



A.A.S.P. NEWSLETTER

Published Quarterly by the American Association of Stratigraphic Palynologists Inc.

December, 1998 Volume 31, Number 4

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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 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 Board of Directors Award recipient

Robert T. Clarke (awarded 1994)

AASP Distinguished Service Award recipients

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

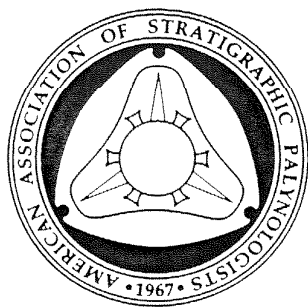
Awards at each Annual Meeting: Unocal Best Applications Paper Award, Best Student Paper Award, and Best Poster Award.

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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Jan Willem Weegink, Editor

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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 January 31st and March 31st 1999. All information should be sent on computer disks (MS Word for Windows is best) 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.

PRESIDENTIAL ADDRESS Chris Denison

Back in 1985, Vaughan Bryant painted a gloomy picture of the future for palynology, with the possibility of eventual extinction. This prediction came to my mind many times during the more than a decade of uncertainty that ensued, with a combination of major reductions in employment in the petroleum industry, and the threat of additional downsizing constantly hanging over our heads. During this period, in the oil industry we witnessed a steep decline in the numbers of biostratigraphers in all sub-disciplines. Academia was not been immune: demand for graduate students dried up and schools closed as professors retired.

But during the past 2-3 years, oil prices were reasonably high and stable, and world demand was slowly increasing. Experienced staff were in short supply; salaries were rising; bonuses were becoming widespread. Companies were beginning to add staff, to be able to cope with new business opportunities in places like Azerbaijan, Venezuela and Brazil, and to address the problems of demographics - basically that most current employees will be retiring in the next 10-15 years. Newly-minted graduates were suddenly at a premium: there was a rush to hire new graduates in the earth sciences in general, and even a few in biostratigraphy. For a while it seemed as though we had finally turned the corner, that we could look for sustained growth, and an increasingly healthy future.

Then the price of oil plunged, and has stayed at low levels, due to over-production, mild winters and the Asian economic downturn. The gas market in southeast Asia has been hard hit, at a time when many companies were gearing up in response to the perceived ever-growing demand for gas.

So everything changed. Cost reduction became the watchword, so projects slowed down or stopped, and hiring was curtailed or stopped, even reversed - despite the reality that it will be several years before the new graduates can make significant contributions.

In the summer of 1998, the BP/Amoco merger was announced. Then the Ultramar/Diamond Shamrock merger with Phillips in October reinforced the feeling that the industry was heading for a time of mergers and takeovers, with the disruption and downsizing inevitably involved. Then Arco essentially closed down biostratigraphy and sedimentology, Shell and Occidental have made significant staff reductions; in December Exxon and Mobil announced a merger. Companies are still looking for further cost reductions - meaning staff reductions.

During the last two to three years it has been possible to get funding for consortia and academic research projects, but now, when the oil business is reducing expenditure, funds have dried up, and projects such as CENEX are struggling for support.

Is there any good news? Biostratigraphy still seems to be vibrant in Europe, driven to a large extent by the need for biosteering

during horizontal drilling and by the need for high resolution, reservoir-scale biostratigraphy in North Sea oil fields that are going into decline. The conference on reservoir scale biostratigraphy that Mike Simmons organized in Aberdeen, in June, 1997, was an eye-opener for me. It was the first time I had seen innovative techniques such as using nannofossils for biostratigraphy and palynomorphs for high-resolution eco-zonations at the reservoir-scale. These are clearly highly valuable techniques that should be applied to horizontal drilling and declining fields anywhere in the world.

Earlier this year, Dino 6 in Trondheim was hugely successful, despite Barry Dale being on strike. Morten Smelror did a wonderful job of organizing the conference, and of coping with the problems created by the air traffic controllers strike that started on the final day. It was invigorating to see so many enthusiastic young people at the meeting, all talking about dinoflagellates. And it certainly reinforces the notion that palynology is still alive and well in Europe.

Palynologists in Australia currently have more work than they can handle, but Robin Helby is concerned that this may change as the economic downturn in the region takes hold. Again at the reservoir scale, some outstanding highly detailed work has been done as part of the effort to resolve correlation problems in the Triassic.

Paradoxically, it seems that despite the concentration of international oil companies in the US, it is where biostratigraphy is declining the most.

Obviously, the dislocations caused by corporate mergers are decided at a level that we cannot affect, so what can we do?

Firstly, I think we can do a better job of selling our product at a level that we can influence - where the oil is being produced. For many of us, the exploration side of the business is the exciting part, but that is where the budget cuts bite first. It is the engineers who control the money, who really run the business. Decisions made by the engineers, in terms of building platforms and pipelines, and drilling production wells, involve billions of dollars. Any influence we as biostratigraphers can have on those decisions can translate into millions of dollars saved on a project.

Secondly, we need to become more involved in the high-tech aspects of the business. Sometimes it seems that when management talks about technology, they mean bigger and better computers, and fancier ways of processing seismic data, yet the basic technology of biostratigraphy has not changed over the years - it involves some fairly simple sample processing techniques and trained eyes looking down the microscope. Data generation may seem slow, and it sounds expensive to the manager who will pay for it, but in reality, each palynomorph identification is costing 25 cents or less; forams and nannofossils are even cheaper. Biostratigraphic data is actually really cheap data, and there are potentially thousands of data points in a well.

What then? It is not enough to get the data into a chart presentation program, generate a nicely colored chart, apply a biozonation, write a report and hand it over to a geologist or geophysicist. We have to use these bigger and better computers to integrate our results directly into the workstation world, so that the biostratigraphy is displayed alongside well logs and on seismic profiles. We also have to use more statistical techniques to extract the maximum amount of information from those thousands of data points - there is too much information to be able to grasp without some statistical techniques.

On this level, I think we do have some control over our futures, because the results of biostratigraphy can be applied to decisions that have a huge financial impact. In many ways, if you want to become part of the decision making process, it means accepting a

lot of challenges. It is not enough to be a skillful biostratigrapher - you also need a broad geological background, the skills to be able to talk with the geologists and geophysicists on their own terms, and a grasp of many different technologies, from oil field operations to Shannon-Weaver Index to workstation programs.

"RETIRED MEMBER" CLASS by David Pocknall

At the annual business luncheon of AASP held in Ensenada the proposal (see AASP Newsletter 31(2):1) to establish a new class of membership for retired members was voted on and passed unanimously by more than 50 members of the association in attendance. The "Retired Member" class is as follows:

"Retired members shall be persons who are retired from professional activities in palynology. Retired members will pay annual dues to AASP at the rate of US\$15.00 and will enjoy all the privileges of active membership with the exception of receiving the journal of Palynology.

A retired member can revert to full membership at any time".

This new class of membership will become effective January 1, 1999.

All correspondence with respect to this announcement and payment of dues should be sent to Thomas Demchuk, Secretary/Treasurer, whose address is published elsewhere in this newsletter.

ENSENADA GOLF TOURNAMENT CARRIES AASP MEMBERS TO THE WINNERS CIRCLE By Vaughn Bryant

The beautiful scenery and mild October weather provided an excellent setting for the 31st annual AASP meeting and also for the more important event—the 9th AASP Invitational Golf Tournament. Participants in the tournament could enter only by invitation and the coveted invitations were extended only to the "creme de la creme" of the pollen society. After careful and painstaking screening and paring down the list of applicants, by the tournament chairman David Pocknall, the lucky remaining few were told to meet at the Ensenada Baja Country Club on the appointed day, and that the tournament would begin early in the morning as soon as the dew had dried on the greens. David Pocknall also assured the group that the "Kiwi scoring system," which had tended to favor those golf players from New Zealand and had come under great scrutiny and criticism after it was used to score the AASP Ottawa Invitational Golf Tournament, would not be used in Mexico!

The select group of participants donned their appropriate golf attire, cleaned and polished their clubs, checked all of their needed gear and headed off to play the appointed round of golf. The complex logistics of ferrying players and the crowds of spectators was handled by the Transport Captain, Anne Norris. Spacious limousines headed out from the Coral and Marina Hotel through the throngs of well wishers and an international group of reporters that lined the streets hoping to capture a picture of the golf stars and celebrities. The limos rumbled through the streets of Ensenada and then onto a wide highway headed south towards Rio Los Cabos. When they reached the country club exit they turned and headed due east into the verdant foothills that lie just beyond the coastline. Lining the road were giant palms, agave plants, and miles of blooming bougainvillea that added a blaze of red to the green landscape. As the group approached the golf clubhouse the early morning sea fog was just lifting and revealed long fairways dotted with lakes and sand traps and punctuated with dark green

patches holding pennant flags. Exotic birds were swimming and feeding along the shoreline of the various lakes while blooming flowers added a sweet aroma to the cool morning air. In front of the Country Club's main building a forest of TV camera and video trucks representing top world media groups greeted each limo as it arrived. Meanwhile, on the steps of the country club a Mexican band played the national anthems of the ranked participants as they entered the clubhouse.

The inlaid black slate floor of the clubhouse echoed as the groups moved slowly through the spacious halls and down to the pro shop where rows of neatly hung golf shirts and jackets hung on spotless racks. Further down, past displays of shoes, hats, and rows of golf balls and clubs glistening in the morning sun, stood the judges in their yellow jackets and grinning smiles. Large picture-windows offered a panoramic view of the course below where all knew the competition would be friendly (but fierce) for the coveted prizes that awaited the winners. Augusta, the pride of the PGA, could not have looked more impressive than this jewel tucked away in the foothills of the Ensenada wine country.

After signing in and getting buckets of practice balls, the group edged out onto the veranda where their golf carts and clubs were parked below and beckoned to be used. A short drive brought the group to the edge of the driving range where a few practice drives and chips would swell the flow of adrenalin and ready the group for the challenges ahead. As each golfer took careful aim and hit the driving balls, the tournament chairman reviewed the various entries and assigned them to different "flights" or competition groups. There would be one group of golfers in the 50-and-under age group; a second group would be comprised of those in the 50-60 age group; the final group would be reserved for those over 60. All was now ready for the competition to begin.

As each group teed off at the first hole there was an aura of excitement as we watched the tiny white spheres, which looked like overgrown pollen grains of *Chenopodium*, jump off their tees and sail skyward down the center of the fairway. Each of the 18 holes presented new challenges and called for exceptional shots down winding fairways, around sand traps, over crystal-clear ponds and lakes filled with fish and turtles, and in some cases up to the surface of elevated greens. During the round there were outstanding shots of all kinds made by the various participants. A few of these are worth mentioning. At the fifth green the leader in the senior group approached his ball lying in the fairway about 90 yards away from the pin. After selecting an appropriate club he hit a beautiful wedge shot that climbed skyward and headed for the white pennant flag in the center of the green. However, a gust of wind caught the ball and it continued on its flight until it reached the far side where it then fell earthward through several olive trees. When the golfer reached his errant ball, he was greeted by an old Mexican who was down on his hands and knees collecting olives and putting them in a bucket. "Gracias," he said with a smile, "Muchas gracias." It seems that the golf ball had managed to dislodge dozens of olives from their branches and had provided easy pickings for the Mexican collecting them on the ground. Another outstanding shot occurred on the 8th fairway when the leader in the 50-60 age group teed off with a solid hit sending the golf ball screaming down the fairway only inches above the top of the grass. About 50 yards away several Ibis birds were crossing the fairway and managed to dodge the oncoming ball with only millimeters to spare. "Boy, I almost got a birdie on this hole!" remarked the golfer with a grin. Then there was the outstanding "cart path" shot that resulted when one of the golfers sent a drive

off to the left of the fairway where it struck the concrete cart path and then rolled nearly 100 yards farther along the fairway, getting a tremendous advantage from that smooth surface. Even turtles had

to be on their guard. At the 15th hole the green was surrounded by water, and as one of the golf balls approached the green it fell short and narrowly missed a turtle basking in the middle of the pond on a small log. Among other great shots were ones often called "cloud splitters." This type of shot is sometimes hit off the tee—so named because it goes very high but not very far. There were also a fair number of "worm burners," which are shots that stay so close to the ground that any worm sticking its head out of his hole would surely be decapitated.

On a number of the holes one of the Mexican caddies would smile and say "ocho" after one of the senior golfers finished the hole. The golfer would bow and thank the caddie and move on to the next hole thinking that "ocho" was a synonym for a complimentary term such as "ole." It wasn't until the end of the round that the golfer realized that "ocho" meant eight and reflected his high score, not a congratulatory praise!

When the round was finished all scores were tallied and all golf clubs were wiped clean and carefully put away until they will again be needed for the next important AASP golf tournament in Savannah. Winners of the Ensenada tournament were congratulated and promised trophies that would be mailed to them soon. Winning in the under 50 age group was David Pocknall who was so outstanding with a score only slightly over par. In fact, he said winning the tournament had nearly convinced him to give up looking at palynomorphs and to turn golf pro. In the 50-60 age group Vaughn Bryant led the way with a score of just under 100, a score nearly identical to his win in that age group during the AASP Ottawa tournament. Finally, in the over 60 category a newcomer to golf, Geoff Norris, came from behind to rally during the last two holes and pull out in front and win.

As the winners sat at a restaurant table in downtown Ensenada celebrating and eating tacos, one of them remarked, "Boy, this sure beats the hell out of looking at dinos!"



The Winners Are! — photo Vaughn Bryant



The U.K. Scene
by James B. Riding

I do not have much news from the UK this quarter unfortunately. Last week I returned from the 31st Annual Meeting in Ensenada, Baja California, Mexico. Perhaps unsurprisingly, western Europe was not well represented this time due to the sheer distance involved. Javier Helenes and Bob Clarke organised a truly superb conference with an exceptional venue, a good programme and a wonderful field trip. Congratulations to all involved with this.

This year's Annual General Meeting of the British Micropalaeontological Society (BMS) will be held on Wednesday 18th November 1998. The venue is the Gustave-Tuck Lecture Theatre, University College London, Gower Street and the event starts at 2.00 p.m. We have two guest speakers following Society business (elections, reports etc.), one of whom is Matthew Collins of the Postgraduate Institute in Fossil Fuels and Environmental Geochemistry, University of Newcastle, whose talk is entitled Small beginnings: ancient biomolecules and micropalaeontology. The other lecturer is Norman MacLeod from the Natural History Museum in London who will speak on The renaissance of graphic correlation. Abstracts of these lectures were published in BMS Newsletter No. 58. At around 4.00 p.m., there will be poster displays and a wine reception in the South Cloister at University College. This is a welcome departure from the noisy and crowded receptions in the Rock Room. AASP members are naturally most welcome to attend this meeting; I hope this information is still relevant when this Newsletter is published and distributed!

The latest book in the BMS Publications Series entitled Calcareous Nannofossil Biostratigraphy, edited by Paul R. Bown, was published recently by Chapman and Hall. This is the last in this series to be produced by Chapman and Hall, who have recently been taken over by Kluwer Academic Publishers based in Dordrecht, The Netherlands.

Calcareous Nannofossil Biostratigraphy, in my view, is an excellent volume. It comprises 315 pages and contains nine chapters; it is comprehensive and well illustrated. Every practising micropalaeontologist should have one. You can order it from: Kluwer Academic Publishers Group, P. O. Box 322, 3300 AH Dordrecht, The Netherlands (tel: +31 78 6392235; fax: +31 78 6392254; WWW: <http://www.wkap.nl>).

The North/Central/South American address for distribution of Kluwer product is: Kluwer Academic Publishers, 101 Philip Drive, Norwell, MA 02061 USA. BMS members will receive a 20% discount.

The JMG Scene
By Niels Poulsen

Message on the JMG Secretary

In August (this year) at the 5th International Symposium on Jurassic Stratigraphy in Vancouver in Canada, Susanne Feist-Burkhardt (Geol.-Pal. Institut, Schnitzspahnstrasse 9, D-64287 Darmstadt, Germany, e.mail: feist@bio.tu-darmstadt.de) volunteered to serve as secretary, convenor and newsletter editor for JMG. The computer database of the Research Directory of the Members of JMG is still been managed by Patricia Whalen (521 St. Albans Lane, Eureka Springs, Arkansas, 72632, USA e.mail: micropaw@ipa.net), and the publications index by David C. Cole (Department of Geology, University of Southampton, Highfield, Southampton SO9 5NH, UK, e.mail: d.c.cole@soton.ac.uk).

The JMG members present at the JMG group meeting in Vancouver (August, 18, 1998) agreed on continuing paying a

subscription for the JMG-Newsletter, however, Susanne will explore the possibility of publicising the JMG Newsletter as a newsletter on the web. If the newsletter will appear on the web, the subscription for the newsletter will only be for those, who want the newsletter in printed version, distributed by post. Susanne will bring further information on this and on payment a fee for printed version of the newsletter soon.

The JMG-Newsletter will in the future be published in the summer each year.

TWENTY YEARS OF PALYNOLOGICAL
SYMPOSIA IN SPAIN, PALYNOLOGY IN
STRATIGRAPHY, PALEOENVIRONMENTAL
RECONSTRUCTIONS AND AMBER STUDIES
By Koldo Nuñez-Betelu

Last September the Association of Spanish Speaking Palynologists (A.P.L.E.) celebrated its 20th anniversary during its XII Symposium held in León (Spain). As explained in this year's abstract volume by M. A. Fombella Blanco, the association was founded in Madrid twenty years ago by F. Cramer, C. Sáenz and P. Candau and that same year held its First Symposium in the Faculty of Pharmacy of the Universidad Complutense de Madrid. In that first conference, a total of 25 papers related to plant taxonomy, paleopalynology, pollen structure and aeropalynology were delivered to the audience. Even though A.P.L.E. held annual conferences for the first three years, with the arrival of M. C. Risueño Almeida to the presidency, the association decided to hold biannual symposiums from then on. Soon A.P.L.E. entered the International Federation of Palynological Societies and started publishing interesting and renowned monographs, specially under the direction of the next president, C. Pardo Martín. The next stage in the history of A.P.L.E. started two years ago with the election of M. Suarez Cervera as president and represents a time of increased activity at all levels, including communication with other palynological communities.

In this year's symposium about one hundred works were presented, including studies on paleopalynology, actinopalynology, melisopalynology, aeropalynology and biology of pollen. To start with, the opening talk was given by B. Owens and entitled "A comprehensive palynozonation of the Devonian-Carboniferous of the Gulf Region, the middle East and North Africa" and was followed by another two key talks by A. Le Thomas on the origin of the angiosperms and by M. C. Risueño on pollen development delivered through the symposium. Although many works were originated in the Iberian Peninsula, it is interesting to observe an increase in the participation of researchers from non-Spanish speaking countries and the growth in the amount of studies from outside Spain.

After the symposium there was little time to rest because October also witnessed two very interesting meetings, one in the Canary Islands and one in the Basque Country. The first one was the XIV Paleontological Meeting of the Spanish Paleontological Association and was devoted to Paleontology and Environment. Among the many works presented there were some directly related to palynology which, as we all know, can represent an important tool for paleoenvironmental reconstructions, especially for the Quaternary. Other applications of palynology, such as biostratigraphy, were also the focus of palynological studies.

The other meeting was the World Congress on Amber Inclusions and gathered the most prestigious investigators on this field, from D. Grimaldi to G. Poinar and many well known specialists from USA, Western Europe and Eastern Europe. The

reason this year the World Congress was held in the Basque Country was to provide first hand information on the recently discovered amber site of Peñacerrada, just a few kilometres south of the conference site and which, so far, is providing an astonishing amount of inclusions, mainly perfectly preserved insects, from the Aptian. The first inclusions were discovered by an amateur just three years ago and since then many specialists have become involved in the study of this Early Cretaceous amber which holds not only insects from at least 13 different orders, including a number of previously undescribed types, but also leaves, feathers, terrestrial palynomorphs, and other organic remains. This amber was deposited in a coastal environment as indicated by the marine and terrestrial palynomorphs described in two of the talks delivered in the this conference. These same palynomorphs have been also used to tentatively date the site as late Aptian to middle Albian. Further palynological studies will refine this datation. Other palynological studies presented at the meeting focused on the palynological content, a forgotten treasure, of amber from other sites around the world. Since the study of the Basque amber is still preliminary, the conference served to contact specialists from different disciplines and to plan future research which will include palynology as the main stratigraphic tool.

The continuous presence of palynologists in paleontological meetings in Southwestern Europe, as demonstrated in the reported meetings, and the use they are making of palynology in many fields of geology is slowly given strength to our discipline. This may attract more funding and the recruit of new palynologists as well as the return of old ones. Let's hope for it.

LEONARD RICHARD WILSON, 1906 - 1998

Leonard Richard Wilson was born in Superior, Wisconsin July 23, 1906. He died at his home in Norman, Oklahoma, July 15, 1998 at the age of 92. He was the elder of two sons of Ernest and Sara Jane Cooke Wilson. He is survived by his wife Marian De Wilde whom he married September 1, 1930. Their son, Richard Graham Wilson, of West Fork, Arkansas, and daughter Marcia Graham Wilson Roe of Norman, Oklahoma, 11 grandchildren and 7 great-grandchildren also survive.

Richard (Dick) Wilson was proud of his roots as a Viking. He traced his forebears back through three centuries to Viking communities in the Orkney Islands and Thurso, Scotland, which borders the strait that separates the Orkneys from the mainland of Scotland, and into northern England.

Richard grew up in Superior, Wisconsin. There, a physician neighbor, Dr. George Conklin, first introduced Dick to the great world of the natural sciences. Conklin was an expert on bryophytes and was curator of the Sullivan Moss Society's worldwide collections of mosses and liverworts. Dr. Conklin also conducted research on freshwater sponges. Wilson later utilized these invertebrates in his studies of Wisconsin's freshwater lakes. Conklin also led Wilson through scouting to become the first Eagle Scout in Superior.

Dick had a paper route that included several of the faculty members of Superior State Teachers College (now University of Wisconsin - Superior). Prof. J.A. Merrill, who taught geology and geography at the college, was one of his customers. Merrill had studied at Harvard and his doctoral thesis was on a Cretaceous problem in Texas. Merrill, who had also published the first paper on

hystriochosphaerids in the United States, taught Dick to recognize those microorganisms. Wilson's fascination with these grew through his years as he worked with freshwater lakes and later whenever he examined marine rock samples.

Richard enjoyed outdoor activities as a boy, including skiing cross-country. He later became a down-hill skier and broke his back preparing for the 1928 Olympic tryouts in ski-jumping. He liked biking and he once took a one-thousand-mile tour in England. Also, in college, he joined the fencing team and later he coached fencing at Coe College.

This broad background in botany and geology impressed the various professors with whom he studied at the University of Wisconsin, Madison. He became field assistant to Norman C. Fassett (systematic botany). He also caught the attention of William H. Twenhofel (geology and sedimentology), F.T. Thwaites (glacial geology) and E.A. Birge (zoology and limnology). Professor Birge, who was director of the Wisconsin Geological and Natural History Survey, engaged Wilson to assist in some of his own research on biology of freshwater lakes. Later, as president of the University of Wisconsin, Birge, who was then studying the physics of light as it affects plant growth in lakes, became a lifelong friend and continued some research with Wilson for several years.

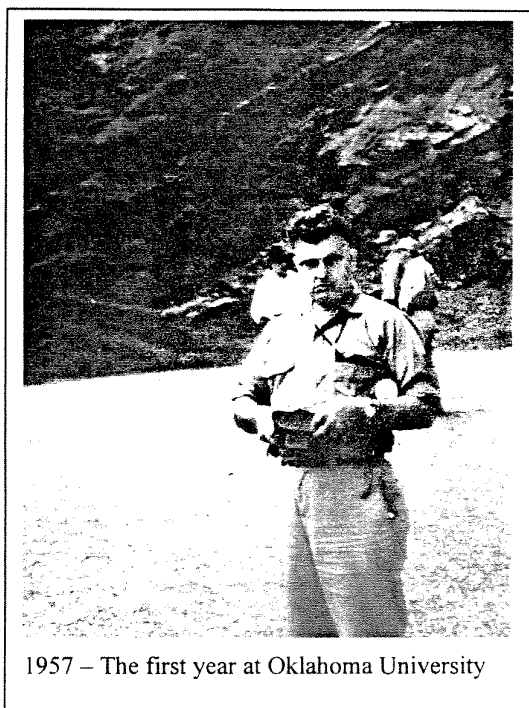
Wilson's family desired that he should have some education in England, so he went to Leeds University in Yorkshire for his junior year. Leeds is only about 100km south of his grandparents' home at Stockton-on-Tees, England, near Newcastle. There he studied with W.H. Burrell, director of the University Herbarium. Burrell has been credited with publishing the first paper on pre-Pleistocene palynology in England, 1924. During Wilson's year at Leeds, Gunnar Erdtman, Swedish pioneer in pollen analysis, presented several lectures there which initiated Burrell's and Wilson's interest in the palynology of peat and coal. This interest grew rapidly in Wilson's mind and was applied first in his masters' and doctoral research on Wisconsin's peat deposits. Fred Thwaites and Norman Fassett directed Wilson's study of the vegetation and geology of the Two Creeks Forest bed, which became an internationally recognized focal point for Late Wisconsinian glacial deposits.



1931 at the Two Creeks Conference of the International Geological congress. LRW as a first year grad student. F.T. Thwaites far right. UW Centennial Yearbook.

Wilson's doctoral dissertation, an analysis of plant microfossils in 10 bogs, Douglas County, Wisconsin was used to determine the history of the several stages in the shorelines of the Nipissing Great Lakes and Lakes Algonquin and Duluth. This information enabled Wilson to demonstrate several stages of plant succession over the glacial terrain and the vegetation's control of soil type, certain other edaphic factors, and effects of fire. He also prepared another extensive report, equivalent to another Ph.D. dissertation, on lake development and plant succession in the Highland District, Muskellunge Moraine, and the outwash area of Vilas County, Wisconsin.

Wilson was instructor to professor of geology at Coe College, Cedar Rapids, Iowa, 1934 - 1947; professor and head of the geology and mineralogy department, University of Massachusetts, 1947 - 1956; professor of geology, Graduate School of Arts and Science at New York University; geologist, Oklahoma Geological Survey 1957 - 1977; professor of geology, University of Oklahoma 1957 - 1962; Curator of Micropaleontology and paleobotany, Sam Noble Museum of Science and History (now Oklahoma Museum of Natural History); and the George Lynn Cross Research Professor of Geology and Geophysics, University of Oklahoma, 1969 - 1977, when he became professor emeritus of geology and curator emeritus of micropaleontology and paleobotany. Dick was Melhaupt Scholar, Ohio State University 1939 - 1940 working on pollen-analysis of Ohio prairies and woodlands of the Postglacial Xerothermic Interval with the eminent ecologist, Prof. E.N. Transeau of Ohio State University. He was director of the Greenland Ice Cap project, "Mint Julep", 1952 - 1953. He worked with Robert Shrock at the Massachusetts Institute of Technology field camp in Nova Scotia during the summers of 1950 - 1955. Wilson also applied his knowledge of biostratigraphy and palynology to professional contract work for several oil companies in United States and South America, 1945 to 1972.



1957 - The first year at Oklahoma University

Wilson was a serious, dedicated teacher. He demanded much from his students in reports and notebooks. He gave very tough

examinations over reading material and identification of the age, source, and history of various rocks and samples of rocks. He also included a great deal of botanical information in his geology lectures and field trips. Dr. Rudolph Edmund, at the fiftieth anniversary of the National Association of Geology Teachers (NAGT) in a presentation to Wilson in 1988 wrote, "L.R. Wilson championed the field as the best way to teach earth processes students followed him into the field, into the lab, and into research." Wilson had been one of five founders of the Association of College Geology Teachers in 1938, the forerunner of the National Association of Geology Teachers.

Wilson worked diligently with James M. Schopf in the preparation of the landmark paper "An annotated synopsis of Paleozoic fossil spores and the definition of generic groups", published by the Illinois State Geological Survey in 1944. In that paper, which was a major factor in bringing order to the presentation of palynological information of pre-Pleistocene palynological studies in North America, they elucidated seven guiding principles for classifying and defining the then-existing genera of fossil pollen and spores.

Wilson, together with one of his former part-time students, Ruth Webster, as an assistant, completed an exhaustive study of the palynology of the strata in two wells in Texas for Carter Oil Company (early subsidiary of Exxon Production and Research Company). These analyses, with over 9500 photomicrographs, were published in five volumes. Distribution of these tomes was limited to a few specialists and museums. However, this extended study contributed importantly to the application of palynological techniques to the exploration for oil by several companies immediately following World War II.

Professor Wilson directed about 50 masters and doctoral theses. Many of those students constituted the nuclei of the staffs of several oil company palynological laboratories. Several became teachers, some worked for various geological surveys, and a few entered other areas of geological research, exploration or administration. Wilson published about 200 research reports, notes and abstracts.

Wilson received numerous honors and awards. He was a Fellow in the Geological Society of America (GSA) and a member of the Botanical Society of America (BSA) and the American Association for the Advancement of Science (AAAS), for over 50 years. He was elected as an Honorary Member of the American Association of Stratigraphic Palynologists (AASP); founding member of the National Association of Geology Teachers (NAGT), and Erdtman International Medalist for Palynology from the Paleontological Society of India. He was a longtime member of various other societies and several state academies of science. Wilson served on the Commission Internationale de Microflore du Paleozoic, and the editorial board Micropaleontology. He was elected to the Order of Mark Twain on the basis of research in Greenland and Pleistocene to Recent deposits in North America.

He was a member and sometime president of the Oklahoma Chapter of the Society of Sigma Xi and the Oklahoma Chapter of Phi Beta Kappa honorary scholastic fraternity. He was adviser to the University of Massachusetts chapter of the honorary geologic fraternity, Sigma Gamma Epsilon.

Wilson's role as an educator was outstanding. His contributions to application of palynology to exploration for oil, and interpretation of environments of deposition of ancient sedimentary rocks have

been preeminent. He was a gentleman of high character and scholarly pursuits. He was an indefatigable teacher and firm disciplinarian in classroom, laboratory, and field studies, and a pioneer in several areas of his research. He continued to publish short papers almost to the time of his death. He was a true "Viking" through 65 years of the highest order of professional contribution to teaching and research in biological and geological sciences.



Left to right: Aureal Cross, Leonard Wilson, Gretchen, Marian Wilson (Gretchen is a part thoroughbred German Shepherd and 50% Weimaraner). Photo taken 1992 at Wilson home, Norman, Oklahoma, by Cross' student Huang Wei

He was the major player in the rise of palynological science in the middle of the 20th Century.

Aureal T. Cross

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Bernadine D. Tschudy

Palynologist Bernadine D. Tschudy (U.S. Geological Survey, retired) died 21 November 1998 in Longmont, Colorado. She was 91. Bernadine was the wife of Dr. Robert H. Tschudy, who preceded her in death in October 1986. In the late 1940's Bernadine and Robert Tschudy joined the Creole Oil Company in Caracas, Venezuela, where they began pioneering work in the identification of fossil pollen and spores and the application of palynology to petroleum exploration. They spent five years in Venezuela before moving to Boulder, Colorado. There they continued doing consulting work for major oil companies until 1961 when they both joined the U.S. Geological Survey. They continued their careers at USGS in emeritus positions long after retirement.

Bernadine specialized in Cretaceous palynology and was particularly interested in the taxonomy of the genus *Aquilapollenites*. In recent years she preferred to spend her winters in the desert community of Borrego Springs, California, and her summers in Longmont and Boulder, Colorado. Until quite recently she was extraordinarily active, walking several miles each day.

She is fondly remembered by close friends and former colleagues throughout the U.S.

Publications of Bernadine Tschudy:

Leopold, E. B., and Tschudy, B. D., 1965, Plant and miscellaneous microfossils of the Pierre Shale: U.S. Geological Survey Open-File Report 65-97, 3 pls.

Drew, Charles M., and Tschudy, Bernadine D., 1967, *Aquilapollenites*-fossil pollen as seen under the scanning electron microscope: Geological Society of America Bulletin, 79: 1829-1832.

Tschudy, Bernadine D., 1969, Species of *Aquilapollenites* and *Fibulapollis* from two Upper Cretaceous localities in Alaska: U.S. Geological Survey Professional Paper 643-A, 17 p., 16 pls.

Tschudy, Bernadine D., and Leopold, Estella B., 1970, *Aquilapollenites* (Rouse) Funkhouser-selected Rocky Mountain taxa and their stratigraphic ranges: Geological Society of America Special Paper 127, p. 113-167.

Tschudy, Bernadine D., 1971, Two new fossil pollen genera from upper Campanian (Cretaceous) rocks of Montana: U.S. Geological Survey Professional Paper 750-B, p. 53-61, figs 1-4.

Tschudy, Bernadine D., 1973, Palynology of the upper Campanian (Cretaceous) Judith River Formation, north-central Montana: U.S. Geological Survey Professional Paper 770, 42 p., 11 pls.

Tschudy, R. H., Tschudy, B. D., and Craig, L. C., 1978, New age data, Early Cretaceous, Colorado Plateau, U.S. Geological Survey Professional Paper 1100, p. 229.

Tschudy, R. H., Tschudy, B. D., Van Loenen, S., and Doherty, G., 1981, Illustrations of plant microfossils from the Morrison Formation, I; Plant microfossils from the Brushy Basin Member: U.S. Geological Survey Open-File Report 81-35, 29 p., 15 pls.

Tschudy, R. H., Tschudy, B. D., and Van Loenen, S., 1981, Illustrations of plant microfossils from the Morrison Formation, II; Plant microfossils from the Westwater Canyon Member: U.S. Geological Survey Open-File Report 81-1154, 20 p., 9 pls.

Tschudy, R. H., Tschudy, B. D., and Craig, L. C., 1984, Palynological evaluation of Cedar Mountain and Burro Canyon formations, Colorado Plateau: U.S. Geological Survey Professional Paper 1281, 24 p. 24, 9 pls.

Tschudy, Robert H., and Tschudy, Bernadine D., 1985, The "fern spike" at the Cretaceous-Tertiary boundary, Western Interior, United States (abs.): Palynology, 9: 255-256.

Tschudy, Robert H., and Tschudy, Bernadine D., 1986, Extinction and survival of plant life following the Cretaceous/Tertiary boundary event, Western Interior, North America: Geology, 14: 667-670.

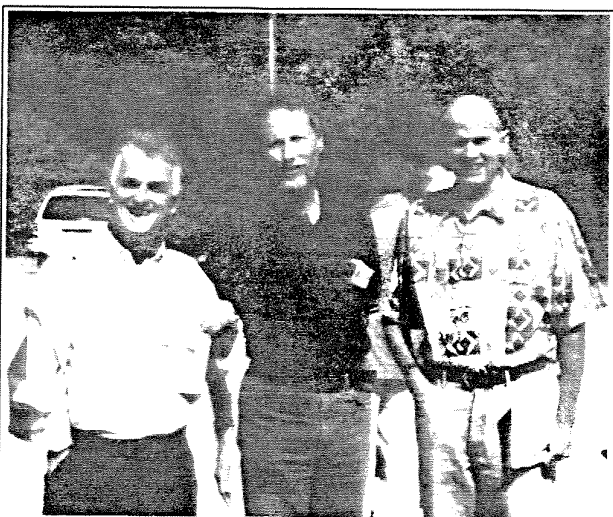
Tschudy, R. H., Tschudy, B. D., and Van Loenen, S. D., 1988, Illustrations of plant microfossils from the Morrison Formation, III; Plant microfossils from the Recapture Member: U.S. Geological Survey Open-File Report 88-234, 9 p., 3 pls.

Tschudy, R. H., Tschudy, B. D., and Van Loenen, S. D., 1988, Illustrations of plant microfossils from the Morrison Formation; IV, Plant microfossils from the Salt Wash Member, U.S. Geological Survey Open-File Report 88-235, 25 p., 15 pls.

- D.J. Nichols, USGS -

CIMP SYMPOSIUM AND WORKSHOPS PISA, ITALY

The latest Commission Internationale pour l'Étude de la Microflore du Paléozoïque (CIMP) Symposium and Workshops meeting was held from September 11-15, 1998 in Pisa, Italy. The Organizing Committee of Marco Tongiorgi, Paola Pittau, and Roberto Albani, along with collaborators Anna Di Milia, Cristiana Ribecai, and Marco Vecoli deserve the thanks of all 83 participants for their hard work that resulted in a very smooth-running and excellent conference, not to mention the clever logo of the meeting that featured the Leaning Tower of Pisa as the 'i' in CIMP Pisa 98.



LtR: Rodolfo Dino, Reed Wicander, Geoff Playford – photo Gordon Wood

Following registration on Thursday, September 10 and Friday morning September 11, the meeting was officially opened by Marco Tongiorgi. We were then treated to an excellent slide presentation by Paola Pittau on the geology, paleontology, and archaeology of Sardinia, which was the site of the post-meeting field trip. The rest of the morning was devoted to being transported to Tirrenia, a seaside town about a 15 minute bus ride southwest of Pisa, and checking into the Regina Mundi Residence Hall, where the actual symposium and workshops were held.

A total of 58 talks were scheduled (with only 2 cancellations), and it would be impossible to mention every one. In the way of a general observation, I found all the talks were generally well-presented and of high quality. In particular, the overall quality of the slides was excellent, with many prepared by 'Power Point,' resulting in high visual impact.

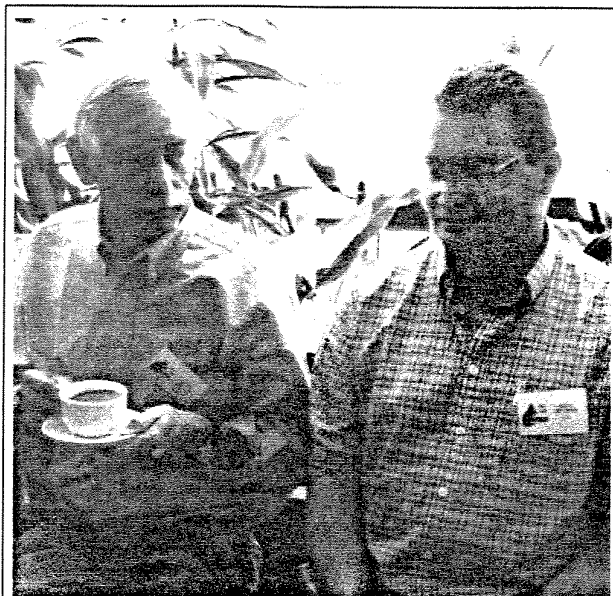


Jacques Verniers and Said Al-Hajri - photo Gordon Wood

The first session began after lunch and consisted of four talks on various aspects of Precambrian and Cambrian acritarchs. The first

talk, by Thomas Servais (coauthored with Stewart Molyneux) concerned the taxonomic treatment of variability among acritarchs, which was a topic that was repeated and discussed in various guises throughout the four days of the meeting. Following the first session talks, Malgorzata Moczydlowska-Vidal gave an invited talk on the Lower-Middle Cambrian boundary as recognized by acritarchs in Baltica and the Gondwana margin. This was a very informative and well-presented talk, in spite of the fact Malgorzata arrived at the Regina Mundi only a few hours before her talk and without the benefit of her luggage because of airline problems and flight cancellations, a fate shared by several other participants at the meeting.

The late afternoon-early evening second session continued with talks on Late Cambrian and early Ordovician acritarchs. This was followed by Welcoming Drinks and socializing and then dinner.



John Utting and Duncan McClean – photo Gordon Wood

Saturday morning's Session C on Ordovician and Silurian chitinozoans contained many interesting talks, including, in my opinion, one of the best delivered and illustrated presentations of the meeting. Theresa Winchester-Seeto discussed and provided excellent illustrations of a late Ordovician microfauna from central New South Wales, Australia which included an abundant assemblage (and the first reported occurrence in Australia) of melanosclerites.

The Saturday afternoon and early evening session was a special section on the Saudi Aramco/CIMP Project and included 11 talks on various aspects of the Paleozoic palynology of Saudi Arabia. This session also provided the only 'hitch' in an otherwise flawless meeting. During Said Al-Hajri's talk on Palynostratigraphy of the Jauf Formation in the Ghawar area, eastern Saudi Arabia, one of the slides became stuck. Professional that Said is, he offered and began to enlighten the audience on the Paleozoic geology of Saudi Arabia while the projector was being fixed. Unfortunately, the projector refused to cooperate and the chairman called for a coffee break at that point. We'll just have to wait until another meeting for Said to finish his impromptu discussion on the geology of Saudi Arabia. I should add, that after

the coffee break. Said presented a flawless talk on his original topic.



Marco tongiorgio at the Leaning Tower –
photo Gordon Wood

The two Sunday morning sessions were devoted to Ordovician and Silurian acritarchs and included a presentation on how acritarch diversity cycles reflect sea level changes on the Yangtze Platform during the Arenig by Marco Tongiorgi (Symposium Chairman) and possible Milankovitch cycles in the Wenlock Series as revealed by palynological assemblages, presented by Ken Dorning (and coauthored with C. Harvey). The subject of morphological variability among acritarchs was again addressed, this time by Bastien Wauthoz (and coauthored by P. Gerard) who did a biometric study of selected Silurian acritarch species of the genus *Domasia*.



Paul Strother and Nick Turner photo Gordon Wood

The Sunday afternoon and ?early evening sessions were devoted to Devonian and Permian sporomorphs and Devonian and Carboniferous acritarchs respectively. Both sessions contained excellent and well-illustrated talks, including the grossest photo of

the meeting (and this time it didn't have anything to do with Gordon Wood, who is gross enough on his own) of an Anaconda snake eating a goat. Rodolopho Dino worked this photo into his presentation (coauthored by Geoffrey Playford) on the palynostratigraphy of Upper Palaeozoic strata of the Amazonas Basin, Northern Brazil.



Gary Mullins and Rodolfo Dino – photo
Gordon Wood

The final session of the meeting was Monday morning and consisted of four talks. Paul Strother presented the rather unorthodox view that some of the Bright Angel Shale in the Grand Canyon may be nonmarine as evidenced from the suites of spore-like palynomorphs recovered. This view generated much discussion and questions.

In addition to the formal oral presentations, there were 33 poster sessions covering all aspects of Paleozoic palynology. As expected, the poster sessions allowed the presenters and viewers with ample time to discuss the various aspects of the material presented, and the formal poster session at the conclusion of the oral presentations was well attended.

The meeting was formally ended following the poster session with closing remarks by Marco Tongiorgi who thanked Roberto Albani, Anna Di Milia, and Cristiana Ribecai for their help in organizing the meeting, as well as the students who ran the projectors during the talks. Bernard Owens also spoke, noting that it has been 40 years since CIMP was founded. Bernard also gave a nice overview of the accomplishments of CIMP, thanked the Organizing Committee for hosting the meeting, and made a plea for preserving the reprint and slide collections that many of our members have made during their careers. Alain Le Hérisse and Theresa Winchester-Seeto also each spoke on behalf of the Acritarch Subcommission and Chitinozoan Subcommission respectively.

Following the Closing Session, the participants were then treated to a tour of the Santa Maria historic district which included the Leaning Tower of Pisa and the Santa Maria Cathedral, a walking tour of Pisa, and a private tour of La Certosa di Calci,

which was just spectacular. The day concluded with a wonderful Gala Dinner in the Pisa countryside.

I would like to thank the organizers of this meeting for all the hard work they did, which paid off in an extremely well organized and efficient meeting. The venue was superb in all aspects, and even included a spectacular fireworks display on the beach beginning at 12:30 a.m. Sunday morning! It was one of the best I've seen (even though the organizers weren't responsible for it). I also enjoyed having the meeting at a residence hall where the participants got to eat together and mingle both formally and informally. People generally changed dining tables throughout the meeting and this provided the opportunity to meet most of the participants on an informal basis. All-in-all, it was a very memorable meeting and the organizers are to be congratulated.

Reed Wicander

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REPORT ON THE CIMP FIELD TRIP TO SARDINIA
SEPTEMBER 15 - 19, 1998
by Paul Strother

After the overnight ferry from Livorno to Olbia some 40 participants in the CIMP Sardinia trip were met by Palao Pittau and her team of students, colleagues and professional drivers from the University of Cagliari. A quick drive across the island brought us to our first cultural stop – a tour of the 1.1 – 1.3 ka Nuraghi towers at Barumini, central Sardinia. A fine buffet lunch in Laconi featuring regional bread, soup, pastas, quiches, cheese, wine and sausages finished with fruit and a taste of the local grappa, put us in the proper mood for some geological activity, sampling the Mcana Sardo Tectonic Unit. In the upper Cambrian Solanas Fm Anna DiMilia, Marco Tongiorgi and their co-workers have recognized numerous species of acritarchs and coenobial algae belonging to 20 or more genera. A second stop in the Solnas overlooking Lago del Flumendosa let us examine these greenish-grey, low grade argillites which yield 45 species of acritarchs indicating a middle late Arenig age. Darkness falls as we drive to a 4 star accommodation on the east coast of Sardinia where an incredible array of food is followed with a fabulous midnight performance of dance and music by a local folklore group. Here, the house *Rosso del Saint Elmo*, remarkably good in flavor with a mild body, had less of the fruitiness of the local interior wines. We had been in Sardinia only 16 hrs.

Following a full breakfast, day two began in the Genn' Argiolas Tectonic Unit where we saw a silicified Llandoveryan section replete with graptolites followed by a picnic lunch at a site of circles of menhirs with a rather Stonehenge-like quality about them. This was a four course picnic (Ken Higgs still didn't like the sausages even though the interior bits were more finely ground than those from the prior day's lunch) plus fruit and dessert which gave us just enough sustenance to climb the *Via dei Graptoliti* past the pig farm in Goni where an Homerian section has yielded graptolites and chitinozoa. Our collecting efforts were rewarded with a reception given by the town mayor who intends to propose a park to preserve this outcrop. Those who were somewhat slow in leaving the reception hall were treated to an extra bottle of local white which was just ever so slightly golden in color and wonderfully sherry-like. Leaving the southeast portion of Sardinia, the troops next saw lodging in the fishing port of Portoscuso where we were treated to a seafood extravaganza including wonderful

mollusc-laden antipasta and pastas followed (eventually) by whole fish and langoustinos as a first course. Because it was Anna DiMilia's birthday, we celebrated with additional champagne and local fruit liquor before retiring.

Day three was the most diverse geologically with early stops in the Permo-Carboniferous sections known to yield beautifully preserved Stephanian palynofloras. Recent discoveries of tetrapod trackways and an insect wing at the San Giorgio Section spurred us on to new levels of excavation which were rewarded by the recovery of nice *Calamites*. We were joined by Luigi Pillola who set a new pace for energetic geologizing as we examined the *Rhabdinopora* beds of Tremadoc age which were somewhat less metamorphosed than the Solnas seen earlier. Lunch overlooking the sea featured a memorable herbed ravioli and particularly nice stuffed roast pork, a harbinger of the regional specialty to come as the principal course for dinner that night. The group split for the afternoon, some preferring to look at Archeocyathid mounds with the few, but pure, OWM types (such as Ken Dorning) preferring to examine the fossiliferous metapelites and argillites of the San Vito Ss in the Arbuse Unit which contain latest Cambrian to early Ordovician acritarchs described by Pittau and Del Rio. I remember the peppered prosciutto, the tasty cheese, the green olives and the properly-textured bread as the antipasta to the roast suckling pig, but there is a gap in my memory for what must have included pasta with *fruite de mer* and other courses. It was Ken Higgs's birthday, the celebration of which continued somewhat into the night at a small establishment overlooking the pier we were to leave from early the next morning.

Our final day in Sardinia was quite fun starting with a boat trip up the southwest coast to see an overview of the regional geology and economic geology. The luncheon meal at a restaurant overlooking a sandy beach included a wonderfully prepared, thinly-sliced grilled tuna with sun-dried tomatoes, fresh fish, marinated (*petites*) octopus salad, and more (I lost track of the courses). Now, drive to the ferry (we did not miss the boat).

This was perhaps a perfect geological excursion, Paolo Pittau and her colleagues have set a standard that I cannot imagine will be met in my lifetime. The guidebook alone sets a new standard in geological publication with its color plates, color maps and extensive references. It is beautiful. Tonight for dinner, as my stomach dreams about those homemade sausages from Laconi, I will be serving my family *Fenway Franks*, the local hot dog variety, accompanied by canned baked beans, bread and water – after the pasta course, of course.

BOOK REVIEWS
by Reed Wicander

The Early Evolutionary History of Planktonic Foraminifera by M. K. Boludagher-Fadel, F. T. Banner, and J. E. Whittaker with a contribution from M. D. Simmons. 1997. British Micropalaeontological Society Publication Series, Chapman & Hall, 2-6 Boundary Row, London, United Kingdom. 269 pages.

This aim of this book is to describe the earliest known planktonic foraminifera from the Jurassic and then elucidate their radiation into the widespread faunas of the Early Cretaceous. Thus, the book is geared to a rather specialized audience, and is more of a reference book, than a general text. None-the-less, for the specialist or individual interested in the origins and systematics of

Jurassic and Early Cretaceous planktonic foraminifera, this excellent volume is certainly required reading.

The Early Evolutionary History of Planktonic Foraminifera is divided into 13 chapters. Except for chapter 2 in which M. D. Simmons makes his contribution as senior author, all of the chapters are written by the three authors (Boludagher-Fadel, Banner, and Whittaker). Chapter 1 is an Introduction in which the authors define what planktonic foraminifera are, their usefulness in studying evolutionary change, and their importance in the construction of chronostratigraphic scales for the Late Mesozoic and Cenozoic. The authors also define and discuss the various morphological terms used throughout the book and discuss the importance of the crystallographic structure and chemical composition of the test wall in terms of classification of the Globigerinina. They conclude this chapter by stating that they are emending the definition of the Globigerinina to include both aragonitic and calcitic genera rather than placing aragonitic forms in separate suborders.

The next 11 chapters discuss the individual superfamilies, families, and in some cases genera of the Middle Jurassic through Early Cretaceous. Chapter 2 covers the Jurassic Favosellacea, which are the oldest known Globigerinina. As mentioned in the Origins section of this chapter, "the evolution of the earliest planktonic foraminifera from their benthonic ancestors is still shrouded in uncertainty." Chapter 3 begins the coverage of the various Early Cretaceous planktonic foraminifera and this and subsequent chapters follow the same general format. Each chapter typically has an Introduction, a Key to the taxa discussed, a Systematics section, Concluding Remarks, followed by a series of plates illustrating the taxa covered in that chapter. The more than 135 species covered in this book are mainly illustrated by scanning electron photomicrographs.

The final chapter discusses aspects concerning the probable physiology and ecology of the Praehedbergellidae as determined, in part, from studies of living Globigerinacea. Included in this chapter is a classification of living Globigerinacea. An extensive References section, Systematic Index, and Subject Index complete this book.

Late Palaeozoic and Early Mesozoic Circum-Pacific Events and Their Global Correlation by J. M. Dickins, Yang Zunyi, Yin Hongfu, S. G. Lucas, and S. K. Acharya (eds.). 1997. Cambridge University Press, 40 West 20th Street, New York, NY 10011. 245 pages. \$110.00.

This volume, containing 25 reports by 44 authors, is the final report of the International Geological Correlation Programme 272 (IGCP-272). Chapter 1, written by the coleaders of IGCP-272 provides an overview of the events and framework of the time period covered by this volume. While some events marking the end of the Carboniferous and Early Permian are discussed in Chapters 2 and 3, it is the events of the Middle Permian through Triassic that is the thrust of this book. For example, Chapter 12 reviews the major changes in geology, environment, and faunas during the mid-Permian for selected areas in the world. The faunal changes are ascribed to environmental changes. Individual chapters cover various changes that occurred during the mid-Permian.

An important outcome of IGCP-272 is the recognition and correlation of a major geologic and biologic event associated with the Midian-Dzhulfian stage boundary of the Upper Permian. This time interval is covered from a variety of perspectives in Chapters 4, 7, and 8.

The Permian-Triassic boundary sequences and events associated with this time interval are covered in Chapters 7, 13, 14,

15, and 16. Extinction of various invertebrate faunas and possible causes are discussed in the aforementioned chapters.

The geologic and biologic events of the the Early, Middle, and Late Triassic are covered in a variety of chapters. The character of the Triassic-Jurassic boundary and associated magmatic and tectonic activity is emphasized in Chapter 17.

While great climatic changes occurred during the late Paleozoic and early Mesozoic, the connections with many of the events discussed in various chapters is not clear. However, one thing that is abundantly clear from a reading of this volume is the importance of a precise geologic time scale that serves as the framework in which to correlate various geologic and biologic events from widely separated areas. Of course, this is where the importance and usefulness of biostratigraphic correlations comes in.

One of the goals of this volume is to emphasize the time relationships of different events that might seem to be unrelated. One of the problems I had with this volume (and it is probably a result of not being an expert on the Permian) was trying to keep everything in perspective and in some type of chronology. A failure of this volume, as far as I was concerned, was not having an abstract for each article. This made it difficult for me to see how articles were related and get a capsule-view of each article.

The following chapters are of particular interest to palynologists and paleobotanists. Chapter 6 (Major global change: framework for the modern world by J. M. Dickins, Yang Zunyi, and Yin Hongfu) covers the spore-pollen floras of the Permian Southern Alps, namely the Lobardy and Dolomitic basins. Chapter 9 (Sitsa flora from the Permian of South Primorye by V. G. Zimina) involves a review and discussion of the Sitsa flora and new data from the type region provides for more accurate correlations with the Upper Permian sections in Kuzbass, the Urals, and Mongolia. There is also a short discussion of the palynology and megafossil plants of the Triassic Chinle Group in Chapter 23 (Spencer G. Lucas).

Guide to Colorado Wildflowers, Volume 1, Plains and Foothills by G. K. Guennel. 1995. 336 pages. \$24.95. Westcliffe Publishers, 2650 South Zuni Street, P. O. Box 1261, Englewood, Colorado 80110.

Guide to Colorado Wildflowers, Volume 2, Mountains by G. K. Guennel. 1995. 352 pages. \$24.95. Westcliffe Publishers, 2650 South Zuni Street, P. O. Box 1261, Englewood, Colorado 80110.

Here is a two-volume book by AASP's very own Joe Guennel. Pursued as a retirement project, this two-volume guide is aimed at the layperson who wants an easy way to identify the flowers he or she encounters in Colorado. As stated in the Introduction, "the average person doesn't want or need botanical jargon." What most people want is an easy-to-use guide they can carry with them on hikes or trips and that allows them to quickly identify the plants they observe and learn something about them. These volumes have both. Printed on good-quality glossy paper, the guides are a convenient size (6" x 9" format) that easily fits into a pack and/or the glove compartment of the car. The volumes are also designed to easily match up the flower one sees in the field with the information one wants to know about that flower.

What is the first thing most people see when they look at a flower? Its color. With that in mind, Joe has produced a book that "allows the user to identify almost any (Colorado) flower by matching its color to the color-coded pages on the side of the book." Thus, if you come across a red flower, simply flip through the pages with a red bar on them until you come across the flower in question. It's as easy as that! One of the drawback to this

system, however, is that some flowers are multi-colored or produce individuals of different colors. In this case, just look in the different color sections that match the colors of the flower until you find it.

With over 3,000 flowering plants and conifers to choose from in Colorado, Joe narrowed the number of species included in these two volumes to approximately 600. Each species in the guide fills one page and is illustrated by both a closeup color photograph of the flower and a watercolor of the entire plant. The plants are grouped by color, and within each color group there is a separate section for trees/shrubs, herbs, as well as the flowers. The plants are listed alphabetically by family, and within each family, alphabetically by common name. Each species has its common name listed at the top of the page in bold letters, followed by its scientific name, and lastly, the common and scientific name of the plant family to which it belongs.

An overall description of each plant is given, including its general appearance, size, flowers, leaves, and any distinguishing characteristics. Measurements are given in inches and feet rather than metric units. The last three items about each plant include the habitat where the plant is found, the different life zone(s) it occupies (plains, 3,500'-6,000'; foothills, 6,000'-8,000'; montane, 8,000'-10,000'; subalpine, 10,000'-11,500'; and alpine 11,500'-14,000'), and the months when you are most likely to find the flower in bloom (flowering time).

The proof that these books are a hit with the general public, is the fact they are now in their third printing. This is the ultimate mark of success for an author. Joe is to be congratulated on producing such a fine 'retirement project' and one that he can be justifiably proud.

BOOK REVIEW

By Vaughn Bryant, Texas A&M University

Pollen Flora of the Philippines: Volume 1, (1997). Lolita Jagudilla-Bulalacao, DOST-TAPI-SPU Press (Department of Science and Technology-Technology Application and Promotion Institute-Special Publication Unit). 1997. Manila, Philippines. 266 pages, 106 plates. \$95.00. (For copies, contact: Advocate Book Supply Company, 1805 Claro M. Recto Ave., CPO Box 1190, Manila Philippines, ph. 735-5666).

In the foreword, Dr. Keith Ferguson notes that this book represents "...the first attempt to bring together an introduction to the pollen of the huge flora of the Philippines." On the next page of this book Gabriel S. Casal, Director of the National Museum of the Philippines, indicates that he hopes this first volume will be followed by others in a series of books on the pollen flora of the Philippines. A few pages later, in the preface, the author notes that this study began as a three-year research project and that it was completed after further work using the facilities in the Philippines as well as pollen labs in Europe. Her primary goal, as stated, was to produce a book that is intended to provide descriptions of the pollen grains of some Philippine plants.

This pollen guide to the flora of the Philippines achieves its stated purpose. It does present a useful look at a limited range of Asian pollen flora and it can be a useful guide to those specific palynomorph types, if one does not have access to modern pollen reference slides for comparison. The author describes, and has included photographs of, pollen types covering 453 species in 264 genera from 63 separate angiosperm and gymnosperm families. The book contains 106 plates of light and SEM photomicrographs. An index at the end of the text portion in the book lists all the

pollen types discussed in the text portion and those that are illustrated in the various photographic plates. The 106 plates are generally good, but the quality varies significantly. For some of the plates it is difficult to determine if the poor quality of the photomicrographs resulted from poor photography, poor printing of the original photographic negatives, or poor printing of the plates by the publisher. Some of the plates show good morphological details both in their light and SEM representations (i.e., plates #14, #61). Other plates (i.e., plates # 32, #17) are either too dark or too light to provide good details.

Another nagging problem was the absence of and reference to scale for many of the pollen types and a total absence of bar scales on any of the pictures. I found that it was usually necessary to read the text portion of the book in order to determine the size of an illustrated pollen type. Without doing this I might not have any idea of the relative size of most of the illustrated types. For example, on Plate # 1, the author illustrates pollen in the genera *Agathis*, *Cupressus*, and *Juniperus*. The photographs of both *Cupressus* and *Juniperus* are illustrated at a size that leads one to believe both taxa have pollen grains that are about the same size, which is true. However, on the same page the photographs of *Agathis* pollen are 200-300% larger than those of the illustrated *Cupressaceae* types. In reality, *Agathis* pollen is only about 33% larger but one would not know this without either knowing the grain from memory or reading the text portion of the book. For those illustrated pollen types that do have scales (mostly the SEM micrographs), they are listed in the captions as being illustrated at some specific magnification (i.e., 1,000x, 2,000x, 2,700x, 8,600x, etc.). In summary, I believe this atlas and the illustrated pollen types could have become a more useful reference tool had each illustrated pollen type been shown with an accompanying bar scale. The pollen key in the text portion of the book is slightly different from other pollen keys the reader might have seen in other publications. As with many keys, the pollen key in this book is not strictly dichotomous for each entry.

In many pollen keys the gymnosperm types are listed first, but in this book the first entry in the pollen key is the polyad and tetrad groups. Next are the inaperturate pollen types. They are followed by a key to the monoaperturate types with the first grouping being gymnosperms. Other major groupings include the porate types followed by another grouping called the sulcates. She also has a category called colpate and colporeate.

Terminology is always brought into question when one constructs or uses a pollen key, and the use of morphological terms in this book is no exception. In past years there were so many different definition variations of pollen jargon that in 1965 Gerhard O. W. Kemp published the much needed book, *Morphologic Encyclopedia of Palynology* (University of Arizona Press). I still use his book often when I try to unravel the implied morphology definitions found in many taxonomic articles. However, that book sorely needs updating! One nice thing about the pollen key to the Philippines is that the author has included a glossary with her specific definitions to the terms she has used in the book. That proved helpful even though I do not totally agree with the use of some of her terminology. Nevertheless, I must admit, the definitions are all there for one to see.

This book's pollen keys also include a group of what the author calls "special keys." She has included detailed special pollen keys to taxa she examined in the *Cyperaceae*, *Poaceae*, *Amaranthaceae*, *Euphorbiaceae*, and *Fabaceae*. Most of those special keys are helpful. However, I must question her reasons for generating a special key to the 37 species of grasses she included in her atlas. Many of the differences she lists in her key to the grasses focus on minute size differences (< one micrometer) of a grain's diameter or

the diameter of the grain's annulus. In many of the taxonomic studies I have conducted I have found that the normal pollen size range within a given plant species may vary as much as 10% or more, thus calling into question the attempt to precisely identify a grain based on size.

In spite of the various shortcomings, this book is of value as a reference tool and pollen key to a group of Asian flora found in the Philippines. Almost any published pollen atlas or guide to the pollen flora of a region is a must for the bookshelf of a serious palynologist. The cost of these publications is often expensive, but they become an invaluable reference source when one needs to know about the pollen flora of a given geographical region. This book is no exception. Although it has a few faults, I would urge palynologists to reserve their own copies now, before the edition goes out-of-print.

DR. HELEN TAPPAN RECEIVES FESTSCHRIFT

On August 15, 1998, Satish Srivastava and his wife Rosalind presented Dr. Helen Tappan with three signed copies of the Special Issue *Review of Palaeobotany and Palynology* Festschrift for Helen Tappan and Alfred R. Loeblich, Jr. (volume 98, nos. 1-2, pp. 1-186, 1997) at her home in Anaheim, California. This day was particularly significant because it was also Al's birthday. Following the presentation, Helen, who is in good health and spirits, reminisced with Satish and Rosalind and then the three of them went to a celebratory lunch.



Helen Tappan holding a copy of the Festschrift volume honoring her and Al Loeblich – photo Reed Wicander

The Festschrift volume was edited by Reed Wicander and Satish Srivastava to honor Dr. Helen Tappan and Dr. Alfred R. Loeblich, Jr. for their tremendous contributions to the fields of micropaleontology and palynology. Twelve invited papers, several by their former students, comprise the volume. These papers cover a wide range of palynological topics, reflecting Helen and Al's many interests and influence in palynology. The twelve papers cover the broad spectrum of palynology from Middle-Upper

Proterozoic acanthomorphic acritarchs to the cell wall morphology of a Recent placoderm desmid from Texas.

In addition to the 272 papers Helen and Al published individually and jointly, Helen directed 11 M.S. and 13 Ph.D. students during her career, while Al directed one M.S., one Ph.D. and one postdoctoral student. Unfortunately, Al did not live to see the publication of this Festschrift, having died on September 9, 1994.

The final paragraph of the Introduction to this volume best sums up Helen and Al's many contributions to our science. "It is hard to imagine that any one person or couple will ever match the scientific and scholarly output of these two individuals. In addition to the prodigious publications Helen and Al produced, they also served as outstanding role models for young scientists everywhere. Their dedication to paleontology, unselfish giving of their time, energy and knowledge is an inspiration to all who had the good fortune to work with or study under them. This Festschrift is our way of saying 'thank you' to Helen and Al for all they have done for the paleontological community."

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LET'S HEAR IT FOR PALYNOLOGY!

by Reed Wicander

The September, 1998 issue (volume 29, number 6, p. 22-24) of *Smithsonian* contains an article that will be of interest to all readers of the *AASP Newsletter*. Written by James Trefil, the short article, titled "When Plants Migrate," relates some of the current research into how plants have responded to climate change in the past by migrating to new areas, and the implications of this research into the preservation of our natural environment.

Aside from the obvious interest in this topic, palynology gets a much deserved 'plug' when Trefil states "To nail down the past, paleontologists are compiling databases of everything they have on past ecosystems. The palynologists, who study pollen, are key players, as are their colleagues who study phytoliths, microscopic glass-like secretions of plants long gone. This work involves more than academic curiosity. Policymakers have to take the best information that scientists can come up with and make difficult decisions."

The crux of the article is that there is little or no evidence that entire plant communities migrated northward together following the retreat of the last ice sheet in North America. Instead, it appears that individual plants migrated north at their own pace. Thus, at any given time during a migration, one sees different groupings of plants, and these groupings are merely transitory associations in a continuously changing environment.

The implications of this research, according to the article, is that we can't preserve everything in nature and what we perhaps should be doing is concentrating on preserving the ability of plants and animals to respond to environmental changes and pressures. The fossil record seems to indicate that for species to survive, they need room to maneuver. If, for example, "we make an environmental preserve in the Amazon, we should include some foothills of the Andes to protect this kind of flexibility."

The article ends on a positive note for palynology when Trefil states "We have much to learn from something as seemingly 'useless' as ancient pollen grains in the mud at the bottom of an ordinary lake."

MESOZOIC-CENOZOIC DINOFLAGELLATE CYST
COURSE, URBINO, ITALY, MAY 17-22, 1999

Conducted by Graham L. Williams (AGC), Jonathan P. Bujak (LEXIS) & Henk Brinkhuis (LPP, Utrecht University)
Local coordinator: Prof Dr Rodolfo Coccioni (University of Urbino)

A general course on aspects of Mesozoic-Cenozoic dinoflagellate cyst bio- and eco-stratigraphy will be held at the premises of the University of Urbino, Italy, between May 17 through 22, 1999. Information on morphology, taxonomy and stratigraphic ranges of ca. 600 selected species will be provided, besides presentations on applications of quantitative dinocyst analysis in terms of reconstructions of paleoenvironment and paleoclimate. Case histories of reconstructions of e.g. third order sea level cycles and orbital forcing will be presented. 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.-

PhD/MSc students US\$ 200.-

Participants can choose from a variety of hotels in the famous medieval city of Urbino, or, if budget requires, stay on the nearby Urbino student campsite. Associated lodging and travel costs are at participant's expense.

The minimum number of participants is set at 15, the maximum at 40. If interested, please send queries, and/or your personal information, incl. company or academic institution to

Henk Brinkhuis - Laboratory of Palaeobotany and Palynology - Utrecht University - Budapestlaan 4, 3584 CD Utrecht, The Netherlands - tel +31.30.2537691, fax +31.30.2535096

email: H.Brinkhuis@bio.uu.nl

Lodging should be arranged individually, a number of options is available from:

Prof. Rodolfo Coccioni - Istituto di Geologia dell'Universita' - Campus Scientifico - Localita' Crocicchia - I-61029 Urbino - ph: 0039.722.304237 - fax: 0039.722.304220

e-mail: cron@info-net.it

or from Dr Simone Galeotti at the same address

email: s.galeotti@bib.uniurb.it

Registration and money-transfer deadline is set at April 1, 1999.

Money should be transferred to the account of the LPP Foundation: ABN/AMRO bank 46.50.04.512, indicating Urbino Dinocourse 1999. LPP's VAT/BTW no. is NL 89.58.427.B.01

Don't hesitate.... Reserve your seat now!

LPP PART FIVE
THE PERMIAN-TRIASSIC BIOTIC CRISIS
by Cindy Looy & Mark Sephton*

Introduction

The Permian-Triassic (P-Tr) extinction was the most brutal test that life on earth has endured. As a result of the stresses imposed on Late Permian organisms, over 90% of marine species and 70% of landvertebrate species were annihilated. Over the past decade a number of salient features representing drastic changes in both the biosphere and geosphere have been identified in the P-Tr sedimentary record. For example, the detection of unparalleled

abundances of fungal remains, which coincide with a rapid decline among gymnosperm pollen, testifies to a destabilization and collapse of the P-Tr terrestrial ecosystem (Visscher et al, 1996). In addition, dramatic shifts in carbon isotope ratios indicate severe changes in ocean water chemistry across the P-Tr boundary.

For a number of years, the study of the P-Tr crisis has been one of our laboratory's main research topics. In particular we have devoted much attention to establishing how the crisis affected primary producers such as marine algae and land plants (Visscher & Brugman, 1986, Visscher et al., 1996, Poort et al., 1997). For the last three years, this topic has been studied in a multidisciplinary project which combines palynology and biogeochemistry. Our main aim is to produce an accurate palaeoenvironmental reconstruction of the P-Tr ecosystem collapse and subsequent recovery. For our studies, samples were collected from P-Tr sections in the Italian Dolomites. The following results illustrate the strength of both biogeochemistry and palynology as palaeo-ecological tools.

Biogeochemistry

In some P-Tr sediments the presence of certain molecular signals can be linked to the occurrence of specific palynomorphs. The source of these signals was confirmed by pyrolysing individual organic fossils which had been identified under the microscope. Once the origins of the P-Tr chemical signals were established, samples in which palynomorphs and palynodebris were poorly preserved could have their organic inputs characterized by examining their chemical fossils. In this way, biogeochemical analyses have identified the organic components from the victims of the P-Tr extinction. Our analyses have revealed that gymnosperm cuticle and polysaccharide decomposition products are the main contributors to the organic assemblage in P-Tr sediments. The former represents an input from arboreal vegetation while the latter may originate from partially decomposed soil organic matter. By monitoring the variation of these inputs to the sediments, the environmental changes occurring during the crisis can be understood. For example, the maximum occurrence of fungal remains coincides with an influx of polysaccharide organic markers to the sediments. This suggests that a widespread destruction of standing biomass occurred on land, triggering fungal decomposition and increased soil erosion following the loss of vegetation.

Further evidence of changes in the P-Tr terrestrial ecosystem is provided by carbon isotopic measurements of organic compounds which are the characteristic degradation products of conifer cuticles. The values obtained indicate that the carbon isotope ratios of leaf cuticles synchronously follow those obtained from coeval marine carbonates. These data represent the first recognition of a parallel isotope shift in coexisting terrestrial and marine carbonaceous materials. This indicates that the carbon isotope shifts at the end of the Permian were pan-environmental and not just confined to the marine realm.

Palynology

The discontinuous plant megafossil record of the P-Tr ecosystem recovery in Europe suggests a delayed resurgence of woodland. A change from lycopsid (*Pleuromeia*) to conifer-dominated fossil assemblages occurs at the end of Early Triassic. Complementary analysis of a high resolution palynological data set from an Early-Middle Triassic transition sequence in Hungary, provided the stratigraphic range needed to resolve the temporal pathway of vegetation succession during the ecosystem recovery. Gradual shifts in relative abundances provide a straightforward picture of the sequence of invasion of gymnosperms coupled with a relative

decrease in dominance of the *Pleuromeia* spores (*Densoisporites nejburgii*). The initial invasion by woody plants was led by the conifer *Yuccites*, as is reflected by the income and proliferation of *Voltziaceasporites heteromorphus*. While additional elements follow, the lycopsid component drastically declines and disappears. The rapid decrease in coniferous pollen marks the onset of the *Voltzia*-dominant climax vegetation of the Anisian. The observed pattern of vegetational change suggests that habitat restoration, competition for resources, migration and evolutionary processes acted synergistically, setting the stage for successional replacement of the lycopsids by gymnosperms within a period of ~ 0.5 Ma.

The Future

At present, our research continues and we look forward to informing you of our latest achievements. Work in progress includes: 1) the determination of palynological signals of the extinction spanning the P-Tr boundary, 2) the taxonomic, morphological and ecological investigation of the nature of fungal remains occurring worldwide at boundary transitions, 3) the ecological significance of mass occurrences of unseparated spore tetrads in several P-Tr sections.

Literature

- Visscher & Brugman (1986): The Permian-Triassic boundary in the Southern Alps: a palynological approach. *Mem. Soc. Geol. It.* 34: 121-128.
- Visscher, H., Brinkhuis, H., Dilcher, D.L., Elsik, W.C., Eshet, Y., Looy, C.V., Rampino, M.R. & Traverse, A. (1996): The terminal Paleozoic fungal event: Evidence of terrestrial ecosystem destabilization and collapse. *Proc. Natl. Acad. Sci. USA* 93: 2155-2158.
- Poort, R.J., Clement-Westerhof, J.A., Looy, C.V. & Visscher, H. (1997): Aspects of Permian palaeobotany and palynology. XVII. Conifer extinction in Europe at the Permian-Triassic junction: Morphology, ultrastructure and geographic/stratigraphic distribution of *Nuskoisporites dulhuntyi* (prepollen of *Ortiseia*, Walchiaceae). *Rev. Pal. & Pal.* 97:9-39.

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THE INFLUENCE OF ENVIRONMENT ON THE STOMATAL FREQUENCY IN *BETULA*

Ph.D. Thesis by Friederike Wagner

A decreasing number of stomata on leaves of Northern Hemisphere trees still provides the only morphological evidence that anthropogenic increase in atmospheric CO₂ concentration has already affected the biosphere. Although already evident from pioneer studies by Wagner (1892), an inverse relationship between CO₂ increase and stomatal frequency was first emphasized by Woodward (1987), who compared data from herbarium material collected over the past 200 years, and seedlings grown under pre-industrial CO₂ levels. Inspired by Woodward's results, the relationship has been repeatedly replicated, notably in deciduous tree species. As a corollary of the response, stomatal frequency analysis of fossil representatives of extant tree species is increasingly introduced to detect and quantify changes in palaeoatmospheric CO₂ concentrations.

Uncertainties with respect to the interpretation of stomatal frequency data in terms of past CO₂ concentration are notably associated with (1) effects of intrinsic variation within and between

leaves, (2) the restricted and fragmentary nature of data sets from herbaria and controlled experiments, and (3) bias by unknown environmental conditions other than CO₂ concentration. Exemplified by a detailed analysis of stomatal frequency patterns in European tree birches (*Betula pendula* and *B. pubescens*), in this thesis it is demonstrated that uncertainties can be largely eliminated by following a physiologically validated research strategy and by analysing large data sets.

Throughout the Northern Hemisphere, tree birches display a wide latitudinal, longitudinal and altitudinal distribution. In extensive European wetland areas, they play a dominant role in regional vegetation. As a result, their leaves may occur abundantly and continuously in Holocene peat deposits. Because of the common availability of both modern and (sub)fossil leaf material, *B. pendula* and *B. pubescens* are excellent species for studying influences of various environmental factors on leaf morphology. Supplemented with data from controlled environment experiments, these studies demonstrate that stomatal formation rates in birches, expressed as mean stomatal index, are primarily determined by atmospheric CO₂ concentration. Consequently, stomatal frequency data of tree birches can well be applied in the detection and quantification of past changes in CO₂ regimes.

Historical stomatal frequency data from herbarium leaves have a generally low temporal resolution and influences of environmental conditions other than CO₂ are difficult to assess. Also effects of single-step CO₂ experiments on seedlings may not be representative of responses to the global CO₂ increases of 1-2 ppmv per growing season. In this thesis a new method is introduced for detecting the rate of CO₂ responsiveness in deciduous tree species in retrospect. Presently formed peat may contain continuous records of annual leaf shedding that are uninterrupted linked to living trees. Fine-resolution stomatal frequency analysis of the of buried leaves of a solitary growing *Betula pendula*, illustrates that "natural archives" provide unambiguous near-annual records of the long-term responses of stomatal characteristics to CO₂ increase that are impossible to replicate in conventional short-term experiments. It could be convincingly confirmed that individual deciduous trees are equipped with a plastic phenotype, capable of a lifetime adjustment of mean stomatal density and index as a to anthropogenic CO₂ increase over the past four decades.

Because stomatal density can become neither zero nor infinite, the prospective range of stomatal frequency change is likely to be a sigmoid function of changing CO₂ concentrations. The near-linearity of the realized range of stomatal frequency response during the lifetime of an individual birch indicates that at least in *B. pendula* the lower plateau of the response has not yet been reached. By combining stomatal frequency data for *B. pendula* and *B. pubescens*, a response curve for the mean stomatal index of leaves of European tree birches is empirically modelled. The predicted response is compared with a response curve for *Quercus petraea*. The models suggest, that non-linear stomatal frequency responses may vary from one tree species to another. Individual species appear to approach their response limits at different CO₂ levels; for *Quercus petraea* this limit has already been reached, for *Betula* this is likely to occur in the next decades at CO₂ concentrations of ~400 ppmv. The modelled response limits well below 700 ppmv may explain that CO₂-doubling experiments with tree species suggest only minor responses or no significant acclimation at all.

Because of the uniform adaptation patterns, empirically determined in *B. pendula* and *B. pubescens*, the two European tree birch species are treated as a single complex. However, the genetic difference of the two species has to be taken into consideration when combined data sets are used. The detailed analysis of epidermal properties in genetically controlled specimens provides the necessary evidence of similar stomatal formation rates. In addition, hybrids of the tree birches and the dwarf birch *B. nana* are investigated. Such hybrids presently dominate the Fennoscandian birch population of the subarctic climate zone. Genetically controlled leaf material from the most common hybrids is studied to test the influence of a possible occurrence of mountain birch in fossil (Late Glacial, Holocene) leaf assemblages from other parts of Europe. The observed species specific characteristics of cell shape and dimensions allow a taxonomic differentiation of hybrids and pure species. A comparison of results from Finland and field studies from The Netherlands shows that the stomatal index is slightly higher in the far north. Enhanced stomatal formation under prolonged photoperiods is suggested as cause of the observed differences under the contrasting latitudinal light regimes.

Light intensity is the best known environmental factor for leaf anatomical modification. Light depending variability in the stomatal frequency is tested in field studies for *B. pubescens* and *B. pendula*. The analysis of leaves grown under a wide range of light intensities support results of plant physiological studies that suggest reduced capacity of shade adaptation in the light demanding birches. Intensive cell undulation, one of the most distinctive epidermal characteristics of shade morphotypes, is not developed in *B. pendula* and *B. pubescens*. Although epidermal cell densities (and hence stomatal densities), are highly responsive to radiation levels, resulting in a wide range of scatter, the stomatal index remains fairly constant. However, a slightly enhanced stomatal formation under high radiation levels occurs in both species. The results confirm that light conditions have a distinct influence on the stomatal density. In palaeoatmospheric CO₂ reconstructions, this influence can be filtered out by applying the stomatal index.

The possible influence of growth temperature on stomatal frequency development is considered next. *B. pendula* leaves from experimental treatments under different growth temperatures reveal a positive correlation between stomatal frequency and increasing growth temperature. A distinct response to this variable is demonstrated for the first time in deciduous trees. Under natural growth conditions, deciduous trees possess the capacity to react to local temperature differences by advancement or delay of leaf growth initiation, in order to maintain growth under optimum conditions. In Quaternary fossil leaf records corresponding to phases of moderate temperature shifts, this phenological adaptation rules out a temperature overprint of the stomatal index. Only in leaf material grown under extremely low glacial and stadial temperature regimes, the opposite correlation of the two variables could lead to overestimated CO₂ concentrations.

The influence of nitrogen supply on the stomatal formation rate in *B. pendula* is further tested. Experimental treatments under optimum, suboptimum and stress N-supply rates show that the stomatal index is independent of nutrient availability under ambient (350 ppmv) CO₂ concentrations. By contrast, cell growth is significantly hampered under stress conditions. This has profound consequences for the stomatal density. The experiments are additionally performed under elevated CO₂ concentrations. The 700 ppmv CO₂ treatments produce analogous modifications in the

leaf morphology. No further reduction of the stomatal index due to CO₂ doubling occurs under optimum and suboptimum nutrient supply, which is in good agreement with the earlier modeled response curve. However, stomatal index reduction is observed in conjunction with the N-stress treatment under elevated CO₂.

In order to test the potential of *Betula* leaves in high-resolution reconstruction of Holocene CO₂ concentrations, the stomatal index of leaf material from the early Holocene part of the Borchert section (The Netherlands) is examined. The established CO₂ curve appears to be in good harmony with the pattern of temperature fluctuation, documented for the first centuries of the Holocene by marine, terrestrial and atmospheric proxy records. The curve matches $\delta^{18}\text{O}$ -inferred temperature trends in ice cores from Greenland. The prominent warming at the Younger Dryas/Holocene transition is paralleled by a rapid shift towards higher CO₂ concentrations. A succeeding short-lived CO₂ decline matches the Preboreal Oscillation, a 150-year cooling pulse that occurred about 300 ¹⁴C years after the onset of the Holocene. The latter correlation demonstrates that, at least for the early Holocene, the temporal resolution of the leaf-based CO₂ trends exceeds direct ice core measurements. In contrast to conventional ice-based estimates of 270-280 ppmv CO₂, quantification of the stomatal frequency signal suggests early Holocene CO₂ levels well above 300 ppmv.

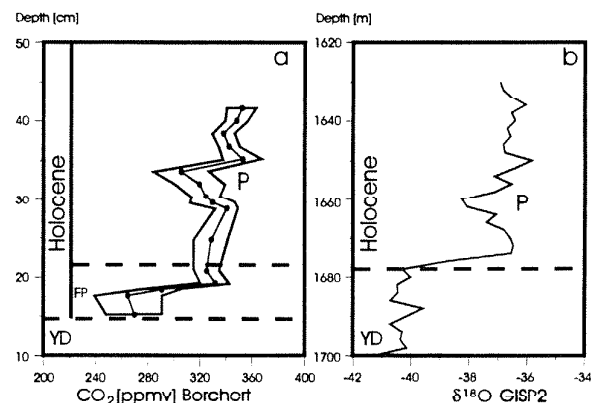


Fig. 1: a: Preboreal atmospheric CO₂ concentrations reconstructed on the basis of stomatal frequency analysis of *Betula* leaves from the Borchert section. YD = Younger Dryas, FP = Friesland Phase, P = Preboreal Oscillation. B: $\delta^{18}\text{O}$ profile for the YD-H transition in the GISP2 ice core from Greenland.

"The influence of environment on the stomatal frequency in *Betula*" - by Friederike Wagner
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ASPECTS OF LATEGLACIAL-EARLY HOLOCENE VEGETATION DEVELOPMENT IN WESTERN EUROPE

palynological and palaeobotanical investigations in Brabant
(The Netherlands) and Hessen (Germany)
PhD thesis Johanna A. A. Bos

1. Introduction

The present study concentrates on the vegetation development in western Europe during the Weichselian Lateglacial and Early Holocene. The Weichselian Lateglacial forms the transition between the cold Weichselian Pleniglacial and the warmer Holocene.

During the period considered, c. 13,000 to 9000 years before present (BP), major climatic changes took place which had a great effect on the flora and vegetation. During the Lateglacial, the vegetation development in The Netherlands and in north-western Germany was different from that in southern Germany and Switzerland. During this time, the German highlands probably played an important role as geographical barrier for the northward migration of *Pinus* (pine). In the present study, the flora and vegetation development of three areas, one north of the German highlands (Milheeze in the southern Netherlands), one south of this barrier (Wetterau, Germany) and one area situated within these German highlands (Amöneburger Basin in Hessen, Germany) have been compared.

2. Material and Methods

In this study the vegetation developments of these specific areas are reconstructed using both pollen- and macro-fossil analyses. The advantages and restrictions of both methods are discussed. It is argued that the reconstruction of vegetation from fossil pollen assemblages is improved when different components (i.e. local, extralocal, regional and extraregional) in the pollen deposition are distinguished. An important tool in the reconstruction is the zonation of the pollen diagrams on the basis of common regional pollen trends and a careful selection of the pollen sum. The accuracy of the ^{14}C technique and existing calibration curves for the Lateglacial are discussed.

3. Case study Milheeze

Changes in the vegetation in and around a former lake, on the south-eastern side of a coversand ridge, were studied during the Lateglacial near Milheeze (southern Netherlands). Pollen- and macro-fossil analyses were performed on four sediment cores along a transect from coversand ridge to lake centre. Correlation was made with the existing chronostratigraphy of The Netherlands to put the study into a larger frame-work. For the first time in The Netherlands, lake level fluctuations were reconstructed based on information provided by a transect of cores. The climatic signal reflected in the Lateglacial flora and lake level fluctuations agree largely with the already published data from The Netherlands. The fine scale mosaic of vegetation patterns around the former lake were reconstructed by the use of the transect. At the end of the Oldest Dryas and beginning of the Bölling the lake had not yet formed and a Cyperaceae (sedge) vegetation was present in the depression. Pioneer communities with heliophilous herbs were present in the whole area. The formation of the former lake started during the end of the Bölling. Plants of open water communities started to grow in the lake and oligotrophic to mesotrophic conditions prevailed. Around the lake an open landscape was present with scattered *Betula* cf. *pubescens* (birch) copses and *Betula nana* (dwarf-birch), *Juniperus* (juniper) and *Salix* (willow) shrubs. During the Older Dryas the climate deteriorated and *Salix*, heliophilous herbs, such as *Artemisia* (wormwood), and Gramineae (grasses) became present near the coversand ridge. *Juniperus*, *Betula nana* and some *Betula* copses were present in the vegetation surrounding the lake. During the early Alleröd open birch forests developed due to the warmer and dryer climate. On the coversand ridge, *Betula nana* and *Juniperus* scrub were present together with heliophilous herbs, such as *Artemisia*. *Betula* and *Populus* (aspen) grew on the slopes of the coversand ridge. More towards the former lake shore *Salix* shrubs were present. The vegetation in the lake and on the shores became more diverse and mesotrophic to eutrophic conditions prevailed. During the middle Alleröd a few pine trees were present on the coversand ridge, but only for a short time. During the late Alleröd pine massively migrated into the area. An open pine forest with an understorey of *Calluna vulgaris* (heather) was present on the coversand ridge. The *Betula/Populus*- and *Salix* zone remained

present between the slopes of the coversand ridge and the former lake shore. In the lake, processes such as terrestrialisation and acidification took place. During the early Younger Dryas dystrophic conditions prevailed in the lake. The climate deteriorated and birch forests opened-up. Some pines on the coversand ridge were affected by late Palaeolithic man and *Artemisia*, Gramineae and *Hippophaë rhamnoides* (sea buckthorn) occurred on the now open spots. During the later part of the Younger Dryas the water level had dropped so far that the *Betula/Populus* zone along the sand ridge had moved towards the centre of the lake. *Pinus* disappeared and an open herbaceous vegetation with *Empetrum nigrum* (crowberry) and *Calluna vulgaris* became present on the coversand ridge.

4. Case study Wetterau and Amöneburger Basin

Changes in the vegetation cover of the northern Wetterau and the Amöneburger Basin (located in the loess area of central west Germany) were studied during the Lateglacial and Early Holocene. Pollen- and macro-fossil analyses were performed on four sediment cores; three from deposits collected on the Wetter river floodplain in the northern Wetterau and one on the floodplain of the Ohm river in the Amöneburger Basin. The pollen assemblages were correlated with the biostratigraphies of the central Swiss Plateau and the Eifel (Germany). In the diagrams of the northern Wetterau and the Amöneburger Basin, phases of hydrological changes and increased fluvial activity could be recognised in the pollen- and macro-fossil assemblages. At the beginning of the Bölling the climate ameliorated and in the northern Wetterau an open herbaceous vegetation with dwarf shrubs was replaced by an open birch forest with dwarf shrubs. Soils stabilised and run-off decreased. This led to a decrease in the sediment load of the Wetter river. The Wetter river probably changed from a multi-channel pattern to a meandering pattern and infilling of the residual channels started. During the Older Dryas the climate deteriorated and birch forests in the river valley were partly replaced by an open herbaceous vegetation. Low groundwater tables were apparent in the areas adjacent to the Wetter river. At the beginning of the Alleröd the climate ameliorated again and birch forests closed. *Pinus* migrated into the northern Wetterau and soon became the dominant tree. Birch forests in the river valley were largely replaced by pine forests and only on the locally wetter substrates of the river floodplain *Betula* stands remained present. During this time, the amount of herbaceous vegetation decreased and pine forests in the river valley and on the hills slowly closed. In the residual channels terrestrialisation took place. At the beginning of the Younger Dryas the climate deteriorated again and pine forests opened-up. The surrounding highlands of Taunus and Vogelsberg received an increased amount of precipitation especially during winter, which resulted in a high seasonal peak discharge of the Wetter and Ohm rivers, both originating on the Vogelsberg. In the northern Wetterau, for a short time, old river channels were reactivated and a thick terrace of coarse grained sediments was deposited. These terraces formed the river floodplain in which mires developed. Infilling started of these mires started during the slightly warmer, drier, later part of the Younger Dryas. During the same time, rivers probably changed back to their meandering pattern and also infilling of the former channels started. Ericales became an aspect of the vegetation during this later part of the Younger Dryas, indicating the development of more acid, nutrient-poor soils. Low groundwater tables were apparent in the areas adjacent to the rivers and a pioneer vegetation was present on these newly formed substrates. At the end of the Younger Dryas yearly floodings occurred and large sediment sheets were deposited on the Ohm- and Wetter floodplains, often containing reworked material (including Laacher See Tephra). During the Younger Dryas, the

Amöneburger Basin had a slightly wetter and cooler climate than the relatively warmer and drier northern Wetterau ("Troockeninsel"). At the beginning of the Early Holocene (Preboreal) the climate quickly ameliorated, pine forests closed and soils became stabilised again. The YD/PB transition is indicated by a lithological change in the sediments and more organic-rich deposits started to accumulate. In the north-western part of the Wetterau a greater cover of open herbaceous vegetation remained present as a relic from the Lateglacial. *Betula* stands remained present on the floodplains on the locally wetter substrates. At the end of the early Preboreal there is an extension of *Betula* stands on the river floodplains. This was interpreted as a phase in which the climate was temporarily wetter and is probably a reflection of a short term climatic oscillation, the so-called Preboreal oscillation (PBO). On the river floodplains ferns become a more important aspect in the local vegetation of the mires, first in the grass/sedge vegetation, but later during the Boreal they form the understorey of swamp forests. During the Boreal a major expansion of *Corylus* took place in both areas. On the hills and slopes of the northern Wetterau and the Amöneburger Basin open pine forests and hazel scrub were present with grasses as understorey. In the river valleys pine forests were replaced by deciduous mixed forests with *Quercus* (oak), *Ulmus* (elm) and later also with *Tilia* (lime). In the Amöneburger Basin, *Corylus* growth was probably favoured by the higher annual precipitation, while in the north-western part of the Wetterau, the growth of pines and dry prairie herbs was favoured by the more continental climate.

5. Synthesis

A preliminary transect from The Netherlands to the Swiss Plateau was established by correlation of the regional pollen assemblage zones (PAZ) in the diagrams of Milheeze and the Wetterau and the Amöneburger Basin with those distinguished for the Eifel crater lakes and the central Swiss Plateau. On this transect, the immigration of various plant taxa during the Lateglacial was followed; *Pinus* played an important role. *Pinus* probably used the Rhine river valley as a major immigration route and reached the Wetterau already during the early Alleröd. The Lahn valley, Eifel and Netherlands were reached much later, during the late Alleröd. During the early Alleröd, the presence of the German highlands in combination with the narrow river valley(s) of Rhine (and Mosel) probably obstructed the immigration of *Pinus* in the Eifel and The Netherlands. Similarly, the Lahn mountains and foothills of the Vogelsberg (also part of the German highlands) obstructed the immigration of *Pinus* in the Lahn valley.

6. Conclusion

During the Lateglacial, major changes in the vegetation of the coversand region around Milheeze and in the loess region of the Wetterau and the Amöneburger Basin occurred. These changes were induced by the synchronous climatological events. However, the reflection of climatically induced trends in the pollen deposition, is quite different in both areas and it depends on factors such as geographical location, bedrock characteristics and palaeohydrology. In Milheeze, the dominant tree in the vegetation during the Lateglacial was *Betula*, in the Wetterau and the Amöneburger Basin it was *Pinus*. This difference was not only a result of the more continental climate of the Wetterau and the Amöneburger Basin but was also induced by the presence of the German highlands. The German highlands may have played an important role as a barrier between the northern European plain and southern Germany, and it might have obstructed an early immigration of taxa such as *Pinus*. Palaeohydrological changes in both areas during the Lateglacial were reflected in Milheeze in fluctuations in

the lake water level and in the Wetterau and the Amöneburger Basin in changes in the fluvial activity. Apart of these differences, also many similarities between both areas existed, for example, the development in both areas of acid, nutrient-poor soils during the later part of the Younger Dryas.

Johanna A. A. Bos – Laboratory of Palaeobotany and Palynology, Budapestlaan 4 – 3584 CD Utrecht – The Netherlands



Address changes and corrections

Eric Monteil has left IKU Petroleum Research (Trondheim, Norway) at the end of August 1998. After 1 September, Eric can be reached at:

BG Technology, Gas Research & Technology Centre, Ashby Road, Loughborough, Leicestershire, LE11 3GR, United-Kingdom

Switchboard: +44 1509 28 20 00

Facsimile: +44 1509 28 31 37

E-mail: eric.monteil@bgtech.co.uk

The correct address and number for M. Aziz Islam are:

60 Wilber Street

ROSSMOYNE WA

AUSTRALIA 6148

Tel. +61-8-9457 2387

E-mail : AzizI@gic.net.au

There is an on-line debate on the adequacy of the fossil record currently taking place in the Nature web site:

http://helix.nature.com/debates/fossil/fossil_frameset.html

INTERNATIONAL SYMPOSIUM ON THE BIOGEOGRAPHY OF SE ASIA 2000

First announcement

The Nationaal Natuurhistorisch Museum, the Rijksherbarium and Hortus Botanicus (both in Leiden) and the Netherlands Research School of Sedimentary Geology (NSG), Amsterdam, are organizing an international symposium on the biogeography of SE Asia, to be held 4-9 June, in Leiden, The Netherlands.

Southeast Asia has received much attention in recent years, both from earth scientists and biologists. It is a region where several lithospheric plates are colliding and this process of ongoing mountain building has resulted in a very complicated biotic history. It comprises major hotspots of global biodiversity. However, the natural environment is much under threat and increased attempts are made to study and to preserve what is left. It has become clear in recent years that the abiotic and biotic developments can only be understood if they are studied in an integrated way. Therefore, an interdisciplinary symposium programme has been developed to give a comprehensive summary of the knowledge at the start of the new millennium. The congress

will cover all aspects of historical biogeography of the area, including geological developments, paleoclimatology, marine and terrestrial life, plants as well as animals. In addition, attention will be paid to methodology, and to "applied biogeography" and conservation. Special themes may include monitoring of Global Climatic Change and Biodiversity assessments. The texts of the lectures will be published shortly after the congress. The meeting will consist of invited presentations, contributed lectures and posters, and workshops such as on computer applications and on multidisciplinary research themes. One day has been planned for excursions and leisure.

For further information and for inclusion in the mailing list for the 2nd announcement, please contact:

Rienk de Jong - Nationaal Natuurhistorisch Museum - Dept. of Entomology - PO Box 9517 - 2300 RA Leiden, The Netherlands
Phone **31 71 516 26 52

Fax **31 71 513 33 44

e-mail jong@nrm.nl

L.S.

Recently, the first phase in producing a central database on Dutch herbaria collections was finished. It concerns the type collections of the Leiden, Utrecht and Wageningen herbaria. In the long run, this should happen for all Dutch herbaria. Please check this out at:

<http://rulrhhb.leidenuniv.nl>

AGENDA
Grazie al Cap website

1999

☞ April 1999. **Fourth Symposium of African Palynology**, Sousse University, Tunisia – Contact Prof. E. Roche, AIPA/IAAP Secretary, Musée de l'Afrique Centrale, Palynology, B-3080 Tervuren, Belgium. Fax. 32.4.366.53.38

☞ TBA. **Canadian Paleontology Conference**, Calgary, Alberta, Canada.

☞ TBA. **International Botanical Congress**, St Louis.

Laure Civeyrel and Annick Le Thomas are trying to organize a symposium on "Palynological Contributions to Phylogeny and Systematics" at this Congress. For more details on this symposium, contact Laure Civeyrel, E-mail: civeyrel@isem.isem.univ-montp2.fr

☞ January 5-6 1999. **QRA Annual Discussion Meeting**

Department of Zoology, University of Cambridge, U.K. Title: 'Recent Advances In Quaternary Biostratigraphy'

Details: Dr Danielle Schreve, c/o Department of Palaeontology, Natural History Museum, London SW7 5BD. Tel: (0044) 0171 938 9258, Fax: (0044) 0171 938 9277, E-mail: D.Schreve@nhm.ac.uk or Gill Thomas, Tel: (0044) 01242 543311, Fax: (0044) 01242 532997, E-mail: gthomas@chelt.ac.uk

☞ January 10-14 1999. **Fourth Meeting of the World Archaeology Congress**

Cape Town, South Africa. Theme: Global Archaeology at the Turn of the Millennium. Details: Carolyn Ackermann, Congress Secretariat, P.O. Box 44503, Claremont, 7735, South Africa. Tel: +27 (21) 762-8600, Fax: +27 (21) 762-8606, E-mail: wac4@globalconf.co.za or globcon@iafrica.com

Web site: <http://www.uct.ac.za/depts/age/wac>

☞ January 18 1999. **Workshop On Decoding Canada's Environmental Past: Adaptation Lessons Based On Changing Trends And Extremes In Climate And Biodiversity**, Victoria, British Columbia, Canada

This Workshop immediately precedes the EMAN National Science Meeting (see <http://www.cciw.ca/eman> for registration, participation and reservation information).

Details: Don C. MacIver, Atmospheric Environment Service, Environment Canada, 4905 Dufferin Street, Downsview, Ontario, M3H 5T4, Canada. Tel: (416) 739-4391, Fax: (416) 739-4882. E-mail: don.maciver@ec.gc.ca

☞ March 28 - April 1 1999. **European Union of Geosciences Meeting (EUG 10)**

Details from conference website:

<http://eost.u-strasbg.fr/EUG/symposia.html>

Includes Symposium B4 **Glacial carbon cycle changes**

Convenors: Louis Francois (Liege), E-mail: francois@astro.ulg.ac.be, Jean-Luc Probst (Strasbourg), Hugues Faure (Marseille)

☞ May 10-14 1999. **AQQUA Annual Meeting**

University of Ottawa, during the 67e Congrès de l'ACFAS. Details: <http://office.geog.uvic.ca/dept/cgrg/bulletin.htm>

☞ May 16-20 1999. **2nd International Mammoth Conference (2nd IMC): "200 Years of Mammoth Research"**

Rotterdam, The Netherlands. Details: Dr Jeffrey J. Saunders, Chair, Geology Section, Illinois State Museum, Research and Collections Center 1011 East Ash, Springfield, Illinois, IL 62703, USA. Tel: (217) 524-7909 Fax: (217) 785-2857, E-mail: saunders@museum.state.il.us

☞ May 17-22 1999. **Mesozoic-Cenozoic Dinoflagellate Cyst Course**

Urbino, Italy. Conducted by Graham L. Williams (AGC), Jonathan P. Bujak (LEXIS) & Henk Brinkhuis (LPP, Utrecht University). Local coordinator: Prof Dr Rodolfo Coccioni, University of Urbino Details: Henk Brinkhuis, Laboratory of Palaeobotany and Palynology, Utrecht University, Budapestlaan 4, 3584 CD Utrecht, The Netherlands, Tel +31.30.2537691, Fax +31.30.2535096, E-mail: H.Brinkhuis@bio.uu.nl

☞ May 25-29 1999. **Second International Limno-Geology Conference**

Brest, France. Details: Jean-Jacques Tiercelin, Directeur de Recherche au CNRS, UMR 6538 "Domaines Oceaniques", CNRS URA 1278, Groupe Riftogenese Est-Afrique, Université de Bretagne Occidentale, Département des Sciences de la Terre, 6, Av Le Gorgeu, 29285 Brest - France, Tel: 33 (0)2 98 49 87 59, E-mail: tiercelin@univ-brest.fr, or conference e-mail address: lenn@univ-brest.fr

Website: <http://www-sdt.univ-brest.fr/~lenn>

☞ May 26-28 1999. **GAC/MAC Meeting**

Sudbury, Ontario, Canada. Details: P. Copper, Department of Earth Sciences, Laurentian University, Sudbury, Ontario, P3E 2C6, Canada. Tel: (705) 6675-1151, X2267, Fax: (705) 675-4898, E-mail: gacmac99@nickel.laurentian.ca

☞ June 1-5 1999. **Canadian Association of Geographers (CAG) Annual General Meeting**

Lethbridge, Alberta, Canada. Details: Dr. Robert Rogerson, Local Arrangements Committee Chair, E-mail: rogerson@hg.uleth.ca

☞ August 3-11 1999. **XV INQUA Congress**.

Durban, South Africa. Theme: "The Environmental Background to Hominid Evolution in Africa". XV INQUA Congress details: Dr. D. M. Avery, Secretary-General, South African Museum, P.O. Box 61, Cape Town 8000, South Africa. Tel: +27-21-243330, Fax: +27-21-246716, E-mail: mavery@samuseum.ca.za

See also <http://inquanlh.no/congress/congress.html>

Congress may include the following proposed sessions:

Commission on Palaeoclimate: Working group on Milankovitch and Plio-Pleistocene vegetation succession from 2.6 to 0.9 Ma

For more information on this session, write to us: Dr Suzanne A. G. Leroy, Centre for Palaeoecology, School of Geosciences, Queen's University Belfast, Belfast BT7 1NN, N. Ireland. Ph: +44-1232-335 143 and 273 978, Fax: +44-1232-321 280, E-mail: s.leroy@qub.ac.uk

Website: <http://www.qub.ac.uk/geosci/admin/staff/leroy.html>. See also Leroy, S., and Ravazzi C., 1996 - New working group within the INQUA commission on palaeoclimate: Searching for vegetation successions at the scale of Milankovitch cycles in between 2.6 to 0.9 Ma. *Canadian Association of Palynologists Newsletter* 19(1):26-30 and look at the commission of palaeoclimate website: <http://inqua.nlh.no/comm/palclim.html>

Quaternary and Holocene sedimentary records in Central Africa and their palaeoenvironmental interpretation

Paper and poster proposals and further information from: Dr Juergen Runge, Physical Geography, University of Paderborn, Germany, E-mail: arung1@hrz.uni-paderborn.de, and Dr Daniel Olago, IGBP-START Office, Nairobi, Kenya, E-mail: pagesnbo@form-net.com

Carbon Cycle Changes: Peak Glacial Versus Interglacial Conditions

Inqua Commission On Carbon/IGCP-404, Tuesday 10th August 1999

Please e-mail Jonathan Adams (jonathan@elvis.esd.ornl.gov) or Hugues Faure (faure@luminy.univ-mrs.fr) if you are interested in speaking at this symposium.

Modern Pollen Records And Their Use In Interpreting Past Tree-Lines And Past Climate

The Symposium co-conveners Sheila Hicks (Oulu, Finland, sheila.hicks@oulu.fi) and Heather Tinsley (Bristol, UK R.C.Tinsley@Bristol.ac.uk) welcome contributions on either theme, particularly any which are able to demonstrate the SIGNIFICANCE of pollen influx (pollen accumulation rates) in investigations involving changing tree-lines and/or changing climate during the Quaternary. The symposium will last for 3 hours and there is space for twelve 15 min presentations. Through these we would like to cover as many different parts of the world as possible. If you are anticipating attending the INQUA congress and have results on this theme which you would like to present do please contact either of the conveners directly. We particularly hope that members of the INQUA Work Group 'European Pollen Monitoring Programme' will also take advantage of this opportunity to present their results to a wider public.

☞ August 20-29 1999. **CANQUA Meeting**

Calgary, Alberta, Canada. Technical and poster sessions August 23-26, Field trips August 20-22, and August 27-29.

Details: Dr Derald G. Smith, CANQUA Conference Chair, Department of Geography, University of Calgary, Calgary, Alberta, T2N 1N4, Canada, Tel: (403) 220-6191, Fax: (403) 282-6561, E-mail: dgsmith@acs.ucalgary.ca

Conference website: <http://pc56.ss.ucalgary.ca/>

☞ September 6-10 1999. **9th International Conference on Luminescence and Electron Spin Resonance Dating**

Rome, Italy. Details: Scientific Secretariat, Dr. Emanuela Sibilia, Dipartimento di Scienza dei Materiali, Milano, E-mail: sibilia@mater.unimi.it or Organizing Secretariat, PR & Co., Roma, b.fersini@flashnet.it

Web site: <http://www.mater.unimi.it/LED99/>

☞ September 13-17. **8th International Conference On Accelerator Mass Spectrometry**

VERA Laboratory, Universitaet Wien, Vienna, Austria. Details: Conference Secretary Gabriele Kratschmann, Tel. +43 1 40480-700, Fax +43 1 4076200, E-mail: gabikra@pap.univie.ac.at

☞ October 25-28. **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

2000

☞ TBA. **GAC/MAC Meeting**

Calgary, Alberta, Canada

☞ TBA. **Canadian Paleontology Conference**

Antigonish, Nova Scotia, Canada

☞ May 29 - June 3 2000. **Canadian Association of Geographers (CAG) Annual Meeting**

Brock University, St Catharines, Ontario. Details: Hugh Gayler (hjgavler@spartan.ac.brocku.ca)

☞ June 24-30 2000. **10th International Palynological Congress (IPC)**

Nanjing, China. Details: Secretary of the Organizing Committee for 10th International Palynological Conference, Nanjing Institute of Geology and Palaeontology, Academia Sinica, 39 East Beijing Road, Nanjing, 210008, People's Republic of China

Electronic version of first circular, with registration form, available at: <http://members.spree.com/sip/spore/index.htm>

Information on International Palynological Congresses is available at <http://geo.arizona.edu/palynology/ifps.html>

☞ July 30 - August 3 2000. **Sixth Quadrennial Conference of the International Organization of Paleobotany (IOPC IV - 2000)**

Qinhuangdao, Hebei, China. Details: Prof. Lujun Liu, Secretary-General of IOPC-VI Organising Committee, Nanjing Institute of Geology and Palaeontology, Academia Sinica, 39 East Beijing Road, Nanjing 210008, PR China, Tel.: +86-25-6637 208, Fax: +86-25-3357 026 E-mail: paleobot@public1.ptt.js.cn

☞ 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

2001

☞ TBA. **GAC Meeting**

☞ TBA. **CANQUA Meeting**

Whitehorse, Yukon Territory, Canada (proposed).

☞ TBA. **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.

☞ November 5-8. **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

☞ TBA. **GAC Meeting**

☞ October 28-31. **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

☛ TBA. **CANQUA Meeting**

Halifax, Nova Scotia, Canada (proposed).

☛ November 2-5. **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

**GEOLOGICAL ETHICS AND PROFESSIONAL
PRACTICES, 1987-1997**
published by AIPG

The American Institute of Professional Geologists (AIPG) announces publication of *Geological Ethics and Professional Practices, 1987-1997*, a 202-page reprint of articles, discussions, and other material relating to ethics and general items of professional geological practice from AIPG's monthly magazine, *The Professional Geologist* (TPG). The book was edited by David M. Abbott, Jr., compiler of the "Professional Ethics and Practices" (PE&P) column in the TPG. Discussion topics from the column form a significant percentage of the book's content. The book provides a thought-provoking introduction to geological ethics unavailable in any other single source.

Geological Ethics and Professional Practices, 1987-1997 is divided into five parts.

- Part I introduces the concept and scope of professional ethics codes and their close relationship to professional practices. AIPG's Code of Ethics and Disciplinary Procedures follow as basic reference material for the rest of the book.

- Part II contains general contributions on professional ethics as a whole.

- Part III focuses on registration and licensing issues including testing. It examines questions such as the effectiveness of registration in protecting the public.

- Part IV examines the utility and limitations of professional standards and the free exercise of professional judgement.

- Part V is an admitted melange of topics, although all address important issues.

Related discussion topics from the PE&P column are included in relevant places throughout the book.

Rather than providing definitive answers to issues, *Geological Ethics and Professional Practices, 1987-1997* provides a variety of views. It demonstrates that many ethical questions are not black and white but rather require careful reflection and analysis. The whole range of geological practice in terms of both area of specialisation and employer is covered. The target audience includes the whole range of the profession from undergraduate students through practising geologists and professors to those who have reached emeritus status. It can serve as both a text and the starting point for further exploration of both the topics presented and other situations and examples from the reader's own experience.

Geological Ethics and Professional Practices, 1987-1997 is available from AIPG at a cost of \$18 for AIPG members, students, and public libraries; and \$25 for others. The price includes shipping and handling.

Orders can be placed by calling 303-431-0831.

The American Institute of Professional Geologists (AIPG) was founded in 1963 to promote the profession of geology and to

provide certification for geologists as a vehicle for establishing a standard of excellence for the profession. Since then over 10,000 individuals have demonstrated their commitment to the highest levels of competence and ethical conduct and been Certified by or affiliated with AIPG.

AIPG, 7828 Vance Drive, Suite 103, Arvada, CO 80003

(303) 431-0831 * Fax (303) 431-1332

aipg@aipg.org

<http://www.aipg.org>

The KU Natural History and Biodiversity Research Center has made the first edition of *The Complete Cladist* available on the web at:

<http://www.nhm.ukans.edu>

because it is out of print, yet in great demand. The authors are planning a second edition to be published by the Museum in a year or so. Enjoy!

An updated phytoplankton image library. Check it out at <http://www.paulsmiths.edu/aai/phyto.html>

Michael R. Martin - Adirondack Aquatic Institute - to understand, preserve and protect the aquatic resources of the Adirondacks through research and education.

STERNBERG MUSEUM OF NATURAL HISTORY

The re-opening of the Sternberg Museum of Natural History in Hays, KS, is scheduled for March 13th, 1999. They may still be painting the exhibit cases, but the doors will open!

For the dinosaur lovers, there will be mechanical dinosaurs in a Cretaceous diorama, with murals making the whole third floor of the dome look like a scene out of that there dinosaur movie, you know, the one what made all the big-bucks. Also, for the first month or so, there will be a temporary exhibit of casts of dinosaur skeletons in the changing exhibits area. For the pure vertebrate lover in all of us, there will be many other fossils, such as the famous (infamous?) fish-within-a-fish.

**LATE CRETACEOUS AND CENOZOIC
HISTORY OF NORTH AMERICAN VEGETATION
(NORTH OF MEXICO)**

Alan Graham, a palynologist specializing in the Tertiary, has just published "Late Cretaceous and Cenozoic History of North American Vegetation (North of Mexico)."

From the Oxford U Press flyer: "This book is a unique and integrated account of the history of North American vegetation and paleoenvironments over the past 70 million years. It includes discussions of the modern plant communities, causal factors for environmental change, biotic response, and methodologies. The history reveals a North American vegetation that is vast, immensely complex, and dynamic." Contents:

1. Setting the goal -- the modern vegetation of North America
2. Cause and effect -- factors influencing the composition and distribution of North American plant formations through the late Cretaceous and Cenozoic time
3. Context
4. Methods, principles, strengths, and limitations
5. Late Cretaceous through Early Eocene North American vegetational history

6. Middle Eocene through Early Miocene North American vegetational history
7. Middle Eocene through Pliocene North American vegetational history
8. Quaternary North American vegetational history
9. The origins of North American biogeographic affinities
November 1998 384 pp; 171 illustrations / 511342-X, Oxford U. Press, 198 Madison Ave., NY, NY 10016
Prepublication price is \$68 (reg. \$85) with \$3.50 shipping on the first copy and \$1.50 for each additional.
Linda-C K Shane - shane002@maroon.tc.umn.edu

The Paleobiological Fund's Student Research Grant Program has begun its 1999 grant cycle and is currently accepting student research grant proposals. Please visit the Fund's web site for more information or feel free to contact me directly. The Fund's address is 6809 Crossman Street, Annandale, Virginia 22003. The deadline for student proposals is March 1, 1999. The Paleobiological Fund's website address is: <http://members.aol.com/cpaleo>

DIGITAL ATLAS OF COAL GEOLOGY
PRESS RELEASE
From The Society for Organic Petrology

The Atlas of Coal Geology (American Association of Petroleum Geologists Studies in Geology #45), a 4-yr publication project of the Energy Minerals Division-AAPG and The Society for Organic Petrology, is available as of the end of November from AAPG. The atlas was compiled by Alex Papp, Jim Hower, and Doug Peters; with Papp and Hower responsible for volumes I and II of the atlas, respectively. This is the first publication by AAPG that is entirely digital, with no associated printed material, and is being produced in CD-ROM format.

The Atlas of Coal Geology CD-ROM is designed as a combination reference and learning resource for novice- through expert-level geoscientists in the energy industry and academia. This publication is the first in over 30 years to fully and pictorially cover the topic of coal geology in all its aspects: coal deposition and sedimentary environments, structural geology, coal components, coal petrology, environmental aspects, coal utilisation (coal mining and coalbed methane) and more. The Atlas contains over 660 color (primarily) and black-and-white digital pictures, from various coal basins around the world, pertaining to these many aspects of coal geology. It is a first-rate research and teaching tool!

All text and picture captions on the CD-ROM can be searched by key words or through the Table of Contents. All pictures and text (both background text and captions) are downloadable for reproduction for reference, presentation, and teaching purposes.

Volumes 1 and 2 of the Atlas of Coal Geology CD-ROM emphasise coal geology and coal petrology, respectively. The coal geology volume includes 393 images relating to megascopic coal geology, exploration, mining, and coalbed methane (CBM). The coal petrology volume includes 275 sets of images pertaining to microscopic examination of coals, including macerals and minerals in coals. All pictures are fully captioned. Supporting and background text exceeds the equivalent of 250 printed pages!!
Reference

lists are included and linked to the Atlas text to allow you to find additional information.

The Atlas contains the following sections:

Volume 1 - Coal Geology

Overview of Coal Exploration
Introduction to Coal Mining
Overview of Coalbed Methane
Coal Depositional Systems
Paleochannel Facies Details
Splits, Partings, Rider Coals, and Subseams
Sedimentary Intrusions
Controls on Mining and CBM Development
Stress Environment
Folds and Inclined Beds
Joints
Cleats
Slickensides in Coal-Bearing Strata
Faults
Igneous Intrusions and Extrusions
Coal Seam Burns
Weathering
Environment and Coal Resource Utilization

Volume 2 - Coal Petrology: An Introduction

Origin of Coal
Macerals
Maceral Analysis
Microlithotypes
Lithotypes
Minerals and Mineral Matter
Coalification
Vitrinite Reflectance
Coal Utilization
Combustion
Metallurgical Coals
International Classification

The Atlas is best used on a Pentium or MMX (IBM-compatible) computer, Windows 95 or newer operating system, with 16 MByte RAM or higher, 4X CD reader, 2 MByte video display card set to 16-bit color ("High Color") or better, and screen resolution (desktop area) of 800 x 600 pixels or better. The Atlas also is compatible with Mac systems.

A sample of the Atlas and order forms soon will be available on the EMD and TSOP web sites (<http://www.emdaapg.org> or <http://www.tsop.org>, respectively). To request further information on the Atlas or to order it by phone, contact Ron Hart, Datapages, Inc., Phone 918-496-7777, Fax 918-496-3756, E-mail: rhart@datapages.com (address: 1743 East 71st Street, Tulsa, OK 74136). Cost for AAPG and TSOP members is \$39 and for nonmembers is \$52.

TSOP STUDENT GRANTS PROGRAM
PRESS RELEASE
From The Society for Organic Petrology

The Society for Organic Petrology (TSOP) is pleased to announce the inauguration of its Student Grants program. Monetary awards up to a maximum of US\$1,000 will be granted to qualified masters or doctoral candidates who demonstrate the application of organic petrological concepts to research problems.

Applications are due by March 31, 1999. Applications and information are available at the TSOP webpage (www.tsop.org) or by contacting the

TSOP Research Committee Student Grants Program

/o C. L. Thompson- Rizer, Chairperson

Conoco Inc. PR 3072

P. O. Box 2197

Houston TX 77252-2197 USA

E-mail: carolyn.thompson-rizer@usa.conoco.com

Phone: 281-293-3160 , Fax: 281-293-3833

The purpose of the Student Grants program is to foster research in organic petrology, which includes coal petrology, kerogen petrology, organic geochemistry and related discipline, by providing support to graduate students from around the world. Factors to be weighed in the selection of successful applicants include: qualifications of the applicant as indicated by past performance, originality and research potential of the proposed project, support of the department in which the work is being done, and perceived significance of the project to organic petrology.

The grant program will be initiated with a maximum of two grants each year of up to \$1,000 each. Grants are to be applied to expenses directly related to the student's thesis work, such as summer fieldwork, laboratory analyses, etc. A portion (not to exceed 25%) of the funds may be used to attend TSOP Annual Meetings. Funds should not be used to purchase capital equipment, to pay salaries, tuition, room, or board during the school year. At the conclusion of the research project, the awardees are required to publish an extended abstract in the TSOP Newsletter and will be encouraged to present their results at the TSOP Annual Meeting.

The TSOP Grant Program focuses on support of qualified candidates for masters or equivalent degrees. Qualified doctoral candidates with expenses beyond the usual scope of funding by other agencies are also encouraged to apply.

The Society for Organic Petrology was founded in 1984. TSOP is an Associated Society of the American Association of Petroleum Geologists (AAPG) and a member society of the American Geological Institute (AGI).



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