professor David Gilbertson [(0)970 622631; Fax (0)970 622659]; e-mail: ddg@aber.ac.uk or Professor David Batten, Director of the Palynology Laboratory [(0)970 622573; Fax (0)970-622659]; e-mail: dqb@aber.ac.uk.

IFPS - Who We Were in 1988

The primary information in the FIRST WORLD DIRECTORY OF PALYNOLOGISTS (WD-1) is the address, telephone numbers, and e-mail address. But, it also contains valuable bibliographic data that exhibits the strengths and diversity of the world's palynologists. These data were provided as the SPECIALTY and AGE codes on pages xiv - xvi of WD-1. Only about half of the entries in WD-1 contain these data.

In preparing the SECOND WORLD DIRECTORY, we have simplified, grouped, and in some cases combined, the WD-1 categories into divisions of approximately equal size. Many of the original, two-letter category codes were marked by few palynologists (e.g., "Biopalynology" had only one), and several categories overlapped (e.g., "Paleoecology" and "Vegetation History"). The AGE category grouped Actuopalynology with the Holocene to produce the largest (149) category.

We have organized the data contained in the FIRST WORLD DIRECTORY into categories of the AGE of sediments analyzed, the GROUP (kinds of organisms) studied, and special TOPICS investigated. The number of palynologists (frequency) in each category is shown in the following figures.

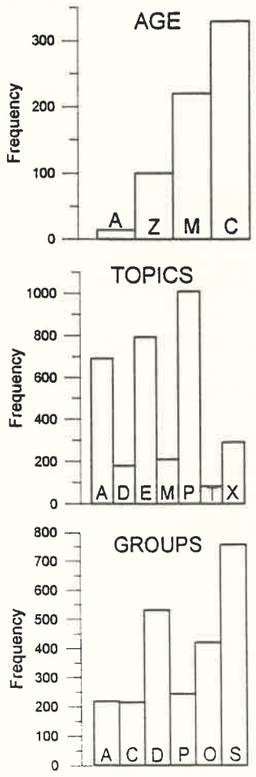


FIGURE CAPTION. Number of palynologists in different categories of the First World Directory.
AGE: A-Archean, Z - Paleozoic, M - Mesozoic, C - Cenozoic.
TOPICS: A - Actuopalynology, D - Depositional Environments, E - Environmental Palynology, M -Morphology / Ontogeny, P - Paleopalynology, T - Techniques / Applications, X - Taxonomy / Systematics.
GROUPS: A - Acritarchs, C - Silicoflagellates, D - Dinoflagellates, P - Pollen, O - Other microfossils, S - Spores.

The broadest divisions of the AGE category are shown in Fig. 1. Although IFPS includes specialty groups working with sediments of various ages, palynologists studying Cenozoic deposits are most abundant. This category includes "Actuopalynologists" + Holocene (149), Pleistocene (60), and Tertiary (120) entries.

The most frequent GROUP studied (Fig. 2) is "Spores," of which "Dispersed Miospores" is the most frequent (640) entry.

The TOPIC category required combinations of 38 divisions, many of which were created after WD-1 was published. For example the "Actuopalynology" category includes aerobiology (570), Actuopalynology (98), Biopalynology (1), Ecology (6), and Melissopalynology (19). The largest category, "Paleopalynology" includes Biostratigraphy + Stratigraphy (892) and Evolution (118).

Copies of the First World Directory Available for the Cost of Postage

IFPS has 90 copies of the WORLD DIRECTORY OF PALYNOLOGISTS - FIRST EDITION for sale. Copies can be obtained from the IFPS Secretary-Treasurer for the cost of postage, paid in advance.

NORTH AMERICA:	$5.00,
OTHER:	$5.00 surface
	$15.00 air mail.

Contact Owen Davis
Department of Geosciences
University of Arizona
Tucson, Arizona 85721 USA.

Meeting Reports

International Association for Aerobiology to Join IFPS

Dr. Paolo Mandrioli, the new president of the International Association for Aerobiology (IAA), has communicated to Dr. Jim Canright, President of the International Federation of Palynological Societies (IFPS) that his organization will join the IFPS. The IAA voted to affiliate with the IFPS at the 5th International Conference on Aerobiology held at Bangalore, India, during August, 1994.

Dr. Mandrioli (Inst. FISBAT-CNR, Bologna, Italy) also indicated that the first circulars of the IXth IPC were handed out to IAA delegates at the Bangalore meeting. IAA members plan to organize special symposia on aerobiological topics at the IXth IPC in Houston.

As editor-in-chief of AEROBIOLOGIA (European Journal of Aerobiology), Dr. Mandrioli welcomes contributions to that publication from members of all IFPS-affiliated societies. Beginning in February of 1995, AEROBIOLOGIA will be published and distributed by Elsevier Science Publishers (Amsterdam).

Report of the APLE Palynological Symposium 1994

A meeting of Palynologist of Lengua Espanola (APLE) takes place every two years. The Xth Symposium of Palynology was held during 19-22 September in Valencia, Spain. The scientific program included sessions on Pollen Biology, Melissopalynolgy, Actuopalynology, Aeropalynology and Paleopalynology. Approximately 100 participants attended the meeting, most of whom were from Spain; but palynologists from France, Germany, Italy, Hungary, Israel, Venezuela, Canada and EE-UU also attended. A total of 87 contributions were given, including 57 oral and 30 poster presentations. Plenary lectures were given by Dr. Vorwohl (University of Hohenheim, Germany): "Melissopalynology" and Dr. Traverse (The Pennsylvania State University, EE-UU): "Nonmarine palynofloral behavior in the great die-offs."

A congress proceedings volume recording the contributions to this Symposium has been published under the title "Trabajos de palinologia basica y aplicada" (eds. I. Mateu, M. Dupre, J. Guemes and M.E. Burgaz, Universitat de Valencia, Spain, 1994).

A successful social program, including a welcoming party, a concert in Valencia's Botanical Garden and a closing dinner was enjoyed by all the participants and provided an ideal opportunity to establish contact among palynologists. The final event of this meeting was a botanical excursion to the "Parques Naturales de la Albufera and Montgo." This excursion was led by Dr. Manuel Costa, director of Valencia's Botanical Garden, whose enthusiasm and excellent explanatory talks informed and entertained everyone.

I extend my congratulations to the Organizing Committee of the Xth Symposium of APLE.

The 11th APLE Palynological Symposium will be held in Alcala de Henares (Madrid) in September 1996.

Maribel Rodriguez-Garcia
IFPS Councillor
Estracion Experimental del Zaidin (CSIC)
Granada, Spain

Announcements

Pollen on the Information Highway

If you have an e-mail address, you may be interested in joining a new pollen-palynology bulletin board. A bulletin board is an electronic forum to exchange information through e-mail. You can ask and answer research questions, discuss topics or just gossip with other like-minded people. Here's how to join. Send this message ONLY:

SUBSCRIBE POLPAL-L (in this space put your full name and that is all).

Send this one-line message (the message above!) to this e-mail address:
listserv@uoguelph.ca

Hope to run into you on the information superhighway....

Submitted by:
Vaughn M. Bryant, Jr.
Department of Antropology
Texas A. & M. Universioty
College Station, Texas, USA

Free Copies of Wim Punt's Glossary of Pollen and Spore Terminology

By now, you have probably noticed the title and contents of the September 1994 issue of the *Review of Palaeobotany and Palynology*. It is the "WIM PUNT Special Issue", published on the occasion of his 65th birthday and his formal retirement from the Laboratory of Palaeobotany and Palynology of the Utrecht University.

Many of you recognize Wim as one of the world's foremost pollen morphologists. You may know him, for example, as the initiator, editor and contributor of the successful, long-term project Northwest European Pollen Flora. Furthermore, you may know Wim as the critical editor-in-chief of the *Review*, a position where he demonstrated his broad overview of both palaeobotany and palynology.

Wim was the Secretary-Treasurer of IFPS during our 1988-1992 term of administration, and he was particularly successful in keeping the IFPS budget on the good side of the balance. Another aspect of Wim's activities within the IFPS was his continuous effort to revitalize the *Working Group on Palynological Terminology* that long lingered under the auspices of IFPS. His efforts came to fruition in 1988. Under Wim's convenorship, a small but effective international committee of pollen morphologists accepted the challenge to make an up-to-date compilation of the wide diversity of technical terms used in the description of pollen and spores, both modern and fossil. After a series of earlier drafts, circulated for comments to each of the IFPS societies, a draft of the GLOSSARY OF POLLEN AND SPORE TERMINOLOGY by Wim Punt, Stephen Blackmore, Siwert Nilsson and Annick Le Thomas was presented at the 8th IPC at Aix-en-Provence.

The completed Glossary contains over 500 alphabetically arranged entries accompanied by schematic illustrations where appropriate. Besides being a comprehensive reference-guide for palynologists who have to provide accurate descriptions of their material, the *Glossary* may also serve as a practical source of information for non-specialists who have to understand the meaning of an ever-increasing number of palynological terms.

Realizing that palynologists throughout the world should be able to obtain the Glossary at low cost, we explored the possibilities of sponsored publication and mailing, rather than offering the manuscript to a commercial publisher. As a result, the *Glossary* was adopted by the LPP Foundation for presentation to the international palynological community as LPP Contributions Series No. 1.

As a tribute to the work of Wim Punt, the *Glossary* is now offered FREE OF CHARGE to individual IFPS palynologists. As long as supplies last, you are invited to request ONE copy by contacting (letter, fax, e-mail) our secretary:

Mascha Tiemessen
Laboratory of Palaeobotany and Palynology
Heidelberglaan 2
3584 CS Utrecht
The Netherlands
fax: 31-30-535096
e-mail: m.tiemessen@boev.biol.ruu.nl

Meanwhile, I am pleased to inform you that the *Glossary* should not be regarded as Wim's farewell to palynology. Despite his formal retirement from the University, he intends to continue his pollen morphological work at our Laboratory. Since it is anticipated that the Glossary may need continuous revision and updating, Wim will appreciate receiving any constructive comments.

Hank Visscher
IFPS Past-President

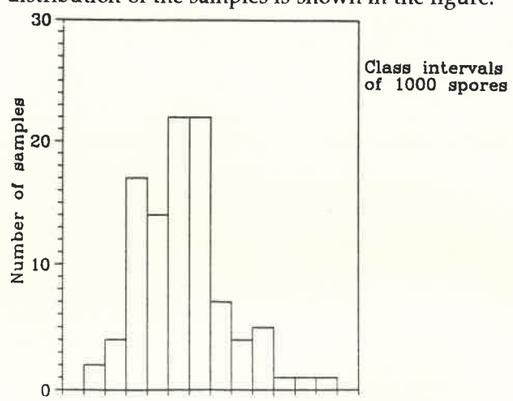
Information on Spore Tablets

Lycopodium spore tablets (batch 124961)
Lycopodium spore tablets can be dissolved in water or in HCl, but not in NaOH. They have been prepared in a slightly different way compared to that described by Stockmarr (1971, 1973). The tablets are thus based mainly on sodium bicarbonate together with polyvinylpyrilidon and polyethyleneglycol, which must be carefully washed away with water and finally with diluted HCl before further treatment. The spores are acetolysed.

The spore concentration has been determined with an electronic particle counter, Coulter Counter ZB (cf. Stockmarr 1973), tube size 140µ. One hundred samples of five tablets each taken from different places in the batch were prepared by dissolving the tablets in Isoton II NaCl solution in 100 ml flasks. Twenty counts each of 0.5 ml were made on each sample.

Result: X = 62,712 s= ± 2,081 V= ± 3.3 %
For one tablet: X = 12,542

The distribution of the samples is shown in the figure.



Production, distribution, payment
Spore tablets for calibration of pollen analyses were formerly produced and distributed by Dr. Jens Stockmarr, Copenhagen. In October of 1980 this business was taken over by the Laboratory of Quaternary Biology at the Department of Quaternary Geology in Lund. It is performed as an official commission approved by the University of Lund. A new batch, No. 124961, is now produced and calibrated and tablets are available.

The tablets are manufactured at Dansk Droge Import A/S, Ishøj, Denmark.

Lycopodium tablets will be distributed in plastic bottles with 500 tablets per bottle. The price is, in Swedish currency, SEK 150/bottle (500 tablets), plus postage (US $ 1 ≈ SEK 8, July 1994).

Examples of current postage (airmail/surface mail):
UK and Germany:
500-5000 tabl. SEK 130/117,
5500-10000 tabl. SEK 150/129.
USA, Canada:
500-5000 tabl. SEK 160/123
5500-10000 tabl. SEK 210/141.
South-America:
500-5000 tabl. SEK 175/135,
5500-10000 tabl. SEK 240/155.
Australia:
500-5000 tabl. SEK 210/135
5500-10000 tabl. SEK 310/165.

Surface mail is often very slow. If no preferance is stated in the order, we send the tablets via airmail.

A university invoice will be sent separately to the receiver of the tablets or to the purchase office. Please remit to Swedish postal giro account No. 1 56 50 - 5 or by check (bank draft) payable to Lund University. The invoice No. must be quoted with your remittal. Payment by private check or credit card cannot be handled.

Please note that production and distribution of tablets is done at cost price, which makes it necessary to reduce administration to a minimum. Therefore, the machinery of payment must be as simple as possible - so, please follow our instructions and try not to impose too many administrative duties on us, which will only result in delayed deliveries.

Björn Berglund & Thomas Persson
Department of Quaternary Geology
Tornavägen 13, S-223 63 LUND, Sweden
Fax: 46-46-104830

Departed Colleagues

G. O. W. Kremp (1913-1994)

Dr. Gerhard Otto Wilhelm Kremp, an internationally known and admired paleopalynologist, passed away on August 18, 1994, at his home in Tucson, Arizona.

He was born on November 14, 1913, in Berlin, Germany. Both his secondary and undergraduate education were in Berlin, culminating in 1937 with a degree in education from Humboldt University. He then accepted a graduate assistantship in geology in the laboratory of Professor Paul Thomson at the University of Poznan. Here he undertook a palynological research problem on the Konin lignites of the Warta River Basin. However, his studies were interrupted by the onset of World War II and in 1939 he was drafted into the German Army.

After the war was over (1945), he received a two-year appointment as a research assistant in the Geological Institute of the University of Göttingen, which enabled him to complete his doctoral dissertation that he had begun eight years earlier at Poznan. Because Poznan had become part of Poland after the war, the University of Göttingen accepted his credits and awarded him the degree of Dr. rer. nat. in Geology in 1945.

From 1948 to 1954 he was employed as palynologist in the Geologisches Landesamt (Geological Survey) of Nordrhein-Westfalen located at Krefeld, West Germany. The Director of the Coal Geology and Paleobotany Division of this organization at that time was the famous Dr. Robert Potonié, one of the principal founders of the science of paleopalynology. After examining Kremp's sizable collection of slides and photomicrographs of spores and gymnospermous pollen

extracted from coal seams of Upper Carboniferous age in northwestern Germany, Potonié proposed that they collaborate on the systematics and description of this material. This cooperative endeavor resulted in a series of publications that are well-known to all paleopalynologists--Potonié and Kremp's Die Sporae dispersae des Ruhrkarbons that appeared in three issues of PALAEONTOGRAPHICA in 1955-56. It was here that the authors proposed a new set of suprageneric form genera, viz., Abteilung, Turma, and Anteturma, as the foundation for their morphographic system of classification for Paleozoic palynomorphs.

In 1955 the Kremp family emigrated to the United States where Dr. Kremp accepted an appointment as a senior research associate in the coal petrographical laboratory of Dr. William Spackman at the Pennsylvania State University. In 1957 Dr. Kremp edited (with H. Tate Ames and Hilde Grebe) the first volumes of the Catalog of Fossil Spores and Pollen, a systematic compendium of original descriptions and illustrations of palynomorphs of all ages. This important reference work (now consisting of 43 volumes) can be found in the laboratories of most palynologists today.

During 1959-60 Dr. Kremp was employed as a palynologist at the Denver Branch of the U.S. Geological Survey; later that year he was appointed as an Associate Professor of Geochronology in the Department of Geosciences at the University of Arizona in Tucson. Almost immediately he began planning an international meeting of palynologists, together with his colleagues Lucy Cranwell, Jane Gray, Edwin Kurtz, Paul Martin and Terah Smiley. Accordingly, the first International Palynological Conference was held at the University of Arizona on April 23-27, 1962. Dr. Kremp was the program chairman for this pioneering conference that attracted almost 250 palynologists from all parts of the world. This highly successful meeting served as a model for the seven quadrennial International Palynological Congresses that have taken place to date.

Dr. Kremp's Morphologic Encyclopedia of Palynology (first published in 1965 by the University of Arizona Press) is an important illustrated glossary of the terms used in palynology. This book has gone through several printings and has been translated into several languages, including German and Russian. In 1972 he co-authored, with Dr. T. Kawasaki, The Spores of the Pteridophytes which illustrated a wide range of fern spore types.

As a result of his concern about the rapid proliferation of palynologic literature, Dr. Kremp and several oil companies founded the Paleo Data Bank under the imprimatur PALYNODATA in 1977. He continued to develop this significant literature data bank service for palynologists from his home after his retirement with the rank of Professor Emeritus from the University of Arizona in 1978.

Dr. Kremp belonged to the several scientific societies, including the: American Association of Stratigraphic Palynologists (AASP), American Paleontological Society, Botanical Society of America, International Association for Plant Taxonomy (IAPT), Commission Internationale de Microflore due Paleozoique (CIMP), and the Palynological Society of India. He was honored in 1966 with the Gunnar Erdtman Medal for Palynology by the Palynological Society of India.

On a personal note, I will always be indebted to Gerhard for his warm friendship over the past 30 years, as well as his willingness to serve on the graduate committees of a number of my former students at Arizona State University.

Dr. Kremp is survived by his loving wife, Eva (*nee* Agahd), their three children, Eva Smith, Peter Kremp and Sabine Weil and seven grandchildren, whose presence he enjoyed immensely. His family, colleagues and many friends will miss him.

James E. Canright
President, IFPS

Donald K. Cameron, Jr. (1931-1994)

Donald K. Cameron, Jr., died February 2, 1994, in Franklin, Tennessee. He was 63. Mr. Cameron was employed by Chevron Oil Corp. from 1954 to 1992 in various exploration capacities in New Orleans, Louisiana, Jackson, Mississippi, and San Ramon, California.

He worked with the Arabian American Oil Co. (ARAMCO) in Dhahran, Saudi Arabia, from 1969-1978 and in Croydon, England, from 1978-1980. At the time of his retirement from Chevron in 1992, he was manager of Stratigraphic Sciences for Chevron Overseas Petroleum, Inc. in San Ramon, CA.

He is survived by his wife, Barbara, in Franklin; a son, Donald III, in Los Angeles; a daughter, Mrs. Douglas Sheppard, and granddaughter, Kelsey, in New York City; and by his mother, Mrs. Rachel Cameron, of Portland, ME

Norman Hughes (1918-1994)

Norman Hughes' recent death took many of his friends and colleagues by surprise. Despite having had some health problems within the last few years, he appeared, until very recently, to be as active as ever. Indeed, in all the years I knew him (from early 1966) he seemed hardly to change physically at all. Since he retired in 1985, he extended his list of publications by two books and around half a dozen papers, and he continued to hold several offices at Queen's College in Cambridge where he was a Fellow. Many of the participants of the 5th International Palynological Conference in 1980 will have pleasant memories of being accommodated in this college for the duration of the meeting, the undoubted success of which was attributable in no small measure to his organizing ability.

Some additional facts and observations pertaining to Norman's career may be found in the introduction to Special Papers in Palaeontology 35 (1986), which I organised, with the help of Derek Briggs (Bristol University), to mark his retirement. All of the articles in this volume were written by former students and others who had spent some time in Cambridge under his guidance. Those who were unable to contribute did not hesitate to wish the project well, a response that showed the respect in which Norman was held by those who had come to know him in his capacity as a PhD supervisor or general mentor, despite any differences of opinion in matters academic. I am sure that for the majority of his students, what began as a pupil-teacher relationship sooner or later developed into a long-term friendship. Norman could appear authoritarian to some people. He could also be stubbornly argumentative, particularly in connection with one of his favourite topics; the failure, as he saw it, of the majority of palaeontologists (not only palynologists) to handle their taxonomic data satisfactorily. There was, however, a more relaxed and gentler side to his nature. Unlike some academics, he was noted, in particular, for being prepared to listen to, sympathise with, and help students and others with both academic and personal problems.

I found him to be a good supervisor. I appreciated being left to my own devices for much of the time! Such an approach doesn't suit everyone, of course, but, in general, I think he assumed that his students would be sufficiently motivated, self-confident and competent to develop their own research programs without undue interference on his part, once the topic and general approach to it had been aproved. On the other hand, he would cajole when necessary. Although for several months during my first year he was away in Thailand in his capacity as a geologist with the Territorial Army (TA), he was otherwise usually around when I needed to talk to him. Most discussions, in fact, took place over morning coffee and 'chocolate digestive' biscuits, and would commonly range on to non-palynological topics. I found him to be particularly helpful when writing up the results of my research.

Norman's work in Thailand and elsewhere with the TA was one manifestation of his wider concern for the world beyond the confines of academe. Politically, he was an 'internationalist', being especially concerned about improving the welfare of poor people in the developing world and in countries in the grip of oppressive dictatorships. More recently, he was equally concerned about the rising tide of nationalism that has been sweeping through many countries. Socially he enjoyed good wine and conversation. He is survived by his wife Pam, a talented artist and companion of 50 years. He will be missed not only by those close to him but also by his many college and palynological colleagues and friends.

David J. Batten
Institute of Earth Studies
University of Wales
Aberystwyth SY23 3DB, UK

Norman Hughes
In Memoriam

Norman Hughes was known internationally for his contribution in the field of palynology, and the study of plant microfossils, mainly pollen and spores. Hughes took the rare opportunity afforded by the Natural Sciences Tripos in Cambridge to become a geologist with a thorough biological training and wide interests in the life sciences. In his chosen field his rigorous work led to original methods and insights. Focusing on Mesozoic stratigraphy and the origins of flowering plants or angiosperms he developed methods for recording data and was early in employing the electron microscope, which yielded a new wealth of information beyond what could previously be seen.

The electron microscope, using much greater magnification, allowed a higher level of discrimination between different kinds of fossils, revealing small evolutionary changes which previously had been undetectable. Hughes argues the advantages of microfossils, which are sampled in their thousands, as compared with megafossils from which species are erected often from few or even only one specimen.

His biorecords related individual characters to their stratigraphic context, showing how much critical information is lost when only species descriptions are employed for purposes of comparison. Many traditional palaeontologists mistakenly perceived this as a threat to the time-hallowed Linnaean system of nomenclature in which so much had been invested. Hughes advocated his biorecords as a supplement rather than a replacement to this system, whose bands of classification are far less detailed. Regrettably, his rigorous reasoning was too often ridiculed rather than countered. Hence he suffered, not by his own choosing, as an anti-establishment figure.

He argued against the common neontologist's practice of deducing evolutionary lineages from living material, on the basis that only the fossil record can provide reliable evidence. After authoring (and editing) more than 70 scientific papers and books, his last work, "The Enigma of Angiosperm Origins" (1994) throws down a methodological challenge to the biological community, with the possibility of no explanation in a single lineage. It remains to be seen how far this challenge will be met.

Hughes was born in 1918 and educated at Kings College School, Wimbledon, and Queens College, Cambridge, where he won the Wiltshire Prize on Part I of the Natural Sciences Tripos before serving in Field and Survey Regiments of the Royal Artillery in North Africa and Italy. He completed his Part II in 1947 with First Class Honours and won the Harkness Scholarship. His military service continued, however, till 1970 in the Royal Engineers Specialist Pool of Geologists of the Territorial Army, rising to the rank of Colonel and advising on terrains in many parts of the world.

On graduating, he became lecturer in Geology at Bedford College, London, and in 1952 he moved to a University Lectureship in Cambridge, where he remained until his retirement in 1985. During this period, entirely on his own initiative and working with a succession of some 25 research students, he developed an internationally recognized school in palynology. He served as President of the International Commission for Palynology in the early '70s and on many other international organizations, including two subcommissions of the Commission of Stratigraphy of the International Union of Geological Sciences, and he led projects in the International Geological Correlation Programme.

Hughes was one of the founding members of the Palaeontological Association and served it for many years in various capacities. He was active in other bodies, notably the Geological Society of London, especially chairing the Stratigraphy Committee. He was awarded [by Cambridge] an ScD degree on his research in 1977.

Hughes was elected to a Fellowship at Queens College, Cambridge, in 1963, and continued till his death, serving in several college offices, not least as an expert on wine. As Steward he figured in the BBC television series on the college in 1984.

Not long before his death he and his wife Pamela, who survives him, celebrated their golden wedding anniversary. They had no children. Together they enjoyed the countryside, especially bird-watching, and he actively supported her career as an artist.

As a person Norman Hughes was a heavyweight, not easily ignored. Perhaps in the eyes of some he could appear outrageously authoritarian. But in personal contacts he was exceptionally unselfish and generous with his time, especially to students. He belonged to a diminishing university tradition where teaching is primary, requiring hours of meticulous preparation of materials.

Conscientious in all he undertook and expressing himself with economy and precision, he was one of the rocks on which the excellence of a university system is built.

W.B. Harland
Cambridge
(reprinted from The Independent, October 7, 1994)

Warren S. Drugg

Warren S. Drugg died in late November, 1994. An obituary will be in cluded in the next issue of *Palynos*.

Nomenclatural Notes No. 2

A New and Invigorating Liberal Spirit Permeates Botanical Nomenclature; Is Anarchy Waiting in the Wings?

Just over a year has passed since the typhoon-struck International Botanical Congress in Tokyo, but the haze has yet to lift from some of its results. A resolution adopted at the meeting and repeated in the Preface of the new Code (Greuter et al., 1994) states: "... the XV International Botanical Congress urges plant taxonomists ... to avoid displacing well established names for purely nomenclatural reasons, whether by change in their application or by resurrection of long-forgotten names." In palynology, examples of such accomplished or potential resurrections come to mind - *Corollina* for *Classopollis* and *Globulus* for *Tasmanites* for instance.

Mycologist David Hawksworth (1994) cited the above resolution in his contention that "Any taxonomist finding that an earlier name threatens one in use should formally propose it for rejection [sensu I.C.B.N.]. If that fails, no change need be made pending the 1999 Congress by citing the 1993 Congress Resolution. Priority of publication thus now counts for little in botanical nomenclature."

To use a well known expletive: Yikes!! Botanist R.K. Brummitt (1994) was similarly dismayed and wrote a commentary on Hawksworth's article. While clearly agreeing in principle with the new liberalism reflected by revised conservation and rejection articles in the I.C.B.N., which we discuss below, Brummitt concluded that "Those who push too hard for maintaining what they regard as names in current use will do a disservice to taxonomy and nomenclature. Stability will not be achieved by encouraging everyone to do what they like. Anarchy leads only to instability."

To paraphrase a dinosaur conference title, a cool look at this warm-blooded issue is in order, though we emphasize that the following represents our personal views and not that of the Fossil Plant Committee. Firstly, the Articles of the Code are the definitive reference points for all botanical taxonomists. Nowhere among these Articles is there recognition of the validity of such a resolution as the one quoted above. Indeed, the Preface to the 1994 Code, while noting this resolution, asks "Does this mean that the present Code is a document of little consequence, to be set aside each time its application leads to results felt (by some) to be disagreeable?" And answers "Certainly not. The Code now offers generous new ways to avoid nomenclatural changes by proposing the conservation or rejection of names, and these opportunities are to be used."

Nicolson and Greuter (1994) have briefly reviewed the changes to the conservation and rejection Articles in the Tokyo code - now published as Greuter *et al.* (1994). With the approval of the Tokyo Congress, the second sentence of Article 14.2 of the 1988 Code ("Conservation of specific names is restricted to species of major economic importance and to ... [other fairly restricted and specific] cases ....") has been dropped for the 1994 Code. Now names at the principal ranks, from family down, can be the subject of a conservation proposal. Additionally, it is now possible to propose formal rejection of "... any name that would cause a disadvantageous nomenclatural change ..." irrespective of rank (Article 56, 1994 Code).

Now is the chance, therefore, for any palynologist, previously discouraged by the old conservative policy, to try her or his hand at a conservation or rejection proposal. If you have a worthy proposal that is: Nicolson and Greuter warn that authors should carefully consider the merits of their case before deluging Taxon and the nomenclatural committees with proposals. However, somehow we can't imagine the new regulations being a cause of such a deluge from palynologists. Anyone interested in making a proposal should refer to Greuter and Nicolson (1993), Nicolson and Greuter (1994) and Greuter (1994) for discussion, guidelines and an example: unfortunately there is no palynological example yet.

One problem with proposals for conservation or rejection is that they are, indeed, only proposals, not ratified decisions. Final ratification will have to await the next Botanical Congress in 1999. What should we do in the interim? Go ahead and use the proposed "conserved" name and avoid the proposed "rejected" name, as appropriate. Or follow the I.C.B.N. rules strictly and use the "legitimate" names in the interim. The latter course of action would seem to defeat the point of having a new liberal policy.

It would be helpful to cite a possible palynological example to illustrate the dilemma (although readers

should note that the following is not a formal proposal and no such proposal is currently planned as far as we are aware). There is ambivalence in Mesozoic palynological literature over the use of the names *Corollina* Malyavkina, 1949 and *Classopollis* Pflug, 1953. The latter name was almost universally used until Cornet and Traverse, 1975 "rediscovered" the earlier name proposed by Malyavkina, which is based on a very simple line drawing. This drawing shows the type of *Corollina* to be reasonably clearly a "*Classopollis*" grain, but some authors have been reluctant to use the earlier name *Corollina* because of the extremely poor illustration of the type, rendering its species relationships obscure and because of the widespread use of the name *Classopollis*. Under the old philosophy, it would have been practically impossible to have rejected *Corollina* or conserved *Classopollis*.

However, times seem to have changed and it might now be possible to plot *Corollina*'s demise. But what would palynologists do between the time of this hypothetical proposal and the next Congress in 1999? Be good law abiding citizens, respect priority and use *Corollina*; or take a risk that the proposal will succeed and use the name *Classopollis*. There is no definitive way out of this dilemma, but the Fossil Plant Committee can reduce the risk by deliberating on conservation proposals referred to it as they arise (or perhaps annually). The Congress rarely declines issues recommended by committees, and this would give palynologists early, if not final indication of the outcome of their proposals. Indeed, Article 14.14 (1994 Code) states that, in the case of a conservation proposal, approval by the General Committee after study by the specialist committee (the Fossil Plant Committee in our case) renders the name "authorized subject to" a decision at a subsequent Botanical Congress. In other words, if a proposal to conserve *Classopollis* were to be - firstly - published in Taxon, - secondly - referred to, studied by and recommended by our committee, and - thirdly - approved by the General Committee, we could go ahead and use *Classopollis* (cited as *Classopollis* nom. cons. prop. to make it clear that the name has been approved but not fully ratified) as the "authorized" name. Such events would, of course, be reported in Palynos.

We would like to thank Martin Head for bringing to our attention the Hawksworth and Brummitt items in his report in the Canadian Association of Palynologists Newsletter and for supplying these two items.

The new ICBN can be purchased from Koeltz Scientific Books, P.O. Box 1360, D-61453 Königstein, Germany, price DM 60 (+ postage), or from Koeltz Scientific Books (USA), 1911 North Duncan Rd., Champaign, Illinois, USA 61821, price US$51 (+$1.50 in US and $2.08 in Canada). Taxon subscribers should refer to the back of the August issue for discount information.

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Brummitt, 1994, The Linnean, v.10(2), p.13-15.
Cornet & Traverse, 1975, Geoscience & Man, v.11, p.1-33.
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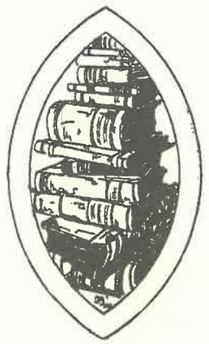
Submitted by Rob Fensome (Chair) and Judy Skog (Secretary), I.A.P.T. sponsored Fossil Plant Committee.
(Other members of the Fossil Plant Committee are as follows: S. Archangelsky, D.J. Batten, K. Faegri, M. Fairon-Demaret, J. Jansonius, H.K. Maheshwari, D.J. Nichols, G. Playford, R.L. Ravn, F. Schaarschmidt, A. Traverse, B.S. Venkatachala, V. Wilde, Zhou Zhiyan.)



New Books Available

Douzième Congrès International de la Stratigraphie et Géologie du Carbonifere et Permien
Comptes Rendus
(C.R. XII ICC-P)

Editor-in-chief:
Sergio Archangelsky

These two volumes (1,130 pages) contain papers presented during the September 1991 Buenos Aires Meeting in symposia on:

- Palynology:
- Late Paleozoic Fossil Fuels
- Glacial Events throughout Gondwanaland
- Tectonics
- Mineral Resources
- Brachiopoda and Mollusca
- Paleobotany
- Regional Geology and Biostratigraphy
- Sedimentology
- L. Palaeozoic & E.Mesozoic Circum-Pacific Events

From the Preamble

The XII ICC-P was significant for several reasons. For the first time several studies of Carboniferous and Permian stratigraphy and geology have been united in one meeting covering the whole Neopaleozoic. This is in accordance with the continuity of biological and geological events related to climatic developments that began with an intense glaciation and finished with gradual global aridization. Crustal mobility and global climatic change were the main causes of the extinction of important plant and animal groups, opening the way to a new era: the Mesozoic.

This is the first time that this Congress has been held in the Southern Hemisphere where the Gondwanan supercontinent existed during the Neopaleozoic. Geological and paleontological evidence from this part of the world contribute significantly to our understanding of our planet during the Carboniferous and Permian. In fact, some contributions to this Congress relate changes that occurred in the Northern Hemisphere to phenomena that occurred simultaneously in Gondwana. New research results from poorly explored areas, such as Antarctica or Patagonia, will necessitate a re-evaluation of our understanding of the Neopaleozoic and Gondwana.

The two volumes cost $US 110 + postage, which is:

Uruguay, Paraguay, Brazil	US $ 18
Bolivia, Chile, Perú	US $ 22
USA & Canada	US $ 61
Europe	US $ 74
Others	US $ 88

Contact:
Asociación Paleontológica Argentina
Maipú 645 1º piso
1006 Buenos Aires - ARGENTINA

The Triassic bivalves Daonella and Halobia in New Zealand, New Caledonia, and Svalbard.
by Campbell, H. J.
Institute of Geological and Nuclean Sciences
1994. Monograph 4: 166 p., 12 plates.

Palynological reconaissance of Early Cretaceous to Holocene sediments, Chatham Islands, New Zealand.
Mildenhall, D. C.
Institute of Geological and Nuclear Sciences
1994. Monograph 7: 204 p., 23 plates.

These monographs cover Permian to Recent paleontology, biostratigraphy and palynology and are of interest to researchers in these fields as well as biogeography, paleogeography, geology, paleoclimatology and oil company investigations.

Monograph 4 is based on new and pre-existing fossil collections and presents substantive assessments of the paleobiology and paleoenvironment of Daonella and Halobia. Their cosmopolitan distribution is explained by long-lived larval stages, and favourable landmass, coastline and marine dispositions during the Triassic. A new superfamily Halobioidea is introduced and six new correlation levels are established which refine age controls for the New Zealand Triassic and reveal major and lengthy unconformities.

Monograph 7 addresses some 320 pollen samples from the Chatham Islands which range in age from the Cretaceous to Holocene and demonstrate marked vegetational changes. Swamp flora, angiosperms, dense podocarp and araucarian forest interspersed with fernlands, and recycled Permian to Jurassic pollen possibly from Marie Byrd Land, Antarctica are part of the early picture. Closed forest disappeared after the Eocene, and the present herbaceous and shrubby vegetational associations appeared in the Late Pliocene. Since the last glaciation, peats, which contain evidence of climatic fluctuations, have covered most of the island.

The Chatham Islands are the largest landmass between New Zealand and South America and have a surprisingly complete sedimentary sequence from the Early Cretaceous to the present. They are the remnants of a Late Cretacous intraplate stratovolcano overlain by thin biogenic and authigenic sediments punctuated by local basaltic volcanism.

Researchers interested in the Chatham Islands should also be aware of the Institute's Monograph 2: **Cretaceous-Cenozoic geology and biostratigraphy of the Chatham Islands, New Zealand** by Hamish Campbell and others (1993). This monograph includes discussion of economic and geological resources such as peat, hydrocarbons and water, and geological hazards in the Chatham Islands. Some 33 tables of fossil lists and 85 photographs are incorporated along with maps, diagrams and paleogeographic reconstructions. Its five appendices cover microfossils, macrofossils, palynomorphs, stratigraphic columns and radiometric dates.

Available from:
Publications Officer
Institute of Geological and Nuclear Sciences
P. O. Box 30-368
Lower Hutt, New Zealand

New Books on Pollen From Elsevier

Pollen Biology, A Laboratory Manual

by K. R. Shivanna and N. S. Rangaswamy

Pollen grains are everywhere: in the air, water and soil, and in the food we eat. Pollen, thus, is important in agriculture, horticulture, plant breeding, crop improvement and biotechnology. It is also used for monitoring cytotoxic effects by herbicides, pesticides and pollutants; testing for allergic reactions; and for basic studies and research on gene expression, differentiation and polarity. The authors give detailed instructions on the standard techniques, including collection and storage of pollen, pollen culture, germination, tests for viability, incompatibility and isolation of protoplasts. They introduce the step-by-step protocols--all of which they have tested--by an explanation of the principles involved, and include personal notes and precautions, specifying the reagents used and various appendices on basic and specific requirements for laboratory exercises on pollen. 1992/132 pp., 18 illus., 9 tables/softcover $41.00; ISBN 0-387-555170-0

Secondary Pollen Presentation

Form, Function and Evolution

by P. F. Yeo

"Secondary pollen presentation" is the presentation of pollen to vectors by structures other than anthers, either passively or via specialized protection and delivery system. Although secondary pollen presentation occurs in the largest family of flowering plants, the *Asteraceae* (*Compositae*), and a large family of great economic importance, the *Leguminosae*, the subject has never been extensively reviewed. Now, Yeo brings together material from the scattered literature and adds original observations, describing secondary pollen presentation genus-by-genus in 25 families. He illustrates many species and individually discusses each family, also providing an overview of the whole topic. 1993/180 pp, 55 illus./hardcover $147.00; ISBN 0-387-82448-0

Angiosperm Pollen and Ovules

by E. Ottaviano, D. L. Mulcahy, M. Sari Gorla and G. Bergamini-Mulcahy, eds.

The biology of pollen development and the phenomenon of self-incompatibility have long been subjects of great interest to plant biologists. Methods in molecular genetics are now facilitating the isolation of genes responsible for controlling pollen development and pollen-stigma interactions, resulting in a revolution in our understanding of these crucial events in plant reproduction. The contributing authors present current research on the physiology, molecular genetics, and biotechnology of pollen and ovule development and interactions in angiosperms. 1992/404 pp., 208 illus./hardcover $87.00; ISBN 0-387-97888-7.

These books can be ordered from:
Springer-Verlag New York, Inc.
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175 Fifth Avenue
New York, NY 10010-7858
e-mail: rwatkins@springer-ny.com
Fax: 212-533-5587

Book Reviews

Pollen Grains of New Zealand Dicotyledonous Plants

by N. T. Moar, 1993, 200 pp., 71 plates, hardback, U.S. $60, including book rate postage. Published by Manaaki Whenua Press, Lincoln, Canterbury, New Zealand.

This recently published book on the morphology of the pollen of New Zealand dicotyledonous plants is a welcome addition to the "Flora of New Zealand" series. It represents almost 20 years of work by Neville Moar, one of New Zealand's foremost palynologists. Although retired, he holds a Research Associate position with Manaaki Whenua-Landcare Research (formerly Botany Division DSIR, Botany Institute, and DSIR Land Resources) in Lincoln, New Zealand.

I have known Neville since 1974 when I first became interested in palynology, and it was one year later that he began this important project. He acted as my first "mentor," and from the outset I gained an appreciation, not only of the finer points of pollen morphology, but also of Neville's keen eye and the meticulous nature of his work. Both of these characteristics are reflected in this book.

It is appropriate that Neville begins the book with a dedication to Bill Harris and a quote from Lucy Cranwell. Over the years, Neville has written many hallmark publications on Quaternary palynology; those publications and this book firmly establish his position with Cranwell and Harris as cornerstones of Quaternary palynology in New Zealand.

The "atlas" is based on pollen from well documented specimens with taxonomically sound plant identifications. In the introduction the author states that "the intention is to provide pollen analysts with keys, descriptions and illustrations to complement that most important tool to any identification, the comprehensive and well-maintained reference collection." This is to be applauded. How many of us have modern reference collections sitting in dusty corners in cardboard boxes with no documentation as to where the material on the slides came from? One hopes that even with the pressure of funding that the reference collection remains well curated and available to future pollen analysts.

Terminology is based on Faegri and Iversen (1964) with some other terms taken from other systems. To this end, a very detailed glossary is included. However, it appears on pages 178-181 after all the morphological descriptions. I would have preferred to see it ahead of the descriptions.

The main body of the book begins with a comprehensive key. There is a key to the main pollen types and then each of the morphological types are treated separately and conventionally under the categories of inaperturates, colporates, porates, and tetrads. Within each group the genera, and/or species are keyed out. All characteristics, excluding size, were considered valid criteria for keying out pollen types. The keys are clear, concise, and easy to use. Occasionally, to illustrate the variation in pollen of members of the same genus, a sub-key is given (e.g. p. 33 for Ranunculus).

The pollen grain descriptions are grouped under plant families beginning with the primitive families of Winteraceae, Lauraceae and Monimiaccea. The descriptions are augmented with 71 plates. Each description includes the plant name (with authority), plate reference, morphological description, and the distribution of the plant in New Zealand.

Where appropriate, a brief discussion on pollen of other members of the family or genus, together with references to other authors who may have illustrated or described the pollen type, is given. All aspects of the description are concise and to the point, which is essential because so many types are included.

The only absentee in my opinion is a note (where known or available) to the first occurrence of the pollen type in the fossil record. This would be of considerable use to biogeographers and stratigraphic palynologists like myself. I appreciate it was out of the scope of the project, but mention of the fossil history of these plants would help bridge the gap between Quaternary and pre-Quaternary workers. An example, *Canavalia rosea* (Fabaceae) (pl. 31, figs 1-5) is very similar to the pollen of *Crassiectoapertites columbianus* found in the Late Miocene-Pleistocene of the tropics (e.g. Trinidad, Venezuela). It would be interesting to know from a biogeographic perspective when his pollen type first appears in the fossil record in New Zealand.

The 71 plates in this book are outstanding and combine both light and scanning electron micrographs (SEMs). Each species is illustrated with a light micrograph and some are accompanied by SEMs. Some of the high magnification SEMs are superb, with those on plates 28 (fig. 3) and 65 (figs. 14, 20) catching my eye. All the light micrographs are sharp and show the excellent technical work that has gone into producing this book. All those involved are to be commended.

This book provides a much needed reference volume for palynologists, working every facet of palynology. For those of you concentrating on the Cenozoic palynology of the Southern Hemisphere, this book is a must, alongside all the reference volumes sitting in a heap next to your microscope. In fact, you could probably discard the tattered, dog-eared reprints and replace them with an attractive, strong hardback book that should endure the test of time.

Reviewed by:
Dave Pocknall
Amoco Exploration and Production
P.O. Box 3092
Houston, TX 77253 USA

February 6-11, 1995
South Asia Geological Congress (2nd)
(GEOSAS-II:95), Colombo, Shri Lanka.
(Congress Secretariat: NARA, Crow Island
Mattakuliya, Colombo 15, Shri Lanka.)
Phone: 941 522008
Telefax: 941 522932; 941 522881

March 5-8, 1995
American Association of Petroleum Geologists Annual Meeting, Houston, Texas, USA. (AAPG Convention Dept., P.O. Box 979, Tulsa, OK 74101, USA.)
Phone: (918) 584-2555

April 19-21, 1995
The Evolution of Plant Architecture, Rooms of the Linnean Society, London, on the 19th and 21st of April; and at the Royal Botanic Gardens, Kew on the 20th of April, 1995, United Kingdom.

Organising Committee:
Dr. A. R. Hemsley, FLS, c/o The Linean Society, Burlington House, Piccadilly, London, W1 V OLQ, United Kingdom.
Phone: 071-434-4479
Fax: 071-287-9364
e-mail: john@linnean.demon.co.uk

Dr. M. H. Kurmann, Herbarium, Royal Botanic Gradens, Kew, Richmond, Surrey, TW9 3AE, United Kingdom.
Phone: 081-332-5244
Fax: 081-332-5278
e-mail: m.kurmann@rbgkew.org.uk

June 12-16, 1995
The Ordovician System, 7th International Symposium, Las Vegas, Nevada, USA. (Dr. Margaret N. Rees, Department of Geoscience, University of Nevada at Las Vegas, Las Vegas, NV 89154-4010, USA.)
Phone: (702) 739-3262
Telefax: (702) 597-4064

August 31, 1995
INQUA, Berlin, Germany. (E. Derbyshire, Royal Holloway and Bedford New College, London University, Egham, Surrey TW20 OEX, UK.)
Telefax: +44(0)273-748919

atember, 1995
Xth Congress of the Committee for Mediterranean Neogene Stratigraphy, Bucharest, Romania (General Secretary Dr. Florian Marinescu, Institute of Geology and Geophysics, 1, Caransebes Street, RO-79678, Bucharest 32, Romania.)
Telex: 122861GRR
FAX: (40.1) 312.84.44

October 10-14, 1995
28th Annual Meeting of the American Association of Stratigraphic Palynologists. Ottawa, Ontario, Canada. Symposia, Technical Sessions, Posters, Field Trip. (Details: Ms. Susan A. Jarzen, Canadian Museum of Nature, P. O. Box 3443, Station "D", Ottawa, Ontario, Canada K1P 6P4, Fax: (613) 954-4724.) Plans are underway for a full-day Special Sessions on Quaternary Palynology. For details contact Dr. Pierre Richard, Laboratoire Jacques-Rousseau, Laboratoire de paleobiogeographie et de palynologie, Department de geographie, Universite de Montreal, C.P. 6128, succursale A, Montreal, Quebec, Canada H3C 3J7.
Phone: (514) 343-8023
Fax: (514) 343-8008
E-mail: richard@ere.umontreal.ca

June 3-7, 1996
European Association of Exploration Geophysicists and European Association of Petroleum Geologists (EAEG 58th Annual Assembly and EAPG 8th Annual Congress), Amsterdam, Netherlands. (EAPG, Attention of Mr. E. van der Gaag, PO Box 298, NL-3700AG, Zeist, Netherlands.)

June 9-12, 1996
North American Paleontological Convention (6th), Washington, D.C., USA. (NAPC-VI, c/o Department of Paleobiology, Mail Stop 121, National Museum of Natural History, Washington, DC, 20560, USA.)

June 22-29, 1996
IXth International Palynological Congress, Houston, Texas, USA (Contact: Dr. Vaughn W. Bryant, Jr., Department of Anthropology, Texas A & M University, College Station, Texas 77843, USA)
Phone: 409-845-5242
Fax: 409-845-4070

PALYNOS (ISSN 0256-1670) is published semiannually (June and December) and is distributed to all individual members of the scientific organizations affiliated with the **International Federation of Palynological Societies (IFPS).** News items, photos, member and society activities are welcomed. (Scientific papers will not be published in *PALYNOS*.) Please forward materials for *PALYNOS* to the Editor:

Dr. John H. Wrenn
Center for Excellence in Palynology
Department of Geology & Geophysics
Louisiana State University
Baton Rouge, LA 70803 U.S.A.

Phone: 504-388-4683
FAX: 504-388-2302

E-Mail: jlwrenn@lsuvm.sncc.lsu.edu

NOTICE

Palynodata Inc. wishes to disseminate its datafile more widely to promote its benefits within the palynological community, to increase and stabilize its annual support, to enhance the software (e.g., an *ad hoc* report writer; query options, etc.), and to assure the continuing development and availability of the datafile. To enable more users to obtain and use the datafile, **Palynodata Inc**. is considering the elimination of the $6,000 "buy-in" charge, a reduction in the annual fees for updates, and undertaking the programming to offer the datafile on CD-ROM. These changes can be implemented if the revenue from additional users with the new fee structure is sufficient to offset any losses of revenues from the current fee structure. **We would be pleased to receive your response to this proposal**. We estimate that we could deliver the CD-ROM version and implement the new fee structure 90-120 days after economic feasibility is established. The table shows user classes, previous user fees and the proposed reduction in annual fees (All users pay material/labor costs for CD-ROM disks ± $125/yr.):

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Institutes	User	$1,000/yr., after Buy-in	**$ 1,000** [3]
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Others	[4]	Not established	[4]

Users also receive the software which queries the datafile. The datafile contains the taxonomic, stratigraphic and geographic information for all palynomorphs reported from 18,000 documents, and can be queried for:

- the occurrence of genera and/or species of interest, and can be restricted by age or location;
- all genera and species from an age, location or range of ages and locations;
- references containing nomenclatural data (New Taxon, New Comb., Emend., or Synonymy); and
- publications by an author of interest.

All search retrievals include a list of citations referencing documents in which data of interest occurs.

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For additional information please contact either: Dr. Merrell Miller, Amoco Production Company, P.O. Box 3092, Houston, TX 77253 USA [Tel. (713) 366-3919; Fax. (713) 366-2404] **or** Dr. Kenneth Piel, 97 Billings Avenue, Medford, MA 02155 USA [Tel. (617) 393-0854].

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[1] Unlimited number of sites and/or users; may be reduced to $6,000 depending on response.
[2] Fee is for one site; second site = $500; third site = $250.
[3] Fee is for one site and/or user; second site/user = $500; additional sites/users =$250 each (maximum of $7,500).
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