

PALYNNOS

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NEWSLETTER of the INTERNATIONAL FEDERATION of PALYNOLOGICAL SOCIETIES



Aerial view of the venue of the 7th IPC—the St. Lucia campus of the University of Queensland, beautifully situated in a graceful bend of the Brisbane River.

7TH IPC UPDATE

Word has just come from the 7th IPC Executive Secretary, **John Rigby**, that the Second Circular is now off the press and will be distributed before the end of June (1987) to all individuals who responded to the First Circular. The Second Circular, an attractive 38-page booklet, lists all costs, titles of 39 proposed symposia, social programs, instructions to authors & speakers, and details of the 13 pre- and post-Congress excursions.

The opening plenary session of the Congress will take place on Monday morning, August 29 (1988); the following Saturday, September 3, the Congress will conclude with

a special closing ceremony held at the site of the World Expo 88.

If you have pre-registered and have not received a copy of the Second Circular, one can be obtained by writing to:

Secretary, 7th IPC
Conventions Department
P.O. Box 489, GPO
Sydney, NSW 2001
AUSTRALIA



As noted in the previous issue of *Palynos* (Vol. 9, no. 2, p. 7), the IFPS Secretary-Treasurer, David M. Jarzen, will commence in July a one-year study leave in Australia from his regular position in the National Museum of Natural Sciences in Ottawa. His new address (through August 1988) is:

Dr. David M. Jarzen
c/o Dr. Geoffrey Playford
Department of Geology &
Mineralogy
University of Queensland
St. Lucia, Qld. 4067
AUSTRALIA

Letter to the Editor

Recently I read Dr. Traverse's report on palm pollen containing sapotaceous pollen grains (*Palynos* 9, No. 2, p. 8). I have found something similar — in a sample of honey from eastern Venezuela many large grass pollen grains are filled with tetrads of *Mimosa* pollen. I think the small *Mimosa* grains get inside the larger grass grains during the acetolysis process, but of course this has to be verified. In the case of the grass pollen it is even more surprising, for the aperture is much smaller than in a monosulcate grain (as found in the palm example). I have turned these grass grains around in order to see if they might be half grains; however, they are entire and without cracks, so the minute tetrads of *Mimosa* must have entered through the pores.

Marialea Salgado-Labouriau
Dpto. Biologia Celular
Caixa Postal 153081
Universidade de Brasilia
70910 Brasilia, D.F.

JANINA CELINA OSZAST 1908-1986



The late Janina Oszast was born in Krakow in 1908 and spent most of her life in this region of southern Poland. In 1934 she graduated from Jagiellonian University with a major in botany, the subject that she then taught at a womens' college in Krakow for the next 16 years.

During the period of the Nazi occupation of Poland (1939-45), she exhibited her extreme patriotism and courage by organizing aid for Polish prisoners, as well as by her activities in the underground Polish national guerrilla army (AK).

After the end of World War II she became interested in palynology and took a position in 1950 with the *Instytut Botaniki, Polska Akademia Nauk* (Institute of Botany, Polish Academy of Sciences) in Krakow. She soon demonstrated that her palynological interests were unusually broad. Initially (during the early 50's) she was involved with reconstructions of the climate and vegetation of northern Poland during the Pleistocene and Holocene. Next (1957) she described specimens of pollen of the then-putative angiosperm, *Eucommiidites troedssonii* Erdtman, from refractory Jurassic clays from Grojec. She was one of the first Polish palynologists to study pollen and spores of Tertiary sediments and to demonstrate the stratigraphic value of Tertiary palyno-

morphs. For example, in 1960 she published a detailed, well-illustrated paper on the fossil pollen derived from Tortorian (Miocene) clays in Upper Silesia (*Monographiae Botanicae* 9: 1-46). Next, she turned her attention to the composition of the Neogene floras of the western Carpathian Mountains, culminating in a classic paper (with Leon Stuchlik) in *Acta Palaeobotanica* XVIII: 45-86, 1977.

Although she was officially retired from the Botanical Institute in 1978 when she reached her 70th birthday, she continued to carry on her palynological research until her death. Further examples of her amazing breadth of knowledge are seen in her pioneering work in the field of archeological pollen analysis, as well as a basic study of the Quaternary pollen flora of Mongolia.

Janina was much loved and respected by her many friends and colleagues. We have been greatly impressed by her demonstrated patriotism to her mother country, as well as by her infectious enthusiasm for so many different aspects of palynological research.

Elzbieta Turnau

Inst. of Geological Sciences PAN
Senacka, 3
31-002 Krakow, POLAND

Report on the 1986 I.U.B.S. Executive Committee Meeting

The International Union of Biological Sciences holds General Assembly meetings once each three years. The last such meeting was held in Budapest, Hungary in 1985; the next meeting is scheduled for Canberra, ACT, Australia in 1988.

But what happens between these general assemblies? I had an opportunity to learn first-hand some of the annual activities of I.U.B.S. when, as an observer, I attended the Executive Meeting of I.U.B.S. held at the State University of New York (SUNY), Syracuse, New York, from August 07 through August 09, 1986.

The Executive of I.U.B.S. meets at least once each year to discuss "issues of concern to biological sciences at the international level..." and to update reports on the several scientific programmes sponsored by I.U.B.S.

The meeting in Syracuse was opened by the President, Dr. Otto Solbrig (Harvard University), with a reading and approval of the report submitted by the Secretary-General, F. de Castri. This report was primarily concerned with status reports on the several scientific programmes supported by the Union. These programmes include:

- 1) Decade of the Tropics (now in its fifth year);
- 2) Bio-Indicators;
- 3) Biological Nomenclature and Biological Taxonomy;
- 4) Elements Concentration Cadasters in the Environment;
- 5) Biological Diversity;
- 6) Control of Fertility/Reproduction Programme;
- 7) Biological Oceanography;
- 8) Biological Education;
- 9) Global Change (a part of the International Geosphere Biosphere Programme established by the International Council of Scientific Unions (I.C.S.U.);
- 10) Medicinal Plants;
- 11) Biotechnology.

One point of concern to I.F.P.S. regards the discussion of I.U.B.S. publications. The journal *Biology International (BI)*, previously published by I.U.B.S. with two regular issues, plus irregularly-appearing special issues, will now (beginning in 1987) be published by I.C.S.U. Press, and will include four issues per year. This move was determined necessary in order to provide *BI* with a larger distribution through I.C.S.U.-affiliated groups. Subscriptions through libraries and other institutions will also be sought. The Executive Committee of I.U.B.S. approved and welcomed the suggestion to include occasional reports from member societies (as I.F.P.S.) as to their activities. In this way it is hoped that *BI* will become a more widely read and useful vehicle for

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the international biological community. Publications prepared by I.U.B.S. during 1985-1986 include Special Issue (BI) No. 9, *Tropical Soil Biology and Fertility* and Special Issue (BI) No. 10, *Responses of Savannas to Stress and Disturbance*.

Publications slated for distribution for the remainder of 1986 include two regular issues of *BI* plus special issues on "Bio-Indicators," "New Challenges for Biological Education" and "Biological Nomenclature."

The reading and approval of the Treasurer's Report contained the usual synopsis of sources of income and expenditures including expenses for meetings, publications, scientific activities and administrative costs—all in all quite routine, with a bottom line figure indicating that I.U.B.S. is financially healthy and has grant money available for member societies.

This final point seems of interest to I.F.P.S., but is not as useful as it may appear. In the past, I.U.B.S. has awarded grant money to member societies as a subvention to assist or otherwise encourage the functions of the member groups. I.F.P.S. has received as late as 1981 such grants up to \$1,000 (US). Since 1982 however, I.U.B.S. has discontinued the granting of funds, but has provided funds on an interest-free loan basis to societies as "up-front" seed money for the purpose of organizing and holding seminars, symposia, annual meetings or special functions. The member or-

ganizations are expected to repay these loans (without interest) in one to three years. As I.F.P.S. has, over the last several years, an adequate reserve in its treasury, additional money from I.U.B.S. has not been sought. The funds available from I.U.B.S. are limited, and many societies in need of funds find I.U.B.S. the only source of available money, and therefore depend on these monies for their continuation. I.F.P.S. will hopefully remain self-sufficient for several years to come.

A major topic of discussion took place during the morning session on Saturday. The topic concerned the cooperation and communication between I.U.B.S. and its member groups. Several categories of members exist within the structure of I.U.B.S. and include:

- 1) **National Members:** adhering countries which pay annual dues based on the size of the country; currently 29 countries appoint delegates to I.U.B.S.
- 2) **Scientific Voting Members:** members representing such major disciplines as Oceanography, Malacology, etc. This category includes 24 divisions of I.U.B.S.
- 3) **Scientific Non-Voting Members:** includes 46 societies, commissions, etc. I.F.P.S. is within this group. Our benefit lies in being advised of the activities of other scientific member organizations and having a voice on the future of biological sciences at the international level. The Executive pointed to the need

USGS AND GSC PALYNOLOGISTS MEET

Palynologists of the U.S. Geological Survey (USGS) hosted an information exchange meeting with colleagues from the Geological Survey of Canada (GSC) at USGS headquarters in Reston, Virginia, on 3-4 November, 1986. Summaries of current activities of the attendees give an overview of palynological research being conducted in the sister organizations.

Tom Ager (USGS, Reston) has been working on Quaternary pollen and spores from Alaska and the east

coast of the U.S. Recently he has begun working down-section, to the lower Tertiary of the North Slope, and to the Cretaceous of the recently-rediscovered dinosaur bone bed on the Colville River. Tom plans biostratigraphic work on the Eocene to Miocene interval recently cored in the New Jersey coastal plain.

Nairn Albert (USGS, Menlo Park) is specializing in fossil dinoflagellate cysts (dinocysts); he is working on his PhD on dinocysts at Stanford University. His current major project

for clear, frequent contact between I.U.B.S. and its constituents. I.F.P.S. has clearly maintained this contact since 1977 when we first joined the ranks as an I.U.B.S. affiliate. Our representative to I.U.B.S., Dr. Annick Le Thomas (Paris), has diligently provided detailed annual reports to I.U.B.S. and has attended meetings both in Paris and at the 22nd General Assembly at Budapest, Hungary in 1985. Additionally, our editor, Dr. James Canright, has forwarded copies of *Palynos* to the I.U.B.S. Executive on a regular basis. On a personal basis (during a coffee break) the Executive Secretary, Talal Younes, expressed to me his appreciation for our continued contact and support of I.U.B.S. endeavours. He commented that we were now a major 'federation' and no longer a 'commission.' It felt good to be recognized.

For more information about I.U.B.S. activities in general and for information on subscriptions to *Biology International* contact:

Dr. Annick le Thomas
I.F.P.S. Representative to I.U.B.S.
Laboratoire de Phytomorphologie
Ecole Pratique des Hautes-Etudes
16 rue Buffon
75005 Paris
FRANCE

Respectfully submitted,
Dr. David M. Jarzen
Secretary-Treasurer, I.F.P.S.
Paleobiology Division, NMNS
Ottawa, CANADA K1A 0M8

concerns Lower Cretaceous biostratigraphy of the Hughes Creek area, north-central Alaska. Nairn also has an interest in the Tuxedni Bay area in southern Alaska, where he is working on Jurassic dinocysts.

Sedley Barss (GSC, Dartmouth, Nova Scotia) has two primary areas of research interest. The first concerns pollen and spores of Carboniferous and Permian coals of eastern Canada. Some of the coalfields under study extend offshore up to 100

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USGS/GSC MEETING

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miles. Sedley's other preoccupation is the development of major databases for palynological analyses. He has now entered age and geographic data on 137,000 taxonomic names into his mainframe computer files.

Lucy Edwards (USGS, Reston) also is deeply involved with computers, and is working on computer applications of the theory of correlation and quantitative biostratigraphy. Recently she has been integrating electric logs with biostratigraphic data. In addition, Lucy works with dinocysts, mostly those of Tertiary age but also some Cretaceous. Field areas for this work are the Atlantic and Gulf coastal plains of the U.S. and the North Slope of Alaska.

Rob Fensome (GSC, Dartmouth) is currently spending most of his time on Mesozoic-Cenozoic palynostratigraphy of offshore eastern Canada. However, he is also writing a series of papers on Jurassic-Cretaceous miospores from the Northwest Territories. Rob is involved with coworkers in various compendium-style projects, including a phylogenetically based classification of fossil and living dinoflagellates and an index of genera and species of acritarchs.



Top row (L-R): Nairn Albert, Ron Litwin, Dave McIntyre, Farley Fleming, Colin McGregor, James White; middle row: Bob Kosanke, Sedley Barss, Art Sweet, Doug Nichols, Rob Fensome; bottom row: Norm Frederiksen, Tom Ager, Lucy Edwards, Graham Williams. (GSC neg. #201000-0)

Farley Fleming (USGS, Denver) is a graduate student at the University of Colorado who holds a student appointment with USGS. His research, which is for his PhD dissertation, is on the palynology of the Raton Formation in New Mexico and Colorado. The Raton includes the Cretaceous-Tertiary (K-T) boundary, and Farley is studying the palynological record of recovery of the flora following the terminal Cretaceous event. His work is an aspect of the USGS project on the K-T boundary headed by Doug Nichols.

Norm Frederiksen (USGS, Reston) studies pollen and spores, primarily of Tertiary age, but also including those near the K-T boundary. His recent work has been on Eocene to Oligocene sections in the coastal plain of Mississippi, Alabama, and Georgia. Norm is now working on sections near the K-T boundary on the Alaskan North Slope, including the Upper Cretaceous at Ocean Point and the Upper Cretaceous and Tertiary of the National Petroleum Preserve, Alaska.

Bob Kosanke (USGS, Denver) specializes in Pennsylvanian spores, such as those occurring in the Pennsylvanian stratotype section in West Virginia, which he is characterizing palynologically in his current research. Progress to date includes de-

termination of stratigraphic ranges and relative abundances of spores in this section. Bob also works collaboratively on other Appalachian coal projects.

Ron Litwin (USGS, Reston) is the newest member of the USGS palynological staff, having been hired in May of 1986. His current work is on pollen and spores of Triassic age from the Colorado Plateau (an extension of research for his recently completed dissertation) and the Triassic-Jurassic rift basins of the Atlantic coast. Ron's future plans call for investigation of Jurassic core material from New Jersey and the outcropping Cretaceous of the Atlantic coastal plain.

Colin McGregor (GSC, Ottawa) is an expert on spores of Devonian age. His present field area is Melville Island in the Canadian Arctic, where he is collaborating in a mapping project. He zoned the Lower and Middle Devonian section biostratigraphically, using palynology tied in with conodont data, and is working on the Upper Devonian. Colin is a member of the Devonian Subcommittee, in which he has been asserting the value of palynology in establishing boundaries, particularly in nonmarine rocks.

Dave McIntyre (GSC, Calgary) works with pollen, spores, and dinocysts of Late Cretaceous and Tertiary age. His field areas are in northwestern Canada, primarily in the Mackenzie Delta and Beaufort Sea. Outcrop is sparse, and most of his material comes from wells. Dave also has current projects on the Campanian to Eocene Eureka Sound Formation on Axel Heiberg Island in the Canadian Arctic and the Cenomanian to Turonian marine succession in the Yukon.

Doug Nichols (USGS, Denver) concentrates his research on pollen and spores of Late Cretaceous to early Tertiary age, and is working in two projects at present. His studies on the K-T boundary from New Mexico to Saskatchewan have been of primary interest. Important new boundary localities have been discovered in nonmarine rocks in Saskatchewan and Wyoming. Doug is be-

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ROBERT H. TSCHUDY, A MEMORIAL

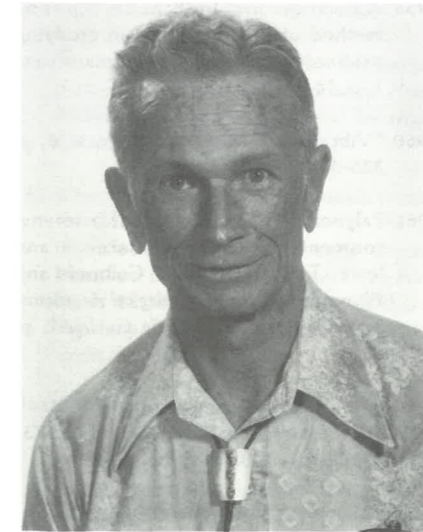
Robert Haydn Tschudy, a pioneer in the field of palynology, died on 31 October, 1986, at the age of 78. He was, in a sense, at the peak of his long and productive professional career.

Bob Tschudy (or just "Tschudy," as he liked to be called) was born 7 May, 1908, in Pocatello, Idaho. He initially attended the University of Idaho, but received his BS, MS, and PhD degrees in botany from the University of Washington. While at the university in Seattle, he met and married Bernadine Dunsford, who became his life-long companion and scientific partner. His research specialties at the time were plant physiology and oceanography. Bob and Bernadine often recalled with pleasure their early years together at the Puget Sound Biological Station (later Oceanographic Laboratories) at Friday Harbor in the San Juan Islands off the coast of Washington.

Tschudy's early career, in the late 1930's and early 1940's, included research and teaching. His earliest publications were on marine algae. He conducted research for the U.S. Bureau of Ships while at the Scripps Institute of Oceanography. He taught botany at the University of Wyoming, held a postdoctoral position at Cornell University, and then taught biology at Willamette University in Salem, Oregon. During World War II, while at Willamette, he taught premedical courses for the U.S. Navy's V-12 program.

After the war, Tschudy was offered a position with Creole Petroleum Company (an affiliate of Standard Oil) in Caracas, Venezuela, which was to set the direction of the major part of his career. Creole was interested in investigating the utility of the relatively new field of palynology in oil exploration. Bob and Bernadine went to Caracas to establish a laboratory and develop techniques of studying palynomorphs in the Cretaceous and Tertiary rocks of Venezuela. They were in Caracas from 1945 to 1950. It was during these years that Tschudy pioneered

in developing preparation techniques for palynomorphs and in using them for age determination and correlation of subsurface strata. This laboratory was one of the first of its kind in an oil company. Always a teacher, Tschudy also taught a course in biology—the first ever—at the University of Caracas, and he taught it in Spanish. Other diversions while in South America included team softball (Tschudy was the pitcher) and a nine-day trek through the rain forest in the vicinity of Angel Falls (the world's highest).



On returning to the United States, Tschudy chose Boulder, Colorado, in which to establish a private palynological consulting laboratory. His partners were Bernadine Tschudy and Constance Ogden. They continued to conduct research for Creole, and later for many other petroleum companies, most of which eventually established their own labs and palynological staffs, as the value of palynology to oil exploration became recognized. Bob and Bernadine returned to South America briefly in 1957 to set up a palynological laboratory for Petrobras in Salvador, Brazil. The Tschudys' own first laboratory in Boulder was in a converted garage. In 1957 they built a combination laboratory and home in a scenic setting in Left Hand Canyon, in the Rocky Mountains near Boulder.

Tschudy soon became quite active in community affairs in the Jamestown, Colorado, area. He joined the Boulder County Fire Fighters Association (later the Left Hand Fire Protection District) as a volunteer. He was trained as an Emergency Medical Technician, taught First Aid and CPR in several nearby mountain towns, and was a member of the Boulder Red Cross Disaster Team.

In 1962, when oil exploration and consulting were entering another periodic decline, Bob Tschudy joined the U.S. Geological Survey in Denver, Colorado, where he began the third phase of his career: the application of palynology to a wide spectrum of geological research. Bernadine was hired soon after and began working with Estella Leopold of the Survey's palynological staff. Bob's calling as a teacher led him to become an adjunct professor at the University of Colorado, a position he held from the 1950's to the 1970's. Bernadine retired from USGS in 1973, but Bob continued until 1978, and thereafter became first a rehired annuitant and finally a volunteer. His enthusiasm for palynological research never diminished. He was active in the field, in the laboratory, and at the microscope right through to August of 1986.

Bob Tschudy's research while with USGS led to the publication of numerous scientific papers and the well-known textbook (with R.A. Scott) "Aspects of Palynology." His bibliography is appended to this memorial. Highlights of his research, for which he will always be remembered among palynologists, include studies on megaspores, on pollen of the Normapolles group, and on palynofloras of Late Cretaceous and early Tertiary age from the Rocky Mountains and Mississippi Embayment regions.

Ironically, Tschudy's greatest contribution to science may have been work that he began after his retirement. His work on palynology of rocks near the Cretaceous-Tertiary

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boundary led to his involvement in perhaps the most exciting scientific debate in recent history, the theory that the terminal Cretaceous extinctions were caused by the impact of an extraterrestrial body. Working with scientists from Los Alamos National Laboratory and USGS, Tschudy used palynology to locate the first iridium anomaly at the Cretaceous-Tertiary boundary to be discovered in nonmarine rocks. This research (along with his earlier work) won him the Meritorious Service Award from the U.S. Department of the Interior in 1983; a coauthored paper on the Cretaceous-Tertiary boundary won an Excellence of Oral Presentation award from the Society of Economic Paleontologists and Mineralogists in 1985. Tschudy continued to work actively up to the end of his life on the nature of the Cretaceous-Tertiary boundary event and its effects on plants. He introduced the view that vegetation had suffered an unprecedented ecological shock at the end of Cretaceous time, although he did not support the concept of mass extinction among land plants. His last paper on the subject (coauthored by Bernadine Tschudy) was published in August 1986.

Throughout his professional life, Bob Tschudy was a meticulous and methodical researcher, who always carefully documented his observations and interpretations. He was a man of imagination, but he never failed to root all of his ideas in reproducible facts. He was a man of dry humor and great personal warmth. An inspiration to students, colleagues, and friends, he is missed by all.

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- 1984 Palynological evaluation of Cedar Mountain and Burro Canyon Formations, Colorado Plateau: *U.S. Geological Survey Professional Paper 1281*, 24 p., 9 pls. (with B.D. Tschudy and L.C. Craig).
- 1984 The "fern spike" at the Cretaceous-Tertiary boundary, Western Interior, United States (abs.): *American Association of Stratigraphic Palynologists Seventeenth Annual Meeting, Program and Abstracts*, p. 22 (with B.D. Tschudy; reprinted in *Palynology*, vol. 9, p. 255-256, 1985).
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- 1986 Extinction and survival of plant life following the Cretaceous/Tertiary boundary event, Western Interior, North America: *Geology*, v. 14, p. 667-670 (with B.D. Tschudy).

D.J. Nichols
U.S. Geological Survey
Denver, Colorado

BOOK REVIEW

Biotechnology and Ecology of Pollen. David L. Mulcahy, Gabriella Bergamini Mulcahy and Ercole Ottaviano, Eds. Springer-Verlag, New York, 1986. xxi, 528 pp., \$46.

We received this book for review with pleasurable anticipation, having admired the results of the two earlier symposia stemming from the same organizers. It is exciting to observe the congruence of several disciplines for the creation of a new biological area of considerable importance for plant breeders, evolutionary theorists, and population ecologists. The first meeting, "International Symposium on Gamete Competition in Plants and Animals: Its Biological Significance" at Lake Como, Italy was followed in 1982 by "Pollen Biology and Implications for Plant Breeding" at Lake Garda, Italy. This most recent gathering at Amherst, Massachusetts in July 1985 reflects an increased effort toward the application of what has become a rather soundly based body of theoretical conclusions, although the theoretical work continues to develop in parallel with the biotechnological usage. Extending the early ideas of gamete competition of these enthusiastic proponents has, as it was meant to, begun to provide a major access point in the artificial manipulation of the sporophytic genome. It is here that the excitement of this field lies, as demonstrated by many of the papers in the current volume. A key point is that pollen genes may provide the flowering plants with a degree of adaptability rivaled only by microorganisms.

The conference title clearly delineates the subject of this meeting from sessions arranged, until now, by the International Federation of Palynological Societies. I.F.P.S. meetings have in one way or another emphasized applications of the exine of pollen grains and spores for studies in stratigraphy and many other disciplines, but here is a proceedings volume of 78 papers and 14 poster abstracts, most involving pollen, with but one index reference to *exine*. The wording of the citation is,

"exine-free gametophytes" and it refers to a method of Baldi, Franceschi and Loewus for isolation of exine- and intine-free sporoplasts (exine-free gametophytes). They discovered that 4-methylmorpholine N-oxide monohydrate (MMNO • H₂O), a potent solvent for polysaccharides, is an effective solvent of the intine layer and a solvent that quickly results in release of sporoplasts from their exine enclosures. With greater time in MMNO the empty exine shells disintegrate and the remnant coalesces into immiscible droplets, thus offering a new approach for study of exine structure and chemistry. There are other papers in the section on "Pollen Ultrastructure and Development" which concern exines, indexed under, for example, *sporopollenin*. Prahel, Rittscher and Wiermann in their paper "New Aspects of Sporopollenin Biosynthesis" report results of their experiments using an inhibitor of carotenoid biosynthesis which seems to demonstrate that sporopollenin accumulation proceeds undisturbed by inhibition of the carotenoid system, in contrast to the findings of Brooks and Shaw 1968. Instead, again in opposition to the theory of Brooks and Shaw, they find that "the metabolism of phenolics is definitely an essential part of sporopollenin biosynthesis." In their report of ongoing work Prahel et al. conclude that sporopollenin is a highly complex biopolymer.

As the title implies the book is largely of interest to biologists, but there are a number of papers which, because of their attention to the interplay between selection and environmental influences, have important implications for those who study plant distribution, past as well as present.

By now we all know that the bulk of genes active in the sporophyte are likewise active in the male gametophyte and, as a consequence of their exposure in haploid form, unusually sensitive to selection which then determines the phenotype. Going beyond the results presented at the first two meetings

work has more and more been addressed to quantifying and verifying the effects in natural populations of the pollen competition ideas developed in these earlier symposia and to identifying the factors of importance influencing the competitive situation of the gametophytes. The paper of Lee and Hartgerink, for example, tests Mulcahy's 1979 thesis, examining whether *Cassia* progeny produced from winners of male gamete competition actually are superior. This is a very important kind of test in the current struggle to define fitness. Stephenson, Winsor and Davis present another in the spate of confirming reports that progeny from fruits (in zucchini) produced by high pollen loads are more vigorous than progeny from fruits produced by low and medium loads.

The first set of papers in the present volume examines "Gene Expression in Pollen" (41 pages, 7 papers). Results of earlier work determined the extent of gametophytic-sporophytic genetic overlap, mainly as identified in electrophoretic assays of gene products. The emphasis in the current papers is upon the expression in the resulting sporophyte of genes selected for via pollen competition.

Examples of applications of this kind of selection are arranged in a second set of papers under the heading, "Pollen in Biotechnology" (117 pages, 20 papers). Here are studies with results showing pollen selection through storage and involving heavy metals, herbicides and phytotoxins. There is at least one indicating that application to field conditions could lead to the need for very special professional skills. Several report techniques for the production of superior phenotypes by means of gametic transformation or selection for superior pollen performance. The study of den Nijs, Maisonneuve and Hogenboom on, "Pollen Selection in Breeding Glasshouse Tomatoes for Low Energy Conditions," was based on experiments of Zamir and Vallejos (1983, Lake Garda, and others reviewed). Zamir and Vallejos

(please turn to page 9)

(continued from page 8)

found that low temperatures during pollen-tube growth favored greater transmission of pollen genotypes carrying sporophytic markers associated with cold tolerance. Den Nijs et al. concluded that they had not found pollen selection at low temperature favouring sporophytic performance at low temperature that was exploitable from a plant breeding point of view. In their discussion, however, they list conditions in the experimental work that they had not quite duplicated. Application, we judge, of basic research will require laboratory-companies operated by persons of exceptional skills using very special equipment.

The third set of papers, "Self-incompatibility and Pollen-Style Interactions" (103 pages, 17 papers) mostly deal with the mechanisms of S-1 systems, but there is some emphasis on effects in actual populations. Several are in the realm of population ecology. The paper of Olmstead, "Self-incompatibility in Light of Population Structure and Inbreeding," for example, has to do with the lack of correspondence between breeding system of the individual plant, (i.e., the degree of self-compatibility or -incompatibility) and the amount of inbreeding in the population, which depends primarily on population structure or size and is essentially independent of the breeding system. Many of the papers in this set describe both biochemically and theoretically how self-incompatibility works. They deal also with the location of the inhibition (e.g., Nasrallah and Nasrallah). The work of Visser, "The Interaction Between Compatible or Compatible and Self-incompatible Pollen of Apple and Pear as Influenced by Pollination Interval and Orchard Temperature" deals with environmental influence, primarily temperature, on competitive gamete performance. The interesting relationships he finds and clear-cut results he presents will certainly be of utility to population ecologists, though perhaps of less relevance to stratigraphers. In these systems compatibility or incompat-

ibility are very much affected by temperature.

The fourth set, "Pollen Ultrastructure and Development," (53 pages, 7 papers) has two papers concerning exines. Dr. Noher de Halac illustrates hybrids and species of *Oenothera* producing various abnormalities in the intine, exine, or both. The results of Prahel et al. on biosynthesis of sporopollenin are outlined above. For biotechnology a key point in this set of papers is *the male germ unit*. There are reviews of the concept in the papers of McConchie and Knox, Mogenssen, and Wilms, Leferink-ten Klooster and Aelst — the sperm cells and vegetative nucleus function as a single transmitting unit, the male germ unit. The sperm cell, its surface, and THE UNIT present a new frontier in plant cell biology.

The set of papers collected under, "Pollen Physiology and Metabolism" (71 pages, 12 papers) represents, according to remarks in the Preface, a rich lode for basic and applied studies.

The final set of papers are grouped under "Gametophytic Ecology" (88 pages, 15 papers). We admit to having only a rather fuzzy notion of what is meant by "pollen ecology" or "gametophytic ecology." Examination of the papers included in this section, while very interesting, has failed to clarify the concept appreciably. Several of the authors test and mostly confirm the suggestion (Mulcahy 1979 and refs. therein) that if fast-growing polyphytic fitness is. Hessing finds no support for the interesting hypothesis of Willson and Burley, 1983, which predicts that the pistil chooses among prospective male gametophytes. Pittman and Levin assessed the relative influence of microenvironmental conditions and genetic background (maternal and paternal identities) on cross-compatibility in natural populations of *Phlox drummondii*.

There are a number of ingenious methods and techniques — among them the use of pollen morphological differences in heterostylous *Pontederia* by Barrett and Wolfe, enabling them to distinguish be-

tween compatible and incompatible pollen, and the use of di-stylous *Anchusa* and *Turnera* in the Boragiaceae by Mary McKenna in determining how gametophytic selection influences sporophytic fitness.

Concluding the book are the Author and Subject Indexes and 26 pages of Abstracts of Poster Presentations. We read these with special attention as most of them are of great interest. They deserve the greater space given to papers given as lectures — the allocation of little or no space in proceedings for contributions presented as posters is, we think, unfortunate.

One can see from this volume that biotechnology and ecology of pollen represent fields offering both intellectual stimulation and great economic and social expectations.

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Joanne S. Rowley and John R. Rowley
Botany Department
University of Stockholm
S-106 91 Stockholm, Sweden

ORT*

McGregor's Law: Whenever two cars are in one line and stopped at a red light, it is always the driver of the second car back who first sees the traffic light turn green.

Lifted from church bulletins: "Meetings will be held in the north and south ends of the church. Children will be baptized at both ends."

"Thurs., 5 p.m., meeting of the Little Mothers Club. All those wishing to become Little Mothers, please meet with the minister in his private study."

*My dictionary's definition of ort is: "Worthless scraps or leavings."

coming increasingly involved in the USGS program on basin analysis, in which he is working on palynostratigraphy of the Powder River Basin of Wyoming and Montana.

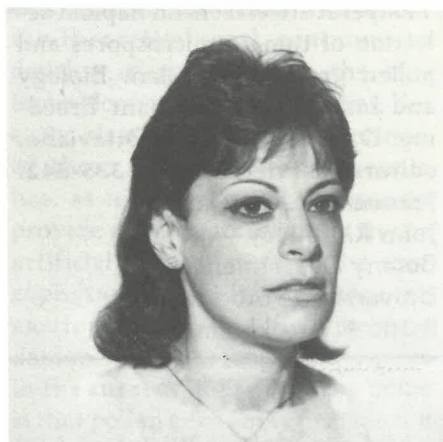
Art Sweet (GSC, Calgary) is a Cretaceous and Tertiary pollen and spores specialist. He has been active in coal inventory programs in western Canada. This work led him to an investigation of the K-T boundary in Alberta, Saskatchewan, and the Yukon. He assisted in the location of boundary sections characterized by palynological changes and the iridium anomaly in these areas. Art is especially interested in the relation of palynomorphs to facies.

James White (GSC, Calgary) is the GSC's most recently-hired palynologist. His research is on Tertiary pollen and spores from the Beaufort Sea, British Columbia, and

Queen Charlotte and Vancouver Islands. James is particularly interested in statistics, and plans to incorporate statistical methods common to Quaternary palynology in his work. His recent results on mechanics of pollen sedimentation promise important new insights, as well.

Graham Williams (GSC, Dartmouth) works with dinocysts of the Mesozoic and Cenozoic. His research is primarily in offshore areas. In offshore eastern Canada he has been working on Triassic to Tertiary subsurface sections important to hydrocarbon exploration. His research directed toward studies of paleoprovincialism and the paleoecology of Cretaceous dinocysts employs Deep Drilling Project and Offshore Drilling Project cores of worldwide distribution. Graham has just begun a study of calcareous dinocysts, which show potential for biostratigraphy.

MEET YOUR IFPS COUNCILLORS



The current Councillor for ALPP (*Asociación Latino-americana de Paleobotánica y Palinología*) is Dr. **Marta Alicia Morbelli**, a member of the botany faculty at the National University of La Plata, Argentina (UNLP).

She was born in La Plata, Buenos Aires Province, on 22 April, 1944. Following her secondary schooling in La Plata, she obtained a position (1964-66) as a technician with the renowned paleobotanist, Dr. Sergio Archangelsky, at that time a member of the Faculty of Natural Sciences at UNLP. During the next two years she served as an assistant

in the experimental oncology laboratories of *Instituto Biológico de la Plata* in a research program to identify antitumoral agents in higher plants. In 1970 she obtained the degree of Licentiate in Botany from the National University of La Plata. She then enrolled in the graduate program in palynology at UNLP and was rewarded with the degree *Doctor en Ciencias Naturales* in 1976. The title of her doctoral dissertation was: "*Morfología de las esporas de las Pteridophyta presentes en la Región Fuego-Patagónica, República Argentina*" (=Morphology of spores of Pteridophyta occurring in the Fuego-Patagonian region of Argentina). This thesis was published in *Opera Lilloana* 28 (138 pp. & 45 plates). In addition, an English key and photomicrographs of these Patagonian spores appeared in Margraf/D'Antoni's volume, "*Pollen Flora of Argentina*," published by the University of Arizona Press in 1978.

For the past ten years Dr. Morbelli has been an Adjunct Professor in Palynology on the Faculty of Natural Sciences at the National University of La Plata. During this period she has taught courses, given seminars and directed students in such diverse specialties as aeropalynology, melitopalynology, archaeo-

logical pollen analysis, spore and pollen morphology as related to taxonomy, and paleopalynology. However, most of her current research is devoted to a comparative investigation of the spores of fern families native to northwestern Argentina.

D.J. Nichols

U.S. Geological Survey
Denver, Colorado 80225

SYMPOSIUM REPORT: PALAEOCENE OF INDIA

The Indian Association of Palynostratigraphers (IAP) organized a multidisciplinary symposium entitled "*Palaeocene of India: Limits and Subdivisions*." About 100 palynologists, palaeobotanists and palaeozoologists assembled on the campus of the Birbal Sahni Institute of Palaeobotany in Lucknow from 14 to 16 November, 1986 to present their views and to discuss the problems. Inaugurating the symposium, the renowned palynologist, **Dr. B.S. Venkatachala**, Director of the Sahni Institute, advocated concentrated efforts to integrate palynological, palaeobotanical and palaeontological data in order to delineate marker assemblages.

H.K. Maheshwari
Birbal Sahni Institute of
Palaeobotany,
Lucknow, India.

NOW IT'S BEES IN HER BONNET?

Dr. **Annick Le Thomas**, Director of the Plant Morphology Laboratory of the *Ecole Pratique des Hautes Etudes* in Paris, is wearing many hats these days. In addition to her regular duties at EPHE, she also serves as the current President of the *Association des Palynologues de Langue Française* (APLF), the Vice President representing actupalynology on the IFPS Executive Council, and is the IFPS Representative to the International Union of Biological Sciences (IUBS).

Last March she was invited to attend the General Assembly in Paris of one of the IUBS affiliates—the **International Commission for Bee Botany (ICBB)**, and subsequently was elected as a member of

their Council. This Commission functions by means of Working Groups, which link together specialists in different parts of the world. For example, Mme. Le Thomas hosted two meetings of the Working Group **Pollen & Bees** in her laboratory at EPHE last year. Dr. Yves Loublier (Montfavet, France) is the Convenor of this Working Group. Other ICBB Working Groups and their Convenors are as follows:

Pollination - Dr. C. van Heemert (Netherlands) & Dr. S.N. Holm (Denmark);

Bee Protection - Dr. J. Stevenson (UK) & Dr. L. Gerig (Switzerland);

Nectar & Nectar Secretion - Dr. U. Luttge (German Fed. Rep.);

Honey - Dr. G. Ricciardelli d'Albore (Italy).

The current officers of the ICBB are: *President* - Dr. S.N. Holm (Denmark); *Vice-President* - Dr. Margaret Adey (UK); *Secy.-Treas.* - Dr. J.N. Tasei (France).

In the past the ICBB has been responsible for the international standardization of methods of pollen analysis of honey (=melissopalynology). Further information about the scope and activities of the ICBB can be obtained from their Secy.-Treas., Dr. J.N. Tasei, Laboratoire de Zoologie, INRA, 86600 Lusignan, France.

FURTHER ORT

The following sign was seen posted on the lobby elevator door of a European tourist hotel: The lift is being fixed for the next days. During that time we regret that you will be unbearable."

Sign posted in a tourist hotel in an Eastern bloc country: "It is forbidden to have women in the bedrooms. If you must have women, please have them in the corridors."

An anonymous friend contributed the following gems spotted in various tourist hotels (in regions where English is at least a second language):

"If this is your first visit to our hotel, you are welcome to it."

"Situating in the shadiest part of town, you cannot fail to remark from the window the odors of the pine trees and our swimming pool."

"If you wish for breakfast, lift the telephone, ask for room service, and this will be enough to bring up your food."

"On our gala night, the chef throws his best dishes, and all water used in the cooking has been passed by the manager personally."

"Swindlers dangling with our guests around our hotel at night have no relations with us. Be care and do not be cheated by their skillful enticement."



Warren Kovach (left) of Indiana University shown receiving the L.R. Wilson Best Student Paper Award from Ray Christopher, outgoing President of AASP, at the meetings held in New York City last October.



New AASP President Don Benson (left) socializing with CIMP President (and an IFPS Vice-President) Bernard Owens. (Photos courtesy of John Wrenn, Amoco Prod. Co., Tulsa, OK).

FUTURE MEETINGS OF INTEREST TO PALYNOLOGISTS

July 6-11, 1987

FOSSIL ALGAE (4th International Symposium), Cardiff, Wales, U.K. (Dr. R. Riding, Department of Geology, University College, Cardiff CF1 1XL, Wales, U.K.)

July 24-August 1, 1987

XIV INTERNATIONAL BOTANICAL CONGRESS, Berlin (West) Germany. (The Third Circular is now available from: The Secretary, XIV IBC, Konigin-Luisse Strasse 6-8, D-1000 Berlin 33).

July 31 - August 7, 1987

INTERNATIONAL UNION FOR QUATERNARY RESEARCH (12th Congress), Ottawa, Ontario, Canada. (Dr. Alan V. Morgan, Department of Earth Sciences, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1)

August 10 - 14, 1987

MESOZOIC TERRESTRIAL ECOSYSTEMS (4th Symposium), Drumheller, Alberta, Canada. Conference Coordinator, Tyrrell Museum of Palaeontology, Box 7500, Drumheller, Canada T0J 0Y0.

August 17 - 20, 1987

SECOND INTERNATIONAL SYMPOSIUM ON THE DEVONIAN SYSTEM. Calgary, Alberta, Canada. (Second Circular is available from: Canadian Society of Petroleum Geologists, 505 - 206 7th Ave., SW, Calgary T2P 0W7).

August 25 - 30, 1987

NONMARINE CRETACEOUS CORRELATIONS (IGCP-245) International Symposium, Urumqi, P.R. China. (Dr. Shen Yanbin, Nanjing Institute of Geology & Palaeontology, Nanjing, P.R. China; or Dr. Niall J. Mateer, 1467 N. 17th, Laramie, WY 82070, U.S.A.)

August 31 - September 4, 1987

CARBONIFEROUS STRATIGRAPHY AND GEOLOGY (11th International Congress). Beijing, P.R. China. Languages: Chinese and English. (Prof. Yang Jing-zhi, Nanjing Institute of Geology and Palaeontology, 39 East Beijing Road, Chi-Ming-Ssu, Nanjing, P.R. China).

September 11 - 17, 1987

PALEOENVIRONMENTAL INTERPRETATION OF PALEOSOLS (GSA Penrose Conference), Warm Spring Indian Reservation, Oregon, U.S.A. (G.J. Retalack, Department of Geology, University of Oregon, Eugene, OR 97403, U.S.A.)

September 23 - 25, 1987

SEDIMENTOLOGY AND DIAGENESIS OF ORGANIC-RICH SEDIMENTS (International Meeting) Sheffield, U.K. (J. McQuaker, Dept. Geology, University of Sheffield, Beaumont Building, Sheffield S3 7HE, U.K.)

September 24 - October 1, 1987

FOSSILS, ROCKS AND HISTORY (13th INHIGEO Symposium), Pisa, Italy. (Prof. G. Giglia, Dip. Scienze della Terra, Via S. Maria 53, 56100 Pisa, Italy)

September 28 - October 2, 1987

PALYNOLOGY, ECOLOGY, PALEOECOLOGY (10th Symposium of Assoc. des Palynologues de Langue Francaise), Bordeaux, France. Claude Caratini, CEGET-C.N.R.S., Domaine Universitaire, 33405 Talence Cedex.

October 26 - 29, 1987

PETROLEUM GEOLOGY OF NW EUROPE (Conference), London, U.K. (NW Europe Petroleum Geology '86, Conference Coordinates, 70 Richmond Road, Twickenham, Middlesex TW1 3BE, U.K.)

October 26 - 29, 1987

GEOLOGICAL SOCIETY OF AMERICA (Annual Meeting), Phoenix, Arizona U.S.A. Meetings Department, GSA, Box 9140, Boulder, CO 80301, U.S.A.)

December 8 - 12, 1987

REUNIAO DE PALEOBOTANICOS E PALINOLOGOS (6th mtg.), Instituto de Geociencias, Universidade de Sao Paulo, Brazil. This meeting is supported by ALPP and IGCP Project 237, "Gondwana Floras." (Thomas R. Fairchild, Instituto de Geociencias, USP, Caixa Postal 20.899, Sao Paulo, SP, Brazil - CEP 01498).

1988

March 20 - 23, 1988

AAPG/SEPM (Annual Meeting), Houston, Texas, U.S.A. (Convention Department AAPG, Box 979, Tulsa, OK 74101, U.S.A.)

April 19 - 23, 1988

INTERNATIONAL SYMPOSIUM ON CIRCUM-MEDITERRANEAN PALYNOLOGY, Zeist, The Netherlands. Co-Sponsored by CIMP and the Laboratory of Palaeobotany & Palynology, University of Utrecht. (Secretariat, Symposium on C-M. Palynology, Lab. of Palaeobotany & Palynology, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands).

August 20 - 27, 1988

INTERNATIONAL PALAEOBOTANICAL CONGRESS (3rd) IOP Conference, Conventions Department, P.O. Box 1901R, G.P.O., Melbourne 3001, Australia)

August 28 - September 2, 1988

INTERNATIONAL PALYNOLOGICAL CONGRESS (7th), Brisbane, Australia. (Dr. John Rigby, Conventions Department, P.O. Box 489, G.P.O., Sydney NSW 2001, Australia)

1989

May, 1989

PREMIER SYMPOSIUM DE PALYNOLOGIE AFRICAINE, Rabat, Morocco. (A. Ballouche, INSAP, Av. John Kennedy, Casier Postal, Rabat - Souissi, Morocco).

SHORT COURSE ON PALEOECOLOGICAL METHODS

The Paleobotanical Section of the Botanical Society of America is sponsoring a pre-meeting workshop on paleoecological methods from 1000-1700 Sunday, August 9, 1987 at Ohio State University in Columbus, Ohio.

PERSONALIA

Professor **Sunirmal Chanda** of the Bose Institute in Calcutta has been elected President of the International Association for Aerobiology (IAA) for the period 1986-1990. Professor Chanda is also the IFPS Councillor representing the Palynological Society of India (PSI).

701542
Arizona State University
Department of Botany
Palynology Laboratory
Tempe, Arizona 85287

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James E. Canright

Department of Botany
Arizona State University
Tempe, Arizona 85287 U.S.A.
(602) 965-1762