Canadian Association of Palynologists
Association Canadienne des Palynologues
NEWSLETTER
Volume 26 Number 1 May 2003

St. Catharines, 2003!

President's Message

During the past three years, I have spent much time involved in a project focussed on developing regional vegetation reconstructions for five specific Holocene time slices across the Canadian prairies. Naturally, the basic data for this endeavour comes from pollen records. Delving into long-published and grey-literature pollen records has been quite fascinating. However, it has also made me realize how crucial it is to archive data properly.

I have been trying to gather raw pollen data, so that I can recompute the percentages on a common basis, and use the results for multivariate statistical analysis. To my surprise, I have found that raw pollen data are simply no longer available for many records from the Canadian prairies. The reasons for this are varied. In some cases, it is because the records were examined by students as part of thesis work. They were not required to include the data as appendices in their theses. Their supervisor does not have a copy of their data, or their supervisor may have retired. Often, the students have moved on to other careers, or are completely untraceable. And so the data are lost. In other cases, the records were explored by researchers, who were either University-based or at other institutions. The researcher has retired or is no longer around, and again the data are lost.

This project has been an interesting but in many ways a frustrating exercise. Sometimes, I have been left staring at a blurry, out-of-focus diagram on a microfilm or a poor resolution reproduction of a diagram in a thesis, squinting as I try to interpret fading lines. Occasionally, I have acquired an almost illegible n-th generation photocopy of a report or thesis. I have tried in vain to read tiny smudged lettering of taxon names, or try to work out whether the scale says 20% or 2%. Sometimes, I can't work out what has been included in the pollen sum or how the taxonomic assignments were made.

But often, too, I have been amazed and pleased by the generosity of colleagues. People have searched basements, garages, and dusty file rooms looking for tally sheets for me. File cabinets have been fossicked in and neglected storage boxes have been rummaged in. Some people have sent me original notes and data. Others have sent me electronic spreadsheets of their data and then tolerated my persistent questions about how the numbers were derived. This collegiality has been one of the best and most rewarding aspects of this research.

Nevertheless, the lesson of this project is clear. It takes years of work and effort, not to say money, to produce a pollen record. Once the research is completed or published, shouldn't that information be shared? Every researcher, it seems to me, has a duty to ensure that the raw data from their work are properly archived, either in print form or through submission to an electronic archive. Student theses, I suggest, should always include raw data appendices. Some CAP members may work for institutions that do have a data-archiving policy, but many don't. Databases, like the North American Pollen Database, act as repositories for data, making sure that it lives on and that the work that was done in the past can continue to contribute to the discipline in new and innovative ways.

Perhaps this obsession with data and record keeping is a result of my own circumstances as a Museum curator. Certainly, my curatorial experience, and also this project, has made me acutely aware of the fragility of memory for data preservation. I would

ISSN 1188-3596

like to think that, thirty years or more down the road, some other researcher could take the work that I have done and use it to explore new hypotheses or make new syntheses. After all, isn't that why we do the work in the first place? To contribute to science and as a legacy to the future?

Speaking of the future, I want to remind you that planning is proceeding apace for the AASP-CAP-NAMS meeting to be held October 5 - 8 2003 in St Catharines, Ontario. Two CAP-sponsored symposia are planned: "Land-Sea Correlations in the Cenozoic", convened by Martin Head and I, and "Palynology in the Great Lakes region", convened by Sarah Finkelstein and Catherine Yansa. Many other sessions, events, and field trips will be happening. The CAP Annual General Meeting will also be held during this conference and details will be included on the CAP website at http://www.scirpus.ca/cap/cap.shtml . More information about the conference itself can be found at http://www.palynology.org/ meet_AASP36.html .

I am looking forward to seeing many of you at this conference. It promises to be a great meeting!

In closing, I thank my colleagues on the CAP executive for their assistance in recent months. And I wish you all the best for the summer field season.

Alwynne B. Beaudoin
CAP President
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From the Editor

The highlights of this newsletter include the two essays submitted by Vaughn Bryant and Dallas Mildenhall. Both Vaughn and Dallas are regular contributors to the essay section of the CAP Newsletters, with thought-provoking articles on fascinating palynological applications. I want to extend a special thank you to both of you for the essays in this newsletter, as well as the many essays you have contributed over the years! Also a highlight in this newsletter is the news from an old friend, David Jarzen, who was at the National Museums in Ottawa for many years and now is in Florida. Many of us obtained pollen reference slides from David and Susan while they were in Ottawa, and it is wonderful to hear of your recent activities—thank you!

There are three thesis abstracts in the newsletter, and as always this is a special section because these students represent the future of palynology and related fields here in Canada. Congratulations to all of you: Nicola Evans, Vera Pospelova, and André Viao! I know that we will continue to hear much more from and about all three of you.

Thank you to everyone who submitted material for this newsletter: Alwynne Beaudoin, Trevor Bell, Vaughn Bryant, Robert Clarke, Sarah Finkelstein, Konrad Gajewski, Whitey Hagadorn, Andrea Herbert, David Jarzen, Suzanne Leroy, Fabienne Marret Jock McAndrews, Francine McCarthy, Dallas Mildenhall, Marlow Pellatt, Vera Pospelova, André Rochon, and André Viau. It is your contributions that make the newsletter possible. A special thank you to those who are regular contributors to the newsletter: Alwynne, Vaughn, Robert, Sarah, Konrad, Suzanne, Francine, Dallas, and Marlow.

Last but not least, I want to thank Rob Fensome and Nellie Koziel, who duplicate and mail out the newsletter at each publication time, and to Marlow Pellatt and Alwynne Beaudoin who keep the mailing list up to date. Thank you so much!

Best wishes to everyone as you look forward, hopefully, to some summer holidays and probably also to field work and conferences. Don't forget CAP when attending these conferences—reports are always a most welcome contribution to the newsletter. I look forward to seeing as many of you as possible at the CAP AGM in Saint Catherine's in October!

Special Announcement CAP Annual General Meeting

CAP's Annual General Meeting will be convened at the AASP-CAP-NAMS meeting to be held October 5-8 2003 in St. Catharines, Ontario. Meeting details (time and place) will be posted at the CAP website http://www.scirpus.ca/cap/cap.shtml as soon as they are available.

Niagara 2003 Joint Meeting AASP-CAP-NAMS October 5 - 8 2003 St Catharines, Ontario, Canada

For information about these sessions, field trips and conference location, please consult the webpage: http://www.geology.utoronto.ca/aasp2003/ or contact co-organizers Francine McCarthy (francine@craton.geol.brocku.ca) or Kevin Gostlin (gostlin@geology.utoronto.ca).

Symposia include (convenors indicated in parentheses):

- Great Lakes Palynology, Paleoecology, and Archaeology (Sarah Finkelstein and Catherine Yansa)
- Micropaleontology and Palynology of the Atlantic and Gulf Coastal Plains of North America (Peter McLaughlin)
- Land-Sea Correlations in the Quaternary/Cenozoic (Alwynne Beaudoin and Martin Head)
- Origins and Evolution of Microfossils (Paul Falkowski, Miriam Katz, Oscar Schofield)
- Micropaleontological Applications in Geoarchaeological Studies (Eduard Reinhardt)
- Pragmatic Palynology: Melissopalynology, Forensic Palynology etc. (John H. McAndrews)
- Micropaleontological Applications in Ecology and Paleoecology (R. Timothy Patterson)

General sessions will also run, as well as three pre-conference and one post-conference field trip.

New Members Welcome!!

Gregory B. Allen
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email: gallen@axys.net
Research Interests: Late Quaternary climates and vegetation history of Alberta and British Columbia, macrofossil analysis, wetlands history and reclamation.

Jason D. Gillespie
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Research Interests: archaeology, paleoecology, geoarchaeology, hunter-gatherers, plains prehistory

Ayobami Babalola Oyelami
Global Energy Company Ltd.
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Research Interests: Dinoflagellate stratigraphy in the Niger Delta; Application of palynology in sequence stratigraphy

Dr. Michael Pisaric
Dept. of Geography
Carleton University
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Dr. Andre Rochon
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email: arochon@nrcan.gc.ca
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Research Interests: Paleoecology, paleoclimatology, archaebotany

who could have been with him. Mary and George both identified him as the man who was sitting on the bed with her when she awoke and the man who had claimed his jacket back. His associate was never identified and the stolen wallet was not found, but the purse was located near the crime scene the following day. Also a small amount of money was never recovered.

The suspect was young and identified as a student. He was well known to the local constabulary.

A local scene examination confirmed that the two burglars had entered an unlocked door leading directly into the kitchen. The offender was charged with indecent assault on a female and burglary with a potential maximum penalty of seven years imprisonment if found guilty.

Immediately outside the kitchen door and partly covering the entrance and path to the street was a small bush in full flower. The flowers were pentamerous, yellow with long stamens and a long style and the Police were certain that the offender in going through the door and down the path would have brushed against this bush each time he passed. The Police confirmed that bright yellow pollen readily came off this bush as they examined it. Four months later a control sample, originally collected two days after the crime was committed, was sent to the Palynology Laboratory of the Institute of Geological and Nuclear Sciences, where the plant was identified as a *Hypericum*.

Fertile anthers from the control sample, a flower from the *Hypericum* bush, was processed separately and in isolation from the evidential samples that were processed later.

Hypericum pollen turns up every now and then in forensic samples, but in my experience of over 1000 forensic samples, never more than a trace or maybe 1%. When someone brushes against flowering plants that release pollen easily, the pollen often occurs in clumps as well as in unusually large numbers. With such large numbers and with the pollen both loosely attached and pressed into the clothing some transfer of pollen from the prime source, that is the part of the clothes that came into direct contact with the flowers, to clothing that could not or did not come into contact with the flowers is possible.

The day following the offence the offender's clothing was taken from him for forensic examination including pollen analysis. These consisted of a blue denim jacket, a black polo shirt, black nylon track pants, a dark blue baseball cap, separate black track shoes, and brown chequered socks.

Pollen in clothing tends to reflect the history of each individual item, and as such it is not expected that each item would produce the same pollen assemblage. Of course, in the unlikely event that all separate items of clothing had always been worn at the same time, then the pollen would reflect this. The pollen recovered from the shoes were very similar in both cases, as could be expected. Because the socks had been packaged together they were processed as one item, so we could not tell if there was any significant difference between them. In this case the only history that was important was the presence or absence of *Hypericum* pollen. Therefore only the *Hypericum* pollen was counted in relation to all other pollen types.

Abundant and diverse pollen was recovered from all items of clothing. All pollen was removed from the baseball cap, shoes and socks. Only those parts of the denim jacket, track pants and polo shirt thought likely to have come into contact with the flowering *Hypericum* was examined first and this amounted to the processing of about two-thirds of each item. As it turned out this was all that was needed.

The track pants contained 14% *Hypericum* pollen, the denim jacket 24%, and 27.5% on the polo shirt. All these items must have been in direct contact with a flowering *Hypericum* bush shortly before they had been seized by the Police. The socks and shoes had traces of *Hypericum* pollen. These items may not have been in direct contact but may have kicked up pollen from the path beside the bush or pollen could have transferred from the other clothing onto the socks and shoes. The baseball cap, which was unlikely to have come into direct contact with *Hypericum* did not contain any *Hypericum* pollen.

Also the amount of pollen still with cell contents intact indicated that the contact with the plants was relatively recent. But without research to determine just how long an interval of time it would need to desiccate this pollen type under different environmental scenarios, a time frame to the crime could not be established using the pollen. However, the garments were studied at least 5 months after the event and many of the grains still had cell contents preserved. The number of pollen grains in clumps, even after processing, indicated that the pollen could not have been aerially dispersed but must have arrived on the clothing in bulk directly from flowers.

The pollen from the control sample was identical in size range, shape, development and colour to the pollen from the jacket and other clothing.

Examination of the scene near where the main offender lived, and the areas he was known to have frequented in the few days before the crime failed to locate any other

From the Bureaucrat's Desk

Dues Due
If your name appears below, here is an urgent reminder that **your CAP membership expired at the end of 2002:** Asnong, Beaudoin, Garneau, Haas, McCarthy, Parsons, van Helden, and Yansa. Thank you so much for your continued support of CAP!

Dues Payment
Please note that CAP membership dues are CDN $10 per year, payable annually or up to three years in advance. Membership is open to all. Please make cheques or money orders payable to "CAP". Following a reminder notice, lapsed members are removed from the CAP mailing list after one year.

The membership form is on the last page of the newsletter. Funds and address changes should be sent to:

Marlow Pellatt
Parks Canada
Western Canada Service Centre
300—300 West Georgia Street
Vancouver, BC V6B 6B4 CANADA

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Essays

HITCHED BY *HYPERICUM* POLLEN

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Some criminals survive on cunning, some are plain stupid, some are plain angry, and others survive on sheer audacity. This is a case of the latter.

The information presented here is but a small part of the total evidence presented in the eventual trial. Following the usual convention, when the term pollen is used it also includes spores from ferns and fern allies.

It was dark but only late afternoon in the middle of winter in northern New Zealand and the victim, who we will call Mary, was in bed asleep with the back door unlocked. She was waiting for her live-in boyfriend to return home. Two suspects entered the house intent on robbery. They stole a wallet and purse which were sitting on the kitchen table. One suspect entered the bedroom and saw Mary asleep and got onto the bed with her and started fondling her breasts while his associate watched from the foot of the bed. Mary awoke and naturally screamed. The two assailants ran off into the night, but not before Mary had grabbed the more audacious suspect and wrestled off his denim jacket, which was eventually left behind on the kitchen floor.

In the meantime Mary's boy friend, who we will call George, returned home to find his partner on the telephone to the Police. At the same time the suspect who had got into bed with Mary and who had apparently been watching the house, returned, knocked on the door and asked George for his jacket back, which he could see from the door. George, not having spoken to Mary yet was a bit confused over what had happened and did not respond immediately. The suspect then pushed passed him, grabbed the jacket and again rushed off into the night the jacket flapping loose in his hands.

Neither suspect made any attempt to disguise himself and the prime offender, who got onto the bed beside Mary, was soon located by a Police dog in a nearby street and arrested. He was interviewed but denied any knowledge of the incident and did not identify anyone

Hypericum plant that he could have come into intimate contact with. It is, of course, possible that the offender had been in contact with another bush immediately before committing the crime or immediately before he was apprehended. But then what are the chances of picking someone at random and finding on their clothing such a large amount of *Hypericum* pollen. With my experience of looking at about 30 cases per year for a number of years that percentage of *Hypericum* pollen had never been even remotely approached.

This pollen evidence, of course, is circumstantial and would on its own not convict anybody of an offence. But with the other evidence at hand, including the identification of the offender by the victims, it provided enough direct and circumstantial evidence for the courts to declare that the offender was indeed guilty of burglary and indecent assault on a female and sentenced him appropriately.

Photo 1: The *Hypericum* bush outside the kitchen door.

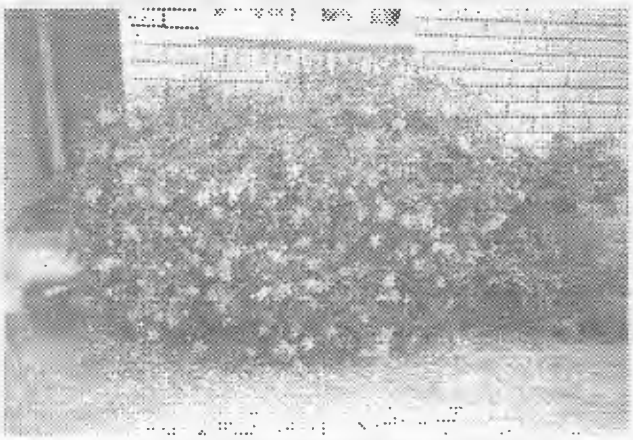

Photo 2: Detail of the *Hypericum* flower.

HOW POLLEN SOLVED A 10,000 YEAR OLD MYSTERY

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Forty years ago just before Christmas I was driving from Austin, Texas, to Vail, Colorado, to go snow skiing. As I inched along the icy highway leading toward Raton, New Mexico, a fierce snowstorm swept down across the high plains and nearly blew my VW off the road. Ahead through the blinding snow and twilight of late afternoon was a small side road and a sign saying, "Folsom 8 miles." Incredible! Just eight miles to the right was the exciting archaeological site that opened the door to our search for how and when the First Americans began to colonize the New World.

As I slithered along the icy side road, my mind flashed back to the textbook and archaeology course I had just completed, and to the existing theories about our ancient ancestors we called "Folsom, Clovis, and pre-Clovis." Ahead, under the overcast sky and blowing snow lay a small group of abandoned stores, a run-down hotel, some weather-beaten frame houses, and a tiny grocery store with two pick ups parked in front that doubled as a post office and gas station. A block away and across the street loomed an old frame building with a wooden sidewalk in front and a battered sign hanging at an angle by a single nail that read: "Museum."

On the inside of the frosted-glass door was a small sign that said, "open." As I entered, I noticed that I was alone in a dimly lit, unheated room full of displays of pioneer farming days to World War II relics. Scattered on tables, hanging on walls, and in various dusty display cases were tools, broken toys, military uniforms, old dresses, a display of rusty guns, faded black and white photos, and a corner display of what a kitchen might have looked like during the mid 1800s. Open on a small table, next to an empty pickle jar with a faded sign saying "donations," lay an open guest register with curling pages; its last entry was more than a six-months old.

In a far corner of the next room I saw the skull of an extinct bison hanging on the wall with rusting shovels and other excavation tools below it in a roped off area. Next to it was a hand-labeled display laid out under the clouded glass of a display case. Neatly arranged in rows were stone artifacts and badly-faded photos of the 1920s excavation of the nearby Folsom site that revolutionized American archaeology.

In the third room were more stone artifacts, mostly from modern Indian groups and a large painted mural on the back wall. There, almost life like was a painting of a large, wounded mammoth surrounded by lightly-clad hunters hurling spears. A sign on the wall said "Clovis Man."

As I walked around on the creaking, wooden floors and shivered in the cold, I read the many hand-written labels in other display cases. It was an eerie place and I felt as if I had stepped back in time. Each breath left a small cloud in the cold air and the only sounds were the howling wind outside and the banging of a distant window shutter.

After closing the front door I just stood there on the wooden sidewalk staring down the street at what once was a bustling community, but had long ago been all but abandoned. I was overcome by wonder. Was I really here? Was this really the place that my professor had called, "the most important archaeological breakthrough in the history of North America?"

I didn't know it then, but I was hooked. In the years after my visit I would go on to finish my education and then be part of the search for early Americans at sites in Texas such as Bonfire Shelter, Lubbock Lake, and Gault, in the Northeast at Meadowcroft, in the Pacific Northwest at the Marmes Site, and in Peru at the site of Pikimachay. I worked at those and other sites not as an archaeologist, but as a palynologist, a person searching for microscopic clues of fossil pollen that might help us understand the paleoclimate, subsistence patterns, and ancient vegetations that affected the lives of early Americans and the animals they hunted.

During the past two decades pollen research has become common and expected at most archaeological excavations, but this has not always been true. Initially, archaeologists were slow to include pollen studies as part of their excavation plan and were slow to embrace the importance of the data fossil pollen could provide. Part of the hesitation was a lack of understanding of how pollen data might help interpret the past and a lack of understanding of how and why fossil pollen studies were valid avenues of scientific research.

A good place to begin our story of pollen is with a lecture presented in 1916 at a meeting of Scandinavian scientists. At that meeting, Lennart von Post, a Norwegian geologist shocked his colleagues by saying that the recovery of fossil pollen from buried sediments was the most precise method yet developed for interpreting past vegetational regimes and determining cycles of vegetational change. Scientists had seen fossil pollen in ancient deposits, but no one had found a way to interpret them effectively. As he lectured, von Post set forth the basic theory of pollen analysis and explained why pollen was the ideal tool for studying changes in past vegetation, and by inference, climate. First, he pointed out that many plants produce great quantities of pollen or spores that are dispersed by wind currents. Second, he noted that pollen and spores have very durable outer walls that can often remain preserved for thousands or even millions of years. Third, his research had indicated that the unique morphological features of each type of pollen and spore remains consistent within each species, yet each different species produces it own specific form. Fourth, as ecologists had already discovered, each pollen and spore-producing plant is restricted in its distribution by environmental conditions that include moisture, temperature, and soil type. As such, each species is most plentiful in areas that best meet the plant's optimal needs. And fifth, von Post determined that most wind-dispersed pollen and spores rarely travel very far before falling to the earth's surface within a small radius (within 50 km) from their dispersed source. Thus, by counting a sufficient number of fossil pollen and spores recovered from each stratum in a deposit, one could reconstruct the types and abundance of plants represented by those fossil grains.

Using the principles, he set forth in his lecture, von Post then detailed how he was able to use his pollen studies of bog deposits in central Sweden to reconstruct the sequence of vegetation changes for that region. He pointed out that his data detailed thousands of years of change beginning with the early vegetation of pioneering plants that grew in the region immediately after the continental glaciers receded, through various stages of forest succession, and ending with the present climax forests of spruce and pines. Subsequent research confirmed the validity of von Post's research.

The magnitude of pollen production by some plants staggers the imagination. Many plants rely upon the wind to carry spores or pollen to their intended destinations, yet wind pollination is an inefficient method. Thus, to insure fertilization plants must produce great volumes of pollen in hopes that at least a small fraction will find its intended destination. So great is the pollen production of conifer trees, that current Swedish scientists estimate the forests in the southern third of their country annually disperse over 75,000 tons of microscopic pollen into the atmosphere. Heavy pollen production is not limited to conifers. For example, in the United States plants such as marijuana (*Cannabis*) produce over 70,000 pollen grains per anther and a single branch on a male marijuana plant can produce more than 500 million pollen grains.

Around 100 million years ago during the Cretaceous Period, a large number of plants began to develop more efficient methods of pollen dispersal that relied on insects and small mammals instead of the wind. With this change came a vast reduction in the need to produce pollen grains. This reduction became so great that some of the modern, insect-pollinated plants such as clover need to produce no more than 200 pollen grains per anther to insure pollination. Others in this group, including maple trees, have found that around 1,000 pollen grains per anther are ample enough to ensure proper seed production. These types of plants now far outnumber the ancient wind-pollinated types and now form the major components of many plant communities.

Almost all of the pollen von Post found in his analysis of Swedish peat deposits was from wind-pollinated plants. Herein lies one of the limitations of pollen analysis. Pollen records are excellent capsules of information about which "wind pollinated" species once lived in a region, yet these same records tell us almost nothing about the insect pollinated plants that were also present. This imbalance of preserved pollen information is not as limiting in environments as it is in others. For example, most of the vegetation in boreal forests is wind-pollinated, therefore the fossil pollen record captures a fairly good image of that ancient vegetation. However, in other regions, such as those dominated by tundra and deserts, most plants are insect-pollinated and therefore those deposits contain a very sketchy fossil pollen record.

Many Paleoindian sites in the New World do not contain fossil pollen because of their environmental location. Rather than try to explain why this phenomenon occurs, I think that subject is sufficiently complex to cover in a separate article. Instead, I would rather focus on the Paleoindian site of Bonfire Shelter and show how fossil pollen solved an important mystery.

Bonfire Shelter is a unique site in Southwest Texas located hundreds of miles south of the Great Plains. During the Late Pleistocene and Holocene that region of southwest Texas was outside the normal grazing range of most bison herds, yet Bonfire Shelter is famous for being a site where large herds of ancient bison were stampeded over a cliff to their death.

When excavated, Bonfire Shelter presented a puzzle for archaeologists. In the bottommost cultural deposits there were broken bones of Pleistocene megafauna and hints that they had been killed by Paleoindians. In two separate intervals above those deposits there are thick layers of fossil bison bones. Each of those two zones contains the remains of hundreds of bison that were driven to their deaths in multiple jumps. Archaeological evidence suggests that the bison jumps took place fairly quickly and that the bones in each of the two intervals accumulated during a period of no more than about 100 years.

The lower, thick deposits of bison bones are dated to the Folsom era and are associated with artifacts from that Paleoindian period around 10,000 years ago. The upper bison bone layer contains stone tools from fairly modern Indians and the deposits have been dated as being around 2,500 years old. What puzzled archaeologists was why Bonfire Shelter had been used as a bison jump site during only two short intervals? Also puzzling was why, for the 7,500 years in between those bone deposits the site has been completely abandoned?

Fossil pollen studies of the deposits in Bonfire Shelter and from sediments in other nearby archaeological sites revealed the answer. It seems that during the past 12,000 years the vegetation in southwest Texas was initially cooler and contained sufficient grass and brushy vegetation to support various species of Pleistocene megafauna. Later, the brushy vegetation was replaced by grasses that reached their maximum coverage only twice. In other words, local grazing conditions were ideally suited for large bison herds only twice, each for only a brief interval, during the last 10,000 years. During each maximum grass period bison jumps occurred at Bonfire Shelter. Strangely, at other nearby archaeological sites, which were occupied during both of these maximum grass intervals, bison bones are absent or exceedingly rare. These data suggest that even though bison were plentiful, they were not hunted by local Indians living in the Bonfire Shelter region. Instead, archaeologists now believe that only skilled, nomadic hunters who followed the bison herds south understood how to kill bison and twice they discovered that the cliff above Bonfire Shelter was an ideal location for bison jumps. At other sites near Bonfire Shelter it appears that local groups hunted smaller animals such as deer, rabbits, and a variety of small rodents throughout the last 10,000 years.

The pollen records at Bonfire Shelter are important for another reason. The Devil's Mouth Site is located on the banks of the Rio Grande River 60 miles southeast of Bonfire Shelter. When it was first excavated, radiocarbon dating was not possible for most of the upper strata. Fortunately, fossil pollen was preserved in those upper zones at the Devil's Mouth Site and the pollen types were similar to those found at Bonfire Shelter. By matching similarities in both pollen records, it was possible to assign estimated dates for some deposits at the Devil's Mouth Site. More than a decade later when renewed excavations at the Devil's Mouth Site uncovered charcoal-filled hearths, the resulting radiocarbon dates revealed those deposits were less than 100 years different

from the estimated dates previously assigned by them by the pollen record. Fossil pollen cross-dating of archaeological sites does not always work this well, but when it does it is impressive.

Unfortunately, few of the earliest sites associated with the First Americans and Paleoindians have been thoroughly tested for fossil pollen. Of the few sites where fossil pollen studies have been conducted, some, such as Bonfire Shelter, have yielded stunning results. However, at most sites the pollen results have been inconclusive or controversial. In Part II of this story (later newsletter) I will examine the problems of pollen sampling, pollen preservation, and pollen interpretations as they apply to the myriad sites in the New World associated with the First Americans and other Paleoindians.

News

CLOSER TO THE EVERGLADES

Greetings and all best warm wishes from Susan and me from sunny Sarasota. It occurred to me to write about our recent move to Sarasota and our new careers at the Marie Selby Botanical Gardens (www.selby.org) through conversation with and prompting from Alwynne Beaudoin, as I still consider myself as part Canadian...or at least as a CAP correspondent based in the USA.

Susan and I moved to Sarasota from the University of Florida, Florida Museum of Natural History, Gainesville, Florida in July of 2002. We did this as I was offered a fabulous opportunity to express my appreciation for botany and my joy of teaching at one time -- in one place. The position of Director of Global Education sounded just right for me, and after a bit of negotiation, I accepted the responsibility. What is really fortuitous, is that my background as a paleobotanist/palynologist has already proved to be a valuable asset in my work. More on this later.

The Marie Selby Botanical Gardens, recently acclaimed by syndicated garden columnist Duane Campbell as "a supernova in the constellation of botanical gardens," is best known for its living collection of more than 6,000 orchids and its extensive bromeliad collection. Recently the Gardens was voted among the top ten botanical gardens in the United States, right up there with the big guys such as the Missouri Botanical Garden, the New York Botanical Garden and the Chicago Botanical Garden. Selby's bay-front property is an open-air and under-glass museum of more than 20,000 colorful plants, many collected by our research staff through expeditions to tropical rainforests. Seven greenhouses and a specialty herbarium are the heart of botanical research and plant identification. The Gardens is a not-for-profit institution fostering understanding and appreciation of tropical plants, especially epiphytes (plants that grow on other plants), through programs of research, horticulture, and education.

My tasks include the direction of our school programs, community classes, and a very successful international intern program. We encourage students from Neotropical countries, especially students from those areas that are within the biodiversity "hotspots" (http://www.conservation.org/xp/CIWEB/strategies/hotspots/hotspots.xml) around the globe, to work with us, to learn from us (and we from them) and to take back to their respective countries sound horticultural, conservation and management practices to help in the preservation and conservation of the native rainforests of their countries. Over the years, the Gardens has hosted and trained more than 300 students from 62 countries.

My years of experience in working at the National Museums of Canada (Canadian Museum of Nature) in Ottawa, and later at the Florida Museum of Natural History, have proved a valuable asset in the curation of the Museum of Botany and the Arts. The museum is housed in a beautiful 1930's southern mansion style building that was once the summer home of Christy Payne, vice-president and treasurer of Standard Oil of New Jersey. The building is a grand place to display the art works and photography of local, national and internationally respected artists.

Since my arrival here at the Gardens, Susan and I have helped foster and develop a science lecture series "Tuesday in the Tropics." Once a month, on a Tuesday, during the tourist season (October through April) we host an internationally respected speaker to provide scientifically accurate and entertaining lectures to educate the public on science issues pertinent to their lives. Speakers who have already provided their wisdom and insight include Thomas Lovejoy, Carl Leopold, David Dilcher, Dale Russell, Sharon Matola, Connie Barlow, Peter Raven and Tweed Roosevelt (Great-grandson of Theodore Roosevelt: see figure 1).

Paleobotany has played a role in the Gardens development. I have initiated a children's garden area, small at first, but with plans to be developed into a much larger "Children's Dinosaur Garden" over the next few years. For now we have a few fossil plants (*Lepidodendron*, *Araucariacites* and an unknown

gymnosperm tree trunk section) on display in our cycad garden. The associated signage indicates the antiquity and relationship of these fossils to the "living fossils" (cycads, ginkgo, *Lycopodium*, etc.) that may be found throughout the garden. Eventually I will contract for a skeletal mount of a Late Cretaceous herbivorous dinosaur, a smaller one that will intrigue visitors to learn more about the plant life associated with the past.

The Director of Research and Conservation at Selby Gardens, H. Bruce Rinker, and I have submitted a grant to NSF for funding an exhibit on rainforest canopy research. This educational supplement to an existing research grant, if approved, will allow the gardens to enter the world of museum exhibition on a grand scale. The overall message of the grant is to provide the visitor with a better understanding of canopy ecology through an exhibit that will educate as well as entertain. The exhibit is titled the "Lollipop Factory" in reference to the fact that it is in the treetops where the manufacture of sugars takes place, and therefore it is in the treetops where the diversity of pollinators, herbivores, and frugivores occur. The treetops are the bastion of rainforest biodiversity. Plans include hands-on teaching techniques, microscope stations, videos, computer interaction, a small lecture space, tours through the garden and take-home reading materials. The exhibit is planned for an opening in 2004.

My contacts with palynology have not been severed entirely, as I am an outside examiner for Hu Shusheng, a Ph.D. candidate at the University of Florida, with David Dilcher's laboratory. Mr. Shusheng is looking at mid-Cretaceous pollen floras from several localities within the Dakota Formation in an attempt to compare and contrast these with the already described plant macrofossil record. Additionally I am the graduate advisor for Ms. Alex Coe, a Master of Science student at New College, here in Sarasota, who is interested in a study of southwest Florida native plants. Ms. Coe hopes to build a pollen reference collection to assist her studies. Recent contact with Mirta Quattrocchio (Bahia Blanca, Argentina) has led to a collaborative study of some Paleocene pollen assemblages from that country, while a reexamination of Gunneraceae pollen has initiated further work with Mary Dettmann (University of Queensland, Brisbane) and Livia Wanntorp, Stockholm, Sweden.

Why the heading of this article, "Closer to the Everglades"? Well for many years, one of my favorite places on this planet has been the Florida Everglades. Although the closeness to this very beautiful ecosystem did not play a major part in making the decision to move to Sarasota, the thought of being closer to "paradise" was certainly an advantage in making the move. The Everglades are in peril, and need our attention to save this widest river in the world from total destruction. I do not wish to "preach" here, as I am sure most of us are aware of the importance of this environmental jewel to the welfare of one of the "hotspots" of biodiversity. Reference to recent web site data will attest to the importance of these most threatened areas on earth. (see: http://www.biodiversityhotspots.org/xp/Hotspots). For those CAP readers interested in learning more about efforts to save the Everglades, I offer the following website as one of many that may provide the needed details (http://www.saveoureverglades.org/).

Susan and I are enjoying our first year in Sarasota and at Selby Gardens. Susan has been fortunate in also being employed at the Gardens. She is now the Executive Secretary to the CEO and President, Dr. Meg Lowman. With all her executive duties, Susan still plays an active role in my work, especially as it concerns our nature studies, Everglades photography, and our pollen studies. We extend an invitation to all CAP Disney visitors and Florida vacationers to travel a bit further south down the peninsula to Sarasota and see trees, shrubs and other botanical treasures that are not plastic, not painted, but real, beautiful and part of Florida's paleohistory. I close with a quote from the National Wildlife Federation.

The Everglades is one of America's greatest but most imperiled natural treasures, home to a vast community of wildlife, and a critical water resource for Florida. Once a healthy eight-million acre "river of grass," the Everglades has been reduced to half its original size by agriculture, urban sprawl and unwise water management.

David M. Jarzen
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Far and Wide

Report on the
Workshop on Middle latitude dinoflagellates and their cysts
Bedford Institute of Oceanography, Dartmouth (Canada)
April 29-May 2, 2002

André Rochon and Fabienne Marret

Participants (in alphabetical order): Gail Chmura (McGill, Canada), Barrie Dale (Oslo, Norway), Anne de Vernal (GEOTOP-UQAM, Canada); Rob Fensome (GSCA-BIO, Canada), Kari Grøsfjeld (GSN, Norway), Rex Harland (DINODATA Services, R-U), Martin J. Head (Godwin Institute for Quaternary Research, R-U), Maryse Henry (GEOTOP-UQAM, Canada), Jobien Laurijssen (LPP, The Netherlands), Elisabeth Levac (St. Francis Xavier University, Canada), Laurent Londeix (DGO, France), Fabienne Marret (SOS-UWB, R-U), Jens Matthiessen (AWI, Germany), Francine MacCarthy (Brock University, Canada), Andrew McRae (GSCA-BIO, Canada), Peta J. Mudie (GSCA-BIO, Canada), Vera Pospelova (McGill, Canada), Taoufik Radi (GEOTOP-UQAM, Canada), André Rochon (GSCA-BIO, Canada), Sandrine Solignac (GEOTOP-UQAM, Canada), Merlijn Sprangers (LPP, The Netherlands), Jean-Louis Turon (DGO, France), Graham Williams GSCA-BIO, Canada).

The third workshop on dinoflagellates and their cysts organised by André Rochon and Fabienne Marret was held at the Bedford Institute of Oceanography. The objectives were to document the morphology, taxonomy and distribution of modern dinoflagellates and their cysts in middle latitudes, and to promote discussions between ecologists and paleoecologists. The workshop was held in the honour of Dr. Peta J. Mudie in recognition for her contribution to Quaternary palynology and paleoecology. A total of 15 presentations were made over 3 days. The afternoons were devoted to microscopic observation of slides and plenary sessions/discussions. Studies on several mid-latitude regions were presented. In particular, sediments from the Black and Caspian seas, which can be considered as extreme environments, proved to be extremely useful to study the influence of environmental parameters on cyst morphology and intraspecific variations. Several points were raised during the discussions, including the influence of hydrographical conditions on the cyst distribution, such as the stratification of water masses, vertical and lateral transport, etc. The methods and interpretations of ecologists differ from those of paleoecologists and it became obvious that consultation and collaboration will be needed to avoid future misunderstandings on the value of paleoenvironmental reconstructions based on fossil assemblages of dinoflagellate cysts.

Andrew MacRae gave a demonstration of the software package DINOFLAJ, which was developed at the Bedford Institute of Oceanography. André Rochon and Frank Thomas gave a tour of the Environmental Scanning Electron microscope, which allows observing wet samples with minimum preparation. We had the opportunity to examine fresh specimens of *Bitectatodinium tepikiense*, collected in Bedford Basin, just outside the Institute. An excursion organised by Rob Fensome, Williams MacMillan, Andrew MacRae and Graham Williams led us to the famous Carboniferous fossil cliffs at Joggins, with abundant fossils of tree trunks and leaves (*Sigillaria*, *Calamites*, giant ferns) and amphibians (*Dendrerpeton acadianum*), the Triassic-Jurassic dinosaur-bearing red beds of the Parrsboro area, and the Fundy Geological Museum, including a behind-the-scenes tour.

The next workshop on dinoflagellates and their cysts will be held at University of Bordeaux, France, in September 2003. For more information you can contact Jean-Louis Turon (turon@epoc.u-bordeaux.fr) or Laurent Londeix (londex@geocean.u-bordeaux.fr).

Scientific Program Workshop 2002:
Monday April 29 (9:30-12:00)
Opening remarks
Fabienne Marret – Shelf sea environments: the potential of dinocyst studies for reconstructing palaeoceanographic conditions.
Rex Harland – The seasonal succession of dinoflagellate cysts in Koljö Fjord, west coast of Sweden.
Vera Pospelova and Gail L. Chmura – Modern dinoflagellate cysts and their spatial distribution along environmental gradients in Buzzards Bay embayments (Massachusetts), USA.

Tuesday April 30 (9:00-12:00)
Peta Mudie, André Rochon and Helen Gillespie – Recent dinoflagellate cyst assemblages from the Aegean-Marmara-Black seas corridor and their relevance to the Noah's Flood myth.
André Rochon, Peta J. Mudie, Ali E. Aksu and Helen Gillespie – *Pterocysta*: a new dinoflagellate cyst genus from Late-Glacial sediments of the Black Sea.
Fabienne Marret – Dinoflagellate cysts in the Caspian Sea, Kara-Bogaz Gol Bay and the Aral Sea: A new genus, *Caspidinium*, a new *Impagidinium* species and morphotypes of *Spiniferites cruciformis*.

Wednesday 1 May (9:00-12:00)
Rex Harland – The use of dinoflagellate cysts as high resolution proxies for environmental change and the characterization of recent anthropogenic activity.
Jobien Laurijssen – Recent distribution of organic-walled dinoflagellate cysts from offshore SE South America.
Merlijn Sprangers – Modern organic-walled dinoflagellate cyst distribution offshore NW Iberia
Martin Head – Eemian dinoflagellate cysts from the Baltic Sea.

Thursday 2 May (9:00-12:00)
Kari Grøsfjeld – Dinoflagellate cysts and hydrography of the last interglacial in the White Sea region.
Francine M.G. McCarthy – What do palynological records record? Examples from the mid latitude abyssal North Atlantic and North Pacific Oceans.
Taoufik Radi – Preliminary results on dinoflagellate cyst distribution from surface sediments along the coast of British Columbia and in the Gulf of Alaska.
Barrie Dale – Views and thoughts on the use of dinoflagellate cyst assemblages for paleoecological reconstructions.
André Rochon – *Gonyaulax Spinifera*: Perpetuating the paradox.

A CD-ROM including the discussions and presentations in PowerPoint format is available upon request (contact Fabienne Marret: f.marret@bangor.ac.uk).

Thesis Abstracts

Evans, Nicola S. 2003. *An Investigation of the Holocene Pollen Record from the Grey Islands, Newfoundland.* MSc Thesis. Department of Geography, Memorial University of Newfoundland, Canada. Supervisors: Trevor Bell and Joyce Macpherson.

ABSTRACT
An 800 cm core from a lake (104 m; 50°46.08'N, 55°31'W) on the Grey Islands, situated in the Labrador Sea 20 km east of Newfoundland's Northern Peninsula, provides a nearly complete Holocene pollen sequence with a distinct maritime influence. By 9800 BP (radiocarbon years; 705 cm depth), the site had emerged from the postglacial Daly Sea and a herb-shrub tundra was established. Tundra persisted until 7800 BP when spruce and fir invaded to form boreal forest. Fire at 7300 BP resulted in a brief resurgence of herbs and shrubs, primarily alder, followed by forest re-establishment by 6800 BP. Paludification led to an increase in *Sphagnum* and greatly decreased pollen influx after 3000 BP, followed by an increase in shrubs and herbs at the expense of trees after 1000 BP. Today the Grey Islands are dominated by dwarf shrub barrens with patchy areas of black spruce forest and sphagnum bog.

Timing of initial forest development at the expense of shrub tundra (7800 BP) coincides with other sites on the Northern Peninsula, though as much as 1 ka later than the rest of the island and slightly earlier than in southeastern Labrador. Increasing tree birch between 7000 and 4500 BP is indicative of higher summer temperatures and a
longer growing season, while also signaling the weakening of a cold ocean influence which, in pollen and dinoflagellate cyst records from the Labrador Sea, is dated about 7000 BP. A major forest fire in the record falls within the 8000 to 6500 BP period of increased fire frequency on the Northern Peninsula. Water temperature in the Labrador Sea reached a maximum around 6000 BP, coincident with the start of the hypsithermal period on the Grey Islands. After 2500 BP the Labrador Sea re-exerted a cold bottom water influence and the Grey Islands experienced paludification and forest demise.

Pospelova, Vera. 2003. *Dinoflagellate cyst assemblages and environmental factors controlling their distribution in New England (USA) estuaries.* Ph.D. Dissertation. Department of Geography and Centre for Climate and Global Change Research, McGill University, Canada. Supervisor: Gail Chmura.

ABSTRACT
Extensive data sets of water quality and sediment chemistry as well as detailed historical records were used to analyze environmental factors controlling dinoflagellate cyst distribution in shallow estuaries (lagoons and embayments) of southern New England. Cyst abundance, species richness, the proportion of cysts produced by heterotrophic and autotrophic dinoflagellates, and the composition of cyst assemblages reflect spatial and temporal variation in environmental conditions.

The cyst record in sediment cores from two embayments, New Bedford Harbor and Apponagansett Bay, Massachusetts, demonstrates cyst sensitivity to environmental change caused by anthropogenic activity in the watersheds. Intensive industrialization and urbanization occurred during the 20th century in New Bedford Harbor resulted in extreme eutrophication and toxic pollution (heavy metals and PCBs). These conditions are reflected in declining cyst diversity and wide fluctuation in total cyst production. At the same time, the proportion of certain heterotrophic taxa increases. As impacts of extreme eutrophication and toxic pollution cannot be separated, the cyst response must be interpreted as a cumulative «pollution signal». The spatial distribution of modern dinoflagellate cysts in the area supports this signal. Cysts vary along gradients of nutrient enrichment, corresponding to distance from sewage outfalls.

Dinoflagellate cysts in surface sediments from New England lagoons also were studied. A comparison of assemblages to water quality parameters, that are affected greatly by the degree of water exchange between lagoon and ocean, indicates that temperature and salinity are the main abiotic factors controlling cyst distribution in these estuaries.

A new species of dinoflagellate cyst, *Islandinium brevispinosum*, has been identified and described. This species was found within a narrow range of water temperature and salinity, and at elevated nutrient levels.

Dinoflagellate cysts reflect environmental conditions at the small spatial scales necessary to characterize variability within estuaries. However, the relative importance of abiotic factors controlling the spatial and temporal distribution of dinoflagellate cysts is likely to vary with the hydrological differences between lagoons and embayments. Therefore, dinoflagellate cysts can be useful indicators of environmental conditions in and human impacts on shallow estuaries.

RÉSUMÉ

Des banques de données exhaustives sur la qualité de l'eau et sur la chimie des sédiments, ainsi que de nombreux documents historiques ont été utilisés pour l'analyse des facteurs contrôlant la distribution de kystes de dinoflagellés dans les estuaires peu profonds (lagons et embayments) du sud de la Nouvelle-Angleterre. L'abondance de kystes, la richesse en espèces, la proportion de kystes produite par les dinoflagellés hétérotrophiques et autotrophiques, et la composition des assemblages de kystes reflètent des variations spatiales et temporelles dans les conditions environnementales.

Les kystes dans les carottes de sédiments provenant de l'embayment du New Bedford Harbor et du Apponagansett Bay au Massachusetts, démontrent la sensibilité du kyste aux changements environnementaux causés par les
activités anthropiques dans les basins hydrologiques. Au cours du dernier siècle, une industrialisation et urbanisation intense à New Bedford Harbor a causé une eutrophisation sévère et une pollution toxique (métaux lourds et BCP). Ces conditions se reflètent dans le déclin de la diversité des kystes et aussi à travers de larges fluctuations dans la production totale de kystes. En même temps, la proportion de certains taxa hétérotrophiques a augmenté. Puisque l'impact de l'industrialisation et de l'urbanisation ne peut être dissocié, la réponse des kystes doit être interprétée comme un «signal de pollution» cumulatif. La distribution spatiale des kystes de dinoflagellés dans les sédiments de surface supporte le signal. Les kystes varient sur des gradients d'enrichissement de nutriments, correspondant à leur proximité des sorties d'évacuations des vidanges.

Les kystes de dinoflagellés dans les sédiments de surface aux lagons de la Nouvelle-Angleterre ont aussi été étudiés. Une comparaison des assemblages de paramètres de la qualité de l'eau indique que la température et la salinité sont les principaux facteurs abiotiques contrôlant la distribution du kyste dans ces estuaires. Dans les lagons, ces paramètres de qualité de l'eau sont grandement affectés par le degré d'échange d'eau entre le lagon et l'océan.

Une nouvelle espèce de kystes de dinoflagellés, *Islandinium brevispinosum*, a été identifiée et décrite. Ces espèces ont été trouvé dans un intervalle de température et de salinité restreint et à des niveaux élevés de nutriments.

Les kystes de dinoflagellés reflètent les conditions environnementales à fine résolution spatiale qui caractérise les variabilités à travers un estuaire. Cependant, l'importance relative des facteurs abiotiques contrôlant la distribution spatiale et temporelle des kystes de dinoflagellés est susceptible de varier avec les différences hydrologiques entre les lagons et les embayments. Les kystes de dinoflagellés peuvent être des indicateurs utiles des conditions environnementales et des impacts anthropiques sur les estuaires peu profonds.

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Viau, André E. 2003. *Millennial-scale climate variability in North America during the past 14,000 years.* PhD Dissertation. Department of Geography, University of Ottawa, Canada. 319 pp. Supervisor: Dr. Konrad Gajewski.

ABSTRACT
Variations in the Earth's climate occur on many time and space scales. A recent focus of paleoclimate research is the so-called 1500-year North Atlantic quasi-periodic cycle, and has revolved around three main themes. First, what are the underlying causes and physical mechanisms governing these millennial-scale variations? Next are they global or restricted to certain sensitive regions of the planet? Last, what is the magnitude of the temperature changes of these variations, and do they vary in time and space?

This dissertation explores millennial-scale climate variability in North America during the past 14,000 years using a dense network of fossil pollen data, which is used as proxy for climate variations. Three independent approaches are used to quantify these changes.

A mixture modeling analysis of radiocarbon dates on pollen transitions, a principal components analysis of pollen diagrams from all of North America and a mean July reconstruction based on the method of modern analogues (MAT) all reveal millennial-scale climate variability throughout North America during the past 14,000 years. The identified transitions generally correlate well with other proxy-climate records from the North Atlantic region. However, certain mismatches occurred particularly at 9, 6 and 4ka BP. IF we assume the dominant millennial-scale period is 1150-years, the records become more consistent. North American temperature variability was not unidirectional nor uniformly distributed in space suggesting large-scale ocean-atmosphere reorganizations at the transitions. Correlation between the proxy-climate and cosmogenic nuclide records supports a variable solar output hypothesis as the fundamental cause for century to millennial-scale climate variability.

The mean July temperature of North America varied on the order of 0.2 to 0.4 °C during the Holocene and 0.4 to 0.6 °C during the deglaciation. Temperature was more variable during the late glacial, possibly due to the impact on the climate of massive meltwater pulses into the North Atlantic, further amplified through ocean dynamics processes. Recent global warming estimated as an increase in temperature of 0.4-0.6 °C, is therefore greater than estimated natural variation of the past 10,000 years, providing further evidence the that recent increases in atmospheric CO_2 have played a major role in modern warming.

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On The Shelf

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New Books

Archaeology in Alberta: A View from the New Milennium

Brink, Jack W. and John F. Dormaar (eds.). 2003. A publication of the Archaeological Society of Alberta. Soft cover, 347 pages, 103 figures.
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The Benthos of Lakes

First published in 1974, "The Benthos of Lakes" by Ralph O. Brinkhurst provides a detailed review of the state of research into the fauna of lake bottoms for scientists and students of limnology. This book became a classic in benthic research and limnology, and still remains the only comprehensive review of the field on a world-wide basis.

The Blackburn Press recently brought the book back into print with a new foreword from the author, making it again available to scholars, students, libraries and researchers who would like to own or replace a copy of this invaluable book.

In his new foreword, Dr. Brinkhurst identifies new themes and progress made since the original work was presented 25 years ago; many current workers in the field were asked to assist in this brief update.

The volume continues to be of value as a source of ideas for benthic biologists, as well as teachers and students of limnology.

For more information, see:
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The Blackburn Press is a relatively new publishing company, founded with the mission of keeping in print and available for purchase at reasonable prices book titles that larger publishers have lost interest in and have declared to be "out of print." It specializes in scientific and technical books that are classics in their field. (See www.blackburnpress.com).

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Aspects of Palynology and Palaeoecology

Festschrift in honour of Elissaveta Bozilova. 2003. ISBN 9546421790, Pensoft Publishers, Sofia-Moscow, 165x240, tables, graphs, b/w and color photos, bibliography. In English. Hardback, 282 pp. Price EURO 58.50 TO ORDER ONLINE: www.pensoft.net/notes/10602.stm

This jubilee volume comprises papers dealing with various aspects of palynology and inferences drawn from pollen-based research. In particular, new detailed palaeoecological information is provided for selected areas in Europe related to the postglacial vegetation development, climate change, environmental history and human impact.

Professor Dr. Sc. Elissaveta Bozilova is one of the outstanding Bulgarian botanists who has been working successfully since the early 1960□s in the field of palynology and palaeoecology. She has published more than 140 scientific papers in national and international journals, symposia proceedings and books, related to Quaternary flora and vegetation history, marinopalynology, aeropalynology, melissopalynology, pollen morphology, pollen monitoring, pollination ecology and archaeobotany. Her most important professional merit is the organization, administration and establishment of the Laboratory of Palynology at the Department of Botany, Sofia University □St. Kliment Ohridski□, as the leading scientific and educational centre in basic and applied palynology in Bulgaria.

The book will be of use to scientists working in palynology, palaeoecology, palaeogeography, geology, climatology, archaeology and forestry.

Contents:

- A collection of 15 papers by outstanding specialists from various European countries
- Numerous figs, b/w and color photos, maps, pollen diagrams, complete bibliography of Prof. E. Bozilova
- Several review papers offering new ideas and concepts
- Rich bibliography

Announcements

Volume on Early-Middle Pleistocene boundary

FINAL CALL FOR MANUSCRIPTS

A major volume on the Early-Middle Pleistocene transition (eds. M.J. Head and P.L. Gibbard) is in preparation and will include papers presented at a conference held in Cambridge, UK last month. A report on this conference is posted at: www.quaternary.stratigraphy.org.uk/EMreport.html

Limited space is available for additional manuscripts. We are particularly interested in those dealing with the marine record, but will consider terrestrial and archeological papers too. If you are in the process of writing up a manuscript and are interested in submitting it to our volume, we would like to hear from you.

Many thanks.

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Palaeontologia Electronica

Got a nearly-completed manuscript? You may not know it, but CAP has been a long-standing sponsor of the electronic paleontology journal *Palaeontologia Electronica* (hereafter *PE*). *PE* is an open-access non-profit peer-reviewed journal that is published on the WWW, including a mirror site provided by CAP. *PE* publishes both "conventional" manuscripts, as well as manuscripts which fully leverage electronic publication efficiencies, such as manuscripts that contain animations, 3D models, movies, large digital data sets or significant numbers of color figures.

PE is trying to reach more of the palynology audience, and thus invites CAPers to submit manuscripts or thematic set of papers.

Why publish in *PE*? In addition to having the largest audience of existing paleontological journals (i.e., ~6500 unique visitors/month; ~150,000 hits/month), *PE* offers technical formatting assistance and rapid turnaround times. For example, recent issues have included submission-publication times as short as 4 months.

Concerned about publishing alpha-taxonomy or biostratigraphy in *PE*? Rest at ease; *PE* meets the requirements of ICZN Articles 8.6 and 9.8 for valid publication of formal nomenclature. All *PE* issues are archived on CD-ROM in 10 international repository libraries, articles are downloadable as PDF and HTML files, and the journal has an agreement for *ad infinitum* archiving and media upgrading by the National Library of Canada.

If you would like to submit a manuscript, or need more information, please visit http://palaeo-electronica.org or contact Whitey Hagadorn, *PE* Executive Editor, at jwhagadorn@amherst.edu.

TOPS Graduate Student Research Grants

The Society for Organic Petrology (TSOP) invites applications for graduate student research grants. The purpose of the grants is to foster research in organic petrology (which includes coal petrology, kerogen petrology, organic geochemistry and related disciplines) by providing support to graduate students from around the world, who demonstrate the application of organic petrology concepts to research problems.
Grant Size: Monetary awards up to a maximum of $1,000.00 US will be granted. TSOP will also provide Merit Awards, in the form of certificates redeemable for TSOP publications, to top-ranking applicants not receiving grants. The program awards a maximum of two grants each year. Use of Grant: 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. Funds must be spent within 18 months of receipt of the award.
Application Deadline: TSOP graduate student research grant application deadline is May 1, 2003. Grants will be awarded in September, 2003. Detailed information and an application form on the TSOP web site http://www.tsop.org/grants.htm or applications may be obtained from S.J. Russell, Shell UK Exploration and Production, 1 Altens Farm Rd., Nigg, Aberdeen AB12 3FY, United Kingdom; fax: +44(0)1224 88 4184; e-mail: suzanne.j.russell@shell.com

JONAS

The journal JONAS (Journal of Nordic Archaeological Science) publishes papers within the field of archaeological science, with an emphasis on the Nordic-Baltic region. The aim is to solve archaeological problems through the integration of a wide range of scientific and technical methods, e.g. soil chemistry, bone chemistry/DNA, palaeopathology, archaeobotany, diet, metallurgy, textiles, analyses of the structure of various materials, prospecting, preservation of objects etc. The journal is addressed to archaeologists in general and any scientist working in an interdisciplinary context with an archaeological connection or interest. By placing this emphasis on problem solving and integration we hope to fill a gap between journals on general archaeology and those devoted exclusively to archaeological science. All articles are peer reviewed by distinguished scientists.

Submit your papers to JONAS
Notes for Authors are found on the JONAS homepage, http://www.archaeology.su.se/arklab/jonas/authinfo.html
Subscribe to JONAS
JONAS is published yearly, and the subscription fee is 125 SEK (c. 14 EUR/USD), excluding postage and packing. Students are offered a reduced subscription fee of 50 SEK (<6 EUR/USD). Order and subscription details can be found on the JONAS homepage, http://www.archaeology.su.se/arklab/jonas/subscribe.html

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INTERNATIONAL GEOLOGICAL CORRELATION PROGRAMME (IGCP)
The role of Holocene environmental catastrophes in human history
IGCP 490

Aims
The project focuses on the inter-disciplinary investigation of Holocene geological catastrophes, which are of importance for civilizations and ecosystems. The project is concerned with environmental events/shifts since the beginning of the Holocene (the last 11,500 calendar years). Three timescales will be considered:

- The Holocene as a whole when major natural hazards are mostly known from sedimentary records.
- The last 5000-4000 years for which we have written documents.
- The last couple of centuries with instrumental records.

Importantly, the project will examine how quickly ecosystems and civilisations are able to recover from catastrophic events.
With the growing recognition that major natural events can have abrupt global impacts, this project is a timely opportunity to assess the sensitivity of modern society to extreme natural threats. This project will involve not only the geoscience community, but also biologists, archaeologists, historians, meteorologists and astrophysicists.www.brunel.ac.uk/depts/geo/igcp490

INTERNATIONAL GEOLOGICAL CORRELATION PROGRAMME (IGCP)
Meeting programme 2003-2007

- Mid-Jan. 2004: Kick-Start meeting on Climatic, Ecological and Health Catastrophes, *Location:* Atar desert/banc d'Arguin wetland (Mauritania). *Main organisers*: Suzanne Leroy (Brunel University, UK) and Aziz Ballouche (Université de Caen, France).
- June 2004: Kick-Start meeting on Geophysical Catastrophes. *Location:* western Turkey, Eskesehir. *Main organisers*: Iain Stewart (Brunel and Glasgow Universities, UK) and Erhan Altunel (Geology Department, Osmangazi University, Eskisehir).
- Oct. 2004: Review meeting on Climatic, Ecological and Health Catastrophes. *Location:* Antananarivo, at Université d'Antananarivo (Madagascar). *Main organiser*: David Burney (Fordham, USA).
- Sept. 2005: Intermediate meeting. *Location*: Como, Italy. *Main organiser*: Alessandro M. Michetti (Università dell'Insubria, Italy)
- 2006: Review meeting on Geophysical Catastrophes. *Location:* Rabaul (Papua New Guinea). *Main organisers*: Ted Bryant (Wollongong, Australia) and Hugh Davies (University of Papua New Guinea)
- 2007: The 'Catastrophes' Congress. *Location:* Aswan (Egypt). *Main organiser*: Fekri Hassan (UCL, UK)

Coordinators:
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Field trips to Crawford Lake: Paleoecology, Archeology & Geology AASP/CAPNAMS Thursday, October 9, 2003, 12:00- 4:00. GAC Saturday, May 15, 2004, 10:00-4:00

Crawford Lake near Hamilton, Ontario, is meromictic and has thus preserved varves over the past 2,000 years. Maria Boyko, Roger Byrne and Jock McAndrews identified 14th century Indian corn below the 19th century ragweed rise. This led to the discovery and excavation by Bill Finlayson of an Iroquois village 100 m from the lake. Charcoal analyses by Byrne and James Clark suggest that Iroquois-ignited forest fires could explain the pollen diagram. Ian Campbell and Zicheng Yu wrote dissertations on pollen-paleoclimate reconstruction. Four textbooks have picked up this story, but there is more.

In 2001, several of us (Charlie Turton, Jane Teranes, Chad Witkop, Erik Ekdahl) cored the upper 70-cm of sediment that spanned the last millennium. Over 20 AMS dates, together with varves counts indicate two intervals of missing varves, probably due to density currents. Charlie's palynological analysis and the new chronology show that Iroquoian farming began 100 years earlier in the 13th century and spanned 250 years. He found pollen of weeds (grass, purslane) and cultigens (corn, sunflower, squash); spores of corn smut covary with corn pollen. However, what is really new and exciting is fossil lorica of four planktonic rotifers; they are not only abundant but some still contain their gut. These phytoplankton grazers peak during both prehistoric and historic settlement intervals indicating that nutrients from the Iroquois village and Canadian farmstead washed into the otherwise oligotrophic lake causing blooms in algae and rotifers.

On the basic field trip we tread a boardwalk, admire the lake and consider some questions such as: how did the lake basin form – solution vrs hydraulic mining; how does the lake cliff retreat – solution vrs frost riving; what formed depressions in a boulder – Indian grinding vrs weathering and why has a hemlock stump continued to grow since 1965. The GAC trip co-led by Paul Karrow and Daryl Cowell will also consider additional topics such as two glacial advances and Glacial Lake Whittlesey, the relative importance of grounded ice vrs subglacial floods in shaping the landscape and how the Hypsithermal led to cedar swamps.

17th International Symposium on the Forensic Sciences

17th International Symposium on the Forensic Sciences

The Australian and New Zealand Forensic Science Society present the 17th International Symposium on the Forensic Sciences "Forensic science: challenges and changes". Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand, 27 March - 4 April 2004. The first call for papers went out in October 2002. A call for registrations will go out in August 2003 (both online and hard copy). The close of early bird registration is the 31 January 2004. The symposium will include a workshop on forensic palynology with the emphasis on what to collect, how to collect and the need to collect samples as early as possible in an investigation. The workshop is set down for a 1/2 day but will be longer if a demand is developed. Early registration is recommended as there will a limit on numbers. For further information and online registration see our website http://www.anzfss2004.org.nz

18th International Radiocarbon Conference

"Kia Ora" and Welcome to the Third Announcement: Call for Papers for the 18th International Radiocarbon Conference,in Wellington, New Zealand, September 1 to 5, 2003. The Third Announcement includes on-line forms for Registration and Abstract Submission,Pre and Post Conference touring offers, and descriptions of Special Sessions. You can find the refreshed conference Website at http://www.gns.cri.nz/14conference2003/

While we expect the bulk of Registration and Abstract submissions to be made via the Web, on-line forms may also be downloaded and posted.
E-mail: 14Conf-info@gns.cri.nz
We look forward to seeing you all in Wellington in 2003.

British Ecological Society

There will be a thematic session of particular interest to members of this listserv at the British Ecological Society Annual Meeting 2003 (9-11 September, Manchester Metropolitan University), entitled "The past as the key to the present? Temporal scales in wetland ecology". Guest speaker: Professor Barry Warner, University of Waterloo, Ontario, Canada
The session description:
Wetlands are unusual ecosystems. As they develop, they preserve a record of the past in the sediments that accumulate. This wetland archive provides a uniquely long-term perspective on ecological origins, stability and transitions. Combined with an understanding of modern processes and temporal scales of change, the wetland archive may provide valuable insight on contemporary problems in ecology. The aim of this thematic session is to bridge the gap between neoecologists and palaeoecologists and to attract everyone with an interest in wetlands. The programme will cover a range of issues such as climate change, conservation, ecosystem processes, atmospheric pollution and carbon cycling. Where possible, offered papers will be paired to highlight both palaeoecological and neoecological perspectives. A site visit to some local bogs and fens is planned for the day preceding the Meeting.
http://www.britishecologicalsociety.org/articles/meetings/current/2003/annualmeeting_mmu/).

9th International Paleolimnology Symposium

The second circular of the 9th International Paleolimnology Symposium held in Finland in August 2003 is on the web now! Please point your browsers on http://www.gsf.fi/9th_paleolimnology/ and start the registration!!! Looking forward to seeing you in Finland! On the behalf of the organizing committee,
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International Palynology Congress Granada, Spain July 2004

We realise this is sometime away, with most people planning for forthcoming meetings this summer, but we need to start the planning early to make a success of the session !
'Late Quaternary ecosystem tropical dynamics: a sensitive tool for unravelling climate, ecological and human impacts.
Conveners: Robert Marchant and Hermann Behling
The aim of this session is to emphasize the importance of tropical palaeoecological records from South America, Asia/Australia and Africa as being highly sensitive archive of change. We intend achieve this broad aim on three fronts by focusing the session into the following areas.

Ecosystem change
Climate change in the tropics: How did tropical ecosystems record and respond (e.g. in terms of floristic composition and vegetation structure) to Quaternary climate changes? E.g. how normal of the non-analogue environments of the last glacial period (in terms of CO2, temp, precipitation). What is the place of the tropics in the global system, what are the spatial linkages inter-hemispheric and inter-tropical, what can these offset tell us about the forcing mechanisms driving ecosystem change agree with

Human dimensions
This session aims to deal with the issues of detecting and understanding human-induced signal within sedimentary records. We would plan this session to go beyond presentations that solely document forest clearance but develop concepts behind interpreting change. For example, what have been the synergies between human use forest and interaction with fire? To what extent are current patterns of biogeography and biodiversity a legacy of human disturbance over previous millennia?

The future
What can Quaternary palaeoecology teach us about likely tropical ecosystem responses/feedbacks to: predicted future climate change and CO2 increase?. What are the predicted future scenarios of continued deforestation and habitat fragmentation.

Practicalities
The aim is to try to achieve a balance between contributions from different geographical areas, those adopting proxy data approaches (e.g. pollen analysis) and those investigating tropical ecosystem dynamics from other approaches (e.g. vegetation/climate modelling, archaeology). We hope you agree that we have the makings of a very interesting and lively session. Please contact us during this initial planning stage for input into the session.

If you are interested in contributing, either as a poster or an oral presentation, please provide a title and preferred method of delivery. Given that we have limited slots for oral presentation, we plan to give the poster session a high profile by allowing a very short oral introduction.

Publication arising from the session is still under debate but it is envisaged that the session will lead to a special issue or a text on tropical environmental change.

We look forward to seeing you in Granada in 2004.
Hermann Behling and Rob Marchant

Calls for Papers

Geological Society of America Annual Meeting

November 2-5, 2003 in Seattle, WA
http://www.geosociety.org/meetings/2003/top12.htm#123>http://geosociety.org/meetings/2003/top09.htm#96
The complete list of GSA topic sessions can be found at http://gsa.confex.com/gsa/2003AM/top/index.epl
Deadline for abstract submission is July 15, 2003.
Abstract information and electronic submission can be completed online at
http://gsa.confex.com/gsa/2003AM/index.epl>http://gsa.confex.com/gsa/2003AM/index.epl

Topical Session T96: Lakes and Holocene Environmental Change: The Use of Multiproxy Lake Records for Paleoclimate Reconstructions

Session Description: This session is aimed at demonstrating the strength of multiproxy approaches to Holocene climate reconstruction from lake sediment records. ORAL and POSTER presentations.

Mark Abbott, University of Pittsburgh, Pittsburgh, PA
mabbott1+@pitt.edu
Andrea Lini, University of Vermont, Burlington, VT
andrea.lini@uvm.edu

Topical Session T98 : Interhemispheric Records of Paleoclimate Change: Low Latitude Influences on the High Latitudes, or the Other Way Around. ORAL and Poster presentations.

Ten years ago, the International Geosphere-Biosphere Program (IGBP) initiated a core international program focused on issues of PAst Global changES (PAGES). The success of the first decade of this program is a testimony to the health of the paleosciences and the vitality of the individuals in the science community interested in climate change on large spatial scales and interhemispheric comparisons across a variety of temporal scales. One of the many focus areas of PAGES has been the Paleoenvironments of the Northern and Southern Hemispheres (PANASH) or Pole-equator-pole transects.
Another major focus has been the International Marine Past Global Changes Study (IMAGES) to understand the mechanisms and consequences of past climate changes including ocean circulation, salinity, ventilation, carbon sequestration and flux, using oceanic sedimentary records.

Emerging evidence and modeling now suggest the tropics may drive the climate system on a variety of time scales. Is this correct? This session invites evolving ideas aimed at pole-equator-pole data comparisons and /or modeling of Quaternary oceanographic and terrestrial proxy records.

If you have questions, please contact session organizers;
1) Vera Markgraf, Institute of Arctic and Alpine Research, Univ of Colorado, Campus Box 450, Boulder, CO 80309, Phone: 303 492 5117, Fax: 303 492 6388, markgraf@colorado.edu.
2) Julie Brigham-Grette, Geosciences, Univ of Massachusetts, Amherst, MA 01003, Phone: 413-545-4840, Fax: 413-545-1200, juliebg@geo.umass.edu, (in the field after June 22)

Topical Session T110: Assessing the deglacial record of Quaternary ice sheets.

We are soliciting oral papers for a topical session focusing on the different styles, spatial patterns and chronologies of deglaciation as inferred from the geomorphic and sedimentary record of past ice sheets.

We wish to generate discussion across disciplines (geomorphology, sedimentology, geoarcheology, geochronology, etc.) and explore records from a wide range of glacial environments (glaciofluvial, glaciolacustrine, subglacial, etc.) and ice sheets in order to better understand deglaciation.

This session will be arranged around four themes:

1. Landform-sediment records. Recent advances in the interpretation of glacial landforms are challenging our understanding of deglacial processes and styles. For example, some hummocky terrain may record subglacial erosion around glacial maximum rather than ice sheet stagnation during deglaciation. Similarly, some eskers may record regional ice sheet stagnation whereas others may record active ice retreat.
2. Deglacial styles and patterns. How do the styles of deglaciation for Quaternary ice sheets vary in different topographic settings? What role(s) does bed topography play in controlling the pattern of deglaciation in mountainous terrain? Is deglaciation a passive process characterized by widespread ice stagnation or is it characterized by active retreat of a glacier margin?
3. Chronology. The chronology of deglaciation is poorly constrained in some regions due to lack of exploration and the sparsity of organic material for radiocarbon dating. Innovative dating techniques and additional data are required to clarify the timing and rates of deglaciation.
4. Causes of deglaciation. The relative role of external atmospheric changes (climate warming) and ice sheet instabilities (including meltwater events) requires exploration.

Four invited speakers will be giving keynote presentations on these themes.
The speakers and their proposed topics are:

- Dr. John Stone, University of Washington: Style, chronology and causes of deglaciation in Antarctica
- Dr. John Shaw, University of Alberta: Outburst floods and the offshore sedimentary record of rapid deglaciation of the Laurentide Ice Sheet.
- Dr. Darren B. Sjogren, University of Calgary: Genesis of hummocky terrain in the southwest sector of the Laurentide Ice Sheet: Implications for deglacial chronologies.
- Dr. Timothy G. Fisher, University of Indiana-Northwest: Landform and sedimentary relationships of proglacial Lake Agassiz spillways.

Meeting Calendar

2003

July 23 - 31 2003. **INQUA XVI Congress**
Reno, Nevada, USA. Theme: "Shaping the Earth: A Quaternary Perspective"
Website: http://inqua2003.dri.edu/

August 24- 28 2003. **9th International Paleolimnology Symposium**
Helsinki, Finland.
Website:
http://www.gsf.fi/9th_paleolimnology/

September 1 - 5 2003. **18th International Radiocarbon Conference**
Wellington, New Zealand. Details: 18th International Radiocarbon Conference, Rafter Research Centre, PO Box 31 312, Lower Hutt, New Zealand. E-mail: 14Conf-info@gns.cri.nz
Website:
http://www.14Conference2003.co.nz

September 21 - 24, 2003. **The Society for Organic Petrology (TSOP), 20th Annual Meeting**
Washington, DC, USA. Information: Dr. Peter Warwick, US Geological Survey, 956 National Center, Reston, Virginia 20192 USA; Phone: (703) 648-6469; Fax: (703) 648-6419; E-mail: pwarwick@usgs.gov,
Abstracts due 4/15/03. Oral and poster sessions September 22-23. Topics include petroleum systems, source rocks, coalbed methane, coal characterization (Ron Stanton memorial session), government and energy. Short courses (Sept. 21) on trace elements in coal, health impacts of coal plus a core workshop on coal and petroleum source rocks of the National Petroleum Reserve in Alaska. Field trip (Sept. 24) on geology and energy resources of the Triassic basins of northern Virginia.
Further details:
http://www.tsop.org/mtgdc.htm

October 5 - 8 2003. **Joint AASP-CAP-NAMS Meeting**
St Catharines, Ontario, Canada. Details: Francine McCarthy (francine@craton.geol.brocku.ca) or Kevin Gostlin (gostlin@geology.utoronto.ca)

Website:
http://www.palynology.org/meet_AASP36.html

November 2 - 5 2003. **Geological Society of America, 115th 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

2004

2004

Date: TBA. **GAC/MAC Meeting**
St Catharines, Ontario, Canada

March 28 - April 2 2004. **Australia and New Zealand Forensic Science Society's (ANZFSS) 17th International Symposium on the Forensic Sciences**
Wellington, New Zealand.
Website:
http://www.anzfss2004.org.nz

July 4 - 9 2004. **XI IPC (International Palynological Congress)**
Granada, Spain
Website:
http://www.ugr.es/~bioveg/ingles.htm

August 20 - 28 2004. **32nd International Geological Congress**
Florence, Italy. Theme: "From the Mediterranean Toward a Global Renaissance - Geology, Natural Hazards and Cultural Heritage". Details: Ms Chiara Manetti, Università degli Studi di Firenze, Dipartimento di Scienze della Terra, Via La Pira, 4, 50121 Firenze, Italy, Tel:/Fax: 055-2382146, E-mail: cmanetti@geo.unifi.it
Website: http://www.32igc.org

November 7 - 10 2004. **GSA 116th Annual Meeting**
Denver, Colorado, USA. Details: GSA HQ, Box 9140, 3300 Penrose Place, Boulder, Colorado 80301, U.S.A. Tel: (303) 447-2020, X133, E-mail: meetings@geosociety.org

2005

2005

Date: TBA. **GAC/MAC Meeting**
Halifax, Nova Scotia, Canada

Have you renewed your CAP membership for 2003?
See list on p. 3!

Special Announcement CAP Annual General Meeting

CAP's Annual General Meeting will be convened at the AASP-CAP-NAMS meeting to be held October 5-8 2003 in St. Catharines, Ontario. Meeting details (time and place) will be posted at the CAP website http://www.scirpus.ca/cap/cap.shtml as soon as they are available.

CAP MEMBERSHIP FORM

CANADIAN ASSOCIATION OF PALYNOLOGISTS (CAP) MEMBERSHIP IS OPEN TO ALL MEMBERS OF THE PALYNOLOGICAL COMMUNITY. THE ASSOCIATION IS DEVOTED TO PROMOTING THE EXCHANGE OF INFORMATION AMONG PALYNOLOGISTS IN CANADA AND ELSEWHERE. MEMBERSHIP DUES INCLUDE TWO ISSUES A YEAR OF THE *CAP NEWSLETTER*, TO WHICH ALL MEMBERS ARE INVITED TO CONTRIBUTE. CAP IS ALSO AFFILIATED WITH THE INTERNATIONAL FEDERATION OF PALYNOLOGICAL SOCIETIES (IFPS) AND CAP MEMBERS RECEIVE TWO ISSUES OF THE IFPS NEWSLETTER (*PALYNOS*) EACH YEAR.

CAP MEMBERSHIP DUES ARE $10 PER YEAR IN CANADIAN FUNDS PAYABLE AT THE BEGINNING OF THE YEAR. LAPSED MEMBERS ARE REMOVED FROM THE MAILING LIST AFTER ONE YEAR, FOLLOWING A REMINDER NOTICE. MEMBERS MAY, IF THEY WISH, PAY FOR UP TO THREE YEARS IN ADVANCE. PLEASE SEND A CHEQUE OR MONEY ORDER PAYABLE TO CAP TO:

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MAY WE INCLUDE YOUR NAME/ADDRESS/RESEARCH INTERESTS IN THE ON-LINE *DIRECTORY OF PALYNOLOGISTS* IN THE CAP WEB PAGE? _____