Canadian Association of Palynologists
Association Canadienne des Palynologues

NEWSLETTER

Volume 34 Number 1 May 2011

President's Message

Summer is almost here and coming with it, hopefully, will be plenty of exciting field-work and research opportunities. This spring CAP awarded our third annual Student Research Award to Laura May, of the University of Victoria, for her excellent project focused on improving the identification of *Alnus* pollen. CAP is pleased to be able to support student work, and we are excited about receiving next year's applications.

I can also announce that we will be holding this year's Annual General Meeting in conjunction with the GeoHydro 2011 conference in Québec City—one of North America's most historic and beautiful locations. This conference is being co-hosted by CANQUA, so we hope to see a lot of palynologists at the event. The conference will take place August 28-31 at the Hôtel Château Laurier. I will be in touch later this summer with a date and time for the AGM. We always encourage CAP members to attend the AGM, so please join us!

Several of our members will also be attending the INQUA Congress in Bern, Switzerland, at the end of July. I would like to organize an informal get-together of CAP members (and other interested people) sometime during the INQUA Congress, so we can get to know one another better and discuss common research interests. If you are planning to attend the INQUA Congress, and would like to meet with other CAP members, please send me an email at mperos@uottawa.ca.

I hope you enjoy CAP's latest newsletter. Thanks to all those who contributed, and to our Newsletter Editor, Terri Lacourse, for once again doing such a great job putting this together. Have a great summer!

Matthew Peros
CAP President, 2010-2011
mperos@uottawa.ca

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CAP EXECUTIVE 2011

President: Matthew Peros
President-Elect: Terri Lacourse
Secretary-Treasurer: Mary Vetter
Newsletter Editor: Terri Lacourse
Website Editor: Alwynne Beaudoin
IFPS Councillor: Jean Nicolas Haas

More information about the Canadian Association of Palynologists and other material relevant to Canadian palynology can be found on the CAP website: www.scirpus.ca/cap/cap.shtml

ISSN 1188-3596

2011 CAP Annual General Meeting

The Annual General Meeting of the Canadian Association of Paylnologists will be held in conjunction with the joint meeting of GeoHydro 2011 and CANQUA, in Québec City this August 28th to 31st.

The exact date, time and location of the CAP AGM will be announced in early August. All CAP members are encouraged to attend the AGM. Members in the Québec City area, but not attending the conference, may also attend.

As per CAP's By-laws, candidates for executive positions will be presented at the AGM. All CAP members are eligible to be elected a director of the Society. If unopposed, the candidates put forward shall be accepted by acclamation. If balloting is necessary for any of the executive positions, ballots will be included in the ensuing issue of the Newsletter.

CAP's By-laws can be accessed at http://www.scirpus.ca/cap/tracking/by_laws.htm

We look forward to seeing you in Québec City!

Editor's Notes

Thank you to all who contributed material for this edition of the *CAP Newsletter*: Alwynne Beaudoin, Laura May, Matthew Peros, John Smol, Diana Tirlea, and Mary Vetter.

Deadline for Next CAP Newsletter

Please submit items for the next issue of the *CAP Newsletter* (Volume 34, Number 2, December 2011) by November 15, 2011. Conference reports, announcements, field trip reports, notices of new books, dissertation abstracts, book reviews, news, and essays on topics relevant to Canadian palynology are all welcome. Please send contributions to:

Terri Lacourse
CAP Newsletter Editor
tlacours@uvic.ca

Table of Contents

Laura May Receives 2011 CAP Student Research Award

Laura May (University of Victoria) received the 2011 CAP Student Research Award. This award was established in 2009 to recognize students' contributions to research in palynology. Laura received the award for her M.Sc. research "Morphological Differentiation of Alder Pollen in Western North America".

I am currently in the final stages of my M.Sc. research under the supervision of Dr. Terri Lacourse in the Department of Biology at the University of Victoria. My M.Sc. research has focused on attempting to define a method to distinguish the pollen of the three dominant alder species that occur on the west coast of North America (green alder - *Alnus viridis* subsp. *sinuata*, mountain alder - *Alnus incana* subsp. *tenuifolia*, and red alder - *Alnus rubra*). While several palynological studies from the Pacific Northwest have distinguished alder pollen into two morphotypes, no definitive method outlining the validity of species level identifications has been devised.

To determine whether it is possible to consistently differentiate the pollen of these alder species in fossil records, modern pollen from each of the three alder species (Fig. 1) were examined with the goal of identifying their critical morphological features. I collected pollen samples from 27-35 individual plants from across the range of each species. After treating all pollen samples using standard acetolysis techniques, 30 pollen grains from each individual plant were examined at 1000× magnification under oil immersion. On each individual pollen grain, six quanti-

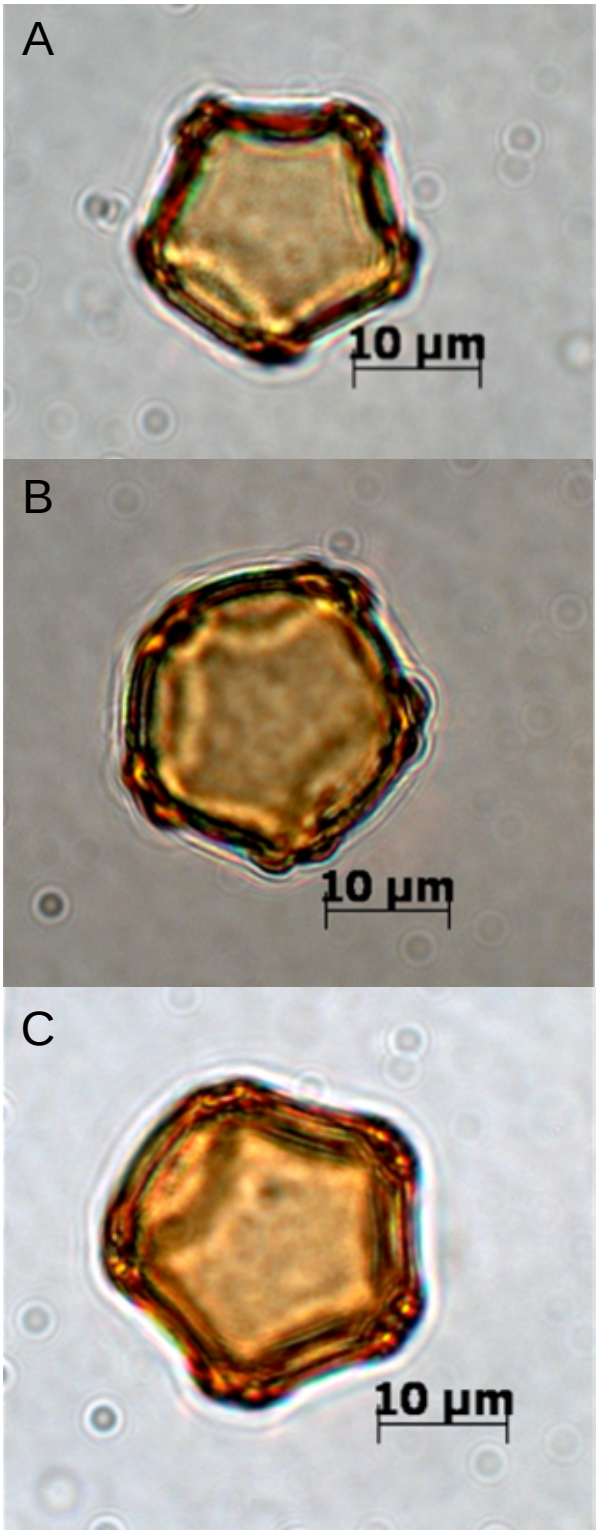

Figure 1: Isopolar view of (A) *Alnus viridis* subsp. *sinuata*, (B) *A. incana* subsp. *tenuifolia*, and (C) *A. rubra* pollen. Photographs were taken at 1000× magnification under oil immersion.

tative measurements (i.e., diameter, exine thickness, arci width, and annulus height, width and area) were made. Three qualitative assessments (i.e., pore protrusion, grain shape and arci strength) were also made. In addition, the number of pores was determined for 200 pollen grains from each individual plant. In total, I measured 21,390 alder pollen grains.

Statistically significant differences in the pollen morphology of the three alder species were found for all of the quantitative traits when compared using nested ANOVA; however, no single morphological trait can be used to differentiate the pollen of these three alder species. The pollen morphology of each species is highly variable across traits, with a large degree of trait distribution overlap between species. Classification and regression tree (CART) analysis was used to produce a multi-trait decision tree that is similar to a standard dichotomous pollen identification key. CART analysis provided morphological trait thresholds that can be used to distinguish the pollen of *A. rubra* (a tree) from *A. viridis* subsp. *sinuata* (a shrub), into ecologically relevant morphotypes that are analogous to species identification. This supports the current practice of separating alder into two morphotypes along the west coast of North America. However, the confounding intermediate morphology of *A. incana* subsp. *tenuifolia* pollen precludes the possibility of separating all three species in fossil pollen records, and therefore in areas where all three alder species are present, it is not possible to differentiate alder pollen past the genus level. The CART tree separates *A. rubra* and *A. viridis* subsp. *sinuata* pollen based on annulus width, arci strength, grain diameter and exine thickness, with *A. rubra* consistently larger than *A. viridis* subsp. *sinuata* in all morphological traits. This morphotype classification is particularly useful along the North Pacific coast, where *A. incana* susbp. *tenuifolia* is absent. Differentiating alder pollen in this region will greatly increase taxonomic resolution in paleoecological reconstructions of long-term plant community dynamics.

Since many previous palynological studies aimed at identifying diagnostic morphological traits for pollen identification have been based on small sample sizes and/or collections from limited areas, I tested the sensitivity of these results by randomly reducing the full dataset to mimic smaller sample sizes and by splitting the full dataset into regional groups to mimic collections from limited areas. When the sample size for each species was reduced (e.g., from 35 individuals to 15 individuals, and then again to 7 individuals), CART analysis produced a classification tree that separated *A. incana* subsp. *tenuifolia* pollen much more successfully than the model based on the full dataset. However, when this CART model was used to classify a reserve test set of pollen grains, classification accuracy was diminished by as much as 50%. In other words, using a collection based on fewer individual pollen samples resulted in the misleading conclusion that *A. incana* subsp. *tenuifolia* pollen could in fact be differentiated from the other two alder species, but the resulting model was less successful in general, at classifying all grains regardless of species. To test the sensitivity of these results to regional effects, CART models were also built using datasets that included pollen samples from limited areas. These models failed to correctly classify test sets of pollen grains from outside these areas.

This research demonstrates clearly the importance of using large pollen collections from across a species range when attempting to identify key morphological features for pollen identification. Pollen collections from limited regions within a species' range

should be avoided, as these can result in biased interpretations of pollen morphology and/or pollen classification that are not representative of pollen from the population as a whole. As species' ranges shift through time, it is crucial that the morphological variability present in any given species is represented in modern reference collections.

I would like to give my sincerest thanks to the Canadian Association of Palynologists for supporting this research and for offering this award annually to students. I am honoured to be this year's CAP Student Research Award recipient.

Laura May
Dept. of Biology
University of Victoria

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Francine McCarthy and Crawford Lake featured on The Weather Network

Crawford Lake in Milton, Ontario has long been a popular draw for nature enthusiasts because of its peaceful forest setting and rich Iroquois history. But beneath its pristine waters, the lake hides clues about the historic relationship between people and their environment.

Check it out!

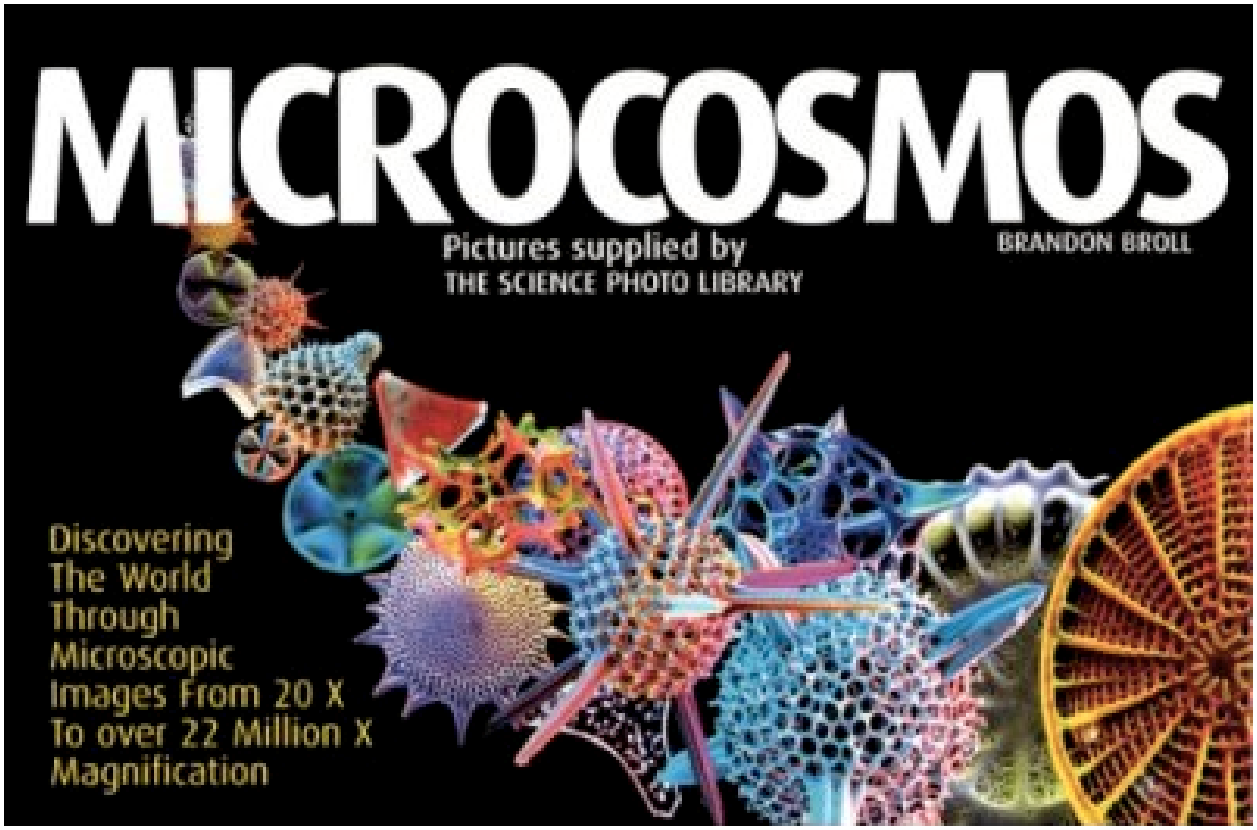
http://www.theweathernetwork.com/news/

Call for New CAP Executive Directors

The Canadian Association of Palynologists is looking for members to serve as Executive Directors. In particular, CAP members are needed to fill the following positions, effective January 2012: President-Elect, Newsletter Editor, and IFPS Councillor.

All members of CAP are eligible to be elected a CAP Director. Elections will take place at the 2011 CAP AGM. The location of the AGM is yet to be determined, but members do not have to attend the AGM to let their name stand for an Executive position.

If you are interested in joining the Executive, more information about positions is available on the CAP website (www.scirpus.ca/cap/tracking/by_laws.htm) or, contact current CAP President, Matthew Peros (mperos@uottawa.ca).



Book Review

Broll, Brandon. 2007. *Microcosmos: Discovering the World Through Microscopic Images from 20 X to Over 22 Million X Magnification*. Firefly Books, Richmond Hill, Ontario. 424 pages. ISBN 978-1-55407-2378. $29.95 CDN.

While identifying and counting pollen grains, it is easy to become absorbed by their intricate beauty. But if you've ever tried to explain the fascination of this small world to someone outside the field, you will soon find it is all but impossible to convey the splendour of the grains in words alone. For pollen, a picture truly is worth a thousand words. *Microcosmos* provides palynologists, and researchers working on other biota and materials at similar scales, with a handy conspectus of the field. In 203 superb images, the book provides a visual treat and is great ambassador for the world of the small.

Within the book, full-page images are arranged according to six major themes: microorganisms, botanical material, the human body, zoology, minerals and technology. For palynologists, the first two sections are perhaps the most interesting. The first section includes two images of coccolithophores, three of radiolarians, and two of foraminiferans. In the second section, there are three images of diatoms, three of spores, and six of pollen grains or pollen on plant structures. Elsewhere, images run the gamut from protozoa to palladium crystals. For example, the book includes images of cells and cell structures, various types of muscle tissues, bird bone, ticks, mites and other invertebrates, scales from a butterfly wing, wood structure, a silicon chip, sugar crystals, and a wound dressing. Most images show specimens or objects in the round, in three dimensions, but a few show more planar views, especially cross-sections. In total, these images show a tremendous variety of structures, textures, and forms.

All the specimens and objects in the book required magnification in order to be seen clearly. The compilation, therefore, also provides an effective demonstration of the power of different types of microscopy to reveal intricate detail. Most (but not all) images were captured through an SEM (scanning electron microscope). Native SEM images are black-and-white but these pictures have been colourized through digital manipulation. Reds, greens, yellows, blues, and browns predominate. In many cases the colours are startling and "unnatural" looking but they certainly help to distinguish features on the specimens and make complex structures clearer. Often I felt the colours must have been chosen simply for aesthetic reasons, to make an arresting image, hold the viewer's attention, and invite closer scrutiny.

Each image is produced on the right-hand sheet of a page, with a caption and explanation, plus scale, on the left-hand facing page. Scale is given by indicating how many times the specimen is magnified; in no case is the precise size of the field of view given, something that I think would have been helpful to the reader unfamiliar with the subject matter. Most images are actually at comparatively low magnification; 125 images (62%) are at less than 1000 times magnification. There's only one image (the last one in the book, of carbon nanotubes) at more than 22.5 million times magnification, and only three others at more than 100,000 times (but less than 750,000 times) magnification. In this sense, I think the subtitle of the book is rather misleading. Nevertheless, all images show things well beyond the acuity of the human eye and expose a world that is hidden from everyday view.

The images are produced in landscape mode, about 9 inches wide by 5 inches high. Each image looks almost like a postcard or a photo print. Indeed, flipping through this book is almost like flipping through one of those photo albums in which the prints are held in clear plastic sleeves. Whether this association was a deliberate choice on the part of the book designer is hard to say, but it certainly works well.

The images are credited to The Science Photo Library. Although the book provides no other details for this organization, a bit of 'net searching turned up their website at http://www.sciencephoto.com/index.html. This commercial operation offers stock scientific imagery to publishers and other users. Micro-scale imagery is only one aspect of their portfolio. Many images there appear to have been contributed by working scientists or research groups. According to his website, Brandon Broll has worked as caption writer for The Science Photo Library, having trained as a biologist and also worked as a science journalist.

Returning to *Microcosmos*, I found it difficult to detect any logic to the ordering of the images within sections or understand how the images relate to each other. In a few cases we do get a "zoom in" sequence and these I find more interesting. For example, one group of four images concentrates on wheat grains, from germination to a cross section showing a grain's interior structure. It was not clear to me what formed the basis for image selection, unless it was simply aesthetics. Most images show "perfect" and "clean" examples. Diatoms are undamaged, pollen grains are unruptured, crystals are unbroken, and leaf edges are untorn. Debris and guck are absent. These images will be the envy of anyone, including me, who has ever tried to get a great SEM picture for publication and been frustrated by specks of litter or loose tissue that obscures the salient structure. The captions, however, are often

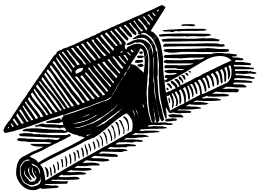
rather uninformative. I found them usually vague, too short and lacking in detail. I wanted to know who took the images, when, and for what purpose; was each picture part of a larger study and if so what was it about? The photo credits at the end of the book don't help flesh out the story. But the text is not really the point of the book; this is not a didactic exercise, the images are the focus. Visually, this is an absorbing and attractive book to peruse and has some fascinating pictures to study and appreciate.

So the next time someone looks at you as if you're from another planet when you tell them you work on pollen, hand them this book. It might just change their mind by showing them the enchantment of the truly small world that lies all around and within us.

Alwynne B. Beaudoin
Royal Alberta Museum
Edmonton, Alberta

Join us at the INQUA Congress in Bern

CAP President, Matthew Peros, invites you to join an informal gathering of CAP members during the INQUA Congress in Bern, Switzerland this July. If you plan on attending the INQUA congress and are interested in connecting with other CAP members while in Bern, contact Matthew at mperos@uottawa.ca to get all the details. All are welcome!

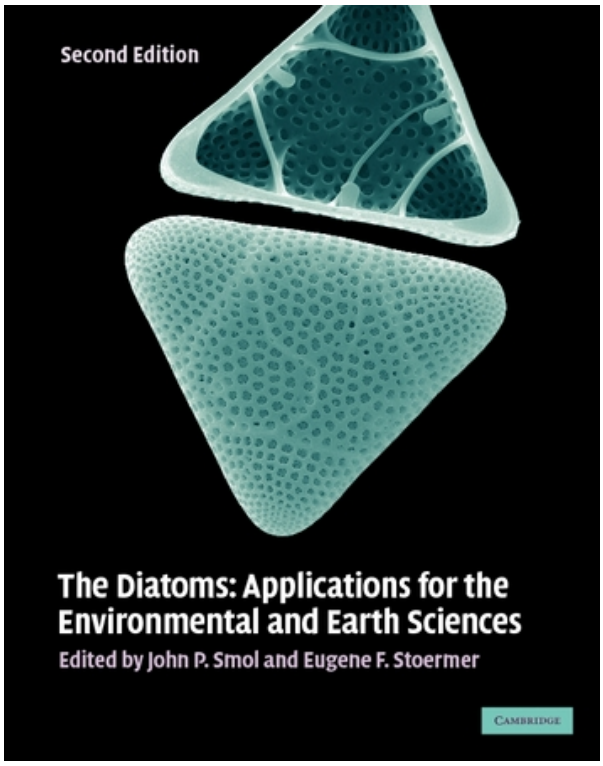


Dissertation Abstract

Diana Tirlea. 2011. *Evaluating terrestrial-aquatic linkages in the Canadian Rocky Mountains: Eiffel Lake and Sentinel Lake, Banff National Park.* M.Sc. Thesis. Department of Biological Sciences, University of Alberta.

Supervised by Dr. Rolf D. Vinebrooke and Dr. Alwynne B. Beaudoin

This study examined if nutrient loading of phosphorus-rich pollen into small mountain lakes has a significant impact on lake productivity. Increased pollen input into lakes due to changes in vegetation (e.g., timberline advance) may increase lake production. Deteriorated pollen was recorded for frozen and freeze-dried sediment samples to determine if storage method effects pollen preservation. There were no strong relationships between pollen accumulation rates (PAR) and pigment concentrations for Sentinel Lake and Eiffel Lake. A lagged response of pigment concentrations to increased PAR was illustrated for Eiffel. Examination of pollen ratios and stomata suggests recent timberline advance for Eiffel, but pollen ratios were a poor indicator of timberline for Sentinel. Sediment storage methods did not play a significant role in differential preservation of pollen grains. Further investigation of the potential effect of PAR on lake productivity is required because timberline advance may alter lake productivity through increased pollen input.



The Diatoms: Applications for the Environment and Earth Sciences, 2nd Edition

Editors: John P. Smol and F. Stoermer

ISBN: 9780521509961

Cambridge University Press
686 pages. 175 illustrations, 16 tables

This much revised and expanded edition provides a comprehensive summary of the many uses of diatoms in the environmental and earth sciences. The 36 chapters of this book were written by 77 specialists and are organized into four main sections. The first three sections cover indicators in different aquatic environments and the final section explores the use of diatoms in other disciplines, such as forensics or archaeology.

Summary of Contents:

Part I: Introduction
Part II: Diatoms as indicators of environmental change in flowing waters and lakes
Part III: Diatoms as indicators in Arctic, Antarctic and alpine lacustrine environments
Part IV: Diatoms as indicators in marine and estuarine environments
Part V: Other applications
Part VI: Conclusions

For ordering information and other details regarding this book, please see:

http://post.queensu.ca/~pearl/textbook.htm

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Recent Publications — 28

Adams, J. K., and *Finkelstein, S.A. 2010. Watershed-scale reconstruction of middle and late Holocene paleoenvironmental changes on Melville Peninsula, Nunavut, Canada. *Quaternary Science Reviews* 29: 2302-2301.

*Batina, M.C., and Reese, C.A. 2010. A Holocene pollen record recovered from a guano deposit: Round Spring Cavern, Missouri, USA. *Boreas*. DOI: 10.1111/j.1502-3885.2010.00186.x

Cumbaa, S., Lauriol, B., Alfonso, N., Ross, M., and *Mott, R. 2010. A new whitefish from the early Quaternary of Bluefish Basin Yukon Territory, Canada, and its paleoenvironmental implications. *Canadian Journal of Earth Sciences* 47: 221-235.

El Beialy, S.Y., *Head, M.J., and El Atfy, H.S. 2010. Palynology of the Mid-Cretaceous Malha and Galala Formations, Gebel El Minshera, North Sinai, Egypt. *Palaios* 25: 517-526.

Fortin, M.-C. and *Gajewski, K. 2010. Holocene climate change and its effect on lake ecosystem production in northern Victoria Island, Canadian Arctic. *Journal of Paleolimnology* 43: 219-234.

Fortin, M.-C. and *Gajewski, K. 2010. Postglacial environmental history of western Victoria Island, Canadian Arctic. *Quaternary Science Reviews* 29: 2099-2110.

*Galloway, J.M., Babalola, L.O., Patterson, R.T., and Roe, H.M. 2010. A high-resolution marine palynological record from the central mainland coast of British Columbia, Canada: Evidence for a mid-late Holocene dry climate interval. *Marine Micropaleontology* 75: 62–78.

*Galloway, J.M., Lenny, A.M. and *Cumming, B.F. 2011. Hydrological change in the central interior of British Columbia, Canada: diatom and pollen evidence of millennial-to-centennial scale change over the Holocene. *Journal of Paleolimnology* 45: 183–197.

Gibbard, P.L., *Head, M.J., and Walker, M.J.C. 2010. Formal ratification of the Quaternary System/Period and the Pleistocene Series/Epoch with a base at 2.58 Ma. *Journal of Quaternary Science* 25: 96-102.

Ginn, B.K., Rate, M., *Cumming, B.F., and *Smol, J.P. 2010. Ecological distribution of scaled-chrysophyte assemblages from the sediments of 54 lakes in Nova Scotia and southern New Brunswick, Canada. Journal *of Paleolimnology* 43: 293-308.

*Goring, S., *Lacourse, T., *Pellatt, M.G., *Walker, I.R, and *Mathewes, R.W. 2010. Are pollen-based climate models improved by combining surface samples from soil and lacustrine substrates? *Review of Paleobotany and Palynology* 162: 203-212.

Hadley, K.R., Douglas, M.S.V., McGhee, R., Blais, J.M., and *Smol, J.P. 2010. Ecological influences of Thule Inuit whalers on high Arctic pond ecosystems: a comparative paleolimnological study from Bathurst Island (Nunavut, Canada). *Journal of Paleolimnology* 44: 85-93.

*Koppelhus, E.B., and *Braman, D.R. 2010. Upper Cretaceous palynostratigraphy of the Dry Island area. *Canadian Journal of Earth Sciences* 47: 1145-1158.

*Lacourse, T., Hebda, R.J., and *Mathewes, R.W. 2010. Cultural and noncultural deposits reveal human impact on late Holocene forests on Anthony Island, Haida Gwaii. In: R.M. Dean (ed.), *The Archaeology of Anthropogenic Environments*. Center for Archaeological Investigations, Occasional Paper No. 37, Southern Illinois University, Carbondale, pp. 54-74.

Ledu, D., *Rochon, A., *de Vernal, A., and St-Onge, G. 2010. Holocene paleoceanography of the northwest passage, Canadian Arctic Archipelago. *Quaternary Science Reviews* 29: 3468-3488.

Ledu, D., *Rochon, A., *de Vernal, A., and St-Onge, G. 2010. Holocene sea-ice history

and climate variability along the main axis of the Northwest Passage, Canadian Arctic. *Paleoceanography* 25 (PA2213), DOI:10.1029/2009PA001817.

*Mudie, P.J., Marret, F., *Rochon, A., and Aksu, A.E. 2010. Non-pollen palynomorphs in the Black Sea corridor. *Vegetation History and Archaeobotany* 19: 531-544.

*Mudie, P.J., Leroy, S.A.G., Marret, F., Gerasimenko, N., Kholeif, S.E.A., Sapelko, T., and Filipova-Marinova, M. 2011. Non-pollen palynomorphs: Indicators of salinity and environmental change in the Caspian–Black Sea–Mediterranean corridor. In: Buynevich et al. (eds), *Geology and Geoarchaeology of the Black Sea Region: Beyond the Flood Hypothesis*. Geological Society of America Special Paper 473, pp.89-115.

Munoz, S., and *Gajewski, K. 2010. Distinguishing prehistoric human influence on late Holocene forests in southern Ontario, Canada. *The Holocene* 20: 967-981.

Munoz, S., *Gajewski, K. and *Peros, M.C. 2010. Synchronous environmental and cultural change in the prehistory of the northeastern United States. *Proceedings of the National Academy of Sciences* (USA) DOI:10.1073/pnas.1005764107.

*Peros, M., *Gajewski, K., Paull, T., Ravindra, R., and Podritske, B. 2010. Multi-proxy record of postglacial environmental change of south-central Melville Island, Northwest Territories, Canada. *Quaternary Research* 73: 247-258.

Schulte, P. ,(+ 40 others). 2010. The Chicxulub asteroid impact and mass extinction at the Cretaceous-Paleogene boundary. *Science* 327: 1214-1218.

*Smol, J.P., and Stoermer, E.F. (Eds), 2010. *The Diatoms: Applications for the Environmental and Earth Sciences*. 2nd Ed. Cambridge University Press, Cambridge. 686p.

Srivastava, S.K., and *Braman, D.R. 2010. The revised generic diagnosis, specific description and synonymy of the Late Cretaceous *Rosannia manika* from Alberta, Canada: its phytogeography and affinity with family Lactoridaceae. *Review of Palaeobotany and Palynology* 159: 2-13.

Sweetman, J.N., Rühland, K.M., and *Smol, J.P. 2010. Environmental and spatial factors influencing the distribution of Cladocerans in lakes across the central Canadian Arctic treeline region. *Journal of Limnology* 69: 76-87.

Talbot, J., *Richard, P.J.H., Roulet, N.T., and Booth, R.K. 2010. Assessing long-term hydrological and ecological responses to drainage in a raised bog using paleoecology and a hydrosequence. *Journal of Vegetation Science* 21: 143-156.

Vermaire, J.C., and *Cwynar, L.C. 2010. A revised late-Quaternary vegetation history of the unglaciated southwestern Yukon Territory, Canada, from Antifreeze and Eikland ponds. *Canadian Journal of Earth Sciences* 47: 75-88.

Yanko-Hombach, V., *Mudie, P., and Gilbert, A.S. 2011. Was the Black Sea catastrophically flooded during theHolocene? Geological evidence and archaeological impacts. In: Benjamin et al. (eds.), *Submerged Prehistory*, Oxbow Books, Oxford, UK, pp. 245-262.

** denotes a CAP Member*

2011 Conference Calendar

May 25-27: **Geological Association of Canada/Mineralogical Association of Canada Meeting**
Ottawa, Ontario
Theme: Navigating Past & Future Change
www.gacmacottawa2011.ca/welcome.php

May 31-June 4: **Canadian Association of Geographers Annual Meeting**
Calgary, Alberta
www.cag-acg.ca/en/cag_annual_meeting.html

June 27-19: **10th International Pollination Symposium**
Cholula, Mexico
www.uoguelph.ca/icpbr/

July 9-13: **Botany 2011**
St. Louis, Missouri, USA
www.botanyconference.org/

July 21-27: **XXVIII International Union for Quaternary Research (INQUA) Congress**
Bern, Switzerland
www.inqua2011.ch

July 23-30: **XVIII International Botanical Congress**
Melbourne, Australia
www.ibc2011.com/

July 31-Aug 4: **28th Annual Meeting of The Society for Organic Petrology**
Halifax, Nova Scotia
www.tsop.org

Aug 7-9: **Pan American Aerobiology Symposium**
San Diego, California, USA
www.paaa.org/

Aug 7-12: **96th Ecological Society of America Annual Meeting**
Austin, Texas, USA
www.esa.org/austin/

Aug 28-31: **Canadian Quaternary Association and the Canadian Chapter of the International Association of Hydrogeologists**
Quebec, Quebec
http://geohydro2011.ca

Aug 28-Sep 2: **DINO 9: 9th International Conference on Modern and Fossil Dinoflagellates**
Liverpool, England
http://pcwww.liv.ac.uk/~dino9/index.htm

Sept 5-7: **American Association of Stratigraphic Palynologists 44th Annual Meeting**
Southampton, England
www.palynology.org/meetings.html

Sept 10-16: **63rd Meeting of the International Committee for Coal and Organic Petrology**
Porto, Portugal
www.iccop.org/

Sept 19-22: **6th International Conference on Environmental Micropaleontology, Microbiology and Meiobenthology**
Moscow, Russia
www.paleo.ru/EMMM-2011/

Oct 9-12: **Geological Society of America 123rd Annual Meeting**
Minneapolis, Minnesota, USA
www.geosociety.org/meetings/2011

CAP MEMBERSHIP FORM

Canadian Association of Palynologists / Association Canadienne des Palynologues (CAP) membership is open to all members of the palynological community in Canada and others with an interest in Canadian palynology. The Association is dedicated to the advancement and encouragement of all aspects of palynology in Canada and the promotion of co-operation between palynologists and those engaged in related fields of study. Membership dues include two issues a year of the *CAP Newsletter*, to which all members are invited to contribute. CAP is affiliated with the International Federation of Palynological Societies (IFPS) and members receive two issues of the IFPS newsletter (*PALYNOS*) each year.

CAP membership dues are $10 per year in Canadian or US funds payable at the beginning of the year. Lapsed members are removed from the mailing list after one year, following a reminder. Members may, if they wish, pay for up to three years in advance. To join, please fill out the the membership form, by hand or in Adobe Reader®, and send it with a cheque (drawn on a Canadian or US bank) or money order payable to CAP to:

Dr. Mary Vetter, CAP Secretary-Treasurer, Luther College, University of Regina, Regina, Saskatchewan, S4S 0A2 CANADA

Name:_____

Affiliation:_____

Address:_____

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Tel:_____ FAX:_____

E-mail:_____

Web page URL:_____

Research interests:_____

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New membership ☐ Renewal ☐ Amount enclosed:_____

May we include your name/address/research interests in the on-line "Directory of Palynologists" in the CAP World Wide Web page? Yes ☐ No ☐