Canadian Association of Palynologists
Association Canadienne des Palynologues

NEWSLETTER

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President's Message

Palynology and Micropaleontology in Canadian Geoscience: New Frontiers and Applications

CAP Symposium, GeoCanada 2000

It seems quite fitting that I should be writing my inaugural Presidential address here in Canada, now that my family and I have moved to Cambridge, England. I am in fact attending the Second Workshop on Arctic and Circumarctic Dinoflagellate Cysts hosted for the second year running by Anne de Vernal in Montreal. The Workshop has brought together about 20 researchers from as far afield as Japan, Norway, Denmark, Germany, England, Wales, and France, as well as from the provinces of Ontario, Quebec, and Nova Scotia. The participants are involved in mapping the geographic distribution of dinoflagellate cysts in modern sediments of the North Atlantic, Arctic Ocean and adjacent seas, and this work is now being extended into the North Pacific. The overall purpose of this activity is to link modern dinoflagellate species distributions to their corresponding sea-surface conditions including summer and winter salinity and temperature as well as duration of sea-ice cover. Transfer functions derived from these data are being used to quantitatively reconstruct the Quaternary record. This work is particularly valuable for the arctic and circumarctic regions where other marine microfossil groups either preserve very poorly (diatoms) or suffer from severely reduced diversity (calcareous microfossils).

All this means that our humble dinoflagellate cysts are now becoming very important proxies for the Quaternary record. What is more, they have attracted the interest of climate modelers because of their sensitivity during cool intervals and their ability to reconstruct ice cover. It is not surprising that this dinoflagellate initiative is largely funded through collaboration with climate modelers who need to test their reconstructions. A little funding even trickles down to support taxonomic work, this being a major theme of the workshop. It

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all goes to show that while some sources of funding in palynology are diminishing, others are emerging as our science moves forward in important new directions. And it is most gratifying to see a Canadian research group taking a lead in one of these directions.

Funding is a major concern to all scientists these days, and the grass always seems greener on the other side of the fence. Having moved to Cambridge after 15 years in Toronto, I am now on the other side of the fence. Actually the grass really is greener over here, but only literally. By the end of the month I will have been this year on six research trips. None will have been paid for by UK money, and most of my expenses including attendance at GeoCanada 2000 will have come out of my own pocket. Ordinarily I should feel hard done by, but such levels of underfunding are not unusual by British standards. Academics here have had to subsidize their own research efforts for years, and have simply hardened to the realities. Canadian funding by comparison now seems quite generous, so I guess it's all relative. I can't really complain because as a college Fellow here at the University I get two free meals a week and do nothing to earn them—the proverbial free lunch. The only snag is having to wear a suit and gown for dinner. College gowns once served the useful purpose of keeping chalk dust off ones clothes, but the long, dangling sleeves were surely never meant for elegant dining!

Your president's activities for CAP this year have mostly involved the CAP-sponsored symposium "Palynology and Micropaleontology in Canadian Geoscience: New Frontiers and Applications." This symposium is being held at GeoCanada 2000 in Calgary later in the month (May 29 – June 2) and will showcase Canadian palynology and micropaleontology. Alwynne Beaudoin, as senior convenor, has put long hours into keeping us compliant with the heavy organizational demands of this conference. Our biggest challenge has been to deal with the online abstract submittal process and its many iterations, a source of much frustration to all concerned. If you are one of the participants, thank you for bearing with us and with a system that was ahead of its time. The revision and compilation of abstracts is now complete and we can look forward to an exciting conference. A major aim of our symposium has been to integrate palynology with micropaleontology, and we hope that many common interests will be discovered. I look forward to meeting you all in Calgary.

I'd like to finish this message by thanking members of the CAP executive for their part in making the association run smoothly, including Mary Vetter for her dedicated work on the Newsletter, and Rob Fensome for his staunch behind-the-scenes support. I warmly invite to you all to attend CAP's Annual General Meeting at GeoCanada 2000 in Calgary. It's a great city and I hope to see many of you there.

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CAP PRESIDENT-ELECT

I am delighted to announce that Alwynne Beaudoin has agreed to serve as CAP's new President-Elect. Alwynne was proposed for this position by Rob Fensome and Graham Williams, serving as the nominating committee, and duly acclaimed. I would like to thank Rob and Graham for their fine work. Alwynne will serve as President-Elect for the period 2000-2001 (two years), after which she will automatically step up to the Presidency for a further two years. Alwynne brings a wealth of experience and dedication to the office of President-Elect. She first joined the CAP Executive in 1989 as Newsletter Editor, a position she held for 11 years. She initiated CAP's website in 1996 and currently serves on CAP's executive as Website Editor. Accordingly it is a great pleasure to congratulate Alwynne on her new appointment.

Martin Head
CAP President

Editor's Notes

In his President's Address, Martin Head refers to the "staunch behind-the-scenes support" that Rob Fensome provides. That is also particularly true with respect to the Newsletter. Rob and Nelly Koziel, secretary at GSC (Atlantic), have very graciously undertaken the maintenance of the CAP membership and mailing list, and they reproduce and mail the newsletter. Thank you very much, Rob and Nelly!

This issue contains the first article in a new section of the newsletter entitled "Lab Scenes". This section will feature descriptions of the labs and research activities of CAP members, and is included so that we can each have a better idea of CAP members activities. Special thanks to Markus Heinrichs for contributing the first article!

As usual, many other people contributed materials to this issue: Alwynne Beaudoin, Jocelyne Bourgeois, Gerhard Cadée, Keith Camburn, Richard Crawford, Rob Fensome, Konrad Gajewski, Martin Head, Markus Heinrichs, Francine McCarthy, Dallas Mildenhall, Charles Schweger, Reimer Simonsen, and William Sarjeant, Thank you all! Special thanks also go to *On Campus News,* University of Saskatchewan, for permission to reprint the article on William Sarjeant.

There are many meetings scheduled this summer, and please think about writing a brief meeting report for the autumn CAP newsletter! Thank you.

Mary Vetter
Newsletter Editor
mary.vetter@uregina.ca

CAP Website

Remember to check the CAP Website often for information on CAP, directory of palynologists, the CAP Library, internet resources, equipment and laboratory supplies, upcoming meetings, back issues of newsletters, etc. There is an ***Update record*** button which takes the reader to a page on which the dates and items added/updated are listed so that repeat visitors can quickly see the new changes to the website. Recent additions to the CAP website include the two book reviews and the article by Dallas Mildenhall from the last newsletter and considerable extensions to the Dictionary with new entries.

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From the bureaucrat's desk

New Members

On behalf of CAP, it is a pleasure to welcome Matthew Dalzell (University of Saskatchewan), Michelle Garneau (INRS-Géoressources, CGC), Bing Han (Stanford University), Jennifer Hopkins (Brock University), and Marlow Pellatt (Parks Canada) as new members.

Dues Due

If your name appears below, here is a gentle reminder that **your membership subscription became due at the start of 2000**:

L. Apaalse, E. Burden, K. Choi, B. Cumming, S. Douglas, J. Ford, L. Fortner, K. Gostlin, J. Haas, M. Heinrichs, R. Kalgutkar, E. Koppelhus, I. Larocque, A. Larouche, M. Mahmoud, C. Morgan, G. Parsons, V. Pospelova, A. Sarvis, L. Shane, J. Smol, G. Williams, and C. Zutter.

Thank you!

Dues Payment

Please note that CAP membership dues are CAN $10 per year, payable annually or up to three years in advance. Please make cheques payable to "CAP". Following a reminder notice, lapsed members are removed from the CAP mailing list after one year. See also the Membership Form on p. 38. Funds should be sent to:

Francine M. G. McCarthy
CAP Secretary/Treasurer
Department of Earth Sciences, Brock University

CAP Annual General Meeting

The CAP Annual General Meeting will be held at the GeoScience 2000 Meeting in Calgary at the end of this month:

University of Calgary
Scotia Bank Room
Rozsa Centre
Thursday, 1 June 2000
6:00 - 7:00 p.m.

The Bottom of the Sea

The news from William Sarjeant in Saskatoon, Saskatchewan, is always fascinating, and no more so than the latest, as reported on the following page. This article has been reproduced here with the permission of the Editor, *On Campus News*, University of Saskatchewan and appeared on March 24, 2000 (Vol. 7, No. 13, p. 8).

Prof. Sarjeant thrilled by use of his names for seabed formations

Some people have streets named after them. Some, parks. Some, towns. Some, mountains.

U of S Geology Prof. William Sarjeant found out quite by accident the other week he has been immortalized in a very special place — at the bottom of the Atlantic Ocean.

And he couldn't be more thrilled.

In an energetic life that has seen him become accomplished not only in geology, but also in pursuits as diverse as mystery writing, fantasy writing, folksinging, and heritage preservation — to name a few — Sarjeant says this latest honor "exceeds my wildest imagination".

A friend in the U.S. recently sent him a copy of a paper in the *Edinburgh Geologist*, in which author Ken Hitchen described how he named a number of "igneous centres", or seabed geological formations, after place-names in Sarjeant's four-book fantasy series, *The Perilous Quest for Lyonesse*, and after his pen-name, Antony Swithin — Sarjeant's real middle names.

Names from the books — including Lyonesse, Owlsgard, Sandastre and Swithin — now grace the seabed near the small real-life island of Rockall in the North Atlantic, northwest of Scotland and Ireland. The tiny outcrop was the subject of fantasy for Sarjeant as a boy in England, and in his books he has created a rich fantasy world around a much larger, mythic Rockall.

Adoption of the names "is the most unexpected thing that's ever happened to me," Sarjeant says.

He says it's a "great thrill and pleasure" to have his place-names close-by other undersea place-names taken from J.R.R. Tolkien's *The Hobbit* and *Lord of the Rings*.

Sarjeant wastes no time resting on these latest laurels, however. As usual, he has many things on the go, including:

• He was recently made an Honorary Member of the Canadian Society for Traditional Music. He has played for more than 20 years with the Prairie Higglers.

• He wrote the biographical introduction to a recently re-published book *Menace from the Moon*, "remarkable" British novel first published in 1924.

• He wrote a number of entries in the just-published *Oxford Companion to Crime and Mystery Writing*.

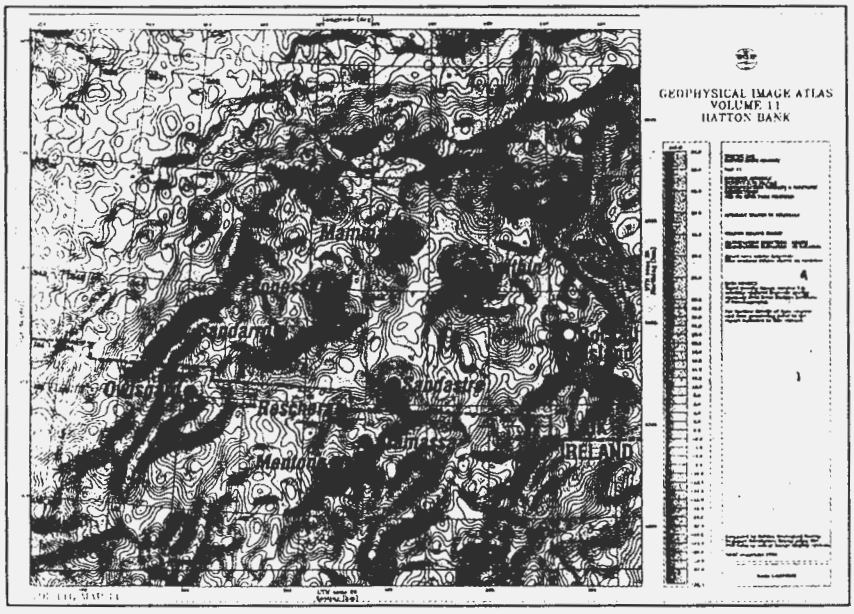
• He wrote a series of geological biographies for the latest edition of Microsoft's *Encarta* CD-ROM encyclopedia.

• He co-authored a "beautiful" coffee-table and naturalists' book, *The Tracks of Triassic Vertebrates: Fossil Evidence from North-West England*.

• He co-authored a serious scientific study on the Jurassic "paleoenvironment".

On top of this, Sarjeant is now doing joint work with Argentinian geologists, and will be an invited speaker at the International Geological Congress in Rio de Janeiro in August.

"So it looks like a very interesting year," Sarjeant says.



This map from the British Geological Survey's *Geophysical Image Atlas* shows names from Prof. William Sarjeant's fantasy books (written under the pen-name Antony Swithin) used for seabed formations in the North Atlantic Ocean, northwest of Ireland and Scotland, near the small Rockall Island.

Lab Scenes

CIRC, or Climate Impacts Research Centre (www.circ.kiruna.se), located in the sub-arctic of northern Sweden, is a multi-disciplinary research institute focussing on remote sensing of vegetation, meterology, glaciology, limnology, terrestrial ecology, dendrochronology, and of course- PALEOECOLOGY. There are presently two CAP members working here, myself and Isabelle Larocque, however Roland Hall (now at Waterloo University) was here at CIRC's beginning. We are currently involved with quantitative Holocene temperature reconstructions using chironomids and diatoms in the Abisko area, however this upcoming year we expect to include pollen, charcoal, and plant macrofossils in our investigations over mid to northern Sweden. CIRC's paleoecology research group consists of a research assistant and two Ph.D. students from Umeå University, Peter Rosén and Christian Bigler. They have been involved with creating diatom-based temperature transfer functions and sediment analyses using grain size and near-infrared spectroscopy.

CIRC and its host institute, Abisko Naturvetenskapliga Station (www.ans.kiruna.se), funded by the Royal Swedish Academy of Science, have an amazing facility, equiped to do most kind of paleoanalyses (except pollen processing). Visiting research is made easy with on-site accomodations, lab spaces, and field equipment. We would welcome any interest in collaboration, or even if you would just like to visit, we would enjoy the company- just bring along a presentation!

Markus Heinrichs,
Senior Scientist, Paleoecology

ESSAYS

Microscopy

Editor's Note: The following article on microscopy was written by Reimer Simonsen, former Curator of the Friedrich Hustedt Diatom Collection, Bremerhaven, Germany. It was posted on the Diatom discussion list earlier this year, and Dr. Simonsen has kindly given his permission to print the article here. Although the specific references are to diatoms, the techniques are relevant to the microscopic observations of microfossils in general. A special thank-you to Dr. Richard Crawford, present Curator of the Diatom Collection for contacting Dr. Simonsen and securing his permission.

Hints for optimising the performance and for maximising the resolution of microscopes in diatom research.

During the investigations on diatoms that I carried out over the past fifty years I met with many situations that every diatomist faces almost daily: I was unable to reveal the structure of a given diatom valve. A first, and of course, rash judgement was quite often that the fault lay either with the instrument or that it was impossible to resolve the structure. But then I realised that there was the question of whether it *was* impossible or that it was *me* that was unable to deal with the problem. In addition there still remained the question of whether or not the microscope was properly equipped. This latter often reminded me of amateur photographers complaining that their "camera did not take good pictures", a silly remark that, sadly, might just as well be applied to microscopes and to some microscopists.

Reliance on the equipment alone can be quite deceptive. Thus, Friedrich Hustedt, my teacher for whom I have the deepest respect, ascertains in many places of his marvellous papers that the structure of some diatom or other could not be resolved and adds that he confirmed this with an apochromatic oil immersion with a numerical aperture of 1.4 and a low-voltage lamp. I happened to own Hustedt's old microscope with the apochromat 1.4 and also his low-voltage lamp (both now incorporated within the Hustedt Collection at Bremerhaven) and I found that the low-voltage lamp has no iris diaphragm which is necessary for Köhler illumination – itself a prerogative to avoid stray light. Further, the condenser on his microscope is not made for oil immersion, thus restricting its aperture to a value of just below 1. Hustedt, therefore, was simply not in a position to resolve the structure of a number of diatoms, mainly because he had no condenser with the necessary aperture that had to be immersed in order to obtain an aperture higher than 1. It is so that many diatomists do not care to immerse the condensers, and for simple routine investigations it is also not necessary. My observation of many visitors to the Hustedt Collection has also shown that they will not even use immersion oil when it does become necessary, e.g. in critical situations or for photomicrography. They had simply relied on the otherwise excellent equipment and expected that the wonderful optics would solve their problems.

Hustedt once taught me, "the most important part of the microscope is the brain above it". He did not remember who had coined this rule, but it is certainly an elementary truth. It means that the microscopist and, consequently and particularly, the diatomist must do their homework and become familiar at least with the basic theories governing microscope optics and performance. It must be regretted that at colleges and universities these things are virtually absent in the curricula of medicine and biology students because they

deal not with science but with "handicraft".

My little note here is not intended to provide the basic theoretical background mentioned above but to give additional hints that I have found necessary or useful for my work, particularly with my contributions of the last 30 years. Many of my visitors to the Hustedt Collection were shown several of my "tricks" which some of them subsequently sold as their own inventions. I have been urged by others to communicate these tricks to a somewhat broader public to prevent their becoming lost. I realise that this is the age of scanning electron microscopes which, in a way, are more primitive to handle and yield better images than those of the light microscopes. Further, I have met with allusions of ridicule for my virtually exclusive LM treatment of Hustedt's diatom types. However, I am stubborn enough to assume and to predict that the light microscope will remain the basic instrument used in diatom research, in spite of the fact that every young student today has access to an SEM. This note may contribute to placing this present ignorance of proper LM treatment on a par with his/her knowledge of SEM operation.

1. Mechanical and Optical Commodities

One thing is of the utmost importance with the light microscope: its perfect service condition. Microscopes should be serviced by authorised service personnel every second year. I remember a colleague asking for fine bone oil in our workshop. After a week he returned with the stage movements of his microscope stage blocked. He had used the oil for making his stage move more smoothly, which procedure, however, resulted in creating a very heavy paste with the dust enclosed in the slits. It must be kept in mind that *no oil whatever* belongs at any place on the microscope. Where necessary, the proper kind of grease is applied, and this only in very small quantities. It should be remembered that no ordinary workshop carries the different kinds of lubricant used in microscopes, only the manufacturer. In cases of emergency, old grease layers may be wiped off with a piece of lens-cleaning paper or with a Q-tip wetted with a little chloroform. A thin application of Vaseline will then lubricate the part, but only until the proper service is available.

As a matter of course, no dust belongs anywhere near a microscope. The service personnel will properly dust the optics and re-lubricate the parts where this is necessary. A rubber bulb with a two-way valve can be used to blow dust from the eye lenses of the oculars and other parts prone to collect dust. The rubber bulb, by the way, should not be too small and ought to be kept under cover. For a time I used to keep mine on the desk with the result that it became contaminated with dust and debris with which I sand-blasted the eye lens of one of my eye-pieces so badly that it had to be replaced. À propose eye lenses, another incident may be noteworthy. A young student used one of our microscopes for a small project. When she returned the microscope after three months, the eye lenses were ruined because she had painted her eye lashes. I was told that the mascara she had used contained oxidised and highly heated manganese which can be very hard and thus scratch the glass surface of the eye piece.

Some microscopes, e.g. the Zeiss Standard series, have light windows very close to the light-field iris diaphragm. The glass covering this window is particularly sensitive to dust on both inner and outer surfaces, because the diaphragm is focussed into the object image plane. Even very small dust particles will then show as shadows in the final picture, remaining stationary when the stage is moved which can be quite annoying. They will also appear on micrographs. The dust particles are apparently attracted by the slight air motion caused by the heat of the light. I have avoided this by replacing the cover-glass with a short brass tube and a cover-glass on its upper end, thus elevating this point away from the iris diaphragm. The condenser-filter assembly will be just above the tube when turned down.

An important part of former microscopes appears to have fallen victim to the rationalisation of the manufacturers – the circular, centrable, revolving mechanical stage. This is an important tool and certainly not only for diatomists. The rotation is indispensable when elongate objects (diatoms among them) are to be photographed. Thus, in many of my micrographs the long diatom had to be positioned diagonally in order to fit into the film frame. When Nomarski differential interference contrast is used, the

rotation is extremely important, because the contrast depends heavily on the direction of the structural elements of the objects, e.g. the striation of pennates or the elements forming these. The arguments of the manufacturers that the mechanical stages with deep–lying movement handles are more ergonomic is correct, but they use it as a pretext for abandoning the manufacture of revolving stages which demands much more skilled handwork than the non-rotating stages. Consequently the production costs of the latter are about one sixth only, compared to the former.

The makers of the microscopes generally provide yellowish-green filters with their instruments. These filters normally have the greatest transmission at a wavelength of 546nm. This is the wavelength for which the aperture values engraved on the objectives are calculated and reportedly the colour of light for which the human eye is most sensitive. Even in combination with a daylight blue filter that also comes with a microscope, I found that this light was normally too yellow. I therefore use Schott glass filters BG 18 which transmit a bluish-green light. The positive effect of this filter (plus the daylight filter) can already be verified visually.

After the manufactures of modern optics have succeeded in eliminating the optical defects of their products to a very large degree, quite often by making multi-lens systems, one of the more important of the remaining shortcomings of light microscopes is the presence of stray light. Even with strict Köhler illumination there continues to exist a small amount of such stray light. One must realise that there are many glass-air surfaces in the optical components of a microscope, and in spite of modern coatings we should take into account that there is always a small chance of stray light. Every small amount of the latter impairs the performance and hence the resolution. Since diatomists are always working near the optical limits, they should minimise this undesirable effect. In my microscopes I inserted a polarising filter in a slot that is made to accept filters. It is situated above the objectives. The filters are at an angle of 45° in a SW-NE direction. When inserting this filter its effect can be seen immediately under high magnification.

2.Measures for enhancing resolution.

The above remarks about light filters apply exclusively to routine visual work, when scanning slides etc., or rough work where non-immersion of the condensers is a very minor sin. When it comes to critical work near the limit of resolution, measures must be taken to enhance and to maximise the performance of the microscope. The same is also the case when photomicrographs are to be taken.

As far as the investigation of diatoms is concerned, I consider photomicrographs as the only scientifically acceptable final product of microscope work. I know very well the value of drawings, in their own right and in comparison with photomicrographs, but they must always remain very personal and individual abstractions and interpretations of the microscopist presenting them. My experience has taught me that too much "interpretation" and excessive "goodwill" sometimes obscures or even misrepresents the true situation (as an example I include my own incorrect diagrammatic drawing of a *Denticulopsis* valve in 1961).

a. Optical equipment

It is a matter of course that only the best components forming a microscope can be the basis for exact work. For private persons with limited funds it is fortunate that the microscopes can be purchased in convenient instalments by ordering a few constituents, e.g. an objective, at a time. This is how I bought my first instrument.

The objectives I used for photomicrography of diatoms are all immersion systems. In this case the biological microscopy profits from the great advances and the growing importance of immuno-fluorescence microscopy in medicine. For this science, objectives with high apertures and of high light transparence are needed. The manufacturers have therefore developed a quite new series of oil-immersion objectives, among them systems with relatively low magnifications but with numerical apertures that earlier one could only dream of. With these objectives it is important that they are flat-field corrected. I remember a system of one

manufacturer with extraordinarily high aperture but with an equally extraordinarily high curvature of field which makes utilisation of the aperture ultimately impossible. My main objectives are a plan-fluorite 16/0.5, a plan-fluorite 25/0.8, a plan-apochromat 40/1.0, a plan-apochromat 63/1.4, and a plan-apochromat 100/1.3. The great majority of the micrographs were taken with the 63/1.4 lens. My Atlas of Friedrich Hustedt's diatom types may be a good example to show the order of importance: in all, 12,176 pictures were taken for this project (only 8,464 are printed); 88% were made with the plan-apo 63, 7% with the plan-apo 40, 4% with the plan-fluorite 25, and only 199(1%) with the plan-fluorite 16. This does not mean, however, that the two low-magnification objectives are superfluous. A large research microscope ought to have these systems. Scientists working on fossil material or marine phytoplankton will need them much more than their colleagues dealing mainly with freshwater material. In addition to the above objectives two dry systems are needed, one with a lower magnification, the other about 25-40x. These are only for visual search and for scanning of slides, and the lower magnification objective, at least, need not be of very high correction. My work in the Hustedt Collection has also taught me to be extremely cautious with slides that I have not mounted myself. The cover glasses can sometimes be too thick to permit the use of high-magnification apochromats (the 63 and 100 objectives of Zeiss have a working distance of only 0.09mm). For these cases a high-magnification objective of lower correction, and therefore with larger working distance, ought to be kept handy, though not necessarily a system with flat field.

Scientists working near the microscope's performance limit may need two condenser types. One ought to be an immersion condenser of highest correction, i.e. achromatic-aplanatic, with a maximum aperture of 1.4. Diatomists at least should also keep a darkfield condenser ready, the use of which will be explained below.

As for contrast methods, my experience with diatoms has shown that Differential Interference Contrast (DIC). at least that of Nomarski, is preferable to, e.g., phase contrast. Particularly older Styrax or Balsam mounted slides pose problems at higher magnifications, because their refractive indices are too low (Canada Balsam: about 1.515-1.53; Styrax ca. 1.58). Diatoms mounted in these or similar media can best be investigated with DIC, the refractive index being unimportant with this method. Another particularly important advantage of DIC is the fact that the condenser can be used with its full aperture, whereas in normal brightfield it has to be stopped down in order to obtain sufficient contrast, and this necessarily has consequences for resolution. With phase contrast the condenser aperture is always stopped down by the phase plate. The completely open condenser diaphragm drastically reduces the depth of focus. This is quite welcome, because it enables the microscopist to separate the different valves of diatoms optically, much more easily and better than with brightfield illumination. If the depth of focus is too small to cover an object, the condenser may be stopped down, the effect being readily visible to the eye. The manufacturers generally offer a limited number of Wollaston prisms which are designed to be used with one, or sometimes, two objectives only. I found it quite worthwhile experimenting with other objectives not intended for this method by the makers. Even though the contrast may then not cover the entire field of view, the lens can be used in cases where that is not necessary.

b. Improving and maximising resolution.

It is a very simple fact that the microscope's performance can virtually not be influenced by measures applied above the plane of the stage, the addition of a polarizing filter (see above) and additions necessary for contrast methods excepted.

At the plane of the stage the most important means is the use of mounting media with high refractive indices (1.7 or higher at 20°C), e.g. Hyrax, Naphrax, Pleurax). It is very important, however, that the applied mountant be clear and colourless. During my investigations I often met with slides on which the Styrax or Hyrax had turned yellowish or sometimes even almost brown, These posed much more of a problem than did mountants of low refractive index. Therefore slides, when not used, have to be protected from daylight. When working with synthetic media, much care should be taken to completely and thoroughly wipe off the immersion oil when finished. This is because some media, e.g. Hyrax, will react with the

immersion oil and release elemental sulphur which turns the media opaque. I remember that a holotype of Hustedt's was lost in this way after trials to remount the slide were unsuccessful.

Below the stage comes the condenser, and here is one of the most important places where the resolution can be improved. We have to remember that Abbe's equation equates microscope resolution to the wavelength divided by 2x the numerical aperture. But this applies only to very oblique light. With a normal brightfield condenser, even of high correction and aperture (which must be stopped down) there are a great many central straight light rays that will obscure the finer details. The experienced microscopist avoids this by excluding these disturbing rays by moving a finger into the light passage or by placing another obstacle there. A colleague keeps a toothpick for this purpose. In an extreme case the result is then a unilateral darkfield illumination. This was formerly obtained by the so-called "Abbe Condenser" which permitted its aperture diaphragm to be moved out of the optical axis.

The impression of a rather drastic increase of resolution will be experienced by the application of a cardioid darkfield condenser. I met with this extremely useful method by accident about 45 years ago and first mentioned it in my Denticula paper with Kanaya in 1961. In the meantime several colleagues have adopted this method after I had shown them its advantages. The darkfield condenser should have an exterior aperture as high as possible, at least 1.3. The interior aperture, which is important for obtaining a good darkfield is, in our case, of less importance because the objective used, generally a 63-100x oil immersion of high numerical aperture, is not stopped down. Its full aperture is needed. When properly focussed on the view field diaphragm which is stopped to just outside the field of view, the result is a mixed dark and brightfield, because some of the light of the condenser's hollow light cone will enter the front lens of the objective. In this way all of the central light beams which are so disturbing when a normal brightfield condenser is used, are excluded and the contrast is extremely high, enabling us to discern details that are otherwise obscured. We are therefore not dealing with a darkfield but with an omnilateral oblique illumination. The first sentence of this paragraph can therefore be misunderstood: in reality the resolution is not increased but optimised.

When the darkfield condenser is in proper focus and centred, the image (or resolution) can sometimes be improved by occluding part of the path of the rays or by decentering the condenser, even by slightly refocusing the condenser. It is often well worth "playing" or experimenting here a little.

The use of a darkfield condenser is by no means advantageous in all cases. This applies especially to the investigation of thicker objects or some structures that have a certain extension in the direction of the optical axis. In such cases there is much danger of interference which may give rise to incorrect interpretations. This latter applies quite generally when using a darkfield condenser and particular caution is always called for.

Below the condenser are the filters and the light source. Both depend on one another and must be treated together. For visual and routine work it is quite sufficient to have a low-voltage or halogen lamp combined with a blue-green filter, e.g. a Schott glass filter BG18 or an interference filter with a transparency peak at 546nm plus a daylight blue filter. This colour is fairly pleasant to the human eye, which is allegedly particularly sensitive to this greenish light.

For photomicrography and also for more critical work I have used separate light sources with special filters for a long time. Remembering Ernst Abbe's equation of resolution, the numerator, i.e. the light colour in our case, is of critical importance. The shorter the wave-length used, the higher will be the resolution. This means in our case that blue to violet light should be used. Here again it is worthwhile looking at what users of fluorescence have. The filters used for fluorescence excitation are of primary importance, they are almost all made to let through the shorter wave-lengths. Depending on which light source is used, there is the choice of two glass filters, the blue BG12 and the BG3 for violet and long-wave UV, the latter being more desirable for our purpose. Unfortunately the average filament lamps produce mainly light of longer wavelengths, the amount of blue light being comparatively small. If a filament lamp is the only choice, a BG 12 filter might be tried with definite

advantage over green illumination. This will warrant long exposure times, however.

Regarding lamps, I can very strongly recommend the use of arc lamps for more critical work and particularly for photomicrography. The choice here is between Xenon and Mercury vapour lamps. I have always used the latter, their advantage for our purpose being their discontinuous spectral emission. With them one is able to select well-defined and rather narrow parts of the visual spectrum. We are particularly interested in the emission peak at 435.8nm (blue) and in the violet maximum at 404.7nm. Both can be used with the glass filters mentioned above. If it can be afforded, an eye should be kept on the interference filters offered for these particular wavelengths. They are very expensive but their light transparence is much higher than that of glass filters. The price depends also on the width of spectral fraction that the filter permits to pass; narrow-pass filters are more expensive than those allowing a wider passage. The wide-passage filters are quite sufficient for our purposes because the spectral maxima emitted by the Mercury lamp are already very narrow.

With the arc lamp working, one might have the idea of switching to UV illumination, e.g. at the longer-wave 365nm Hg maximum. It has been suggested that one might properly focus with violet light and then change over to UV. Unfortunately the objectives calculated for 550nm have a certain focus shift so that the photographs will be out of focus, i.e. not sharp. I never had the opportunity to use a video camera. It may be worth trying to use it for focussing on the UV-lit object and then to take a picture.

It must be said here that the blue-violet light is not very "pleasant" to the eye and should not be used for routine work. There is, however, apparently no danger to the eye by UV radiation, because the light, if properly filtered, passes through so many glass lenses that no harm will be done. If there is any such fear, a UV filter is readily procured in any photo shop. It must be remembered that the Mercury lamps are relatively short-lived, some lasting not much longer than a week's average working time. A lamp blowing up is quite a memorable experience. I recommend that operating time counters are built into the transformers or that at least exact track of operating time is kept. The instructions of the manufacturers must be very thoroughly followed here.

The visual effect of the blue-violet microscopic image is quite impressive. A normal brightfield illumination already affords a noticeably higher resolution with excellent contrast. The addition of DIC even enhances the effect, and darkfield condenser illumination permits even finer structures to be made out with the eye. If a structure of a diatom cannot be resolved with this illumination, I would assume that *it* cannot be resolved, and that it is not that *I myself* cannot resolve it. Of course there are diatom species in which the interstriae are of very little difference in depth of thickness compared with the striae and if these are both delicate, there will be little hope of making them visible to the eye even though their density might not be very extreme. Then there are the slides that are less suitable for investigation with short-wave light. By that I mean slides where the mountant has turned yellowish or even brown. In this context one should mention the high-refracting realgar, the use of which has been made obsolete by interference contrast and Pleurax, which has its own merits as an alcohol-soluble mountant.

One thing must be made clear at this point. The statement "resolved" does not imply that the microscopic image of the structure being "resolved" shows the true shape of this structure. The term "resolved" means, by definition, that two diffraction maxima must form a microscopic image in order to separate two distinct structures. Only the addition of further maxima will reveal the true nature of some structure, and this is the case only at something like an order of magnitude above the possible limit of resolution. But being able to resolve the density and direction of striae in, e.g. some Nitzschia species is certainly a very valuable addition for an easier identification, independent of what the striae are composed of. When working on Hustedt's diatom types, I was amazed at the comparatively small number of species in which the striae could not be made visible.

I stated at the beginning of this note that I consider only a micrograph as the final product of microscope work. An interesting question has often been the magnification of the final prints. I have always

advocated that the final magnification should be in round hundreds or thousands in order to permit measurements from the published figure. Contrary to what one sees these days in publications, this is so simple to achieve by once photographing a micrometer with each objective and then by starting each darkroom session with an adjustment of the corresponding negatives. Although the "useful magnification", as Abbé termed it, does not exceed 1000x the used N.A. then it may be surpassed in a printed micrograph, provided that the print allows this. The printing process has its own limits in reproducing very fine details. If there are important fine details present in a micrograph, they should be sufficiently enlarged to make sure that the book printer will not cause them to disappear. In such cases, "over-magnification" must be tolerated. A certain amount of magnification beyond the "useful" value will probably not be noticed, e.g. the standard x2000 magnification I used for the Hustedt types can hardly give the impression of over-magnification.

I hope that the studies of some of my colleagues will benefit from these lines. Dick Crawford kindly corrected me po'English for which I am very grateful.

Reimer Simonsen, Schobüll, 1999

Radiocarbon Dating Labs

In a follow up to the article in the December, 1999, newsletter on Radiocarbon Dating Labs, Dallas Mildenhall in New Zealand sent information on the lab described below, with the following introduction:
"I happen to work at a New Zealand institute which runs what I regard as one of the best ^{14}C laboratories in the world. Unfortunately, this ^{14}C lab doesn't appear on search engines as much as we would like but we are trying to improve things...I am happy to send more brochures if required."

Rafter Radiocarbon Laboratory

The Institute of Geological and Nuclear Sciences in New Zealand has been involved in radiocarbon dating for over 40 years. For the past 13-14 years the Rafter Radiocarbon Laboratory has been providing a service for researchers world-wide and has developed a reputation for a fast and accurate response.

Company: Rafter Radiocarbon Laboratory, Institute of Geological and Nuclear Sciences Ltd.
Address: P.O. Vox 31 312, Lower Hutt, New Zealand
Website: www.gns.cri.nz/atom/rafter/rafter.htm
Contact: Dr. Rodger Sparks, r.sparks@gns.cri.n
Telephone: +64 4 570 4671
Cost: $US 440, with a higher rate for a faster turn-around time
Time frame: within 8 weeks; 3 weeks by arrangement
Minimum weight (seeds): 5 mg
The cost includes full processing, all of which is done on site.

While the laboratory provides a specialised service for archaeologist, for CAP readers the research into pollen dating may be of more interest. Rather than collecting bulk carbon we are researching the possibility that individual types of pollen can be C^{14} dated with the further possibility that individual pollen, otoliths or phytoliths will eventually be dated. Already this work has been used to date hiatuses in Holocene sedimentation that proved impossible to date with conventional bulk C^{14} techniques. One of the advantages of using our laboratory is that many other services can be accessed at the same time using the same or associated materials. These services include palynology, stable isotope measurements, $\delta\ ^{13}C$ and $\delta\ ^{15}N$, ion beam analysis for elemental characterisation, amino acid analysis, etc.

Dallas Mildenhall
Institute of Geological and Nuclear Sciences Limited
P.O. Box 30 368
Lower Hutt, New Zealand

Long-Distance Transport

In a follow-up to the reprint of his article entitled "Darwin on Dust at Sea" in the December, 1999, newsletter, Gerhard C. Cadée sent the following citation with a note that Darwin was interested in this topic also:

Cadée, G.C. 1996. Tropical drift seeds from the Dutch coast in a wider perspective, palaeontological implications. Contribution to the Proceedings of the 6th International Workshop on Plant Taphonomy in Bonn, November 12, 1994, edited by Carole T. Gee. N.Jb. Geol. Paläont. Abh. 202 (2): 183-190.

Bourgeois, Jocelyne C. 2000. Modern and Holocene pollen assemblages from arctic ice cores. Ph.D. Thesis, Dept of Geography, University of Ottawa, Ottawa, Ontario, Canada. Supervisor: Konrad Gajewski.

Records of pollen deposition on arctic ice caps are used to infer paleoenvironments of the Holocene and atmospheric circulation patterns in the Arctic. As part of this study, several snow samples were collected over a broad area, over the course of several years, to investigate modern pollen deposition patterns in the Arctic. Pollen assemblages recovered from snow are diverse and consist of tundra and forest types. The results show that pollen percentages and concentrations are related to the density of the regional vegetation and to the distance to source of more productive areas. In addition, the long-distance transport of tree and shrub pollen permits the identification of regional patterns that might be used to define air mass trajectories in the Arctic. In a more detailed study, the seasonal and annual variations in pollen deposition in snow layers were studied in four ice caps, including one in the Russian Arctic. It is shown that the pollen succession in the annual snow layers is related to the flowering periods of arctic and southern plants. The number of pollen reaching ice caps varies from year to year. Furthermore the variability in number of tree and shrub pollen increases with decreasing distance to the treeline. The last section of this study is an interpretation of a Holocene record of pollen distribution in an ice core from the Agassiz Ice Cap, Ellesmere Island. Pollen concentrations, particularly those of tree pollen, were highest in the early Holocene, decreased in the mid-Holocene and changed relatively rapidly after *ca* 3500 years ago. In the early Holocene, the pollen profile parallels the $\delta^{18}O$ and ice-melt records from the same ice core indicating that the warmest summer temperatures occurred very early in the Holocene. The high concentration of tree pollen in the early Holocene, when large parts of Canada were still ice-covered and forest zones more limited and generally further away, implies that atmospheric circulation was stronger than at present. The data may be of significant value for comprehensive studies of atmospheric dynamics and vegetation changes.

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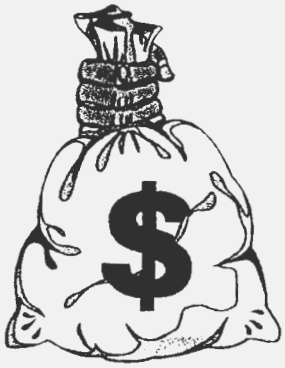

See page 4 for dues notice
and page 27 for membership form

On the shelf

RECENT PUBLICATIONS BY CANADIAN AND OTHER PALYNOLOGISTS - 13

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*Bourgeois JC. 2000. Seasonal and interannual pollen variability in snow layers of arctic ice caps. *Review of Palaeobotany and Palynology* 108 (1-2): 17-36.

*Braman DR; and Sweet AR. 1999. Terrestrial palynomorph biostratigraphy of the Cypress Hills, Wood Mountain, and Turtle Mountain areas (Upper Cretaceous Paleocene) of western Canada. *Canadian Journal of Earth Sciences* 36 (5): 725-741.

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* denotes a CAP member

NEW BOOKS

The following two books, both classics in their fields, have been out of print for some time, but will soon be back in print and available again from Blackburn Press. Contact:

Frances Reed, Publisher
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973-228-7077 (Tel.)
973-228-7276 (Fax)
www.blackburnpress.com

Faegri, Knut, Johs. Iversen, Peter Emil Kaland and Knut Krzywinski. 1989. Textbook of Pollen Analysis, 4th Edition. Originally published by John Wiley & Sons Ltd. This book is unique in its approach as it discusses both the practical and theoretical aspects of palynology. It uses palynological techniques as tools for solving problems in Quaternary geology, ecology and archeology.

Martin, Alexander C. and William D. Barkley. 1961. The Seed Identification Manual. Originally published by the University of California Press. The book deals with the long-standing need for a reference work dealing exclusively with seed identification. The immediate aim of the manual is to help agriculturists, foresters, wildlife biologists and others interested in land-use programs to identify the seeds in their particular fields of interest. The authors have, in the main, restricted the content of the description to those characteristics useful for identification. The descriptions are, to the extent possible, nontechnical and therefore useful to a broad range of interests and skills.

Camburn, Keith E. and Donald F. Charles. 2000. Diatoms of Low-Alkalinity Lakes in the Northeastern United States. Academy of Natural Sciences of Philadelphia Special Publication 18. 152 pp., 37 plates. Hardbound. US $45.00. April, 2000.
Abstract: Diatoms, in addition to being important components of aquatic ecosystems, are valuable ecological indicators. In lakes, diatoms accrue in sediments over time, providing a lasting record of response to changing environmental conditions. Data from analysis of this record can be used to address a variety of environmental issues, including lake acidification, eutrophication and climate change. Successful use of diatoms to assess ecological conditions requires that taxa be identified correctly and that their ecological characteristics be known. This publications aims to provide information to help meet both objectives. It contains photomicrographs and information to help meet both objectives. It contains photomicrographs and ecological data for diatom taxa found in sediment samples collected from 116 lakes in the Adirondack Park, northern New York. Becuase many of these diatom taxa are relatively widespread, however, the taxonomic and ecological information is applicable to low-alkalinity lakes throughout the northeastern United States and southeastern Canada. There are 37 plates with 887 light and 12 SEM photographs depicting 292 of the 405 taxa found in the samples. Thirteen taxa are described as new in addition to the one new combination. Tables present data on lake location, morphometry, and water chemistry characteristics. In addition, for the 207 taxa which occurred in samples from five or more lakes, ecological optima and tolerance are presented for pH, acid neutralizing capacity, total aluminum, dissolved organic carbon, and total phosphorus. This publication documents the taxonomy used by diatomists in the PIRLA project (Paleoecological Investigation of Recent Lake Acidification), and also provides taxonomic guidance and ecological data for future studies of low-alkalinity lakes.
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Announcements

CHANGING OPPORTUNITIES AND CHALLENGES: Human-Environmental Interaction Within the Canadian Prairies Ecozone

A SSHRC Major Collaborative Research Initiatives (MCRI) grant of $2.5 million has been awarded to a research team led by Principal Investigator Bev Nicholson at Brandon University. Other members of the team are Scott Hamilton (Lakehead University), Dion Wiseman (Brandon University), David Meyer (University of Saskatchewan), Alwynne Beaudoin (Provincial Museum of Alberta), Andrea Freeman and Gerry Oetelaar (University of Calgary) and Collaborator Garry Running (University of Wisconsin - Eau Claire). This inter-disciplinary team represents a wide range of research expertise including archaeology, ethnology, geoarchaeology, geomatics, paleobotany, and soils science, and draws on the resources of several major research institutions.

Over the five years of the project, the goals of the research include:
1) the reconstruction of the "natural" and "cultural" landscapes in selected locales at five time slices between 500 and 9,000 yr BP.
2) the collection of data on landscape use in areas of high biodiversity within the Canadian Prairies Ecozone at selected intervals in the Precontact Period
3) developing an understanding of the perceptions and responses of Aboriginal groups to the environmental changes and opportunities provided by these landscapes through time
4) the identification of the ways in which Aboriginal groups intentionally modified their environment to

maintain or enhance resource potential
5) the use of GIS technology to model the data which we collect.

In addition to a program of archaeological excavation at suitable locales in each of the three Prairie Provinces, we will employ a suite of investigative techniques to construct paleoenvironmental and ethnohistoric models, which we will use to test our archaeological models. These investigative techniques include an exhaustive literature search and review, including archival sources, together with consultations with Elders to glean information on oral traditions of land use. Soil and sediment samples will be examined for a variety of biotic and abiotic environmental indicators. Sample collection will be extended beyond exposures in archaeological excavation through the use of a Geoprobe coring unit. We anticipate that this multi-disciplinary approach will provide an unprecedented opportunity to create a holistic view of the past lifeways and the processes which gave rise to vigorous and flourishing Aboriginal societies within the Canadian Prairies Ecozone over the millennia.

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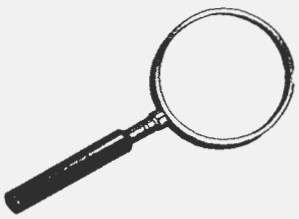
For a media release with additional information, please see:
http://www.pma.edmonton.ab.ca/events/releases/000313.htm



Field Courses

Kindrogan Field Centre, Scotland
Enochdu, Blairgowrie
Perthshire PH10 7PG U.K.
Freshwater Algal Course, 29 July - 5 August 2000.
Dr. Eileen J. Cox and Dr. L. Elliot Shubert.
The course is designed for advanced undergraduate students, postgraduate students, biology teachers, those in a professional capacity who need to further their knowledge in freshwater algae, and other interested in freshwater ecosystems. Participants will receive both field and laboratory experience. During last year's course, over 300 taxa representing ten divisions were identified.
Practical Algal Ecology Course, 5-9 August 2000.
Dr. Eileen J. Cox and Dr. L. Elliot Shubert.
The course will focus on straightforward low tech quantitative methods for measuring algae and standard limnological methods for small water bodies. This course immediately follows the Freshwater Algal course and participants may elect to stay for both. The field and laboratory investigations will use Kindrogan Pond as the study site, which contains a range of habitats for phytoplankton, benthic and periphyton algae. The course assumes the participant is familiar with freshwater algae (*e.g.* prior attendance at a freshwater algal course).
Contact:
Dr. L.E. Shubert, e.shubert@nhm.ac.uk
http://www.econet.org.uk/kindrogan

Australian Vertebrate Fossil Field School, July 2001.
Queenland Museum Palaeontology Department is planning a Vertebrate Palaeontology field school/expedition during July 2001. This two-week field school will teach the principles of vertebrate fossil

excavation and field techniques, as well as involve the serious excavation of Pleistocene-Holocene cave and surface fossil sites in north Queensland, and the survey of a major limestone karst region for similar fossil sites. The setting is in tropical Queensland, which during the austral winter is extremely pleasant, in the middle of the dry season. This is an unrivalled opportunity for amateurs, professionals and anyone who is interested in gaining experience in palaeontological techniques downunder. In addition we will have on-board recognised experts in the local living fauna. Please register your interest by e-mailing to the address below. Please include full name, e-mail, address, etc.

AlexC@qm.qld.gov.au

Dr. Alex Cook, Curator, Geology and Palaeontology, Queensland Museum

UNIS (University Courses on Svalbard). UNIS is a private foundation established by the Norwegian government and owned by Norway's four universities. The objective of the foundation is to offer university-level courses and to perform research relevant to Svalbard's geographical location in the high arctic. The location makes the archipelago an ideal location for both laboratory work, and the collection and analysis of data.

Three courses will be held at UNIS in 2000:

Arctic Terrestrial and Marine Quaternary Stratigraphy - Excursion, 29-31 July 2000. Based on field studies of sediment successions and processes, the students will obtain an understanding of the Quaternary history of Svalbard, and of the long-term climatic fluctuations between glacial and interglacial periods in the Arctic.

Quaternary Climate Records and Climate Models, 18-29 September 2000. The overall focus of the course is to understand past changes in Earth system by confronting coupled Earth-Atmosphere system models with paleodata- and historical records on millennial- and decadal resolution recording past states and changes in climate.

The Quaternary Climate History of the Arctic, 9 October - 3 November 2000. The course will privde a knowledge and insight of natural climatic variations, glacial history and palaeoenvironmental development in the Arctic, based on the latest research. Deposits from glaciations and interglaciations will be discussed, and students will be trained to critically assess the geological history as reconstructed from them.

Contact for information on UNIS and these courses:

Www.unis.no

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27 August - 1 September 2000

Winnipeg, Manitoba, Canada

Due to several requests, the deadline for the submission of abstracts for the conference has been extended to May 31, 2000.

Contact: Irene Motnenko, Conference Secretary

irmot@ilos.net

http://www.avalon-institute.org

palyno bytes

Automatic Diatom Identification and Classification (ADIAC)

The ADIAC is a large collaborative project funded by the European Union which aims at automating the process of diatom identification, using image analysis and pattern recognition techniques. Ultimately, ADIAC aims at automating the whole process of analysing diatom slides, by providing automated scanning technology which will locate diatoms on slides and take images of these; specimens will then be identified to the lowest taxonomic level possible by the identification software. Further information about ADIAC can be

found on the main project website at

http://www.ualg.pt/adiac/

As part of this project, large libraries of high resolution diatom images are being established, the first 2000 of which have now been made available for public use. The original images are downloadable as TIF files, primarily to interest other pattern recognition experts in the problem, but anyone including phycologists is free to use the images providing that use is non-commercial and that ADIAC is acknowledged fully. Information about downloading can be found in the ADIAC public data web pages:

http://www.ualg.pt/adiac/pubdat/pubdat.html

The images are also available in a browsable/searchable WWW database, hosted by the Royal Botanic Garden Edinburgh at

http://www.rbge.org.uk/ADIAC/db/adiacdb.htm

The database also contains ecological information (compiled by Steve Juggins' group at University of Newcastle) and synonyms, and users will be ab le to retrieve taxa regardless of which names they are using.

Dr. Micha Bayer
Royal Botanic Garden Edinburgh
20A Inverleith Row
Edinburgh EH3 5LR
Scotland, UK

Palaeopeatlands Research Group (PALPEAT)

Our basic aims are to stimulate research on the origins, development, biodiversity and proxy-climate record of the peatlands of Europe and North America. We also aim to collaborate on the generation of standard methodologies for data collection and management; to set agreed taxonomic standards, and to develop protocols for access to any centrally held data. The Group will run in parallel with EUROPEAT, a new project, also based at the Palaeoecology Lab (PLUS), under the PAGES/PEP III (Pole-Equator-Pole, African/Europe transect) programme. The mailbase list for PALPEAT is now open with an introduction covering most of your likely questions. You can access it via the web at

http://www.mailbase.ac.uk/lists/palpeat/

and you can join online from there. Alternatively, send an e-mail to

mailbase@mailbase.ac.uk

with the simple message

join palpeat firstname lastname

Professor Keith E. Barber
Palaeoecology Laboratory
Department of Geography
University of Southampton
Southampton SO17 1BJ UK

Radiocarbon WEB information
http://c14.sci.waikato.ac.nz/webinfo/index.html

This compendium of information on the theory and practice of radiocarbon dating is online at the radiocarbon laboratories at Waikato University, New Zealand, the location of the principal author and webmaster Tom Higham, and at Oxford University, UK. There are 15 sections, most of which are teaching modules on topics like measurement, corrections, age calculation, and calibration.

Paleomap Project
http://www.scotese.com

This site presents full-colour global paleogeographic maps that include the positions of ancient mountain belts, shorelines, continental shelves, and lithospheric plate boundaires. Reconstructions are presented for the Late Precambrian through the Recent, and include some animated reconstructions.

Atlas of the Flora of New England
http://www.herbaria.harvard.edu/~rangelo/Neatlas0/WebIntro.html

This atlas includes vouchered records of the flora of Maine, New Hampshire, Vermont, Connecticut, Massachusetts, and Rhode Island. The distributions of the species are shown on dot maps.

Review and Atlas of Paleovegetation
http://www.soton.ac.uk/~tjms/adams1.html

See also

http://www.esd.ornl.gov/ern/qen/nerc.html

This site is a collection of continent-wide paleovegetation maps spanning the last 18,000 years.

Digital Earth
http://atlas.geo.cornell.edu/

This site is hosted by Cornell University's Institute for the Study of the Continents and contains an interactive digital map of the world. Students can retrieve and synthesize geological and geophysical information about large areas of the earth's surface and interior.

PalynoLit

RUB YOUR FEET WITH POLLEN AND REST THEM
RUB YOUR HANDS WITH POLLEN AND REST THEM.
RUB YOUR BODY WITH POLLEN AND LIE AT REST.
RUB YOUR HEAD WITH POLLEN AND PUT YOUR MIND TO REST.
THEN TRULY YOUR FEET BECOME POLLEN.
YOUR HANDS BECOME POLLEN.
YOUR HEAD BECOMES POLLEN.
YOUR SPIRIT WILL THEN BECOME POLLEN.
YOUR VOICE WILL THEN BECOME POLLEN.
ALL OF YOU IS AS POLLEN IS.
AND WHAT POLLEN IS, THAT IS WHAT PEACE IS.

DINÉ BAHANÉ: THE NAVAJO CREATION STORY
(contributed by Charles Schweger, via Alwynne Beaudoin)

DEADLINES

Please submit items for the next issue of the CAP Newsletter (Volume 23, Number 2, December 2000) by November 1, 2000. Laboratory articles, conference reports, field trip reports, announcements, notices of new books, book reviews, news, and essays on topics relevant to Canadian palynology are all welcome. Submissions by disk or e-mail are preferred. Articles may include diagrams and photos; for photographs, please provide a glossy black-and-white or colour print (3" x 5") from a picture with good contrast, a 35 mm slide (colour or black-and-white), or illustrations may be submitted in digital format. Please send material for the next issue to

Dr. Mary Vetter
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E-mail: mary.vetter@uregina.ca

Meeting calendar

2000

May 20-27 2000. AMQUA 16th Biennial Meeting. University of Arkansas, Fayetteville, Arkansas, USA. Theme: Landscape and Biotic Responses to Climate Variability: Future Impacts and Past Lessons. Technical Sessions May 22-24; Field Trips and Short Courses May 20, 21, and 25-27. Contacts: Registration: Continuing Education, Attn. Tracy Selvin, CTED-504, University of Arkansas, Fayetteville AR 72701; tselvin@postbox.uark.edu
Technical Program: Robert S. Webb, NOAA-NGCD Paleoclimatology Program, 325 Broadway, Boulder, CO 80303; Robert.S.Webb@noaa.gov
Abstracts: Joanne or Ken Kvamme, Anthropology

Department, MAIN-330, University of Arkansas, Fayetteville, AR 72701; kkvamme@comp.uark.edu
All other correspondence: Margaret J. Guccione, Geosciences Department, OZAR-113, University of Arkansas, Fayetteville, AR 72701; guccione@comp.uark.edu
Tel: (501) 5755-3354; Fax: (501) 575-3177

May 29-June 2 2000: GEOCANADA 2000. Joint meeting of Canada's major geoscience societies, including the Geological Association of Canada (GAC), the Mineralogical Association of Canada (MAC), the Canadian Society of Petroleum Geologists (CSPG), the Canadian Society of Exploration Geophysicists (CSEG), the Canadian Well Logging Society (COOLS) and others. University of Calgary, Alberta. Details: Dr Grant Mossop, Geological Survey of Canada, 3303-33rd Street N.W., Calgary, Alberta, T2L 2A7, Canada. Tel: (403) 292-7049, Fax: (403) 292-5377, E-mail: Mossop@gsc.nrcan.gc.ca
Website: http://www.geocanada2000.com
Will feature a CAP-sponsored symposium on Palynology and Micropaleontology in Canadian Geoscience: New Frontiers and Applications. Details: Dr. Alwynne Beaudoin (abeaudoi@gpu.srv.ualberta.ca) or Dr. Martin Head (mh300@hermes.cam.ac.uk). This is also the venue of the CAP Annual General Meeting (see p. 3).

May 29-June 3 2000. Canadian Association of Geographers (CAG) Annual Meeting. Brock University, St. Catharines, Ontario. Details: Hugh Gayler E-mail: hjgayler@spartan.ac.brocku.ca

June 1-3 2000. Paleo-Grassland Research 2000. Sponsored by the National Science Foundation Geosciences: Earth System History and PAGES Past Global Changes - IGBP. Water's Edge Resort, Long Island Sound, Westbrook, Connecticut, USA.
Co-ordinators and contacts:K.R.M. Beuning, Department of Earth and Environmental Sciences, 265 Church Street, Middletown, Connecticut, 06459-6067; kbeuning@wesleyan.edu and
M.J. Wooller, Tropical Paleoenvironments Research Group, Department of Geography, University of Wales Swansea, Singleton Park, Swansea, SA2 8PP; m.wooller@swansea.ac.uk

June 2-4 2000. 63rd Annual North East Friends of the Pleistocene Field Conference. Northampton, Massachusetts, U.S.A. Details: www.geo.umass.edu/quaternary/fopinfo.html
Julie Brigham-Grette, e-mail: Brigham-Grette@geo.umass.edu

June 4-8 2000. GSA Penrose Conference: Great Cascadia Earthquake Tricentennial. Seaside, Oregon, USA. Contact: John J. Clague, Earth Sciences, Simon Fraser University, Burnaby, British Columbia, V5A 1S6 Canada. Tel: (604) 291-4924; **Fax: (604) 291-4198;** jclague@sfu.ca.

June 18-20 2000. 17th International Radiocarbon Conference. Near Jerusalem, Israel.
Website: http://www.radiocarbon.co.il/

June 24-30 2000. 10th International Palynological Congress (IPC). Nanjing, P.R. China. Details: Secretary of the Organizing Committee for 10th International Palynological Conference, Nanjing Institute of Geology and Palaeontology, Academia Sinica, 39 East Beijing Road, Nanjing, 210008, People's Republic of China. Electronic version of first circular, with registration form, available at: http://members.spree.com/sip/spore/index.htm
Information on International Palynological Congresses is available at http://geo.arizona.edu/palynology/ifps.html

June 26-30 2000. 2000 World Conference on Natural Resource Modelling. Wageningen, The Netherlands. Theme: The Ecology of Scale, and the emphasis will be on spatially explicit models. Contact: Max Rietkerk, Wageningen University, Department of Environmental Sciences, Bornsesteeg 69, 6708 PD Wageningen, The Netherlands. Tel: 31 317 485437; Fax: 31 317 484845; Max.Rietkerk@staf.ton.wau.nl
Website: http://www.slm.wau.nl/natcons/RMAconf/

June 26-30 2000. National Speleology Society. Elkins, West Virginia, U.S.A. Details: http://www.caves.org.events/nss2000/
Paleontology Section Session Details: Rick Toomey, e-mail: toomey@museum.state.il.us

July 3-6 2000. 4th Asia-Pacific Conference on Algal Biotechnology. Details: http://web.hku.hk/~sfchen/algae

July 10-14 2000. 8th International Symposium on Pollination. Mosonmagyaróvár, Hungary. Theme: "Pollination: integrator of crops and native plant systems" Details: Prof. P. Benedek, Zoology Department, Faculty of Agricultural Sciences, Pannon University of Agricultural Sciences, H-9201 Mosonmagyaróvár, Vár 4. Hungary Fax: 36(96)215-931, E-mail: benedek@movar.pate.hu

July 12-14 2000. 5th International Ancient DNA Conference. Manchester, England, U.K. Details: Terry Brown adna5@bi.umist.ac.uk

July 30 - August 3 2000. Sixth Quadrennial Conference of the International Organization of Paleobotany (IOPC IV - 2000). Qinhuangdao, Hebei, China. Details: Prof. Lujun Liu, Secretary-General of IOPC-VI Organizing Committee, Nanjing Institute of Geology and Palaeontology, Academia Sinica, 39 East Beijing Road, Nanjing 210008, PR China, Tel.: +86-25-6637 208, Fax: +86-25-3357 026, E-mail: paleobot@public1.ptt.js.cn

August 6-17 2000: 31st International Geological Congress. Rio de Janeiro, Brazil. Theme: "Geology and Sustainable Development: Challenges for the Third Millennium".

Details: Secretariat Bureau, Av. Pasteur, 404 - Casa Brazil 2000 - Urca, Rio de Janeiro - RJ - Brazil, CEP 22.290-240. Tel: 55 21 295 5847, Fax: 55 21 295 8094, E-mail: 31igc@31igc.org, Website: http://www.31igc.org

August 20-24 2000. 8th International Symposium on Paleolimnology. Queen's University, Kingston, Ontario, Canada Details: J.P. Smol, E-mail: smolj@biology.queensu.ca
and B. Cumming E-mail: cummingb@biology.queensu.ca
Paleoecological Environmental Assessment and Research Lab (PEARL), Dept. of Biology, Queen's University, Kingston, Ontario K7L 3N6, Canada
Details also appear at the PEARL website at http://darwin.biology.queensu.ca/~pearl/
Special Sessions:

Long Term Environmental Change in Mountain Lakes. Contact: Michael Pisaric, e-mail: 6mfjp@qlink.queensu.ca

Paleolimnology of Polar and High Latitude Regions. Contact: Reinhard Pienitz, e-mail: Reinhard.pienitz@cen.ulaval.ca

August 22-27 2000. Association québecoise pour l'étude du Quaternaire (AQQUA) 2000 and Canadian Geomorphology Research Group (CGRG) Annual Meeting. Université du Québec Montréal, Montréal, Québec, Canada. Participants to this joint meeting are invited to take a critical look at the Québec and Canadian contribution over the last thirty years to the knowledge of the Quaternary, as well as to evaluate the impact of new technologies on solving the problems we face today. A special session on the Holocene and general presentations will complete the programme. The first circular will be sent in May 2000. Until then, contact Michel Lamothe, Département des sciences de la Terre, UQAM; lamothe.michel@uqam.ca

August 25-27 2000. 16th International Diatom Symposium. Hellas, Greece; Athens 25-27 August, Aegean Islands, 28 August - 1 September. Copies of the first circular are now available at http://www.uoa.gr/IDS2000
Contact: Dr. Richard M. Crawford, Curator: Friedrich Hustedt Diatom Collection, Alfred Wegener Institute for Polar and Marine Research, AM Handelshafen 12, 27570 Bremerhaven, Germany. Tel: 49 471 4831 530; Fax: 49 471 4831 425; rcrawford@awi-bremerhaven.de

August 27-31 2000. Application of Microorganisms to Environmental Problems, 2nd International Conference. Winnipeg, Manitoba, Canada. Aim: to present results of innovative multidisciplinary research in microorganisms (e.g. bacteria, foraminifera, ostracoda, Radiolaria, diatoms, calcareous nannoplankton,

dinoflagellates, pollen and spores) and to show their significance in solving environmental/paleoenvironmental problems in the fields of biosciences, geosciences and agriculture. Conference secretariat: Dr. Irena Motnenko, Avalon Institute of Applied Science, Box 60013 - RPO, Tuxedo Park - 110-2025 Corydon - Winnipeg, MB, R3P 2G9, Canada; Tel: (204) 489-4569, Fax: (204) 489-5782; valyan@ilos.net

September 4-8 2000. International Symposium on High Mountain Lakes and Streams: Indicators of a Changing World. Innsbruck, Tyrol, Austria. Details: E-mail: hmls2000@uibk.ac.at
Website: http://zoology.uibk.ac.at/congress

September 4-9 2000. Second European Symposium on Aerobiology. Vienna, Austria. Website: http://betula.hno.akh-wien.ac.at/s2000/linksprog.html

September 12-15 2000. Annual Meeting of the Association des Diatomistes de Langue Francaise (ADLaF). Robertville, Belgium. Details: http://perso.club-internet.fr/clci/19ColloqueADLaF2000.htm

September 17-20 2000. The Society for Organic Petrology (TSOP) 17th Annual Meeting. Bloomington, Indiana, U.S.A. Details: Maria Mastalerz, 312-855-9416, e-mail: mmastale@indiana.edu
http://adamite.igs.indiana.edu/tsop

September 2000. Field Conference of the INQUA Commission on Glaciation, Work Group on Geospatial Analysis of Glaciated Environments (GAGE). Tatra Mountains, Slovakia and Poland. Details: http://www.emporia.edu/earthsci/gage/

October 16-20 2000. 3rd International Symposium on Extant and Fossil Charophytes. Nanking, P.R. China. Details: Qi-fei WANG, e-mail: qfwang@jlonlone.com

October 25-26 2000. International Symposium to celebrate the 70th Birthday of Prof. W.A. Watts. Dublin, Ireland. Theme: From Palaeoecology to Conservation: an Interdisciplinary Vision. Details: http://www.tcd.ie/Botany/

November 13-16 2000. Geological Society of America, Annual Meeting and AASP 33rd Annual Meeting. Reno, Nevada, 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
AASP: contact Thomas Demchuk (thomas.d.demchuk@conoco.dupont.com) or Fred Rich (frich@gsaix2.cc.GaSoU.edu)
Topical Session #46, Advances in Quaternary Geochronometry. Details: Glenn Berger, e-mail: gwberger@dri.edu

November 15-19. American Anthropological Association Annual Meeting. San Francisco, California, U.S.A. Theme: The Public Face of Anthropology. Details: http://www.aaanet.org/
Special Session:
A committed Archaeology: Integrating Science, Our Topics, and Public Participation. Details: Jason Gonzalez, e-mail: jayce@siu.edu

2001

Date: TBA. CANQUA Meeting. Whitehorse, Yukon Territory, Canada (proposed).

Date: TBA. Canadian Paleontology Conference. London, Ontario, Canada

January 2-5 2001. Royal Geographical Society - Institute of British Geographers. Plymouth, England. Biogeography Study Group Session: Numerical Analysis of Past and Present Biogeographical Data; January 3 2000. Details: Martin Kent (mkent@plymouth.ac.uk) or Dan Charman (dcharman@plymouth.ac.uk)

February 5-9 2001. Australasian Archaeometry Conference. Auckland, New Zealand. Theme: Issues and Developments in Australasian Chronology: New Directions for the New Millennium. Details: http://car.ant.auckland.ac.nz/archconf/arch_feedback.html
P.Sheppard@auckland.ac.nz

May 27-30 2001. GAC/MAC Joint Annual Meeting St John's, Newfoundland

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

September 2001. North American Diatom Symposium. Northern Minnesota. Details: John Kingston, 218-365-2246, e-mail: jkingsto@nrri.umn.edu

September 18-22 2001. PAGES - PEP III Conference. Le Centre de Congres, Aix-en-Provence, France. PAGES - PEPIII is concerned with studies of past climate variability in Europe and Africa. Key aims are to assess variability on different time-scales, to assess the impacts of past climate change on natural ecosystems and human society, and to provide a firm basis for the verification and testing of climate models. There will be a number of plenary lectures from invited speakers plus a series of poster sessions open for all participants, plus a post-conference excursion to the Massif Central, France (subject to interest). Contact: Dr. Catherine E. Stickley, Environmental Change Research Centre, University College London, 26 Bedford Way, London. WC1H 0AP. C.stickley@ucl.ac.uk Website: www.geog.ucl.ac.uk/ecrc/pep3

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

2002

Date: TBA. GAC Meeting. Saskatoon, Saskatchewan

Date: TBA. 7th International Association for Aerobiology Congress. Quebec, Canada.

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

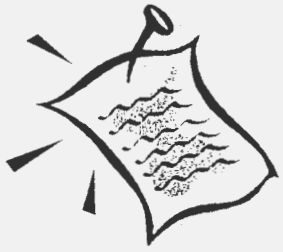
2003

Date: TBA. CANQUA Meeting. Halifax, Nova Scotia, Canada (proposed).

Date: TBA. INQUA XVI Congress. Reno, Nevada, USA

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

More conference information, together with other material relevant to Canadian palynology, can be found on CAP's website at http://www.ualberta.ca/ ~abeaudoi/cap/cap.htm



Palynology and Micropaleontology in Canadian Geoscience: New Frontiers and Applications
CAP-sponsored Symposium
1-2 June 2000
at GeoCanada 2000

CAP Annual General Meeting
University of Calgary, Rozsa Centre
Scotia Bank Room
Thursday, 1 June 2000
6:00 - 7:00 p.m.