Canadian Association of Palynologists
Association Canadienne des Palynologues

NEWSLETTER

Volume 16 Number 1 May 1993

Editor's soapbox

I hope to have this edition of the *CAP Newsletter* on your desk before the G.A.C./M.A.C. meeting in Edmonton in May. To allow as many people as possible to share in the CAP Special Session, I have included the abstracts for the presentations in this issue (pages 11-18). I am looking forward to a day of interesting and eclectic presentations covering many subdisciplines in palynology. I hope to have the opportunity to meet many of you at the conference.

This *CAP Newsletter* is considerably slimmer than others in the recent past. For the first time since I took over as editor in 1989, the amount of material submitted has declined. I hasten to add that this is simply a decline in quantity and certainly not in the quality of material submitted. Those who read the Newsletter regularly will notice the recurrence of a few names as frequent and much-valued contributors. But what about the rest of the membership? I would also like to hear about the activities of other palynologists, in Canada and abroad. I understand that, with tighter budgets, we are all under greater pressure to produce and writing an item for the *CAP Newsletter* may not seem a high priority when grant applications, memos, and research papers are awaiting composition. Yet, as Elliott Burden points out in his President's Message, part of the strength of Canadian palynology is in its diversity. But this diversity also places greater pressure on us all to communicate with each other. After all, if we can't explain our research to our colleagues, we haven't much chance of reaching other earth scientists, or the general public. I'll end my polemic by reminding you all that with summer fast approaching, and perhaps a little more time to relax, it would be a good opportunity to write a note for the Newsletter. In addition, if you go in the field or to far-away conferences this summer, please keep your camera handy and remember to document your adventures.

On behalf of CAP, I again thank Bert van Helden and Chevron Canada Resources in Calgary for assistance with printing and distributing this edition of the *CAP Newsletter*. My thanks also to everyone who provided articles, photographs, information, announcements, and material for this issue: Yves Beaudoin, Elliott Burden, Tom Demchuk, David Jarzen, Susan Jarzen, Joyce Macpherson, Bob Mott, Godfrey Nowlan, Mel Reasoner and Bert van Helden.

Best wishes to you all for an enjoyable summer.

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President's message

As I weave my way through life, I have come to the startling conclusion that there are two kinds of people in this world - people that behave like I do and people that don't. Take, for instance, palynology (this is after all a palynology newsletter); here, in my travels, I have studied at or visited many palynology labs. In setting foot in another's office space, I am immediately drawn to the conclusion that our science attracts people that are extremely tidy and others that are apparently disorganized. Neither end member is a reflection of right or wrong in our science - just different.

Differences are in fact what makes CAP an interesting and challenging organization. Before taking office, I was advised that we are an eclectic group of people involved in everything from Chitinozoa to coffee (the pollen that is!). Our differences are our strength and they should be promoted. All too often (perhaps it is in our Canadian psyche), we underestimate our achievements and contributions to science and society. Just look around this country, we have at least three of the worlds' leading dinoflagellate researchers; likewise, we have a significant number of internationally recognized experts in Paleozoic, Mesozoic, Cenozoic and recent pollen, spores, fungi and acritarchs. Research papers coming from Canadian institutions are a smorgasbord of significant studies having impact on such obvious topics as resource exploration and development (including our coffee expert), environment change, and health and welfare. We have every reason in the world to be proud of our accomplishments. From an organizational viewpoint, CAP is one of the few scientific associations in this country that has a stable membership base; in fact, correspondents from outside the country form our largest area of new growth. We must be doing something right! By extension, by looking out for one another and capitalizing on our differences, we have a national palynology community that is second to none.

In that wonderful world of PR, image is all that counts. Fortunately for us, there is some substance upon which we can draw. Historically, the hydrocarbon industry has been a mainstay in our field. Lately, however, and through no fault of our own, palynology has gone through some hard times in this area. Fortunately, and again because of our diversity, modern environmental studies have kept us in the public eye. Without these fundamental differences in our science, we might all be in serious trouble. Inasmuch as the lustre of black gold has become tarnished, other aspects of palynology keep us in the spotlight.

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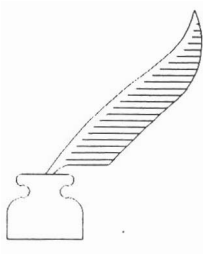
So, as my first Presidential Decree, when someone comes up to you and asks "What is the value of palynology?", don't just focus on your expertise - open up a little and give others in this profession a boost. Who knows, one day you too may be needing this favour.

Moving on to related business, I would like to congratulate Dave McIntyre, Alwynne Beaudoin and Bert van Helden for organizing the **"Palynology in Canada" session at the Geological** Association of Canada meeting in Edmonton. After perusing the Abstracts, I can honestly say that palynology in the Earth Sciences is still a vibrant and very active research area in Canada. In getting exposure in a national meeting of a larger organization, we improve everyone's position in palynology.

Where do we go from here? I for one am inclined to let the free market rule. This means that to survive, we must all become more innovative and develop new niches for our considerable expertise. If this means symbiotic relationships and odd marriages, then so be it. From my perspective, I believe we are on the verge of a new age in palynology. Where we are going and what it will be like is dependent on us alone. One thing you can be sure of is that it will be different. In another 10 years I would like to look back at a dusty old newsletter that has been sitting on my apparently disorganized office floor and contemplate just where we have gone.

Elliott Burden
CAP President
St. John's, Newfoundland



From the bureaucrat's desk

[Editor's note: As I assemble this Newsletter, Martin Head is in Europe, travelling, attending DINO-V and organizing the Dinoflagellate Workshop. So, just for this issue, I am acting as a substitute **bureaucrat.**]

Please check your memories and send Martin your CAP dues for 1993. CAP membership dues are CAN$7 per year, and are payable annually or for up to three years in advance. CAP members receive two issues of the *CAP Newsletter* each year, in May and December. All CAP members and correspondents are encouraged to submit items on any palynologically-related matters for the Newsletter. Membership dues include affiliation to IFPS and CAP members also receive two issues of the IFPS newsletter, *PALYNOS*, each year. Lapsed members are removed from the CAP mailing list after two years. Please make dues cheques payable to "CAP". See also the dues form, page 22. Funds should be sent to:

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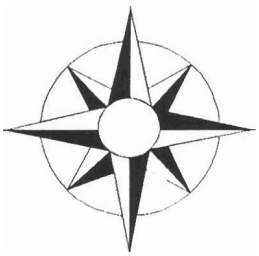


Far and wide...

PALYNOLOGY IN ST. JOHN'S

Palynology in the Earth Sciences department is occupied with a diverse range of topics spanning Cambrian through recent strata. Elliott Burden, Henry Williams and P.K. Mukhopadhyay are presenting some results of a thermal maturation study of the Cambro-Ordovician strata of western Newfoundland at the GAC Meeting in Edmonton. This frontier region holds promise for significant hydrocarbon reserves. Their study explores the relationship of Acritarchs and Graptolites to fluid inclusion paleotemperatures and Conodont Alteration Indices to identify prospective source and reservoir rocks.

Farther afield, Burden is still chipping away at upper Jurassic and lower Cretaceous strata in the Western Interior Basin. Some of this work will be presented in Edmonton in a joint paper with Dale Leckie on Albian unconformities in southern Alberta. South of the border, Burden has recently completed a study for Peter DeCelles on the Morrison and Cloverly formations in Wyoming. Burden's contribution in dating these rocks has helped DeCelles model basin dynamics during orogenesis. This work is to be published later this year.

Burden's Arctic research on Cretaceous-Tertiary rocks on Bylot Island has moved from field exploration to laboratory analysis and synthesis. Hundreds of samples have been collected over the last several years; Kerry Sparkes, James Waterfield, Philip Benham and Terry Wiseman have each completed field studies on parts of the depositional basins. A paleomagnetism study with Joe Hodych is designed to provide independent evidence for the age of these beds.

Quaternary sedimentary strata from Newfoundland are being analysed by Brian Sears and Terry Christopher. Brian's thesis study is directed towards understanding glacial and recent marine deposits along the west coast of Newfoundland. Terry's thesis, co-supervised with Dr. Peter Davenport, is a multidisciplinary study of palynology and geochemistry of St. John's watersheds. One of the surprising observations from this work lies in the paradox of heavy metals and the environment. St John's watersheds contain clean waters hosting some of the healthiest, fastest growing trout in North America. In contrast, the sediment deposited in ponds during the last 200 years contain very high concentrations of heavy metals (i.e., 600 ppm lead). Terry's work is directed towards understanding the history and mechanics of urban pollution.

Across campus in the Geography department work continues on late-glacial and Holocene lake sediments from the island of Newfoundland. At the CAG in Ottawa Joyce Macpherson will be presenting a paper showing widespread evidence of fire disturbance and change in forest composition during the Holocene. At a local scale Macpherson has recently completed a synthesis of early post-glacial inshore marine and lake sediment records from the northeastern Avalon Peninsula, including work by former students Gillian Mellars and Sheila Vardy. The radiocarbon, pollen and sedimentary records shed light on the mode and timing of deglaciation; "early post-glacial" in this part of Newfoundland means "early Holocene".

Deborah Butler's thesis study in Terra Nova National Park, eastern Newfoundland, undertaken to reveal evidence of regional Holocene vegetation

history, especially the former extent of red pine, has had an unexpected bonus in the discovery of evidence of a late-glacial climatic oscillation, equated with the Younger Dryas. This evidence will appear in a forthcoming publication with Alex Wolfe (Queen's University) who examined the diatoms.

Many research projects incorporating palynology, sedimentology and environmental studies are available to students interested in attending Memorial University. Partial to complete financial support is provided on a competitive basis to students with good to excellent grades.

Joyce Macpherson
Elliott Burden
St. John's, Newfoundland

PALYNO-TRIVIA

Did you know who first used the word "palynology"? Exploration of the electronic Oxford English Dictionary, available via mainframe at University of Alberta, reveals that the word itself is derived from the Greek, meaning "to sprinkle". The term was introduced by H.A. Hyde and D.A. Williams in a letter dated July 15th, 1944, which was included in a privately-circulated newsletter, the *Pollen Analysis Circular* 28, on October 6th, 1944. In their letter, they stated:

> We would therefore suggest palynology..: the study of pollen and other spores and their dispersal, and applications thereof. We venture to hope that the sequence of consonants p-l-n, (suggesting pollen, but with a difference) and the general euphony of the new word may commend it to our fellow workers in this field.

Careful perusal of recent journals and newspapers reveals CAP members and other palynologists launching into new fields of endeavour and active in many spheres.

An introductory statement by David Piper, the new editor of the prestigious *Canadian Journal of Earth Sciences*, in *Geolog* 21(3):7, includes an announcement that he has asked Graham Williams (CAP Past President) to be Assistant Editor to carry out editorial duties when he (Piper) is in the field. We wish Graham well with these new responsibilities. We should all, of course, make a strenuous endeavour to flood Graham's desk with manuscripts!

Items from the Calgary *Herald* newspaper (published March 6th and March 22nd, 1992), submitted by Bert van Helden, include a letter from Frank. L. Staplin. Staplin was responding to an article dealing with events surrounding the Manitou Stone or Iron Creek meteorite from eastern Alberta, an object of spiritual significance to Native people, removed by Rev. George McDougall in 1869. After surveying the Stone's history over the last century, Staplin suggests that it be surrendered to the Cree. Frank Staplin, now retired, was an ESSO palynologist based in Calgary, and is known for Staplin's TAI scale and the taxon *Staplinisporites*.

It is good to see that Canadian palynologists continue to be involved in a broad range of earth science, cultural, and environmental fields.

AQUILAPOLLENITES: CARVED IN STONE!

In 1986 Public Works Canada embarked on a programme to produce a series of stone carvings to adorn the walls of the House of Commons Chamber, along the shoulders of archways (spandrels) enclosing the public galleries. Parliament later approved a series of fourteen carvings to represent the "Origin of Life in Canada." It was proposed that these carvings would acknowledge the internationally recognized work of Canada's paleontologists and provide the public with a view into Canada's prehistory.

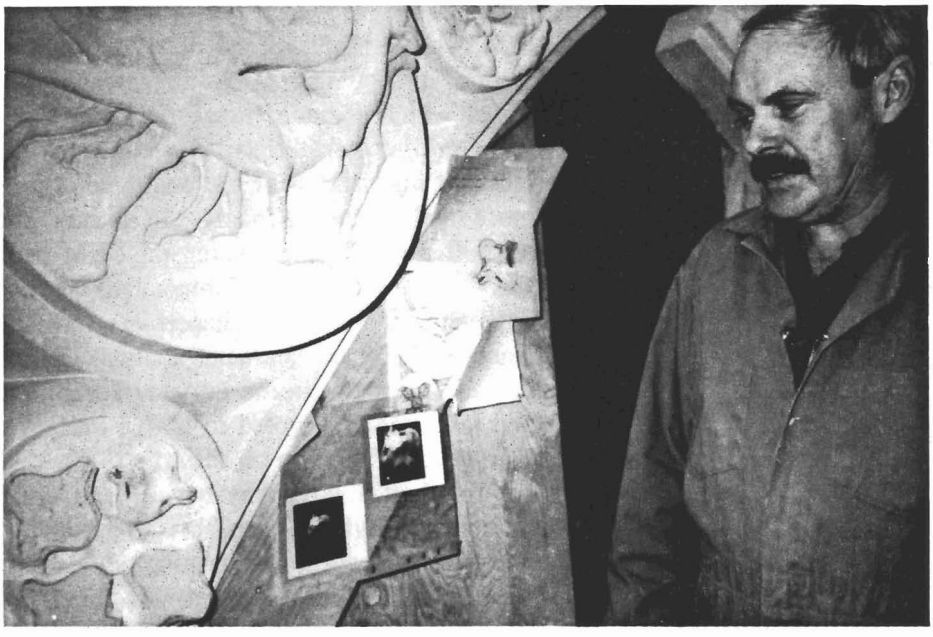
The beautifully detailed carvings are the creations of Eleanor Milne and Maurice Joanisse, the Government of Canada's only professional stone sculptors. Maurice, a student of Milne's since 1971, is now carving the entire prehistory life series from Milne's meticulously detailed designs. Working patiently and researching each detail of the fossil organism that he creates in stone, Maurice spends about four months on each sculpture. Sculptures already completed include dramatic and detailed representations of *Smilodon*, *Triceratops*, trilobites, dragon-flies and *Eusthenopteron*, a primitive Devonian fish.

Of interest to CAP readers is the choice of *Aquilapollenites* as a candidate for one of the sculptures. Early in 1986 Dr. Dale Russell and I were approached by Eleanor Milne to provide subject material which she could incorporate into the Cretaceous-age carvings. Excited at the prospect of having palynology forever preserved in the Parliament buildings, I selected *Aquilapollenites* Rouse (*sensu lato*) as appropriate to represent a part of Canada's plant history. Eleanor Milne was delighted with the "bizarre" yet intriguing morphology of these "tiny architectural wonders."

A well-written and beautifully illustrated account of the work of Eleanor Milne and Maurice Joanisse is that of Dugas (1992) in which one of the color photographs (p. 79) shows Maurice and Eleanor discussing the early stages of the *Aquilapollenites* sculpture.

One of the archway carvings to be installed during the summer of 1993 on the House of Commons walls is a representation of an ostrich dinosaur flanked above by leaves of *Gunnera* and below by a stylized rosette of four specimens of *Aquilapollenites*. The sculptures are carved in the fine-grained, nearly white, Indiana Limestone (Mississippian) since this rock material is easily

David Jarzen and Maurice Joanisse discussing the nature of *Aquilapollenites* details (early shapes of *Aquilapollenites* at lower portion of sculpture). Photo: Susan Jarzen.



The sculptor standing near his work. Note preliminary drawing and photos of *Aquilapollenites*. Photo: David Jarzen.

carved and usually free of inclusions (including fossils) which may mar the appearance of the final work.

The specimens chosen for Maurice to carve were styled from SEM and LM photomicrographs of *Aquilapollenites (Integricorpus) clarireticulatus* recovered from the Lea Park and Foremost Formations (Campanian), Youngstown borehole, southeastern Alberta. Radforth and Rouse (1954) were the first Canadian palynologists to illustrate and describe specimens of *Aquilapollenites* (as N_1, N_2 "Not previously described") and later Rouse (1957, p. 371) provided the first validly published diagnosis of the new genus. In doing so Rouse noted that "The form genus *Aquilapollenites* has been formulated to incorporate two pollen forms of unknown botanical affiliation which occur in the Brazeau and Oldman formations and appear to be characteristic microfossils of these Upper Cretaceous formations."

The carvings of the four grains of *Aquilapollenites* are arranged in a cruciform pattern with the long axis (polar axis) aligned radially. Overall the four-specimen circle (rosette) measures about 30 cm in diameter. Even at this size, detail of the reticulate surface could not be carved onto the sculpture as the soft limestone tends to crumble when closely spaced, fine lines are required. Once in place, however, high above the floor of the House of Commons Chamber, the grains will, indeed, be recognizable as *Aquilapollenites*.

Certainly the importance of *Aquilapollenites* in Canadian Late Cretaceous biostratigraphy need not be stressed here; however, its inclusion in the Parliament buildings will assure its permanence as the only fossil pollen grain so honoured.

References

Dugas, G., 1992. Master Sculptor: Our history comes to life at the hands of Eleanor Milne; (with photography by Ron Devries). *Canadian Geographic* 113(1):68-77, Jan/Feb 1992.

Radforth, N.W., and G.E. Rouse, 1954. The classification of recently discovered Cretaceous plant microfossils of potential importance to the stratigraphy of Western Canadian coals. *Canadian Journal of Botany* 32:187-201.

Rouse, G.E., 1957. The application of a new nomenclatural approach to Upper Cretaceous plant microfossils from Western Canada. *Canadian Journal of Botany* 35:349-375.

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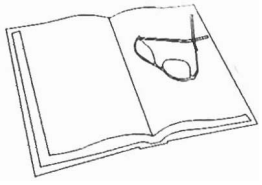

On the shelf

D. Claugher (ed.), 1990. Scanning Electron Microscopy in Taxonomy and Functional Morphology. The Systematics Association Special Volume No. 41. Clarendon Press, Oxford. xii+ 315 pp., hardback. ISBN 0-19-857714-1. $110.00 (US).

Over the years the Systematics Association has published a series of high quality "textbook" style volumes covering nearly all aspects of systematics and taxonomy. Volume 41, skillfully edited by Claugher, carries on this tradition. Although the book was published in 1990, I feel it is important to bring this contribution to the attention of *CAP Newsletter* readers, since several papers comprising this volume are of potential interest to palynologists.

The purpose or aim of the volume was to update an early Systematics Association volume, produced in 1971, entitled Scanning Electron Microscopy: Systematic and Evolutionary Applications (Heywood 1971). Since 1971, the use of SEM in taxonomic investigations and improvements to the machines and preparation techniques warrant the publication of this book. Rowley *et al.* (1987-1988) have graphically illustrated the increased use in SEM investigations in the description of pollen grains. Their figures indicate as much as a 46% use of SEM in papers published in 1982-1983. Certainly taxonomic studies and systematic approaches to palynology are enhanced using SEM and TEM applications, which are indeed considered necessary tools by many investigators.

The 13 chapters of Volume 41 are devoted to applications using improved or new SEM capabilities which include lower field emission, viewing of uncoated materials, viewing of frozen materials and digitization of the analogue signal. Blackmore and Barnes (Chapter 1) review the study of pollen development using the SEM from examples of Lactuceae (Compositae) pollen ontogeny, while Hennipman (Chapter 2) relates the significance of SEM for character analysis of both exospore and perispore in the Polypodiaceae. The third and last chapter devoted to pollen or spores is by Harley and Ferguson on the role of SEM in pollen morphology and plant systematics, in which the authors provide specific attention to palynomorph preparation and terminology used in describing exine features observed with SEM.

Other chapters concentrate on studies of the epidermal surface in plants (Barthlott), plant cuticle (Hill and Dilcher), taxonomy of living planktonic thecate dinoflagellates (Lewis and Dodge), marine ascomycetes (Moss), diatoms (Paddock and Sims), paleobotanical macrofossils (Hill), testate amoebae (Ogden), bryozoans (Taylor), helminths (Gibbons and Khalil), and digitization in SEM (Wagener).

The contribution by Hill (Chapter 9) discusses the many and varied applications of SEM to paleobotany, including the study of fusainized material, impressions and opaque mineralizations in limonite and pyrite. I found the section on replica palynology especially interesting. As we are all aware, palynomorphs are preserved as *compressions* with complementary *impressions* often preserved within rock matrix. However, some rock types, i.e., most red bed matrices and those from surface outcrops in tropical and hot arid regions, do not yield palynomorphs for a variety of reasons, oxidation being perhaps the major culprit. These "barren" samples, however, may in fact contain well-preserved *impressions* of the palynomorphs once contained within the rock matrix. Using relatively elaborate techniques, Hill was able to produce beautifully detailed replicas of

the impressions of Permian fern spores from Saudi Arabia. Although success using the technique described by Hill depends upon several factors, including palynomorph density and sufficiently detailed imprints, it may prove to be another method to provide the palynologist with at least some data as to the nature of the "once contained" palynoflora. The chapter is worthy of our attention.

The book appears very well edited, with generally clear and well reproduced photographic plates. The book may serve as a reference-type text for palynologists who use SEM routinely as a tool in their research program.

References

Heywood, V.H., ed., 1971. *Scanning Electron Microscopy: Systematic and Evolutionary Applications*. Systematics Association Special Volume 4, Academic Press, London and New York.

Rowley, J.R., J.J. Skvarla, and E.L. Vezey, 1987-1988. Evaluating the relative contributions of SEM, TEM and LM to the description of pollen grains. *Journal of Palynology, G. Thanikaimoni Memorial Volume*, Vol. 23-24, pp. 27-28.

David M. Jarzen
Canadian Museum of Nature
Ottawa, Ontario

Siwert Nilsson and Joseph Praglowski (editors), 1992. Erdtman's Handbook of Palynology. 2nd edition (revised). 576 pp., illus. Munksgaard, Copenhagen, Denmark. DKr650 + postage (approx. $132 Can)

The publisher's flyer announces that this text has been extensively revised and updated by invited specialists. These include CAP member, W.A.S. Sarjeant, writing on microfossils other than pollen and spores.

palyno bytes

E-MAIL

In the last *CAP Newsletter* (15(2):33), I included a proposal to assemble a directory of E-mail addresses. Judging by the response to this item, few CAP members have access to electronic mail. Most responses were from university-affiliated palynologists, suggesting that E-mail, at least via Internet, is almost exclusively a privilege of University faculty and some other researchers in large organizations, such as the GSC. However, for those who do have access to E-mail, here is a list of addresses available to date:

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Thomas R. Demchuk 1992 Palynology, Petrography and Geochemistry of the Ardley Coal Zone at Wabamun, Alberta, Canada. Ph.D. Dissertation, Department of Geology and Geophysics, University of Calgary, Calgary, Alberta. 342 pp.

The Wabamun and Wetaskiwin mining areas of the central Alberta Plains provide an excellent opportunity to investigate local and regional geological aspects of the Ardley coal zone. From cores and outcrop, these coals are accessible in the Highvale, Whitewood and Genesee areas where they are mined as thermal feedstock. From palynological, petrographical and geochemical investigations it is revealed that these coals were deposited in varied wetland (mire) environments. Also, there are recognizable trends in the variations of these coal characteristics, which are a reflection of the influence of fluvial activity (or lack of) on the deposition of these coals.

In the Highvale area, stratigraphically lower and thinner seams are bright in nature and are huminite-rich. In contrast, the overlying thicker seams are inertinite-rich and are megascopically duller. At Whitewood and Genesee, correlative thicker seams are bright and huminite-rich reflective of higher groundwater levels, deposition in predominantly topogenous environments, possibly proximal to fluvial activity. In the Highvale area distal of this fluvial activity, peat accumulated to an appreciable thickness and an ombrogenous situation was achieved. Consequently, peat was susceptible to oxidation and degradation during periods of lowered groundwater levels, droughts, and fires.

A correlation is illustrated between coal lithotype and maceral content in that bright coal contains abundant huminite, and inertinite content increases with increasing dullness. Fibrous (fusain) coal contains the highest percentage of inertinite. Bright coals are a product of wetter depositional conditions, and duller coals for the most part, are a product of drier environments. Utilizing Diessel diagrams, bright coals display higher gelification/tissue preservation indices indicative of wetter, forested environments whereas duller and fibrous coals display lower gelification/tissue preservation indices indicative of drier environments with herbaceous vegetation. Also, brighter coals contain higher percentages of *Taxodiaceaepollenites hiatus* pollen (taxodiaceous vegetation) and are relatively lower in ash content. Duller coals exhibit higher percentages of pollen/spore other than *T. hiatus*, and are relatively higher in ash in comparison to bright coals. Other palynoflora include *Laevigatosporites* spp. (Polypodiaceae), *Stereisporites* spp. (mosses including *Sphagnum*), varied bisaccate pollen (Pinaceae) and *Osmundacidites* sp. (Osmundaceae).

Ombrogeny in the Highvale area is determined from criteria which on their own are not unique,

but collectively lead to a conclusion of an ombrogenous environment. The occurrence of *Stereisporites* ssp. (fossil mosses including *Sphagnum*), in conjunction with increasing inertinite content and associated fibrous coal, are indicative of peat accumulation in an acidic environment above the influence of local groundwater. The increasing percentages of inertinite, especially inertodetrinite, towards the top of a coal seam with fibrous coal suggests the original peat was susceptible to oxidation and degradation, and that such oxidative events were frequent. A genetic relationship may be suggested between inertodetrinite, and *Stereisporites* spp. and other low-stature, stunted vegetation common to an ombrogenous bog.

The presence of kaolinite in low-temperature ash residues from the Highvale area, may be further indicative of ombrogeny. Detrital minerals incorporated into the peat, were subsequently dissolved in the acidic environment. Cations were leached away by rainwaters, leaving authigenic quartz and kaolinite to mineralize. Detrital minerals present at Whitewood and Genesee include quartz, feldspar and mica. Montmorillonite is the common clay mineral as an alteration product of volcanic ash. Epigenetic minerals consist of pyrite and calcite which are present in the cleat network of these Wabamun coals.

Announcements

CAP SPECIAL SESSION "Palynology in Canada - Palaeoecological and Stratigraphic Applications"

Geological Association of Canada
Annual Meeting
Edmonton, Alberta
May 18th, 1993

The CAP Special Session will be held on Tuesday May 18th, 1993, in Room V-107, V-wing lecture room complex, adjoining the Physics and Chemistry Buildings, on University of Alberta campus. The session will begin at 8.10 am and is scheduled to end at 4.00 pm. The CAP AGM follows at 5 pm (see page 19). Papers will comprise 15 minutes for presentation and 5 minutes for questions. The session consists of 16 oral presentations and one poster. Because of the diversity of topics to be covered, the papers will be presented in rough geochronologic order, beginning with the Paleozoic and ending with the Holocene. For the information of those not able to attend, we include, in order of presentation, a complete listing of the abstracts for all seventeen papers.

All CAP members and other interested colleagues from the geoscience community are warmly invited to attend the special session and listen to some diverse and thought-provoking papers.

David J. McIntyre, Bert G. van Helden
and Alwynne B. Beaudoin
Organizers, CAP Special Session

E.T. Burden, S.H. Williams, and P.K. Mukhopadhyay "Comparative Analysis of Thermal Maturation Indices for Acritarchs, Spores, Graptolites and Vitrinite from Paleozoic Strata, Western Newfoundland"

Paleozoic strata from western Newfoundland are analysed for palynomorph thermal alteration indices (TAI) and graptolite reflectance (Ro) to develop comparative data for thermal maturation. At very low levels of thermal maturity, corresponding with TAI of less than 2 and a fluid inclusion paleotemperature of 70°C, the graptolite periderm gives Ro values greater than 0.5. At higher levels of thermal maturity where TAI is about 2.5 and nearby paleotemperatures are around 100°C, the graptolite R_o values are around 1.0. For rocks containing brown and black palynomorphs (TAI 3 to 4), graptolite R_o values begin to increase rapidly to about 2.0. This corresponds with nearby fluid inclusion paleotemperatures which are thought to be at least 130°C. By comparing palynomorphs and graptolites, a sensitive indicator of thermal maturation is achieved for Paleozoic rocks which span the hydrocarbon window.

D.J. McIntyre, C.J. Schröder-Adams, and J.H. Craig "Late Albian to Turonian Palynological and Microfaunal Assemblages, Lower Colorado Group, Southern Alberta"

Marine shales of the Westgate, Fish Scales, Belle Fourche and Second White Specks formations in southern Alberta contain distinctive dinocyst, foraminifer and coccolith assemblages.

Dinocysts of the Westgate Formation indicate a nearshore open-marine environment. Many of the Late Albian species range into the Cenomanian. Foraminiferal assemblages are indicative of the *Miliammina manitobensis* Zone.

Dinocyst assemblages of the lowermost Cenomanian Fish Scales Formation differ little in species composition from Westgate and Belle Fourche assemblages. The lower diversity, dominance of one or two species, abundant amorphous material and the absence of foraminifera suggest anoxic depositional conditions.

Many dinocyst species last appear in the Cenomanian Belle Fourche Formation and some characteristic Late Cretaceous species first appear in the upper part of the formation. The low diversity foraminiferal assemblage indicates the Cenomanian *Verneuilinoides perplexus* Zone.

The rich Turonian dinocyst assemblages of the Second White Specks Formation are characterized by the appearance of important Late Cretaceous species. Amorphous organic detritus, of probable algal origin, is abundant. The planktonic foraminiferal assemblage indicates the *Hedbergella loetterlei* Zone. The upper part is assigned to the *Whiteinella aprica* Subzone. The presence of abundant coccoliths, including species which first appear in the Turonian, is a distinguishing characteristic of the Second White Specks Formation.

R.A. MacRae and L.V. Hills "Species Succession and Morphoclines of the Fossil Dinoflagellate *Nyktericysta*: A Measure of Increasing Paleoenvironmental Stress and Proximity to Shoreline?"

The fossil ceratioid dinoflagellate *Nyktericysta* is the dominant dinoflagellate in marine palynomorph assemblages from the Late Albian Bastion Ridge and Strand Fiord formations, Canadian Arctic Islands. The dominance of *Nyktericysta*, decrease in dinoflagellate diversity, and high, increasing-upwards proportion of terrestrial palynomorphs (>90%) is interpreted as shallowing-up conditions, from open marine to restricted marine and to mixed marine and terrestrial conditions.

Over this paleoenvironmental gradient, five species of *Nyktericysta* are present, some recognized. A vertical succession of dominant species and first appearances is used to define a biozonation, probably of local chronostratigraphic significance only. The biozonation proves the two units laterally correlate in part.

Additionally, two distinct lineages of *Nyktericysta* - *N.* sp A and *N.* cf *N. pentagonum* - display vertical morphoclines, from forms with many horns at the

base, to forms with few horns at the top of the Bastion Ridge Formation. Some forms show completely intergrading morphologies in the same sample, and are therefore considered intraspecific variation in both lineages.

A similar variation in horn number is observed in the extant ceratioid *Ceratium hirudinella*, and is in part controlled by paleoenvironment, particularly temperature and seasonal variations. Given the independent evidence for a paleoenvironmental gradient in these units, the *Nyktericysta* morphoclines are interpreted as an example of paleoenvironmentally-controlled "fossil polymorphism", probably reflecting increasing proximity to shoreline. This interpretation is being tested by examining other areas for repetition or reversal of the same trends at different geologic times.

L.V. Hills, L.K. Núñez-Betelu, F.F. Krause and D.J. McIntyre "Palynological Re-evaluation of the Cretaceous Hassel/Kanguk Fms Boundary at Mt. Bridgeman, Ellesmere Is., Canadian Arctic Archipelago"

The upper Lower Cretaceous Hassel Fm commonly consists of poorly to fairly indurated medium- to fine-grained quartzose sandstone and siltstones with interbedded mudstones. The overlying Upper Cretaceous Kanguk Fm usually comprises organic-rich mudstones with interbeds of thin to relatively thick bentonites and silty mudstones. Traditionally the Hassel /Kanguk boundary is placed at the base of the organic-rich mudstones, and, thus, all underlying sandstones are placed in the Hassel Fm.

At Mt Bridgeman these sandstones are 179 m thick and the overlying mudstones 131 m thick. Our detailed palynological and sedimentological analysis of this section indicates the following: 1/the lower 54 m thick sandstones are marginal marine with a marked tidal signature and abundant bioturbation dominated by *Ophiomorpha*. The palynological assemblage is preeminently terrestrial in nature, well-preserved, and contains diagnostic Early Cretaceous (Albian) taxa such as *Appendicisporites* and *Trilobosporites* plus limited acritarchs; 2/ the upper 125 m thick sandstones comprise three to four coarsening upward rhythms of which the two uppermost ones are capped by immature paleosols. In these rhythms palynomorphs are very well preserved, abundant and marine in origin. The taxa are Late Cretaceous and the presence of diagnostic forms such as *Isabellidinium globosum* indicate a Late Turonian age for these coarsening-upward sandstones; 3/ the overlying organic-rich mudstones are palynologically similar and do not indicate the presence of a break with the upper sandstones as observed sedimentologically.

Thus, palynological analysis indicates the following: 1/ presence of a disconformity within the sandstones; and 2/ the need for redefinition of the Hassel/Kanguk boundary, since the upper 125 m thick sandstones are Late Turonian and, therefore, these sandstones should be considered as Kanguk equivalent and not part of the Hassel Fm.

D.A. Leckie and E.T. Burden "Geology of Middle to Late Albian Unconformities in the Alberta Basin: Correlation of Basin-wide Erosion Surfaces"

Major unconformities occur in Blackleaf Formation of northern Montana, the Mill Creek Formation and Bow Island formations in southern Alberta, the Viking Formation of central Alberta and the Boulder Creek and Paddy Formations of northwestern Alberta and northeastern British Columbia. These unconformities are marked by distinctive petrographic changes. Sediment below the unconformities is typically volcano-feldspathic or mixed quartz and chert; above the unconformity, the sediment is quartz arenite in several localities. A drop in relative sea level resulted in the incision of major drainage networks which can be traced for several hundred kilometres. The subsequent rise in sea level resulted in fluvial to estuarine valley fill deposits which are variably coarse grained. Palynology suggests a hiatus of as much as 3 to 5 Ma is represented by these unconformities. It is tempting

to equate these surfaces with one another to identify one regional Late Albian event in the Alberta Basin. However, the palynology suggests a more complicated picture where an older Middle Albian unconformity is in part masked by a younger, Late Albian erosion surface.

B.G. Van Helden "Palynostratigraphy and Depositional Environments of Jurassic Sequences in the Western Canada Basin"

Underlying the early Cretaceous clastic wedges in the Western Canada Basin are shales and sandstones of Jurassic age, which have significant potential for hydrocarbon accumulation.

The detailed stratigraphy, distribution and geometry of these sandstones is not fully understood.

Palynological analysis provides a powerful source of information on the age, biostratigraphic correlation, depositional environment and sequence stratigraphy of these strata.

In addition this analysis is an inexpensive, fast and reliable method to obtain information on source-rock potential and thermal maturity of the section.

A. MacRae, R.A. Fensome and G.L. Williams "Dinoflagellate Diversities, Extinctions and Sea-level Curves"

The development of a palynological data base, PALYLIT (developed by several oil companies and the Geological Survey of Canada), provides a powerful research tool, as it contains detailed biostratigraphic, geographic and taxonomic information from more than 16,000 publications. PALYLIT is the basis of our plots of dinoflagellate genera and species occurrences ("diversities") through time. The plots are derived from a filtered data set of more than 50,000 biostratigraphic records, by far the largest paleontological data resource used to establish diversity curves for any fossil group. We interpret appearance and rapid diversification of fossil cysts in the Late Triassic to Middle Jurassic as representing a successful adaptive radiation of the dinoflagellates. Maximum diversities of cysts were attained in the Maastrichtian and Eocene, with about 700 known species. There was a significant decline between Maastrichtian and Paleocene and a dramatic decline from Eocene to recent times. Correlation of the diversity curves with published long-term sea-level curves indicate some striking similarities, possibly even with third order cycles. The diversity curves also correlate well with an earlier published curve for dinoflagellates produced by more conventional means and a much smaller data set. Like the earlier curve, the present plot can be tested against biases, such as greater number of publications for certain stratigraphic intervals. Initial comparison with other data sets such as extinction plots and paleotemperature curves show promise for new avenues of research.

G.L. Williams, J.A. Wade, R.A. Fensome, B.C. McLean and L.E. Stover "Palynological Delineation of Third Order Sequences, Scotian Margin"

A 320 km seismic section running from the Scotian Shelf through the slope to the continental rise has provided a unique opportunity to correlate deep sea seismic reflections with Mesozoic and Cenozoic shelf sequences. Biostratigraphic control was obtained from three wells. These are Sauk A-57 and Banquereau C-21 on the shelf and Tantallon M-41 on the slope. The ranges of dinoflagellates from sidewall cores from Banquereau C-21 were compared with known ranges from the classic sections from north-west Europe, as well as those from North Atlantic ODP sites. These ranges, in conjunction with gamma log character and the seismic reflections, permitted delineation of the following sequence boundaries: 36 Ma, 39.5 Ma, 49.5 Ma, 54 Ma, ?63 Ma and 68 Ma. These horizons could then be recognized updip in the Sauk A-57 well and downdip in the Tantallon M-41 well. This made it possible to check the age of the deep water seismic markers A^c and A^u as recognized in the Sohm Abyssal Plain, but never previously correlated (with any degree of accuracy) with Scotian Shelf sequences. The oceanic reflection designated A^u (early Oligocene unconformity) is found to tie with

the 49.5 Ma sequence boundary (early-middle Eocene) on the shelf. 49.5 Ma actually equates to A^c. A sequence boundary at 30 Ma (A^u) is not identified in the wells, however, an unconformity which onlaps 36 Ma seaward of Tantallon M-41 is tentatively identified as A^u. Integration of the different disciplines has thus provided a more concise understanding of Paleogene correlations between Scotian Shelf and deep sea sediments.

J.M. White and T.A. Ager "Middle and Late Miocene "Snapshots" of Vegetation and Climate in Northwestern Canada and Alaska, and Biostratigraphic Implications"

Localities 90-1 and 90-7 along the Porcupine River, Alaska, dated by $^{40}Ar/^{39}Ar$ as 15.1 to 14.4 and 6.7 Ma, respectively, were analyzed quantitatively during joint GSC-USGS research on Neogene, high latitude paleoclimates. Locality 90-1, Middle Miocene, is dominated by T-C-T and Pinaceae pollen, but is notable for the occurrence of thermophilous angiosperms including *Acer*, *Carya*, *Castanea*, *Fagus*, *Quercus*, *Ilex*, *Juglans*, *Liquidambar*, *Nyssa*, *Tilia*, *Ulmus/Zelkova*, and taxa now confined to Asia, *Sciadopitys*, *Cercidiphyllum*, and *Pterocarya*. No Poaceae or Cyperaceae were found. The Mean Annual Temperature (MAT) may have been as high as 9° C. In contrast, the Late Miocene Locality 90-7 has little T-C-T pollen and few occurrence of *Castanea*, *Juglans*, *Ilex*, *Pterocarya*, and *Ulmus/Zelkova*. It is dominated by the Pinaceae and angiosperms such as *Betula* and *Alnus*, with common occurrences of herbs including the Poaceae and Cyperaceae. Other thermophilous angiosperm taxa listed above do not occur. The MAT may have been ca. 0° C, as opposed to a MAT today of about -7° C. Locality 90-1 allows correlation from south and central Alaska to Banks Island, and to the Mackenzie Bay sequence, Beaufort Sea. A more continuous record from the Middle and Late Miocene, with independent radiometric control, is needed to define the pattern of high latitude, continental temperature decline, and to provide more refined palynostratigraphic control for Neogene rocks.

M.J. Head, G. Norris, L. de Verteuil, C. Anstey, S. Kolev, and F. Neumann "Dinoflagellate Cysts as Sensitive Signals for Neogene Cooling in the North Atlantic and Contiguous Seas: Ecostratigraphic Analysis of Deep-sea and Shelfal Assemblages"

Dinoflagellates are dominantly auxotrophic and heterotrophic protistans. Their distribution is controlled by various influences of light, temperature, salinity, nutrient supply, watermass position relative to coast, and ocean currents. Late Miocene-early Pliocene dinoflagellate assemblages from circum-North Atlantic mid-latitudes represent temperate surface-water temperatures, the neritic assemblages being associated with temperate terrestrial palynomorph assemblages that extend as far north as Baffin Island/Greenland, and compositional changes being associated largely with initiation or termination of stratigraphic sequences. Late Pliocene changes in diversity (species richness) and specific termination of ranges signal the advent of northern hemisphere ocean cooling which appears to proceed diachronously and cyclically from the Norwegian Sea and other high latitude areas southwards. The earliest glaciomarine event is recorded in Baffin Bay at 9.5-7.4 Ma but permanent sea ice is not established here until ca. 4-6 Ma as indicated by cysts of englacial marine gymnodinioid dinoflagellates. Major cooling at 2.47 Ma affected open ocean water and is also recorded in the dinoflagellate record in other North Atlantic localities, with some exceptional seawater temperature conditions in northwest Europe reflecting Gulf Stream instability. Ice cover in ocean areas appears to result in ecostratigraphic changes consequent on decreased productivity, decrease in absolute abundances of algal microfossils, decreased nutrient supply affecting high-level dinocyst taxa, assemblage changes related to thermal tolerance and surface current circulation, and salinity changes related to run-off. These ecostratigraphic results have implications for ocean-atmosphere circulation models for moisture sources and growth of land ice in the late Neogene.

I.D. Campbell and J.H. McAndrews "Late Holocene Disequilibrium Forest Caused by Rapid Climate Change"

Many techniques for the interpretation of palynological records rely on the assumption that vegetation maintains equilibrium with climate. In southern Ontario, Canada, the forest's response to the Little Ice Age (AD 1450 - 1850) shows strong transient effects indicative of a temporary disequilibrium.

Simulation modelling shows that the observed pollen record is best explained by a cooling of 1 - 2 °C. This cooling caused increased mortality of the thermophilous climax beech (*Fagus*), allowing first a 'bloom' of the shade-intolerant oak (*Quercus*), then an increase in the more cold-tolerant white pine (*Pinus strobus*). The model results further suggest that the increase in white pine may also have been transitory, but the natural vegetation succession was interrupted by EuroCanadian forest clearance, starting around AD 1850. One result of this transient response is that pollen-climate transfer functions cannot be applied to this time period in this region.

In practice, these results suggest that: (1) forest can respond rapidly to climate change, but transient effects should be expected in certain situations; (2) pollen-climate transfer functions and other techniques assuming that the vegetation is in equilibrium with climate should be applied with care wherever transient effects are suspected; and (3) the modern forests and pollen spectra used for comparison of fossil pollen spectra and palaeoclimatic interpretation may not be in climatic equilibrium in all areas, even where anthropogenic effects are not visible; while the pre-1850 forest and pollen spectra are often used to avoid problems caused by anthropogenic impacts, they were certainly not in equilibrium with the Little Ice Age climate in southern Ontario.

G.M. MacDonald and J.M. Szeicz "A Fossil Pollen Based Reconstruction of Regional Variation in Treeline History in the Western Interior of Canada"

The western interior of Canada has four ecotones that could be classified as treelines: (1) northern boreal treeline, (2) upper alpine treeline, (3) southern boreal treeline, and (4) lower alpine treeline. Changes in the northern and upper alpine treelines are controlled primarily by summer temperatures. Changes in the southern and lower alpine treelines are mainly controlled by moisture availability. Thus, pollen based reconstructions of treeline movement in these four zones can provide an extensive network of proxy data on temperature and moisture variations in the western interior. We combine data from new and previously published fossil pollen records from the Rocky and Mackenzie Mountains, the northern edge of the boreal forest in the central and northwestern Northwest Territories, and the southern edge of the boreal forest in Alberta to document similarities and differences in the timing of treeline movement in these different regions. Our data indicate that upper alpine and arctic treelines in the far west experienced increases in elevation or latitude during the mid-Holocene. However, the arctic treeline in central Canada extended northward later than the western sites. Evidence, particularly from northern sites, suggests that smaller but widely recorded advances and retreats in treeline have occurred in the last 3000 years.

R.E. Vance "Climatic and Hydrogeological Implications of Holocene Paleolimnological Studies in the Southern Canadian Prairies"

Numerous lake basins in southern Alberta, Saskatchewan, and Manitoba contain detailed archives of past hydrological conditions in this drought-prone semi-arid environment. Paleobotanical and mineralogical studies of sedimentary sequences, obtained from a wide spectrum of lake types (in terms of catchment characteristics, water depth, chemistry, and salinity), form a major component of the Geological Survey of Canada's Palliser Triangle IRMA (Integrated Resource Management Area). The

goal of this project is to outline linkages between Holocene climate change and geomorphic processes (with an emphasis on the last 2000 years) to improve understanding of possible future hydrological and landscape changes accompanying Global Change in this agriculturally important region.

To date, preliminary analyses of pollen, plant macrofossil, and sediment stratigraphies indicate that major changes in Holocene climatic and hydrogeologic regimes have been a prominent feature of lake history in the region. Prior to 6000 BP recurrent, severe drought significantly reduced the regional water table and few basins held water. Shallow groundwater input was sporadic. From 6000 to 3000 BP groundwater flow increased as climatic conditions ameliorated and previously dry and ephemeral basins filled with water throughout much of the Palliser Triangle region. Between 3000 and 1000 BP lake levels were high. In saline, groundwater discharge lakes, increased water levels were accompanied by declining salinity. A regional lake-level decline occurred about 1000 BP, followed by rising lake levels to a high stand that persisted through the Little Ice Age. Lower lake levels have prevailed during the historic period, although this recent decline in the regional water table is minimal compared to the mid-Holocene water deficit.

D.W. Fedje "Palynology, Micropaleontology and Sea-level Changes in the Southern Queen Charlotte Islands, British Columbia"

Integration of palynology and micropaleontology in analysis of sediment cores and stratigraphic sections from southern Moresby Island allows improved detailing of the sea-level curve for the southern Queen Charlotte Islands. Marine transgressive and regressive events are established through analysis of several type of microfossils including pollen, dinoflagellates, diatoms, foraminifera and thecamoebians. This research shows that the early Holocene marine transgression in this area was very rapid, that the mean sea-level reached a maximum elevation of approximately 14 metres above present levels at about 9,500 RCYBP and that relative sea-levels remained between 13 and 14 metres above modern levels until about 5,500 RCYBP.

C.E. Schweger "Quaternary Paleoecology of Beringian Tephras"

Tephra units have gained increasing importance over the past decade in defining and dating the Quaternary stratigraphy of Beringia (Alaska and Yukon). Paleoecological research associated with several important Quaternary tephras will be reviewed. Little Timber tephra, Loc 94, Old Crow Basin, fell on shrub tundra vegetation over 1.2 ma. B.P., at a time of reversed polarity. The tephra provided a nutrient source that changed the vegetation for a short period. Surprise Creek tephra, Loc 47, Old Crow Basin, fell on open spruce woodland at some time during the middle Pleistocene. It is too pumiceous to date which is unfortunate because it is associated with a rich mammal assemblage. The widespread Old Crow tephra is the best studied of the tephra units. Dated 150 ka B.P., it fell during a brief interval of open spruce woodland which was followed by tundra and then boreal forest development. This period of warmer than present climate is correlated to the Koy-Yukon, or last interglacial. Also widespread, the Sheep Creek tephra is at present undated but is known to be stratigraphically below the Old Crow tephra. A prominent forest bed occurs below the tephra and suggests an interglacial climate. Tundra-steppe pollen assemblages occur above the tephra which fell on an open spruce woodland.

A.B. Beaudoin "Multivariate Statistical Analysis Applied to Modern Pollen Data from the Sunwapta Pass Area, Jasper National Park"

In recent years, increasing attention has been focussed on Late Quaternary pollen records from high elevation sites in the Canadian Rockies. Modern pollen assemblages are essential as analogues for interpreting these data, yet few surface pollen studies are available for the region. During an investigation of Holocene pollen records from the Sunwapta Pass area, 71 surface samples, mainly from moss polsters, were examined to see how they related to the three major vegetation types (subalpine wetlands, subalpine forest, alpine) in the area today. Cluster analysis showed that the modern pollen assemblages formed eight clear groups. Three of these had one or two members. The remaining five clusters (67 samples)

were used as predefined groups in discriminant function analysis (DFA). Three main arboreal taxa (Pinus, Picea, Abies) were selected as good discriminators. Data from the alpine Wilcox Pass core were classified using discriminant functions derived from the modern assemblages. Samples from the base of the core (248-203 cm, Zones WP1 and WP2, >9600 yr BP) do not plot closely with any group, suggesting that the modern data do not provide good analogues for these early assemblages. Samples between 203-163 cm (Zone WP3, >9600-ca. 6350 yr BP) plot most closely with Group 5, comprising assemblages derived from sites in open areas as well as those from the upper forest margin. This strengthens inferences from other analyses that the upper forest margin was closer to the Wilcox Pass site at this time, thus that timberline was higher, implying an interval of warmer than present temperatures. In the upper part of the core (163 cm-surface, Zones WP4 and WP5, ca. 6350 yr BP-present), samples are most like those from open wetland surfaces, although for some the relationship is not close, suggesting increased distance from the forest margin, perhaps associated with cooler temperatures and Neoglacial conditions. This study demonstrates that multivariate statistical calibration of modern data from the local area using DFA can provide a useful perspective for refining interpretation of Late Quaternary pollen records.

R.M. Kalgutkar "Fossil Fungal Spores and Fructifications from Iceberg Bay Formation, Kanguk Peninsula, Eureka Sound Group, Axel Heiberg Island, Northwest Territories" (poster)

Well preserved and noteworthy fungal remains from Iceberg Bay Formation at Kanguk Peninsula were encountered during the palynological study. However, good recoveries of fungi were obtained in 13 of 35 samples from Section RAK 83-27, after reprocessing all samples by controlled oxidation technique.

A total of 34 genera and 79 species of fungal spores and fructifications were recorded. Twenty one new species will be subsequently described. The total fungal flora of section RAK-83-27 contained species which are restricted to only one sample and species very limited in their distribution. This indicates floral diversity in the fungal population of the Iceberg Bay Formation, and is supported by the Floristic Similarity Index. Distribution of various microthyriaceous fungi combined with common occurrences of hyphomycetous taxa of saprophytic nature suggests a mesothermal humid climate and a marshy habitat during deposition of Iceberg Bay Formation at Kanguk Peninsula.

Preliminary examination of pollen flora indicates an age range of Late Paleocene to Early Eocene for the Iceberg Bay Formation at Kanguk Peninsula. The presence of Helicosporous fungi and other fungi such as *Dicellaesporites* sp. (11), *Phragmothyrites eocaenica*, *Plochmopeltinites masonii* suggest an Early Eocene age based on the comparison with the known flora of the Early Eocene in the Iceberg Bay Formation at Strand Fiord. The presence of *Ctenosporites eskerensis*, *Diporicellaesporites pluricellus*, and *Diporisporites anklesvarensis*, which are mainly restricted to the Eocene of the Arctic, also favor an Eocene age for the samples.

MICROSLIDE STORAGE CABINET

I have identified a carpenter in Calgary who is interested in making good quality microscope slide cabinets of the type used by micropaleontologists and for those who store thin sections. The cabinets will be oak-finished, and have metal trays, similar to commercially-made cabinets. A major component of the price is the initial tooling cost for the metal trays, so it is important to assess the volume of sales before manufacture. 500, 1500, or 3000 slide cabinets could be made, at costs roughly $295, $825, and $1495 respectively (GST and shipping is extra). If you are interested in purchasing such cabinets, contact, **as soon as possible**:

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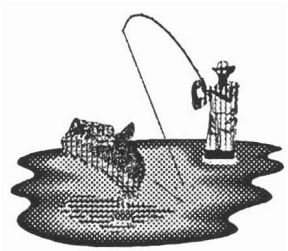

RETIREMENT

After thirty four years with the Geological Survey of Canada, and almost thirty nine years in the federal public service, I have decided to retire effective May 26.

My retirement plans include a number of activities for which I have not had much time to pursue in the past. I also plan to keep in touch with the world of palynology and complete a number of outstanding projects. However, should the fishing be good or other interests more enjoyable, I may be easily distracted.

My career in palynology has been extremely enjoyable and fulfilling due in large part to fellow "pollen peekers" with whom I have come in contact. Thank you all for your support and encouragement. Maybe I'll turn up at some future pollen conference just to say hello.

I am told that my E-mail address will remain valid after retirement, so I can be contacted that way. After May 26 I can be reached at my home address which is: 19 Skipton Road, Nepean, Ontario, K2G 0Y8, Tel: (613) 226-8860, E-mail: rjmott@emr.ca

R.J. (Bob) Mott
Ottawa, Ontario

[Editor's note: Thirty four years' outstanding service to geoscience is certainly a career of which Bob can be justly proud. I am sure I convey the feelings of all CAP members when I wish Bob an enjoyable and busy retirement. I hope the fishing is good, but not too good! We would still like to see you often at conferences and other meetings.]

CORRECTION

Please note a correction to the Minutes of the CAP Annual General Meeting, Item 10 (*CAP Newsletter* 15(2):5). David Jarzen is proposing to host the 1995 AASP Meeting in Ottawa (not 1996, as the AASP meeting will no doubt be held in conjunction with the 9th IPC, scheduled for Houston, Texas). Should this become a reality, we will need some volunteers to assist with symposia, field trips and any other areas of expertise that you may be willing to provide. Please let David or Susan Jarzen know of your desire to help (before we 'phone you!) at 613-954-0355 or FAX 613-954-4724. Thanks!

Susan Jarzen
Ottawa, Ontario

CAP ANNUAL GENERAL MEETING 1993

The CAP Annual General Meeting for 1993 will be held in Edmonton during the G.A.C./M.A.C. Annual Meeting. The meeting will be held on Tuesday, 18th May, beginning at 5 pm in Room V-112 of the V-wing lecture room complex, adjoining the Physics and Chemistry Buildings on the University of Alberta campus. This follows the CAP Special Session, which will be held along the hall in Room V-107 and is scheduled to end at 4 pm (see page 11).

All CAP members and correspondents are invited to attend the CAP Annual General Meeting. Other people interested in the Association are also welcome. Anyone wishing to place items on the agenda should contact Elliott Burden (CAP President) or Martin Head (CAP Secretary/Treasurer) as soon as possible.

DEADLINES

Please submit items for the next *CAP Newsletter* (Volume 16, Number 2, December 1993) by November 15th, 1993. I prefer to receive articles on disk using MS-DOS WordPerfect 5.1; MS-DOS or Macintosh text files or Mac Word 4.0 files are also fine. Either 5.25" or 3.5" disks (low or high density) are acceptable. Each item should also be submitted as hardcopy. Articles may include diagrams and photos; for photos, please provide a glossy black-and-white print (3" x 5") from a picture with good contrast. Illustrations may be submitted on disk in CorelDraw 3.0 format. Please send material to:

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Please note the following new address and affiliation:

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Meeting calendar

1993

May 17-19: G.A.C./M.A.C. Joint Annual Meeting. Edmonton, Alberta. Meeting includes CAP Special Session "Palynology in Canada - Palaeoecological and Stratigraphical Applications" (page 11) and CAP Annual General Meeting (page 19). Details: J.W. Kramers, Alberta Geological Survey, Box 8330, Station F, Edmonton, Alberta, T6H 5X2. Tel: (403) 438-7644, FAX: (403) 438-3364.

July 7-9: First European Palaeontological Congress. Lyon, France. Theme: "Organism-Palaeoenvironment Interactions". Details: Mireille Gayet or Bernard Courtinat, Université Claude-Bernard-Lyon 1, 43 boulevard du 11 novembre, 69622 Villeurbanne cedex, France. Tel: 72 44 83 98 or 72 44 85 72, FAX: 72 44 84 36

July 31 - August 7: "The Gross Symposium". Göttingen, Germany. Joint Meeting between IGCP Project 328: Palaeozoic Microvertebrates and the Subcommission for Devonian Stratigraphy. Symposium marks the 90th anniversary of the birth of Prof. Walter Gross (1903-1974). Emphasis on biochronology and marine/non-marine correlation. Details: Prof. Otto H. Walliser, Institut und Museum für Geologie und Paläontologie, Goldschmidtstrasse 3, D-3400 Göttingen, Germany. Tel: 010-49 551-397950, FAX: 010-49 551-397996.

August 15-19: Carboniferous to Jurassic Pangea: A Global View of Environments and Resources. Calgary, Alberta. Canadian Society of Petroleum Geologists Annual Convention. Details: B. Beauchamp or A. Embry, Inst. of Sed. and Pet. Geology, 3303-33rd Street NW, Calgary, Alberta, T2L 2A7. Tel: (403) 292-7190. FAX: (403) 292-4961.

August 28 - September 3: 15th International Botanical Congress. Tokyo, Japan. Details: M. Furuya, Frontier Research Programs, The Riken Institute, Wako City, 351-01, Japan.

October 2-3: 3rd Canadian Paleontology Conference (CPC-3). Sudbury, Ontario. Theme: "Paleozoic Paleogeography and Shallow Marine Shelf Communities of Infracratonic Basins and Shield-Fringing Areas". Registration fee $25. Details: Paul Copper, 3rd Canadian Paleontology Conference, Department of Geology, Laurentian University, Sudbury, Ontario, P3E 2C6.

October 17-24: Non-marine Triassic Symposium. New Mexico Museum of Natural History, Albuquerque, New Mexico, U.S.A. Symposium follows Annual Meeting of the Society of Vertebrate Palaeontology to be held in Albuquerque, October 13-16, 1993. Details: Spencer G. Lucas and Michael Morales, c/o New Mexico Museum of Natural History, 1801 Mountain Road NW, Albuquerque, New Mexico 87104, U.S.A.

October 19-22: American Association of Petroleum Geologists International Meeting. The Hague, The Netherlands. Theme: "New Views on Old World Oil - Technology Leads the Way". Details: AAPG Meetings, Box 979, Tulsa, Oklahoma 74101, U.S.A. Tel: (918) 584-2555, FAX: (918) 584-0469.

October 25-28: 26th Annual Meeting of American Association of Stratigraphic Palynologists (AASP). Baton Rouge, Louisiana. Theme: "Facies Models and Sequence Stratigraphy". Symposia: "Palynology and Climate" (organizer Kam-Biu Liu), "Palynology, Climate and Sequence Stratigraphy of the Pliocene" (organizers John Wrenn and Jean-Pierre Suc). Details: George F. Hart or John H. Wrenn, Department of Geology and Geophysics, Louisiana State University, Baton Rouge, LA 70803, U.S.A. Tel: (504) 388-3353, FAX: (504) 388-2302.

1994

May 16-18: G.A.C./M.A.C. Joint Annual Meeting. Waterloo, Ontario. Details: Alan V. Morgan, Department of Earth Sciences, University of Waterloo, Waterloo, Ontario, N2L 3G1. Tel: (519) 885-1211, Ex. 3231, FAX: (519) 746-2543.

June 12-15: American Association of Petroleum Geologists Annual Meeting. Denver, Colorado. Details: AAPG Meetings, Box 979, Tulsa, Oklahoma 74101, U.S.A. Tel: (918) 584-2555, FAX: (918) 584-0469.

September: 4th European Palaeobotanical-Palynological Congress. Heerlen, The Netherlands. Details: Dr. G.F.W. Herngreen, c/o Geological Survey, P.O. Box 157, 2000 AD, Haarlem, The Netherlands.

1995

March 5-8: American Association of Petroleum Geologists Annual Meeting. Houston, Texas. Details: AAPG Meetings, Box 979, Tulsa, Oklahoma 74101, U.S.A. Tel: (918) 584-2555, FAX: (918) 584-0469.

August 28 - September 2: XIII International Congress on Carboniferous-Permian. Kraków, Poland. Topics: 1) Global syntheses: palaeogeography, plate tectonics, palaeoclimate, 2) Stratigraphy and palaeontology, biostratigraphic global correlations, 3) Sedimentology, analysis and reconstruction of sedimentary basins, 4) Tectonics and magmatism, 5) Post-depositional transformations of organic substance, coal petrology and geochemistry, 6) Economic geology with special reference to coal, coalbed methane and hydrocarbons, 7) Ecological impact of coal mining and related industrial activities. Details: Prof. dr. hab. Sonia Dybova-Jachowicz, Państwowy Instytut Geologiczny, Oddział Górnośląski, 1 Królowej Jadwigi, 41-200 Sosnowiec, Poland. Tel: 48 32, 66 20 36 (38), FAX: 48 32, 66 55 22.

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Canadian Association of Palynologists (CAP) membership is open to all members of the palynological community in Canada. The Association is devoted to promoting the exchange of information among palynologists in Canada. Palynologists from outside Canada may become corresponding members for the same dues, with no voting rights. 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.

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CAP membership dues are $7 per year in Canadian funds payable at the beginning of the year. Lapsed members are removed from the mailing list after two years. Members may, if they wish, pay for up to three years in advance. Please send a cheque or money order payable to CAP to:

Martin J. Head, CAP Secretary/Treasurer, Department of Geology, Earth Sciences Centre, University of Toronto, 22 Russell Street, Toronto, Ontario, M5S 3B1, Canada.

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