



A.A.S.P. NEWSLETTER

Published Quarterly by the American Association of Stratigraphic Palynologists Inc.

September 2000 Volume 33, Number 3

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A.A.S.P.

American Association of Stratigraphic Palynologists Inc.

The American Association of Stratigraphic Palynologists, Inc. - AASP - was established in 1967 by a group of 31 founding members to promote the science of palynology. Today AASP has a world-wide membership of about 800 and is run by an executive comprising an elected Board of Directors and subsidiary boards and committees. AASP welcomes new members. The AASP Foundation publishes the journal *Palynology* (annually), the *AASP Newsletter* (quarterly), and the *AASP Contributions Series* (mostly monographs, issued irregularly), as well as several books and miscellaneous items. AASP organises an Annual Meeting which usually includes a field trip, a business luncheon, social events, and technical sessions where research results are presented on all aspects of palynology.

AASP Scientific Medal recipients

Professor William R. Evitt (awarded 1982)
Professor William G. Chaloner (awarded 1984)
Dr. Lewis E. Stover (awarded 1988)
Dr. Graham Lee Williams (awarded 1996)
Dr. Hans Gocht (awarded 1996)

AASP Board of Directors Award recipient

Dr. Robert T. Clarke (awarded 1994)

Teaching medal recipients

Professor Aureal T. Cross (awarded 1999)

AASP Honorary Members

Professor Dr. Alfred Eisenack (elected 1975)
Dr. William S. Hoffmeister (elected 1975)
Professor Leonard R. Wilson (elected 1975)
Professor Knut Faegri (elected 1977)
Professor Charles Downie (elected 1982)
Professor William R. Evitt (elected 1989)
Professor Lucy M. Cranwell (elected 1989)
Dr. Tamara F. Vozzhennikova (elected 1990)
Professor Aureal T. Cross (elected 1991)

AASP Distinguished Service Award recipients

Dr. Robert T. Clarke (awarded 1978)
Dr. Norman J. Norton (awarded 1978)
Dr. Jack D. Burgess (awarded 1982)
Dr. Richard W. Hedlund (awarded 1982)
Dr. John A. Clendening (awarded 1987)
Dr. Kenneth M. Piel (awarded 1990)
Dr. Gordon D. Wood (awarded 1993)
Dr. Jan Jansonius (awarded 1995)
Dr. D. Colin McGregor (awarded 1995)
Professor John H. Wrenn (awarded 1998)
Professor Vaughn M. Bryant (awarded 1999)

Awards at each Annual Meeting: Unocal Best Applications Paper Award, Best Student Paper Award, and Best Poster Award.

Student Scholarships to support studies in palynology. Currently up to two scholarships of \$1000 (U.S.) each annually. The qualification of the student, the originality and imagination evident in the proposed project, and the likelihood of significant contribution to the science of palynology are factors that will be weighed in selection of award winners. Previous winners of this award are eligible only if they are pursuing a different degree than the one they were pursuing when they received the previous award. AASP Scholarships are available to all students of palynology in all countries. Students need not be AASP members. Application forms appear in the January issue of the *AASP Newsletter*. Chairman of the AASP Awards Committee is Owen K. Davis (palynolo@geo.Arizona.EDU).

AASP Membership Application - Membership in AASP is for the calendar year. Dues are \$30.00 U.S. per year for individuals and \$40.00 U.S. per year for institutional members. All members of AASP receive *Palynology* which is published annually, the *AASP Newsletter*, which is mailed out four times a year, and an annual *Membership Directory*. Dues may be paid up to three years in advance. Overseas AASP Members (Individual or Institutional) who would like to receive their *AASP Newsletter* and *Palynology* by air mail, rather than book rate surface mail, need to include the applicable postage surcharge (noted below). Credit card users must pay a \$1.00 U.S. surcharge per transaction. Air mail surcharge (increased for 1995 and beyond): Europe & South America: \$12.00 U.S. per year. Africa, Asia & Australia: \$15.00 U.S. per year. Credit card surcharge \$1.00 per transaction.



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Marloes Kloosterboer van Hoeve, Editor

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AASP NEWSLETTER EDITOR

Marloes Kloosterboer van Hoeve, m.l.vanhoeve@bio.uu.nl,
Laboratory of Palaeobotany and Palynology, University of
Utrecht - Budapestlaan 4, 3584 CD Utrecht, The
Netherlands - Vox +31.30.253.9318; Fax +31.30.253.5096

The AASP Newsletter is published four times annually. Members are encouraged to submit articles, "letters to the editor", technical notes, meetings reports, information about "members in the news", new websites and information about job openings in the industry. Every effort will be made to publish all information received from our membership. Contributions which include photographs should be submitted a week before the deadline. Deadlines for next issues of the newsletter, are December 1, 2000 and March 1, 2001. All information should be sent on computer disks (preferably Word-Perfect) or by email; if possible, send a hard copy. Always send a duplicate typescript of all electronic copy sent for checking. If possible, please illustrate your contribution with art, line drawings, eye-catching logos, black & white photos, colour photos, etc. We **DO** look forward to contributions from our membership.

A presidential message by Fred Rich

"The time is fast approaching for the next meeting of AASP, which everyone should know by now is being held jointly with the Geological Society of America in Reno, Nevada, from November 12 to 18. The deadlines for submitting abstracts are long past, but it looks as though we have had such a favorable response that we will fill our topical session, "Frontiers in the Palynological Sciences", and have more presentations for an additional session. The actual nature of that session is undecided at this time (8/5/00), but we will try for either a session on just palynology, or a joint one with an allied field, such as paleobotany.

The registration for this meeting is higher than we would have paid for a regular AASP meeting, but as members of an affiliated society all AASP members qualify for the GSA member rate. This reduces the fee to US\$260 for professionals, and US\$90 for students. Preregistration ends October 6, after which the rates go up, so register before that time. Housing in Reno is not particularly expensive, and large blocks of rooms are available at three selected hotels, so be sure you make a room reservation soon.

Next year we will meet in San Antonio. The lessons we learn from the GSA joint meeting will be valuable to the Board of Directors as we look ahead at meetings in London, and, now, Madrid (IPC 2004). We will have a new Board by then, of course, and a different President, but they will need, and appreciate your guidance as we steer AASP through the coming years. The responses I have received from people from a number of nations concerning the conduct of the society, the nature of recent meetings, and the prospects for this new venue have all been very positive. I am pleased that our society is doing well (see the annual review of palynological activities in the July, 2000 issue of *Geotimes*) and that, while palynology may be taking a different course from the one AASP's founders had visions of, we are making steady progress. This is due to the active participation and interest of all our members, not just the Board, and I urge all of you, once again, to take an active role in AASP's business. Thanks to all of you, best wishes, and I hope to see you in Reno."

Fred Rich
President

Important afternote of the president:

Work proceeds almost unabated on the scheduling of events for this year's AASP meeting. The timing of the technical sessions is, as of this writing (8/25/00), still uncertain, but we have enough oral presentations to fill two half-day sessions (27 presentations). These include several invited talks which we have solicited in order to showcase some of the most interesting aspects of palynology. There are also 15 posters. No abstracts have yet been refused, though all authors need to wait for official confirmation from GSA before making final plans to make presentations. The abstracts represent an excellent sampling of palynological efforts, and have been submitted by palynologists from many countries. This program has the potential of being an very fine one, and the enthusiastic response we have received from both AASP members and the Geological Society of America organizers has been wonderful. If you haven't made plans to attend this year's meeting, and it is within your means, please consider joining us!

*** MORE NEWS ON THE AASP 2000, Reno NV, November 13-16, 2000**

Some events still to be finalized: Many of you have expressed concern over the upcoming AASP/GSA meeting to be held in Reno, NV, November 13-16, 2000. Below I have attempted to give you a brief timetable of events to be sponsored by AASP, followed by a short write-up.

Sunday, Nov. 12 (5PM) - Icebreaker in the Exhibits Hall

Monday, Nov. 13 (Afternoon: Location TBA) - Topical Session No. 115, Oral Session One

Monday, Nov. 13 (Tentative, Evening; Location and Time TBA) - Outgoing Board of Director's Meeting

Tuesday, Nov. 14 (Evening; Time TBA) - AASP Social Evening at the Great Basin Brewing Company, Sparks NV

Wednesday, Nov. 15 (Morning; Location TBA) - Topical Session No. 115, Oral Session Two

Wednesday, Nov. 15 (Noon; Location and Time TBA) - AASP Business Luncheon (**tickets sold separately**)

Wednesday, Nov. 15 (Afternoon; Exhibits/Poster Hall) - Topical Session No. 115, Poster Session One

Wednesday, Nov. 15 (Tentative, Evening; Location and Time TBA) -Incoming Board of Director's Meeting

Topical Session No. 115 "Frontiers in the Palynological Sciences"

Thank you very much to all who submitted abstracts in response to the Topical Session. In fact, response was so good that there will be three (3) sessions related to palynology at the meeting; two oral sessions and one

poster. At the time of printing of this issue, the information received from GSA is that Oral Session One of the AASP-sponsored Topical Session will be held the afternoon of Monday, November 13, location to be announced. Oral Session Two will be held on the morning of Wednesday, November 15, and Poster Session One of this Topical Session will be held on the afternoon of that same day in the Exhibits/Poster Hall. All members who submitted abstracts should have already received official word of acceptance directly from GSA with the format, date, time and location of their presentation. Please check the GSA website for detailed speaker's information concerning your presentation. Additional meeting information may be seen at the GSA website, <http://www.geosociety.org/meetings>

AASP Business Luncheon, Board Meetings, Icebreaker and Exhibits Booth

At the present moment, dates and times have not been finalized for the AASP Business Luncheon or the two Board Meetings. The dates and times listed above are those which have been submitted to GSA, but had not been accepted at the time of printing of the newsletter. Many of you have noticed that the Business Luncheon is not mentioned on the meeting registration form. The Business Luncheon is not included in your registration cost, and you will have to buy a separate ticket when you arrive at the meeting registration desk in Reno.

All information concerning AASP sponsored events will be clearly posted at the AASP booth in the Exhibits Hall. Please look for our booth near the GSA Exhibit and Bookstore. Up-to-date times and locations will be clearly posted for all events including the board meetings and business luncheon.

AASP will not be holding a separate Icebreaker, but will be part of the opening ceremonies and Icebreaker in the Exhibits Hall the evening of Sunday, November 12 beginning at 5PM.

AASP Social Evening

AASP invites members attending the meeting in Reno to join them for a social gathering at one of the best watering holes in the Reno immediate area. The Great Basin Brewing Company in nearby Sparks will host the gathering on the evening of Tuesday, November 14. This gathering will allow you to meet and chat with the other AASP members who are at the meeting. Exact details and timing need to be finalized, but all information will be posted at the AASP booth in the Exhibits Hall.

Registration, Accommodations, Short Courses and Fieldtrips

With regards to registration and hotel reservations, AASP members are asked to investigate the GSA website, <http://www.geosociety.org/2000/reg.htm>. All registering and housing information is at this website. Since we are a GSA Associated Society, be aware that AASP members can register as a GSA member at the reduced registration fee. The Reno Hilton has been selected as AASP headquarters where many of the AASP functions have been requested to occur (i.e. the two Board meetings,

and the Business Luncheon). Hotel prices are extremely moderate, but please feel free to choose. Also, check out the extensive selection of short courses and fieldtrips available to all attendees.

Finally, to all AASP members that expected to receive detailed information in the mail regarding this meeting, all AASP members were supposed to have received a copy of the June meetings issue of GSA Today, the newsletter of GSA, which would have contained all the meeting information that many of you had been wondering about. We realize that some of you did not receive that newsletter which would have answered many of your questions. Since this is the first time AASP will be having it's meeting with GSA, some problems and inconsistencies are/were expected. But now that we understand GSA's workings and scheduling a littlebit better, this only ensures that our next venture with GSA will be more successful. I would ask that you make sure your up-to-date e-mail address is on record with the Secretary, so future e-mailings with AASP information will reach you. As well, please check the GSA website as events are sheduled and that website is updated.

Many thanks to Fred Rich for reviewing the abstracts submitted to the Topical Session and working with the Program Committee to ensure AASP get appropriate representation within the Technical program. If there are any questions or concerns that the websites cannot answer, please feel free to contact Thomas Demchuk at thomasdd@hypercon.com



THE 2000 AASP STUDENT SCHOLARSHIPS AND THE CRANWELL SMITH AWARD

The AASP Awards Committee congratulates **Jeffrey Richardson, Caroline van Mourik and Sarah Tiffen**, recipients of 2000 AASP Student Scholarships and of the Cranwell Smith Award. Eleven applications were received from six nations. These covered a very wide range of topics including Aeropalynology, Quaternary Palynology, and Stratigraphic Palynology.

Richardson and van Mourik each receive \$1000 from the AASP Scholarship Fund. Tiffen's award is made separately from the Lucy Cranwell Fund, but the pool of applicants and criteria are the same. The awards are based on the qualification of the student, the originality and imagination evident in the proposed project, and the likelihood of significant contribution to the science of palynology.

Caroline van Mourik's proposed study is entitled, "High-resolution Eocene dinoflagellate paleoecology and paleoceanography from the subtropical Atlantic Ocean as a proxy for th Eocene climate system response to orbital forcing." She writes that she was practically born in the middle of the sea on the island of Terschelling (the Netherlands) and from early days she has been interested in small bugs which were the subject of her masters in Biology.

"After getting my Masters at the Laboratory for Paleobotany and Palynology (LPP) (Utrecht University), I got the opportunity to become a PhD-student in General and Historical geology at Stockholm University in early 1998. As my supervisor here, Jan Backman, is a nannoplankton-man we even have an official cooperation with the LPP-bunch in Utrecht, so Henk Brinkhuis is one of my additional supervisors., as is Nick Shackleton in Cambridge."

"Yes, you guessed right my project is about dinocysts and astronomical forcing. The aim of my project is to use dinocysts as paleoecological indicators of paleoenvironmental changes and to determine the response of the Eocene climate system to orbital forcing. An initial study on the sediments of ODP Site 1053 (subtropical Atlantic Ocean) was carried out. We now know that the preservation at Site 1053 is good, and have a good overview of the composition of the palynological assemblages. So now I'm ready to get started with a high resolution study (10 cm sampling interval). If you want to stay updated on my endeavors in dinospace check out <http://130.237.180.36/CvM/index.html>

Jeffrey G. Richardson is a Ph.D. candidate in the Department of Geological Sciences at The Ohio State University under the guidance of Dr. William I. Ausich. Jeff earned his B.S. in geology from Denison University (1993). In 1998 he earned his Master's degree from The Ohio State University under the advisement of Dr. Stig M. Bergström, , working on Ordovician conodont biostratigraphy. During this time, he was introduced to palynology by Drs. S.R. Jacobson and R.A. Askin.

Jeff's proposal is entitled "Sedimentology, sequence stratigraphy, and miospore zonation of the Borden Formation (Osagean) of Kentucky and adjacent states." The stratigraphy of the Borden Delta Complex (Lower Mississippian) is difficult to interpret due to its wide geographic extent, numerous facies changes, and time_transgressive nature of the lithologic contacts. Facies of the Borden Delta and their lateral equivalents occur in West Virginia, Kentucky, Ohio, Indiana, Illinois, Missouri, and Iowa, both at the surface and in the subsurface. The various lithologic contacts are time_transgressive due to the westward progradation of the delta. By sampling these different facies, a miospore zonation will be constructed for the Borden Delta. The miospore zonation will be compared with the established miospore zones of western Europe. Sequence stratigraphic concepts will be combined with the miospore zonation to produce a more detailed stratigraphic framework for the Borden Formation (Lower Mississippian).



Sarah Tiffin writes, "I completed my undergrad BSc Hons. At Brock University in 1999 with Dr. Francine McCarthy. My undergraduate thesis was titled "Late Pleistocene_Holocene History of Georgian Bay Ontario_Sedimentation Patterns in Response to Fluctuating Lake Levels." By observing the palynostratigraphy and lithostratigraphy from a series of cores, changing sedimentation patterns since the retreat of the Laurentide Ice Sheet were distinguished. As a result of the changes in sedimentation and lake levels, sediments of greatly differing ages are exposed on the lake bottom. Pollen provided the chronostratigraphy for the sediments and, together with thecamoebians, provided date for paleoenvironmental interpretations."

"I am presently working towards my Master of Science degree and continue to work with Dr. McCarthy. I am working on the Miocene palynology of a series of cores from the New Jersey margin. Until recently, the chronology of the Miocene sequences remained uncertain as calcareous microfossil zonal markers (i.e., calcareous nannofossils and planktonic foraminifers) are rare in these sediments due to the marginal marine depositional environment of deposition."

"Palynological data (i.e., dinocysts and pollen) will be collected from ODP Leg 174A continental shelf cores and the Leg 174AX onshore cores. This data will allow middle and upper Miocene sequences to be dated and correlated from previously analyzed slope sites, across the New Jersey shelf, and onto the Atlantic Coastal Plain. Palynofacies analysis will allow us to distinguish changes in water depth or sea level over the Miocene of the New Jersey Margin."



AASP NEWSLETTER REPORT, NEWS FROM AUSTRALIA AND THE UK

by Jim Riding, August 2000

The AASP 2002 meeting is to be held in London during September of that year. We hope to use the facilities of University College London, which is convenient for all modes of transport to and from the metropolis. Jamie Powell is currently putting together an organising committee. It is envisaged that this conference would be held jointly with the British Micropalaeontological Society. Naturally we in Europe are very excited at the prospect of the first AASP meeting ever to be held in the U.K. If anyone has ideas as to good pre- or post conference field trip venues, please let Jamie or myself know. I do not have much in the way of other UK news this quarter, mainly as I have been in Australia since late May. If anyone could supply some copy for the next issue on the recent International Palynological Congress in China, in particular contributions from Europe, it would be greatly appreciated. Contact me at jim.riding@agso.gov.au.

In these articles recently, I have been trying to paint a picture of the palynological scene in Australasia. Helen Hartin of the University of New South Wales sent me some notes on the state of Tertiary and Quaternary palynology in Australian Universities. Thank you for your contribution Helen and I hope my editing has preserved the sense of your original notes.

Quaternary palynology in the University sector of Australia is alive and well and is used to elucidate vegetational history, climate change, archaeological environments, bushfire history and other environmental scenarios. Tertiary spore-pollen palynology is practiced in Australian universities as well, but not to the extent of work on the Quaternary.

At the University of Western Australia in Perth, Western Australia, Professor John Dodson and his colleagues are active in Quaternary palynology, especially with regard to human impact and climate change on local and global scales.

Professor Peter Kershaw leads a large and active team working on the Quaternary palynology of northern Australia and Victoria from Monash University, Melbourne, Victoria. This school is also active in the Tertiary palynology of Victorian brown coal deposits.

In the Australian Capital Territory (ACT), at the Australian National University (ANU), Canberra, Dr. Geoff Hope and his colleagues work on the fine resolution Quaternary palynology of southeastern Australia. Dr. Mike MacPhail also works on Tertiary and Quaternary palynology at ANU and is also a consultant to industry.

Dr. Leslie Head works on Quaternary palynology, especially in relation to archaeological studies, from the University of Wollongong, Wollongong, New South Wales.

Also in New South Wales, at the University of New South Wales, Sydney, Dr. Scott Mooney and his students work on Holocene palynology as part of projects on climate change and bushfire history. At the same institution, Dr. Helene Martin undertakes research into Tertiary palynology, supervises students working on Quaternary palynology and does consulting work for ground water exploration.

Professor Eric Colhoun and his collaborators at the University of Newcastle, Newcastle, New South Wales are active in Quaternary palynology in the local area and in the inland arid region.

Finally, at Southern Cross University, Lismore, New South Wales, Dr. Bill Boyd and his associates work on Quaternary palynology which inputs to multidisciplinary studies on environmental archaeology.

*** LETTER OF DEDICATION FOR DONALD WAYNE ENGELHARDT**

by James E. Canright, Professor Emeritus, Arizona State University, Tempe, AZ 85287

Donald Wayne Engelhardt was born in Blue Island, Illinois, on February 25, 1935. Upon completion of his secondary education, he matriculated at Wabash College, a Crawfordsville, Indiana institution, widely recognized for its high academic standards.

After his graduation from Wabash College in 1957 with an outstanding record in biology, Don joined my paleobotanical research group at Indiana University, where he was awarded a Graduate Teaching Assistantship for a 4-year period. In 1962 he completed his Ph.D. dissertation entitled, "A palynological study of postglacial and interglacial deposits in Indiana." About this time Aureal Cross had just begun organizing a stratigraphic palynology group at the Pan American Petroleum Corporation (now BP-Amoco) in Tulsa and, after interviewing Don, hired him to join that group as a Research Scientist. During a 25-year period with Amoco, he served as Staff Paleontologist in the Denver Region, Regional Paleontologist in Houston, then Division Exploitation Geologist in the West Texas-New Mexico, and Senior Paleontologic Associate in the Houston office. In 1992 he took a position as Research Professor in the Earth Sciences and Resources Institute of the University of South Carolina in Columbia, SC

Don joined AASP shortly after its founding in 1967, and immediately became actively involved with this new organization. He was elected as Vice-President in 1970, with the major responsibility of arranging and coordinating the 4th Annual Meeting in Tucson in 1971. He next ascended to the position of President of AASP for the 1972-73 term of office. This was followed by service as a Councillor during 1973-74. He served on a number of AASP committees, as well as chairing technical sessions at annual meetings.

Due to his greatly increased responsibility with Amoco in such areas as training and international exploration activities, for a time his AASP involvement was restricted to attendance, presenting research reports and chairing technical paper sessions at annual AASP meetings. However, after he left Amoco and became a Research Professor at ESRI at the University of South Carolina, in 1995 he was appointed to a 4-year term as Director at Large of AASP. Despite the occurrence of a number of medical problems, he attended the 1999 annual meeting of AASP in Savannah and also presented a research paper.

Unfortunately, his unexpected and tragic death on February 13 this year, just 12 days prior to his 65th birthday, has terminated an active, productive life and left a void that is impossible to fill.

*** LUCY MAY CRANWELL**

BY Owen K. Davis, with contributions by Ewen Cameron, Benjamin Smith, and Satish Srivastava.

Lucy May Cranwell (Mrs. S. Watson Smith) died on the morning of June 8, 2000 of cancer at Saint Joseph's Hospital, Tucson, Arizona. She was preceded in death by her husband Samuel Watson Smith, and is survived by her son Benjamin Watson Smith.

Lucy was born August 7, 1907, in Henderson (now Cranwell Park, West Auckland), New Zealand, where her father, Benjamin Franklin Cranwell, owned an orchard and a hardware store. Lucy attended the Henderson

public school, the Epsom Girls Grammar School (Central Auckland), and graduated with a M.A. from the University of Auckland in 1929. Lucy was a hockey player and strong swimmer, and matriculated with a double major in English and Botany. Her English major explains the quotes from Spenser, Keats, and Milton that enlivened her letters, as well as her considerable skill as an editor. The second (Botany) degree shaped her career, because upon graduation she was hired as Head of the Botany Department of the Auckland War Museum, a post she held until 1944. Lucy Cranwell was awarded a D.Sc. degree from the University of Auckland in 1959.

Her duties at the Auckland Museum included setting up the new natural history galleries, care of the herbarium (her own collections for the herbarium number over 3600 specimens), service to the public through plant identifications, radio talks, preparing native flower shows, and regular newspaper columns. With her friend, Dr. Lucy Moore, the "two Lucys" carried out fieldwork in remote areas of New Zealand, collecting plant specimens and publishing their results. These areas included the Poor Knights Islands, Hen and Chickens Islands, the summit of Te Moehau, Mt Hikurangi, and the summit of Maungapohatu in the Urewera country.

Lucy married Watson Smith on September 30, 1943 in Auckland, where he was stationed as a Major in the U.S. Army Air Forces. The couple moved to the United States after Major Smith was transferred from the Pacific and to Washington, D.C. After being discharged, "Wat," as he was known, worked at the Peabody Museum of Harvard University, and Lucy held a post of Research Associate in the Botany Department of Harvard University from 1944 to 1950. Their son, Benjamin Smith, was born in Boston, Massachusetts, on March 19, 1947. After the family moved to Tucson, in 1950, Lucy became a Research Affiliate in the Department of Geosciences at the University of Arizona - a post she held until her death.

Lucy Cranwell was made a Fellow of the Linnaean Society (London) in November 1937, "in recognition of botanical research work done both in New Zealand and Sweden and because of efforts she has made to stimulate interest in botany through her position at the Auckland Museum." Lucy was awarded the Hector Medal from the Royal Society of New Zealand in 1957, and she also won the Loder Cup (New Zealand's premier conservation award) in 1937. She was made a Fellow of the Royal Society New Zealand in 1944, and was given an honorary DSc from Auckland University in March 1992. In November, 1999, the Auckland Museum bestowed upon Lucy M. Cranwell its Honorary Fellowship in recognition of a life-time's distinguished contribution to the botanical sciences. Lucy was appointed a Fellow of the Arizona-Nevada Academy of Science in 1983, an made an Honorary Member of the American Association of Stratigraphic Palynologists in 1989. In 1983, Lucy Cranwell and Watson Smith established the Cranwell Award in Palynology for Graduate Students. This award has provided research scholarships to 25 students since then.



Several living plant species have been named in her honor, as have been four microfossil taxa: the genera *Cranwellia* Srivastava, and *Cranwellipollis* Martin, and the species *Nothofagus cranwelliae* Couper, *Gephyrapollenites cranwelliae* Stover, Lucy Cranwell began the study of microfossils under the guidance of Lennart von Post, the founder of pollen analysis, during the winter of 1935-36, when she was invited to Stockholm to study peat samples collected from Southland, New Zealand, by Carl Caldenius in 1934. This collaboration resulted in a joint paper presenting the first Australasian pollen diagram (Cranwell and von Post, 1936). In 1938 she was awarded a Bishop Museum (Honolulu) Fellowship by Yale University that allowed her to study Hawaiian montane bogs. These fossil studies were followed by Lucy's morphological studies of pollen from New Zealand and related genera and species (conifers 1938, *Nothofagus* 1939, 1963, 1964, keys to New Zealand genera 1942, monocots 1953, *Acropyle* 1961, and others). Her arrival in the U.S. was heralded in Paul Sears' *Pollen Analysis Circular* (Sears, 1944). After moving to the U.S.A., Lucy Cranwell initiated the first palynological investigations of Antarctic sediments including McMurdo Sound erratics (1960 with H.J. Harrington and I. Speden), and reports on upper Cretaceous and Tertiary (Campanian to Eocene) finds (not in situ) from Seymour Island and Snow Hill (1959, 1964, 1966, 1969). Similar Eocene deposits were traced to Southern Chile and worked on with Cookson (Cookson and Cranwell, 1967).

Lucy Cranwell was a member of the Organizational Committee for the First International Conference on Palynology held in Tucson, April 23-27, 1962. The gracious accommodations of the Lucy and Watson's desert home (dubbed *The Casa Gondwana*) were a gathering place for many of the 175 international scientists, many of whom were visiting the American Southwest for the first time.

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*** CONSEQUENCES OF ENVIRONMENTAL CHANGE ON THE GROWTH AND MORPHOLOGY OF *Lingulodinium polyedrum* (Dinophyceae) IN CULTURE. Ph.D. Thesis. University of Westminster, London.**

By Richard Hallett, PT Robertson Utama Indonesia, Cilandak, Jakarta, Indonesia, E-mail rhallett@indo.net.id

Dinoflagellates are an extremely diverse biological group; however, *Lingulodinium polyedrum* (previously *Gonyaulax polyedra* and *Lingulodinium machaerophorum*) is one species that may be regarded as a model dinoflagellate. It is single celled, photoautotrophic, marine, planktonic, produces fossilisable cysts and exhibits circadian rhythmic cellular functions of swimming behaviour, cell division, photosynthetic activity and bioluminescence (Lewis & Hallett 1997). The thesis describes i) salinity and vegetative cell division, ii) salinity, temperature and cyst morphology, iii) salinity and cyst growth rate and iv) salinity and tocopherol concentration. All the work was undertaken using controlled laboratory culturing techniques.

In this brief review I intend to describe the research, some of the findings and discuss a few points of interest. If any workers are interested further please contact me. Meanwhile, manuscripts for publication are currently being prepared.

Salinity and Cell Division

Four strains of *Lingulodinium polyedrum* were established in laboratory conditions six salinities ranging from 15 to 40. The resulting exponential growth rates suggest *Lingulodinium polyedrum* is tolerant of salinities between 15 and 40 and salinity is independent of cell growth. There was no obvious relationship between successful growth and salinity. Consequently, it is clear that this species can successfully reproduce in a wide range of salinity conditions in the laboratory, which goes some way to explain the distribution of *Lingulodinium polyedrum* in the natural environment. In the natural environment, they successfully inhabit normal marine salinities and also salinity environments as low as 7 (Dale 1996). The ability to occupy regions of low salinity is believed to be a preference to alternative environmental conditions that co-exist in such regions, rather than salinity itself.

Cysts, Salinity and Temperature

A wide range of cyst morphologies reflecting intraspecific morphological variation of dinoflagellate cysts has been recorded including *Lingulodinium polyedrum* (e.g. Reid 1972, Kokinos & Anderson 1995, Ellegaard 1998). Furthermore, it has been suggested process morphology may shorten or become clavate (bulbous) in low salinity environments (e.g. Wall *et al.* 1973, Turon 1984, Nehring 1994, 1997, Dale 1996, Ellegaard 1998). An alternative explanation is the existence of ecophenotypes, with short and/or clavate processes that exploit low salinity conditions. Another factor referred to as a possible reflection of a low salinity regime is cyst shape. Cruciform outlines of *Pyxidinosopsis psilata*, *Spiniferites cruciformis* and *Serilodinium explicatum* have all been attributed as

a consequence of growth in a low salinity regime (Wall *et al.* 1973, Dale 1996, Eaton 1996). It was with these findings in mind that the research program was established.

Culture conditions were controlled with salinity or temperature as the only variable. Single motile cells of *Lingulodinium polyedrum* were isolated and stock cultures established. Cultures were established in salinities of 15 to 40 and temperatures of 16, 20 and 24 degrees Celsius.

Process length, process width and cyst diameter (excluding processes) were measured. In addition cysts without processes were present in the majority of cultures, coexisting with cysts of varying process lengths. Consequently, a count of the proportion of cysts with measurable processes and spheromorphic cysts (with no processes) was undertaken.

Unsurprisingly, many different process morphologies were observed, an observation also made in laboratory culture material by Kokinos & Anderson (1996). The most striking difference was the variation in process length in any one culture. There was no proven relationship between process length and cyst diameter and such a wide range of cyst dimensions was attributed to the natural size variation within a biological species. The cyst diameter and process base statistics were calculated and analysis of variance concluded they were independent of the salinity of the culture medium. However, on the whole process length increased in greater salinities and decreased in greater temperatures. Cysts with no processes (termed spheromorphic cysts) occurred in varying proportions in each salinity and strain. On the whole, spheromorphic cysts were more common in lower salinity cultures.

The recognition that *Lingulodinium polyedrum* cysts in culture and the natural environment exhibit a wide range of process dimensions and morphology also has important repercussions for the palaeontological study of dinoflagellates. The discovery of such a large variation in morphology of laboratory cultured cysts led Kokinos & Anderson (1995) to combine three previously different fossil species, defined by differing process morphology, of *Lingulodinium* spp. (*Lingulodinium brevispinosum*, *Lingulodinium funginum* and *Lingulodinium sadoense*) into *Lingulodinium polyedrum*.

Process dimension and to some extent, morphology is of limited use as distinguishing criteria within a genus of dinoflagellate cysts. The study has shown there is a gradation or continuum in process morphology and size. A more robust approach would consider wall structure and if possible features of paratabulation, the replication of the vegetative stage thecal plate arrangement. When this is not possible due to the nature of the cyst morphology (e.g. chorate cysts such as *Lingulodinium polyedrum*) species should be distinguished with careful forethought. The recognition of *Lingulodinium polyedrum* cysts with clavate shaped processes in sediments deposited in the

low salinity regime of The Black Sea (Wall *et al.* 1973) was the first reported occurrence of such processes belonging to *Lingulodinium polyedrum*. These forms were attributed to either a consequence of growth in a low salinity environment or an ecophenotypic adaptation to a low salinity environment. In the current study, clavate processes did not form in a pattern consistent with salinity change and the suggestion that they represent growth in a low salinity environment was not confirmed. Another factor referred to as a possible reflection of a low salinity regime is cyst shape. Cruciform outlines of *Pyxidinospis psilata*, *Spiniferites cruciformis* and *Seriliodinium explicatum* have all been attributed as a consequence of growth in a low salinity regime (Wall *et al.* 1973, Dale 1996, Eaton 1996). In this study, cruciform cysts were not observed.

Considering the predominance of spheromorphic cysts in lower salinities, there are also indications in published literature that hint at a possible connection. Wall *et al.* (1973) described *Tectatodinium psilatum* as a new species (now *Pyxidinospis psilata*) with a smooth wall and no processes from the Black Sea. It has been referred to as a low salinity cyst (op. cit., Dale 1996). In the laboratory, this cyst has been incubated providing a motile population of *Protoceratium reticulatum*, which also encysts to *Operculodinium centrocarpum*, a cyst with a full complement of processes (op. cit.). Dale (1996) suggested this cyst may be an 'end-member' of *Operculodinium centrocarpum* or represent a motile stage currently indistinguishable from *Protoceratium reticulatum*. Given the results obtained during the present study the former explanation is preferred. The relationship between spheromorphic cysts and salinity is likely to be related to the observation of reduced process lengths in lower salinities, with spheromorphic cysts representing the ultimate response to a low salinity environment.

The data were modelled further with Generalised Linear Modelling software (GLIM) to investigate the potential of *Lingulodinium polyedrum* cysts to predict salinity. However, these findings are not discussed in this brief report.

The proven relationship between salinity and process presence and length in a salinity gradient were investigated further. Observations and measurements of cyst growth in two different salinities were contrasted and compared in search of an explanation for these findings.

Cyst Growth Rate and Salinity

The growth rate of dinoflagellate cysts has not previously been recorded, however, Taylor & Gaines (1989) and Kokinos & Anderson (1995) have published observations of cyst formation. These publications are the only record of observations of the encystment process in real time using cultures of *Lingulodinium polyedrum* (Kokinos 1994) and *Gonyaulax spinifera* and *Polykrikos kofoidii* (Taylor & Gaines 1989), although comparatively the latter was not particularly detailed.

Cultures were established in salinities of 15 and 32 and checked for signs of encystment on a daily basis. When a

cell was seen to encyst, its culture was selected for prolonged observation and recording. Often the majority of cells in a single culture would encyst over a short period. Consequently, several observations and recordings were possible over a few hours.

Encysting cultures were recorded on videotape and the growth rate of processes and the external thecal membrane (plasmalemma) were measured at intervals of ten seconds using an image analysis system. A membrane expansion factor was defined as the final membrane circumference immediately prior to rupture divided by the circumference of the cyst after membrane rupture. The growth rate curves were compared visually.

During the course of the research into cyst growth, over eighty-one encystments were observed and growth rates were measured. Observations of the encystment procedure mostly concurred with those of Kokinos (1994) and Kokinos and Anderson (1995).

The relationship between the membrane expansion factor and salinity was similar. Cysts grown in a salinity of 15 expanded the membrane between 1.56-2.03 times the cell diameter and cysts grown in a salinity of 32 expanded the membrane between 1.59-2.15 times the cell diameter, consequently membrane expansion was independent of the salinity of the growth medium (tested statistically). A visual comparison of process growth could not discern a difference between the two salinities. In conclusion, the only difference between cyst growth in the two salinities was the lower salinity cultures grew shorter processes for a shorter period.

The results find a lower salinity environment does not cause the membrane to rupture sooner and shorter processes do not grow slower, both possible explanations of shorter process lengths and a predominance of spheromorphic cysts in lower salinities. Given the rapid rate of cyst formation (less than 20 minutes in this study), it is believed the planozygote cell produces the 'building-blocks' for dinosporin formation prior to cyst formation (Kokinos 1994). Consequently, research continued for a biochemical explanation for these findings.

Tocopherol and Salinity

Further experimental studies considered a proposal by Kokinos (1994) and Kokinos *et al.* (1998) that tocopherol might be an important precursor to the formation of cyst wall material (dinosporin). Three cultures were established in two salinities (20 and 32) and the tocopherol concentration per motile cell was determined using spectrophotometry analysis. The cultures grown in a lower salinity had lower levels of tocopherol per cell. These results imply salinity may be a controlling factor for the amount of tocopherol that can be biosynthesised by *Lingulodinium polyedrum*. If tocopherol were a precursor for prist-l-ene, a recognised component of dinosporin, the tocopherol content in motile cells would control the amount of dinosporin precursor material that may be accumulated prior to encystment. This in turn implies that

cell biochemistry controls the reduced process length and predominance of spheromorphc cysts in lower salinities. However, the results from this latter experiment should be regarded as preliminary and the biochemical relationship between salinity, tocopherol production and dinosporin precursors in motile cells requires further research.

The findings briefly reported here progress our knowledge of this common phytoplankter a little further and hopefully, promote an appreciation of the importance of understanding dinoflagellate cell biology and ecology when dealing with palaeontological material. The research was kindly funded by the University of Westminster, London and sincere thanks go to the supervisors/advisors (Dr Jane Lewis, Prof. Chris Bucke, Dr John Latta and Dr Ian Harding).

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* NEW MEMBERS

BAIR, ALLISON N.
700 W. UNIVERSITY AVE.
APT. 9-104
FLAGSTAFF, AZ 86011
TEL. (520) 774-03011
lunabair@yahoo.com

BHATTACHARYA, PARTHA
B-1096, MIG FLAT (DDA)
EAST OF LONI ROAD
P.O. NANDNAGARI
NEW DELHI 110 093,INDIA

* ADDRESS UPDATES

AWAD, MOHAMED Z.
GREATER NILE PETROLEUM
PALACE HOTEL
P.O. BOX 479
KHARTOUM NORTH, SUDAN
TEL. 00249-11-330750
FAX. 00249-11-336227
ZAWAD.KHARTOUM@GNPOC.COM

CLARKE, ROBERT T.
3400 WELLBORN STREET #227
DALLAS, TX 75219-5211
TEL. (214) 219-5399
FAX. (214) 219-5398
rtclarke1@aol.com

GUTIERREZ, PEDRO RAUL
SECCION PALEOBOTANICA
MUSEO DE CIENCIAS NATURALES
BRIVADAVIA
AV. ANGEL GALLARDO 470
(1405) BUENOS AIRES, ARGENTINA
TEL. 54-11 4982-5243
prgmig@sineotis.com.ar

HANKEL, OTFRIED
HOLLERBORNSTR. 64
65197 WIESBADEN
GERMANY
TEL. +49 611 4118427
FAX. +49 611 4118427

ISLAM, M. A.
60 WILBER STREET
ROSSMOYNE, WESTERN AUSTRALIA
AUSTRALIA 6148
TEL. +61 8 9457-2387
azizi@inet.net.au

KNELLER, MARGARET L.
DIPARTIMENTO DI SCIENZE DELLA TERRA
UNIVERSITA DI SIENA
VIA LATERINA, 8
53100 SIENA, ITALY
TEL. 0577 233814

FAX. 0577 263938
kneller@unisi.it

KNIGHT, R. R. W.
ENB-NLUK NAM
P.O. BOX 28000
9400 HH ASSEN
THE NETHERLANDS

LEYDEN, BARBARA
DEPARTMENT OF GEOLOGY
UNIVERSITY OF SOUTH FLORIDA
TAMPA, FL 33620
TEL. (813) 974-0324
FAX. (813) 974-2654
leyden@chuma1.cas.usf.edu

LINDSTROM, SOFIE
DEPARTMENT OF GEOLOGY
LUND UNIVERSITY
SOLVEGATAN 13, S-223 62
LUND, SWEDEN
TEL. 46-46-2227870
FAX. 46-46-121477
sofie.lindstrom@geol.lu.se

MARSHALL, JOHN E. A.,
SCHOOL OF OCEAN AND EARTH SCIENCE
UNIVERSITY OF SOUTHAMPTON
SOUTHAMPTON OCEANOGRAPHY CENTRE
EUROPEAN WAY
SOUTHAMPTON S014 3ZH, ENGLAND
TEL. (+44) 023 8059 2015
FAX. (+44) 023 8059 3052
jeam@mail.soc.soton.ac.uk

MCPHILEMY, BRONAGH M.
10 GREENHILL PARK
NEWCASTLE, CO. DOWN
NORTHERN IRELAND, BT33 OHP
TEL. 028437-22088
MORON, JEAN-MARC
E.A.P. DEPARTMENT GEOLOGIE SEDIMENTAIRE
C.S.T.J.F.
PAU CEDEX, FRANCE 64018
TEL. 59.83.44.00
FAX. 59.83.55.51
jean-marc.moron@elf-p.fr

PALAMARCZUK, SUSANA
TENIENTE GALAN 2956
1684 EL PALOMAR
PROVINCIA DE BUENOS AIRES
ARGENTINA
TEL. 54 11 4758 8319
FAX. 54 11 4758 0990
suspai@movi.com.ar

REID, SABRA L.
1723 ANNAPOLIS DRIVE
ANCHORAGE, AK 99508
TEL. (907) 272-5005

SOMOZA, DOUGLAS
LABORATORIO GEOLOGICO EL CHAURE-PDVSA
PUERTO LA CRUZ, ESTADO ANZOATEGUI
VENEZUELA
APTDO. 4326
TEL. 58-81-606482
FAX. 58-81-606445
SOMOZAD@PDVSA.COM

STANCLIFFE, R.P.W.
IMPERIAL OIL RESOURCES LTD
RESEARCH CENTRE
3535 RESEARCH ROAD N.W.
CALGARY, ALBERTA, CANADA T2L 2K8
TEL. (403) 284-7480
FAX. (403) 284-7431
stan.stancliffe@io.sprint.com

SULLIVAN, AMY E.
3511 IVY FALLS DRIVE
HOUSTON, TX 77068
TEL. (713) 656-9530
amy-e-sullivan@mobil.email.com

THUSU, BINDRA
29 WINSTON AVE.
KINGSBURY, LONDON NW9 7LA
UNITED KINGDOM
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*** CREATION OF A WORKING GROUP ON TROPICAL TERTIARY DINOFLAGELLATES**

Until recently, dinoflagellates have not been the palynomorph group of choice for interpreting stratigraphy or paleoenvironment of tropical Tertiary oil prospects: these are traditionally found mostly in deltaic settings where pollen and spores provide the most information.

However, the never ending quest for new reserves, coupled with technical progress , (drilling, seismic imaging) has opened an entirely new exploration tract, where the key words are deep, very deep, or ultra-deep. Deep in terms of present-day bathymetry, with water depths in excess of 1500m, but also in terms of the initial depositional setting. The petroleum industry is moving away from shallow waters, toward the dark confines of the abyss, where dinocysts abound, whose taxonomy and environmental significance is poorly understood and whose stratigraphic potential is largely untapped.

In response to this deepwater exploration trend, a number of trailblazers, namely **Laurent de Verteuil** , **Dominique Pourtoy** and **Graham Williams** initiated an idea to organise a **WORKING GROUP ON TROPICAL TERTIARY DINOFLAGELLATES**, whose aim would be:

“to assess the global state of knowledge of Oligocene to Recent dinocyst taxonomy, biogeography, biostratigraphy

and paleoecology, in relation to evolving icehouse ocean climate and circulation, and tectonic basin structuring, between 30° north and south of the equator”.

“Areas of interest for investigation include the Gulf of California, Pacific Central America and Peru; the Gulf of Mexico, the Caribbean and Brazil; West Africa from Namibia to the Canary Islands; the Red Sea, Persian Gulf, Arabian Sea and East African coast; the Bay of Bengal, South China Sea, the Philippines, Indonesia and Melanesia; and most of Australia”.

A kick-off meeting during the Reno conference was suggested. It is my pleasure, on their behalf, and with their consent and support, to invite you all to come and join us in Reno for the organizational meeting of the Working Group on Tropical Tertiary dinoflagellates, and help us get the project off the ground. COME BE A PART OF SOMETHING NEW!.

I think this is a great opportunity and invite all interested to get in touch in order to adjust the organisation to the number of potential attendees. At the time of going to press, Tom Demchuk, who is liaising with GSA, does not know exactly when the various official AASP functions will be slotted into the GSA schedule, let alone when we can hold our impromptu get-together. So check the AASP booth at the conference venue for day and time.

If you are interested, and have any comment or suggestion, please feel free to get in touch with any of the following: Tom Demchuk; thomas.d.demchuk@usa.conoco.com, or Sharma Gaponoff: slga@chevron.com

*** NEW EMAIL DISCUSSION LIST FOR MODERN AND FOSSIL DINOFLAGELLATES (Dinoflagellate-L).**

The purpose of the list is to bring together dinoflagellate workers from the biological and palaeontological communities. It is for discussion/questions related to *modern* and *fossil* dinoflagellates, such as culturing, toxicology, HAB, taxonomy, systematics, evolution, ecology, palaeoecology, physiology, palaeoclimatology etc. In addition, it may distribute information on relevant seminars, courses, meetings, research grants, post-graduate and post-doctorate vacancies etc.

The list was started in June 2000 and dinoflagellate workers are invited to subscribe by sending a blank e-mail (no subject, message or signature) to dinoflagellate-L-subscribe@egroups.com. The list server (egroups.com) will then send a message asking for confirmation, followed by a welcome message with full details.

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BOOK REVIEWS

*** *The Origins of Agriculture in the Lowland Neotropics*. Delores R. Piperno and Deborah M. Pearsall. Academic Press, 525 B Street, Suite 1900, San Diego CA 92101-4495 (1998). 400 pages. Cost: \$99.00.**

The thesis of a Lowland Tropical origin of agricultural systems was originally promulgated by Carl Sauer (1952) among others, in response to the accepted consensus of the time of a highland origin for plant domestication. The researchers during these early decades were hampered by a decided lack of empirical data, particularly from lowland tropical regions. Within the last two-decade, new recovery and laboratory techniques have contributed much information on these Lowland Tropical Regions. These new data are amply presented in this volume.

In their new book, Piperno and Pearsall have provided an excellent overview of the theories advanced for the development of food production, summarized by the factors. The discussion concerning the Neotropical Ecosystem (chapter 2) is an excellent summary of our current understanding. The synthesis of the modern ecosystem distribution and the paleoenvironmental data provide the reader with the necessary framework for the remainder of the book.

Chapter 3 provides a discussion of major domesticated crops important in Central and South American Prehistory. The overall discussion is supplemented by data from archaeology, botany, and phytogeography and provides a meaningful discourse on the modern distributions of these plants. I found this section to be not only instructive but illuminating.

Chapters 4 and 5 provide the basic data for their thesis. Chapter 4 focuses upon the development of foraging and food production from the earlier periods. The authors present very convincing data that domestication had occurred as early as 9000-8000 years ago and by 7000

years ago had evolved from the incipient "house gardens" to more inclusive systems such as swidden. Chapter 5 discusses the development of small scale horticulture into full blown agricultural systems and the concomitant development of these agriculturally dependent societies. The emphasis upon a wide variety of disciplines presents a very convincing argument.

The authors argue convincingly that the domestication process begins in the New World Neotropics at approximately the same time as in the Middle East, or about 10,000 years ago. This documents the antiquity of Neotropical agriculture in the New World in comparison to the highland systems of Peru and Mexico. The observed changes in climate and vegetation associated with the terminal Pleistocene and early Holocene Periods are mirrored in the Neotropical regions of the New World. Much of this data has been generated within the last two decades.

Comparing plant macro botanical remains, pollen, phytoliths and archaeological data, they show that by as early as 8000-9000 years ago, incipient plant domestication was occurring with these Lowland regions. Their argument for a development from localized "house gardens" to more extensive, large scale agricultural systems is both cogent and illuminating. The focus upon the development of later (mid-late Holocene) agricultural systems is especially useful for students within these particular subareas.

I have only one criticism of the book and this is of a technical nature. In the maps scattered throughout the volume showing the distribution of sites and ecosystems, the upper elevation mountainous areas are not specifically identified. While these areas, usually shown in black, can be identified by reference to figure 2.1, I think it would have been preferable to include references to these areas within the legend of the subsequent maps.

The price of \$99.00 for this volume may appear somewhat high, but given the recent inflation of academic volumes, does not appear prohibitive. The immense quantity of data assembled by these authors makes this volume an attractive course requirement. The book is well organized and very readable and the authors should be congratulated for this valuable contribution. The integration of so many diverse disciplines covered by this volume makes this book required reading for an extremely large number of academic courses as well as for serious researchers in the field. Whether one agrees with the authors arguments or not, this volume is must reading for all students of paleoethnobotany and archaeology.

Reviewed by:
Richard G. Holloway, Ph.D.
Quaternary Services
5000 N. Country Club Drive
Flagstaff, AZ 86004-7326

*** *Late Cretaceous and Cenozoic History of North American Vegetation*. Alan Graham. Oxford University Press. 350 p. 1998. \$95.00.**

Graham has provided us with a very well-written and broadly encompassing tome of the last 100 million years of North American vegetation. Most of our paleobotanical knowledge of the Late Cretaceous and Cenozoic is based on leaves (and to a far lesser extent other megafossils such as reproductive structures and woods) and on pollen/spores; to properly use and relate knowledge from these different organs is a difficult task, and thus this book is unique and especially welcome. Graham, who cut his eyeteeth by studying megafossils and microfossils of Miocene floras knows well these different plant organs. Although he restricted his later studies primarily to palynology, this book demonstrates that Graham has kept abreast of advances in megafossil paleobotany.

Graham proceeds in an orderly fashion by providing us with background information and concepts, for example in present-day climate and vegetation/climate relations, including a review of the modern vegetation of North America. A review of data derived from especially the marine record from the Deep Sea and Ocean Drilling Projects provides a necessary context for discussion of the nonmarine record derived from plants that follows. The record of vertebrates is only briefly discussed.

A significant part of the book occupies itself with discussions of methodologies currently used in the studies of paleobotany/palynology, and these discussions include their limitations as well as their strengths. These constitute an exceedingly valuable part of the book. At the same time, my most serious criticism is the exclusion in the methodological discussions of taphonomy; this area of study provides us with new interpretive insights.

About half the book comprises discussions of floras that samples vegetation through the Late Cretaceous and Cenozoic from different latitudes and longitudes. Graham has attempted – very successfully in my judgement – to include a broad spectrum of floras that have been described by a broad spectrum of workers. By following the references cited, you will be led into virtually all the pertinent literature. As well, Graham has included the most recent references available on different topics. Here you will find, for example, a discussion of what is known of the Cretaceous-Tertiary boundary events or of events proximal to the Eocene-Oligocene boundary.

Graham is clearly undaunted by controversy, and it is especially here that his synthesis shines. His discussions of the Cretaceous/Tertiary boundary, for example, present some different viewpoints and references allow the reader to pursue the controversy further. Similarly, the discussion of some of the newer methods in biogeography (e.g., molecular clocks) and apparent conflicts with paleobotanical data are treated fairly and emphasize areas for which additional investigation is needed.

Graham's book is a significant addition to the bookshelves of researchers in palynology or in megafossil paleobotany:

we often ignore one another's data and/or conclusions. However, any researcher who needs an easy-to-read summary of what went on in the plant-world of North America during the last ~100 million years will find this book valuable and presenting balanced viewpoints of controversial subjects.

Other than the almost total absence of taphonomy, another criticism of this book is the circumscription of the subject matter. I fully realize that the Flora of North America published by Oxford University Press in 1993 excludes Mexico. But, Graham is, I think, the most knowledgeable person on the Tertiary floras of the Caribbean-Mexican region and has unquestionably contributed much to our palynological knowledge of that region. The inclusion of his knowledge on that region would have presented us with an even more useful tome.

Reviewed by Jack A. Wolfe, Desert Laboratory, University of Arizona

AGENDA

*** URBINO, ITALY, JUNE 4-8, 2001: UPPER CRETACEOUS-NEOGENE DINOFLAGELLATE CYST COURSE; Morphology, Stratigraphy & (paleo)ecology**

Conducted by Graham L. Williams (GSC Atlantic), Karin P. Boessenkool (LPP, Utrecht University), Henk Brinkhuis (LPP, Utrecht University) and Martin A. Pearce (Kingston University). With contributions by Rob A. Fensome (GSC Atlantic) & Jan Willem Weegink (NITG-TNO). Local coordinator: Prof Dr Rodolfo Coccioni, University of Urbino Venue address: Istituto di Geologia dell'Università, Campus Scientifico, Localita Crocicchia, I_61029 Urbino, Italy. Tel. +39-0722-304237, fax +39-0722-304220, email: cron@info-net.it (Coccioni)

Information and Registration: Henk Brinkhuis, Laboratory of Palaeobotany & Palynology (LPP), Utrecht University, Budapestlaan 4, 3584 CD Utrecht, the Netherlands. Tel. +31-30-2537691, Fax. +31-302535096, email H.Brinkhuis@bio.uu.nl; Alternative contact: Mrs. Marjolein Mullen, LPP secretary, at M.Mullen@bio.uu.nl

Set up: A general course on aspects of Late Cretaceous-Recent organic-walled dinoflagellate cyst morphology, stratigraphy and (paleo)ecology will be held at the premises of the University of Urbino, Italy, between June 4-8, 2001.

Information on morphology, taxonomy and stratigraphic ranges of ca. 300 selected species will be provided, besides presentations on applications of quantitative dinocyst analysis in terms of reconstructions of paleoenvironment and paleoclimate.

Participants will be provided with a detailed manual, besides a CD-ROM with illustrations of key-taxa. A mid-week excursion is planned, with visits to Jurassic, Cretaceous and Tertiary outcrops, incl. e.g. the Cenomanian/Turonian, Cretaceous/Tertiary, Eocene/Oligocene and Oligocene/Miocene boundaries. Fees include the manual, CD-ROM and excursion, and are set at:

industrial staff US\$ 550.-, academic staff US\$ 350.-, and PhD/MSc students US\$ 150.-

Lodging can be arranged in a selection of hotels in the famous renaissance City of Urbino, or if budget requires, on the nearby Urbino Campsite for students. Associated lodging and travel costs are at participant's expense. More information can be obtained via Henk Brinkhuis (see above for address).

The maximum of participants is 40. If interested, please send queries, and/or your personal information, incl. company or academic institution to Henk Brinkhuis (see address above).

Registration and money-transfer deadline is April 1, 2001. Required funds should be transferred to the account of the LPP Foundation: ABN/AMRO bank 46.50.04.512, indicating Urbino Dinocourse 2001. LPP's VAT/BTW no. is NL 89.58.427.B.01 If so wished for, fees can also be paid on site, but registration should be definite. Your LPP Foundation contact person: Wim A Sluis at W.Sluis@bio.uu.nl

PROVISIONAL PROGRAM URBINO DINOCYST COURSE 2001

Daily program: Morning sessions: 09.00-12.30hrs (with coffee/tea break), Afternoon sessions: 14.30-18.00 hrs (with coffee/tea break).

Monday June 4

Morning:- -Introduction to the course, timescales
-Morphogroups-1
Afternoon: -Morphogroups-2

Tuesday June 5

Morning:- -Stratigraphy-1
Afternoon: -Stratigraphy-2
-(Brief) Intro Excursion (Coccioni & Brinkhuis)

Wednesday June 6

Morning: -Stratigraphy-3
Afternoon: -Excursion Contessa & Bottaccione Valleys
Leaders: R. Coccioni, S. Galeotti & H. Brinkhuis

Thursday June 7

Morning: -(Paleo)ecology-1, incl. notes on (paleo)ceanography; concepts
Afternoon: -Paleoecology-2; Upper Cretaceous & KTB

Friday June 8

Morning: -Paleoecology-3; Paleogene
Afternoon: -Paleoecology-4; Neogene & Quaternary
-Wrap-up

* A GLOBAL MEETING ON EARTH SYSTEM PROCESSES June 24-28, 2001, Edinburgh, Scotland. Organized by the Geological Society of America and Geological Society of London.

Earth System Processes will focus on two themes critical to the understanding of how our planet works: 1) Earth System Linkages will explore the relationships between the solid Earth, the hydrosphere, atmosphere, cryosphere, and biosphere and 2) Earth System Evolution will examine the way in which processes controlling the nature of the planet have changed since the birth of the solar system 4.5 billion years ago.

The meeting will be limited to four parallel sessions and so the number of oral presentations will be strictly limited to some of the topics of most general interest, but there will also be a major emphasis on poster presentations.

The detailed shape of the meeting will be determined by the autumn by interaction between the technical Committee and the Geoscience community. If you are interested in making a contribution, suggesting ideas, or organizing a session, please contact one of the co_chairs or members of the Technical Committee. The topics attached to each name refer to a broad area of interest, not the titles of specific sessions. They are listed to help you decide who might be the best person to contact with your ideas.

Technical Committee Co-chairs: Ian Dalziel (University of Texas at Austin; ian@utig.utexas.edu) Tectonics and Earth history Ian Fairchild (Keele University; i.j.fairchild@keele.ac.uk) Earth surface geochemical processes; climate change. For more information and updates visit: www.geosociety.org or www.geolsoc.org.uk.

*** GENERAL CONFERENCE AGENDA (with thanks to the CAP, see also <http://www.ualberta.ca/~abeaudoi/cap/conf.htm>)**

2000

November 13-16 2000. Geological Society of America, Annual Meeting. Reno, Nevada, U.S.A. Conference theme: "Crossing Divides". Details: GSA HQ, Box 9140, 3300 Penrose Place, Boulder, Colorado 80301, U.S.A. Tel: 303 447-2020, X133, E-mail: meetings@geosociety.org

November 13-16 2000. AASP 2000 Reno, Nevada, U.S.A., to be held in conjunction with the GSA Annual Meeting. T. Demchuk (thomas.d.demchuk@usa.conoco.com), Fred Rich (frich@gasou.edu), or Paul Strother (strother@bc.edu), **see for more information also this newsletter!**

2001

May 27-30 2001. GAC/MAC Joint Annual Meeting St John's, Newfoundland. Details: St. John's 2001, c/o Department of Mines and Energy, Geological Survey Division, Regional Geology Section, P.O. Box, 8700, St John's Newfoundland, A1B 4J6, Canada, Tel: (709) 729-2301, Fax: (709) 729-3493, E-mail: dmp@zeppo.geosurv.gov.nf.ca, Website: <http://www.geosurv.gov.nf.ca/stjohns2001>

May 29 - June 2 2001. Canadian Association of Geographers (CAG) Annual Meeting, McGill University, Concordia University and Université de Montréal, Montreal, Canada. A joint event arranged by the three Montreal universities in celebration of the 50th anniversary of the founding of the CAG. Details: Tim Moore (moore@felix.geog.mcgill.ca), Patricia Thornton (thorpat@vax2.concordia.ca), André Roy (royandre@ere.umontreal.ca)

June 17-23 2001. 12th Symposium of the International Workgroup for Palaeoethnobotany (IWGP) Sheffield, England, UK. Details: IWGP, Department of Archaeology and Prehistory, University of Sheffield, Northgate House, West Street, Sheffield, S14ET, England, UK. E-mail: iwgp@sheffield.ac.uk Website: http://www.shef.ac.uk/uni/academic/A_C/ap/conf/iwgp/iwgp.html

September 18-22 2001. PAGES - PEP III Conference. Le Centre de Congres, Aix-en-Provence, France. PAGES - PEP III is concerned with studies of past climate variability in Europe and Africa. Key aims are to assess variability on different time-scales, to assess the impacts of past climate change on natural ecosystems and human society, and to provide a firm basis for the verification and testing of climate models. There will be a number of plenary lectures from invited speakers plus a series of poster sessions open for all participants, plus a post-

conference excursion to the Massif Central, France (subject to interest). Details: Dr Catherine E. Stickley, Environmental Change Research Centre, University College London, 26 Bedford Way, London, WC1H 0AP, England, UK E-mail: C.stickley@ucl.ac.uk Website: <http://www.geog.ucl.ac.uk/ecrc/pep3>

November 5-8 2001. Geological Society of America, Annual Meeting. Boston, Massachusetts, U.S.A. Details: GSA HQ, Box 9140, 3300 Penrose Place, Boulder, Colorado 80301, U.S.A. Tel: (303) 447-2020, X133, E-mail: meetings@geosociety.org

2002

October 28-31 2002. Geological Society of America, Annual Meeting. Denver, Colorado, U.S.A. Details: GSA HQ, Box 9140, 3300 Penrose Place, Boulder, Colorado 80301, U.S.A. Tel: (303) 447-2020, X133, E-mail: meetings@geosociety.org

2003

November 2-5 2003. Geological Society of America, Annual Meeting. Seattle, Washington, U.S.A. Details: GSA HQ, Box 9140, 3300 Penrose Place, Boulder, Colorado 80301, U.S.A. Tel: (303) 447-2020, X133, E-mail: meetings@geosociety.org