Canadian Association of Palynologists
Association Canadienne des Palynologues

NEWSLETTER

Volume 38 Number 2 December 2015

PRESIDENT'S MESSAGE

This has been an important year for CAP in light of changes in the laws governing incorporation. We are greatly indebted to our long-time Secretary-Treasurer, Mary Vetter, who did virtually all the legwork in getting CAP incorporated as a *not for profit* organization- thank you Mary! All that is left to do is vote on the by-laws to make things legal.

CAP is in good financial shape, and I think that our decision to award more money to students in order to promote Palynology has produced good dividends already without really depleting our coffers since we have few expenses since our newsletter has gone fully electronic- with the one-time expenditure this year to put us in compliance as a federally incorporated association being the biggest drain on our finances in a long time. Congratulations to Kimberley Bell who won this year's award in a tightly contested competition. I would like us to consider expanding both the number and dollar value of student awards before I step down as President. Vera Pospelova is our current President-Elect and will be taking up the reins at next year's AGM, and I have agreed to stay on as President until then.

A very professional-looking Newsletter continues to be produced twice yearly, in compliance with our bylaws, by Florin Pendea, but this can't be done without input from the membership. Please send in your contributions for the December Newsletter by November 15, and remember- you, the membership, determine the content of the newsletter and direction of the organization…. I don't want it to become a series of essays written by me on my favourite topics!!!

Both Mary Vetter and Alwynne Beaudoin, our long-time Website Editor, have expressed a desire to step down from their roles when someone agrees to take on these important roles on the CAP Executive. I have heard several of our younger members express an interest in getting more involved in CAP and these positions would be a good opportunity to do so.

The most pressing issue facing CAP, and to be spearheaded by the current Executive (hopefully with support from the entire organization) is to revisit our by-laws in light of a changing political landscape around incorporation and *not for profit* organizations, to be discussed today.

One of the most important decisions at every AGM is choosing a location for our next meeting (required by the regulations for incorporation). It is important to be inclusive of the various interests of our membership, not all of whom have a strong geological focus, as well as considering accessibility of the location to our membership in order to attempt to achieve quorum. Suggestions are welcome!

Respectfully submitted,
Francine McCarthy
CAP President
November 3, 2015

Editor's Notes

Thank you to all who contributed material for this edition of the *CAP Newsletter*:

O. Ayobami, A. Beaudoin, K. Bell, M. Bringue, M. Chaput, K Gajewski, S. Goring, R. Mathewes, F. McCarthy, R. Mindell, V. Pospelova, W. Reed, F. de Assis Santos, and M. Vetter.

Deadline for Next CAP Newsletter

Please submit items for the next issue of the *CAP Newsletter* (Volume 39, Number 1, May 2016) by April 15, 2016. 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:

Florin Pendea
CAP Newsletter Editor
ifpendea@lakeheadu.ca

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Update from the IFPS Councillor

Greeting all,
I hope you've had a good year and are looking forward to the next International Palynological Congress. The upcoming International Palynological Congress (IPC XIV) / IoPC X will be held in Salvador, Brazil this coming October. The organizers now have a website detailing the preparations for the meeting at www.ipciopcbrazil.com.

There is a reduced rate if you register before January 31st, and the Symposia will be announced on February 19th. If you have not submitted a Symposium idea yet, there are still opportunities to do so. This is the first IPC in South America, a continent with a rapidly expanding palynological community, with a number of very interesting recent contributions, and a number of open questions of interest to the palynological community.

The Latin American Pollen Database was featured in the 2013 PAGES News (link) and has expanded since then. Their presentation at the most recent Neotoma Constituent Database Meeting in Berkeley, CA this year showed considerable development. Salvador, the third largest city in Brazil, is right on the Atlantic coast of Brazil, with a historical center that has been declared a World Heritage Site by the UN.

Recognizing the cost of travelling to Brazil may be prohibitive to students, the IFPS will be offering bursaries for student attendance. More information can be found here: http://www.ipciopcbrazil.com/financial-support-grants/

Simon Goring
IFPS Councillor

CAP Student Award

by Kimberley Bell
University of Calgary

I would like to thank CAP for supporting my research this year with a student award. I am currently a PhD candidate in the Department of Geoscience at the University of Calgary working primarily on the biostratigraphy of Cretaceous and Paleogene strata from northern Yukon Territory and District of Mackenzie, Northwest Territories, co-supervised by Drs. Charles Henderson (University of Calgary) and Arthur Sweet (Geological Survey of Canada).

I used the funds from CAP to support my trip to Baltimore, MD for the Geological Society of America (GSA) Annual Meeting. This year AASP-The Palynological Society held their annual meeting in conjunction with GSA and sponsored eight technical sessions. I gave an oral presentation in one of these technical sessions titled "Investigating 'horny' triprojectate pollen" co-authored with Arthur Sweet that explored the spatial and temporal distribution of three genera of triprojectate pollen with unique subpolar projections or 'horns'. The talk focused on the Campanian species *Parviprojectus trialatus* in which the horns are demonstrated to be an evolved morphological feature based on data from the Brackett Basin, Northwest Territories. The functional morphology of these horns remains an interesting question; we proposed that their function could be related to pollen transport (entomophily).

Attendance at this meeting allowed me to present my research to an expert audience, provided excellent networking and learning opportunities and allowed my attendance at the 2015 CAP Annual General Meeting (see photo). I appreciate CAP contributing funds towards this valuable professional development experience.

Featured article

The interdisciplinary study of organic walled microfossils: A ramble

By Simon Goring

It's no secret to members of the Canadian Association of Palynologists that the study of organic-walled microfossils is the most interesting branch of science, but it may come as a surprise to some of our colleagues. The thing is, our colleagues all have their own opinions. If they're in biology departments they probably like bears; in geology, they probably like different kinds of gravel; geography, obviously they like the names of rivers and knowing where towns and cities are. The reality of being a palynologist is that you're often working in a department that specializes in something that isn't palynology. From time to time this can be a curse, but it's also a very exciting opportunity.

This year I had the pleasure of attending the Ecological Society of America meeting and the Geological Society Meeting, both of which were held in Baltimore, Maryland (39.2833° N, 76.6167°W for the Geographers). At both meetings I co-chaired a session titled "Paleoecological patterns, ecological processes, modeled scenarios: crossing temporal scales to understand an uncertain future" (sponsored in part by CAP at GSA). The sessions highlighted the applications of paleoecology to understanding the processes of ecological and geophysical change across decadal to millennial time scales.

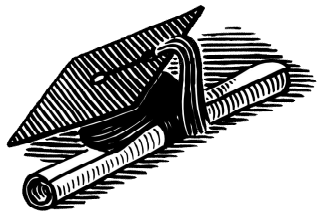
It really is a testament to palynologists (and paleoecologists more broadly) that neither session felt out of place in either ESA or GSA. The nature of the problems we address through our research rely on the integration of ecological knowledge and geophysical process. Both sessions had impressive contributions from early-career re-

searchers and established researchers, and both sessions pointed to new and unexplored avenues of research. Both sessions also showcased a bit of the flavor of the meetings themselves. The ESA talks focused more on ecological processes, the accumulation of carbon in ecosystems, forest cover change and regional dynamics, and change within ecological systems. Speakers included Lindsey Gillson talking about conservation paleoecology, Kendra McLauchlan, Feng Sheng Hu, and Yao Liu of the University of Arizona who is doing interesting work bringing pollen data together with vegetation models.

There was just as much ecological focus at the GSA meeting. Bob Booth and Jesse Morris each talked about disturbance and the effect of temporal resolution in the paleo record, focusing on fire & the Hemlock decline. Sarah Ivory talked about human land use over millennia in Africa and Abigail West discussed aDNA from Alaskan Musk Oxen.

In recent years paleoecology has become more visible to ecologists as ecologists have begun to tackle the complex problems of predicting community change under various climate change scenarios. At the same time, questions of carbon dynamics, vegetation-atmosphere feedbacks, and other large scale questions of relevance to geoscientists have increasingly drawn from the knowledge of paleoecologists and palynologists. Of course, there is a long tradition of paleoecologists contributing significantly to interdisciplinary sciences. Palynologists have been using their unique view of the earth system over long time scales to help frame our understanding of the Earth's past as far back as von Post (see Conway's overview of von Post's work in the *New Phytologist*: http://dx.doi.org/10.1111/j.1469-8137.1948.tb05101.x).

Palynology is great precisely because the people studying it continue to pursue innovative and exciting research that borrows strongly from our history as a deeply interdisciplinary discipline. It is this interdisciplinary history that allows us to present our work to Foresters, Ecologists, Geologists, Climatologists, or Oceanographers. We have to be a little bit of all of these in order to make sense of the microscopic organic-walled microfossils that we see dancing under the microscope. [*note*: if they really are dancing you should cut down on the silicone oil]



Student Theses

Cooper, Emily, 2015. The response of cladoceran communities to the climatic changes of the late Holocene in southwestern Quebec. **M.Sc. Thesis**, Ottawa-Carleton Institute of Biology.
Supervisor: **Dr. Konrad Gajewski**

Abstract: This thesis focuses on a chronological analysis of the cladoceran communities from a sediment core of a small oligotrophic lake in southwestern Québec, Canada over the past 1250 years. The sediments of the lake were varved, which allowed for accurate dating. A previously-published pollen study of the lake provided a record of the paleoclimatic and landscape changes in the region. The core was then used to infer how changes in temperature and landscape changes impacted the taxonomic composition of the cladoceran community through time. Cladoceran diversity was high throughout most of the Medieval Warm Period and into the Little Ice Age and decreased during the modern period in response to increased temperatures and anthropogenic impacts. Daphnia and plant-associated species greatly

decreased in the past 100 years. This shift, combined with increased temperatures and changes in the landscape opened up a niche for the colonization by the smaller *Bosmina longirostris*. The modern communities are unlike most of what was observed throughout the past millennium.

Manuel Bringué, 2015. High resolution dinoflagellate cyst sedimentary records of past oceanographic and climatic history from the Northeastern Pacific over the last millennium. University of Victoria, School of Earth and Ocean Sciences. **PhD Thesis**
Supervisor: **Dr. Vera Pospelova**

Abstract. This thesis contributes to the development of dinoflagellate cysts as indicators of past environmental change in the Northeastern Pacific coastal ocean, and investigates past variations in sea-surface temperature, salinity and primary productivity encoded in dinoflagellate cyst sedimentary records from the Santa Barbara Basin (SBB, southern California) and Effingham Inlet (Vancouver Island, British Columbia) over the last millennium. The dinoflagellate cyst records extracted from the SBB and Effingham Inlet predominantly laminated sediments, analysed at sub-decadal resolutions, constitute some of the most detailed records of cyst-producing dinoflagellate populations in the world.

A two year-long sediment trap study from the SBB documents the seasonality in dinoflagellate cyst production for the first time on the Pacific coast of the United States. The study shows that dinoflagellate cyst data can be used as indicators of sea-surface temperature and primary productivity variations associated with seasonal upwelling in the SBB. In particular, several dinoflagellate cyst taxa such as *Brigantedinium* spp. and *Lingulodinium machaerophorum* are identified as indicators of "active upwelling" (typically occurring in spring and early summer) and "relaxed upwelling" conditions (fall and early winter) at the site, respectively.

Analysis of a dinoflagellate cyst record from the SBB spanning the last ~260 years at biannual resolution documents the response of cyst-producing dinoflagellates to instrumentally measured warming during the 20th century, and reveals decadal scale variations in primary productivity at the site that are coherent with phases of the Pacific Decadal Oscillation (PDO). The cyst assemblages are dominated by cysts produced by heterotrophic dinoflagellates (in particular *Brigantedinium* spp.), but the turn of the 20th century is marked by an abrupt increase in concentrations of *L. machaerophorum* and *Spiniferites ramosus*, two cyst taxa of autotrophic affinity. Their increasing abundances during the 20th century are interpreted to reflect warmer conditions and possibly stronger stratification during summer and fall. The dinoflagellate cyst data suggest a warming pulse in the early 1900s and provides further evidence that persistently warmer and/or more stratified conditions were established by the late 1920s.

The dinoflagellate cyst record from Effingham Inlet, spanning the last millennium, is characterized by the proportionally equal contribution of cysts produced by autotrophic and heterotrophic dinoflagellates in most samples. The cyst data indicate variations in sea-surface temperature, salinity and primary productivity, which are associated with the local expressions of the Medieval Climate Anomaly (from the base of the record to ~1230), the Little Ice Age (from ~1230 to ~1900) and warming during the second half of the 20th century.

Both dinoflagellate cyst records reveal that since the beginning (in the SBB) and mid-20th century (in Effingham Inlet), autotrophic dinoflagellates contribute to a greater portion of the primary production in the region, whereas heterotrophic dinoflagellates, as indicators of diatom populations, decline. Variability in the dinoflagellate cyst data is coherent at both sites and suggest a reduced expression of decadal scale variability associated with the PDO during the 19th century.

2015 CAP Annual General Meeting Minutes November 3, 2015 (GSA, Baltimore, Md)

Members Present:

President (Francine McCarthy)
Simon Goring
Jennifer Galloway
Qiang Yao (new member)
Jennifer O'Keefe
Kimberley Bell

Recording secretary: Morgan Black, Morehead State U.

Meeting called to order, 11:55AM; Agenda approved unanimously

Approval of Minutes of the Last Meeting (moved: Simon Goring; seconded: Jen O'Keefe; carried unanimously)

President's Report (moved: Simon Goring; seconded: Jen O'Keefe; carried unanimously)

- CAP is now a federally incorporated not-for-profit incorporation thanks largely to the efforts of Mary Vetter; updated the bylaws have to be ratified (Mary is planning to retire, CAP is looking for someone to take the position of Secretary/Treasurer position
- Financial standing of CAP is good; there is relatively little room for additional expenditures but members expressed a desire to see an increase in the amount of the money allotted to the CAP student award in light of the exceptionally strong competition this year (ultimately awarded to Kimberly Bell)
- Vera Pospelova is the current President Elect; nominations will be sought for this position (Francine McCarthy willing to stay in the position an additional year, as agreed at the last AGM); call will go out for nominations for the positions of Secretary/ Treasurer, Website Editor and President-Elect by email.
- CAP is looking for location that is likely to draw CAP members for next year's AGM.

Secretary's Report (moved: Kimberly Bell; seconded: Simon Goring; carried unanimously)

- CAP is in good financial standing (statement received from auditor, Sarah Finkelstein)
- CAP is looking for new, vibrant/ active members to join.

Website Editor's Report (moved: Kimberly Bell; seconded: Simon Goring; carried unanimously)

- Alwynne Beaudoin would like to step down, so nominations will be sought for this position.
- Qiang Yao has volunteered to stand for election for the Website Editor position

Newsletter Editor's Report
(moved: Kimberly Bell; seconded: Jen O'Keefe; carried unanimously)
Florin Pendea is seeking submissions for the December Newsletter, particularly for articles.

New Business

- The IPC 2016 meeting will be in Salvador Brazil
- For the 2016 AGM meeting, there has been expressed interest in the AASP-TSP & TSOP meeting in Houston as well as the IFCP meeting in Salvador Brazil. Membership will be polled before a decision is made.

Motion: To increase CAP student research award to 500 dollars, the best application will be awarded 300

dollars and at the discretion of the jury 200 dollars will be awarded to comparable applicants (moved: Simon Goring; seconded: Jen O'Keefe; carried unanimously)

Motion Passes

Motion: To accept the changes made to the bylaws (moved: Jennifer Galloway; seconded: Jen O'Keefe; carried unanimously)

Meeting Adjourned, 12:45 PM

2015 Reports of CAP Executive Directors

CAP President's Report

This has been an important year for CAP in light of changes in the laws governing incorporation. We are greatly indebted to our long-time Secretary-Treasurer, Mary Vetter, who did virtually all the legwork in getting CAP incorporated as a *not for profit* organization- thank you Mary! All that is left to do is vote on the by-laws to make things legal.

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attempt to achieve quorum. Suggestions are welcome!

Respectfully submitted,
Francine McCarthy
CAP President
November 3, 2015

CAP Secretary/Treasurer's Report 30 October 2015

Membership Report

As of 30 October 2015, CAP has 58 members in good standing who have paid dues for 2015 or who have received a complimentary membership as a result of winning a CAP Student Award. The chart below shows our membership over the past twelve years.

I would like to extend a special welcome to our new members in 2015:
Kristen Michels, Clayton Shearer, Magdalena Sobol, Dr. Glenn Stuart, and Dr. Maria Velez.
The membership numbers continue to be of concern, as we are losing members to retirement, completion of graduate studies, or career changes faster than we are gaining new members. A significant source of new members is the students who are applying for the CAP Student Award. It is very important that all CAP members encourage students and newly-appointed colleagues to consider membership in CAP!

Financial Report

For the period ending 30 October 2015, the balance in the CAP account is $6891.31 (compared to $7234.10 at the 2014 AGM). Of this amount, $540 represents pre-paid or grants of CAP Student Award memberships for future years. IFPS dues ($1.50 USD per member) have not yet been paid for 2014 or 2015 as several attempts to reach the IFPS Treasurer, following verification of the Treasurer's name and contact information, have not been successful. I am awaiting an invoice; the dues amount owing is $177.00 USD (approximately $226.00 CAD). In

Year	Members
2004	43
2005	36
2006	47
2007	51
2008	58
2009	66
2010	64
2011	66
2012	65
2013	65
2014	60
2015	58

2014-2015 we had the additional one-time expense of $224.67 to incorporate federally with Corporations Canada.

In general, membership receipts during the year balance expenditures. For example, here is a breakdown of annual income and expenditures with 58 members: dues receipts are $580 the CAP Student Award is $300
IFPS dues are approximately $110 CAD fees for filing the annual to Corporations Canada are $20

This leaves an annual positive balance of approximately $150 to spend on support of coffee breaks at conferences and other activities.

Recommendations: CAP's financial position allows us to continue to support, in a modest way, outreach initiatives at conferences (*e.g.* coffee breaks), sponsor sessions, and other initiatives.
I recommend that CAP continue to use some

of its accrued bank balance to support active promotion of CAP and recruitment of new members. However, CAP will not want its bank account balance to drop below $5,000.00 as this minimum monthly balance results in a waiver of monthly administration fees of $2.50 that would be charged by the Bank of Montreal.

Financial Statement for the period 8 October 2014—30 October 2015

The closing balance includes 54 prepaid annual memberships in the amount of $540.00 for the years 2016-2021. This will affect the income from this source for the years indicated.

As of 31 May 2014, the Bank of Montreal is charging a monthly administration fee of $2.50; however, accounts with a minimum monthly balance of $5,000 receive a waiver on this fee. CAP has therefore not been charged the new monthly administration fee to date.

2014 and 2015 IFPS membership dues will be paid as soon as the invoice is received. The dues are $1.50 USD per member, for a total owing for 2014 and 2015 of $177.00 USD.

Respectfully submitted

Mary Vetter
CAP Secretary/Treasurer

Annual Statement 8 October 2014—30 October 2015			
	Income	Expenses	Balance
Opening balance			$7,234.10
Memberships	$481.88		
2014 and 2015 IFPS membership dues		(Waiting for invoice from IFPS ($177.00 USD))—not yet accounted	
2014 and 2015 CAP Student Awards (2014 cheque cashed after 2014 AGM)		$600.00	
One-time Corporations Canada registration fees		$200.00	
One-time Corporations Canada name search fees		$24.67	
Closing balance	Total $481.88	Total $824.67	$6891.31

CAP Newsletter Editor's Report, 2015

Since my last report, two issues of the CAP Newsletter have been produced. The December 2014 Newsletter (Vol. 37, No. 2) had 26 pages and was distributed to CAP members on January 26, 2015. Most notably, the December newsletter featured an article on dinoflagellates by F. McCarthy and one on Paleoecoinformatics by S. Goring (University of Wisconsin). This issue also included letters from members featuring information on various professional events, summer school, and information on palynology in other countries. As per CAP Bylaws, this issue also included minutes of the 2014 CAP Annual General Meeting.

The May 2015 Newsletter (Vol. 38, No. 1) was distributed to members on July 21, 2015. It consisted of 13 pages and included important information on CAP federal incorporation, an arduous task that Mary Vetter, our Secretary-Treasurer, completed successfully on June 23rd, 2015. Thank you Mary! This issue also included the announcement of the winner of the 2014 annual CAP Student Research Award. Congratulations to Kimberly Bell, PhD candidate at University of Calgary, who was the winner of the award. The May newsletter also featured a very interesting article on improving lake level reconstruction using various taphonomic features of microfossils, written by our president Francine McCarthy.

I would like to remind our members that past Newsletters are available in electronic format on the CAP website. Contributions for the next issue of the Newsletter will be accepted until November 15, 2015.

Respectfully submitted,

Florin Pendea
CAP Newsletter Editor
October 30, 2015

CAP Website Editor's Report, 2015

I have continued to maintain the website at a fairly minimal level since the last AGM. I have been provided with little new content, other than occasional updates to the Directory listing, and issues of the *CAP Newsletter* for archiving.

In my view, the webpage is now functioning more or less as an archive and resource of CAP-related material and has ceased to be an active site or a venue for engagement with the palynological community. With the discussion at this AGM around our by-laws and potentially other changes to our governance, this may be an opportune time to discuss the role and function of a web-site and assess what form and format it should take from here on.

As I noted in my report last year, I would like to step down as CAP's Website editor. Having been on the CAP Executive for many years, I feel it is time I stood aside and let someone else shape this outreach portal for CAP.

I look forward welcoming an incoming Web Editor. CAP will also need to find a new hosting venue for the website. I will, of course, help with transferring files and redirecting users to the new location and ensuring a smooth transition.

Although I would prefer to step down, I am prepared to stay on in this position until the 2016 AGM, if no replacement steps forward.

Respectfully submitted

Alwynne B. Beaudoin
CAP Website Editor
October 28 2015

CAP Financial Audit, 2015

Mary Vetter
Secretary/Treasurer
Canadian Association of Palynologists

November 3, 2015

Dear Mary:

I have reviewed the financial statements for CAP and it is my opinion that the documents and report submitted represent a full and fair account of the financial affairs of the Canadian Association of Palynologists for the period October 2014 to October 2015. I consider the financial affairs of CAP to be in good order.

Yours sincerely,

Sarah A Finkelstein
Associate Professor
Email: finkelstein@es.utoronto.ca

Members in the News

Paper by Rolf Mathewes et al. receives Editor's Choice award

One of our distinguished members Dr. Rolf Mathewes has recently made headlines with his new paper "Early Wisconsinan (MIS 4) glaciation on Haida Gwaii, British Columbia, and implications for biological refugia". For more information please visit:

http://globalnews.ca/video/2267824/was-haida-gwaii-home-to-wooly-mammoths
http://www.cdnsciencepub.com/blog/learning-more-about-the-conditions-of-haida-gwaii-57000-years-ago.aspx-.

Forensic Palynology makes national headlines in the US

A woman's dead body found in 1976 remained unidentified until recently. Dr. Andrew Laurence, a forensic palynologist with the US Customs and Border Protection Agency. Pollen found on the body traced the murder scene to Massachusetts.

For more information including a video from ABC News please visit:
http://www.wcvb.com/news/police-hope-new-pollen-evidence-will-help-id-victim-in-76-murder/36420026.

SYMPOSIUM PROPOSAL

The IPC / IOPC 2016 theme is "***Palaeobotany and Palynology: towards new frontiers***".

The proposed Symposia will cover several areas, such as Palaeobotany, Palaeoecology, Palaeoclimatology, Biostratigraphy, Taxonomy, Plant Morphology, Forensic Palynology, etc.

The Organizing Committee will accept only one symposium proposal from any individual who will participate in congress. Symposium organizers must be physically present to coordinate the symposium session.

Please submit your proposals to the Organizing Committee (**brazil.ipc.iopc@gmail.com**) until **October 31, 2015**.

FORM

Descriptive title
Key words
Organizer(s)
Contact email address:
Purpose (1,000 characters)

Featured article

Insights into marine – freshwater transition in the Phylum Dinoflagellata Bütschli from the fossil record of *Peridinium wisconsinense* Eddy

By Francine McCarthy

In 1930, Samuel Eddy found a new species of thecate dinoflagellate abundant in the plankton of Oconomowok Lake, Wisconsin (see Fig. 1a, b). *Peridinium wisconsinense* Eddy, 1930 is a large (length 55 - 64 µm; width 48 - 56 µm) spindle-shaped dinoflagellate with a distinct apex and with a horn developed from elongation of the left antapical plate, giving an extended pointed appearance to the antapical end (Eddy, 1930, p. 300). This large, distinctive species is endemic to North America where it is a common component of the summer phytoplankton in lakes.

Wall & Dale (1968) found thecae enclosing cysts in Round Pound (Falmouth, Massachusetts, USA) (Fig. 1c). They described the "resting spores" as:

"ellipsoidal capsulate cysts. Parts of the outer wall are drawn out to form a pronounced apical horn with a truncated apex and a single pointed antapical horn. Both horns have ridges or shoulders situated near the periphery of the inner capsule in lateral view. The inner body is ovoid and slightly compressed dorsoventrally. The ornamentation of the outer wall is unevenly scabrous to granular and generally more pronounced along the edges of a reflected equatorial cingulum. The archeopyle, which penetrates both the outer wall and the capsule, is a compound apical aperture. The operculum remains attached ventrally and is equivalent to the apical plates 2', 3', 4' and part of 1'. In some cysts secondary sutural traces outline the intercalary plate series in both walls, and these sutures may begin to open after acetolysis. The cell contents of the cysts are bright red or orange immediately after encystment.

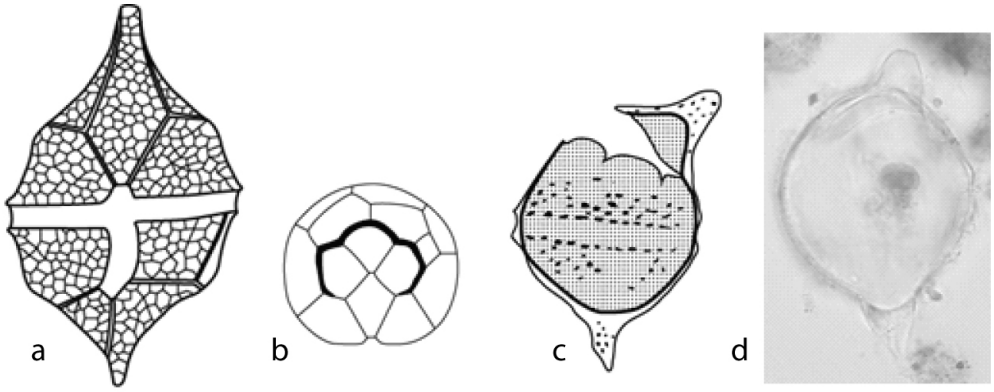

Fig. 1. Illustration of a) a theca of *Peridinium wisconsinense* Eddy with distinctly reticulated cellulosic plates and distinct apical and antapical horns, b) the epicyst showing 14 plates, outlining the 2', 3' and 4' plates that define the archeopyle, and c) a proximocavate "resting spore" (cyst) with operculum and ornamentation reflecting tabulation, particularly along the cingulum (a-c redrawn from Wall and Dale, 1968 text-figure 6). d) Light micrograph of the cyst stage of *Peridinium wisconsinense* (?= *Geiselodinium tyonekensis* Engelhardt) from late Holocene sediments from Sluice Pond, MA showing the large red dinokaryon nucleus in the ellipsoidal endocyst, and the rounded apical and pointed antapical horns developed in the ornamented outer layer of the cyst. The location of the paracingulum is illustrated by light indentation in the outer wall. Dimensions of the thecae and cysts are discussed in the text.

They include a bright red eyespot, numerous refractive starchy grana, a large nucleus, and microgranular cytoplasm." (Wall and Dale, 1968, p. 279 – 280)

Zippi *et al.* (1990) commented on the resistance of these cysts to KOH, HF and acetolysis, and Drljepan et al. (2014) noted their resistance to oxygenated bottom waters. This, together with the distinctive morphology that closely reflects the thecae (Fig. 1d), explains the common reports of large proximocavate cysts attributed to *Peridinium wisconsinense* in palynological preparations from North American lakes and estuaries (Norris & McAndrews, 1970; Miller *et al.*, 1982; Burden *et al.* 1986; Zippi et al., 1990; Pospelova et al., 2005; Danesh et al. 2011; McCarthy et al. 2011; McCarthy and Krueger 2013; Drljepan et al., 2014).

Despite their high fossilization potential, cysts attributed to *Peridinium wisconsinense* have not been reported from sediments older than early Holocene (Drljepan et al., 2014; Volik and McCarthy, in revision) but Engelhardt (1976) recognized a probable affinity of cysts in the Miocene Tyonek Fm. with those produced by *Peridinium wisconsinense*. He attributed the cysts in nonmarine sediments in strata from Alaska to the genus *Geiselodinium* Krutzsch (large cysts with conspicuous apical and antapical horns that are common in freshwater sediments of Paleogene age in Europe) and he described this species as follows, depositing the type species in the Amoco collection in Denver, CO.:

> Proximate cyst without a distinct cingulum or sulcus. Pericorpus elliptical, with broadly rounded to triangular apical horn and sharply pointed antapical horn. Antapical horn displaced in lateral view, which gives an asymmetric profile to the cyst; antapical horn 7 μm to 10 μm long. Periphragm thin (less than 1 μm) and non-tabulate. Surface has irregularly spaced granules (.5 to 1 μm) and occasional baculae (and echinae?) which are not uniform in size. Pericoel 1 to 5 μm wide in equatorial region. Endocorpus distinct and elliptical in outline, lying in close proximity to pericorpus in equatorial region and projecting slightly into bases of apical and antapical horns. Endophragm thin (less than 1 μm); compression folds present in most specimens. Surface of endocorpus scabrate. Tabulation indistinct. The archeopyle is a compound apical aperture, but the exact nature cannot be discerned. *Dimensions*: based on 25 specimens; average values are in parentheses. Pericorpus, length, 45 μm (57 μm), 66 μm; width 38 μm (42 μm) 47 μm. Endocorpus, length, 37 μm (44 μm), 55 μm; width 30 μm (38 μm) 44 μm (Engelhardt, 1976, p. 122).

The description is virtually identical to that of cysts from which the vegetative stage corresponding to *Peridinium wisconsinense* Eddy was produced by germination of cysts in culture from Honey Harbour (McCarthy et al., 2011); the bright red colouration just prior to excystment was also observed during a bloom of *P. wisconsinense* in Buckthorn Lake, Ontario by Nicholls (1973). Engelhardt (1976) cited size and differences in ornamentation as diagnostic criteria to differentiate the Miocene cysts from those illustrated by Wall and Dale (1968) and "type B" cysts from Holocene sediments in Glatsch Lake, Minnesota described by Norris and McAndrews (1970). Acetolysis was performed in both of these studies, however,

swelling the cysts. Proximocavate cysts in unacetolysed preparations from Honey Harbour, Lake Huron are of comparable size to cysts described as *Geiselodinium tyonekensis* (outer layer length: 61.8 µm, stdev = 5.6 µm; width: 45.2 µm; stdev = 4.2 µm; inner layer, length: 46.0 µm, stdev = 4.5 µm; width: 42.8 µm, stdev = 4.5 µm), and ornamentation varies substantially, from scattered granules to accumulations of these granules, producing finely to roughly scabrate texture (McCarthy et al., 2011). The cyst stage of the dinophyte *Peridinium wisconsinense* Eddy should thus probably be referred to using the validly erected binomen *Geiselodinium tyonekensis* Engelhardt.

The preservation of these cysts in the Tyonek Fm is consistent with their high preservation potential, substantially extending the range of this dinoflagellate. Based on large subunit ribosomal DNA (LSU rDNA) sequences from cysts from Plastic Lake, Ontario, Luo et al. (in press) inferred that *Peridinium wisconsinense* Eddy evolved from brackish/ estuarine ancestors of the *Scrippsiella* lineage. *P. wisconsinense* belongs to the same "CHI" subclade as the calcareous cyst-forming open

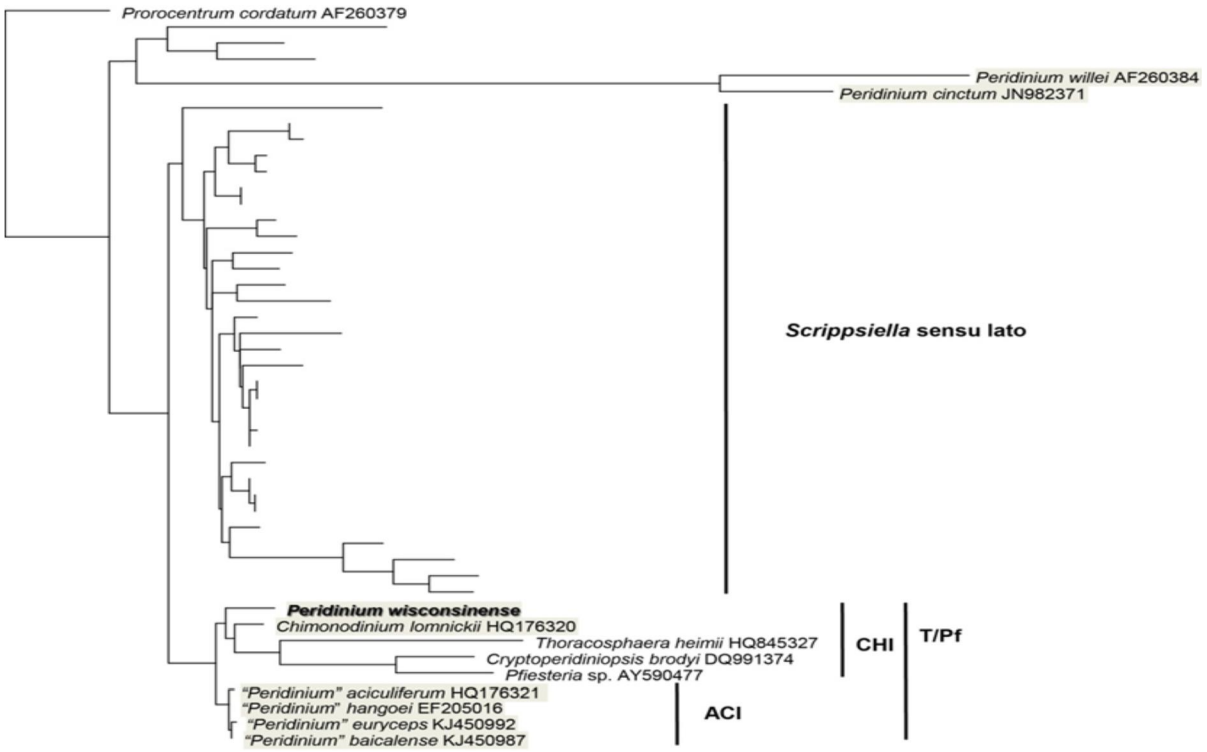

Fig. 2. Phylogenetic tree inferred from partial LSU rDNA sequences based on maximum likelihood (ML) using *Prorocentrum cordatum* as outgroup, simplified and redrawn from Luo et al. (in press). *Peridinium wisconsinense* belongs to the T/Pf = clade of *Thoracosphaera*, *Pfiesteria* and related species, including the ACI subclade in which Annenkova et al. (2015) described radiation. The CHI subclade is separated from *Peridinium willei* and *Peridinium cinctum* (the type species of the genus *Peridinium* Ehrenberg) by many species of the *Scrippsiella* sensu lato clade that includes many brackish taxa. Several independent adaptations to freshwater environments appear to have occurred in dinoflagellates, and the late middle Miocene record of *Geiselodinium tyonekensis* provides a minimum age for the evolution of *Peridinium wisconsinense* from a probable *Scrippsiella* –like brackish ancestor.

marine *Thoracosphaera heimii* (Lohmann) Kamptner, and various organic cyst-forming heterotrophic pfiesteriaceans as well as the closely related *Chimonodinium lomnickii* (Wołoszyńska) Craveiro, Calado, Daugbjerg, Gert Hansen & Moestrup that produces tiny cysts with a very low fossilization potential (Fig. 2). This appears to record very rapid speciation in response to adaptation to different ecological conditions, as recently postulated by Annenkova et al. (2015) for the closely related "ACI" subclade.

The Tyonek Fm in the Cook Inlet region has been assigned a late middle Miocene age (Zippi and Loveland, 2012), a time associated with rapid glacioeustatic lowering (recorded by major $\delta^{18}O$ increases; John et al., 2004; Miller et al., 2011; Browning et al., 2013). The isolation of coastal water bodies during the Serravallian would have strongly selecting for taxa that could adapt to fresh water – an explanation invoked by Masure et al. (2013) to explain the increasingly common occurrences of dinoflagellate cysts from freshwater environments unequivocally without marine influence following their first occurrence in the Eocene, e.g., Traverse, 1955; Krutzsch, 1962; Harris, 1973; Evitt, 1974; Krutzsch and Pacltova, 1990; Batten et al., 1999; Kohler and Clausing, 2000; Lenz et al., 2007).

While advances in DNA sequencing are questioning long-held assumptions about unicellular eukaryotes, the combination of palynological and phycological approaches is proving essential to understanding freshwater dinoflagellates.

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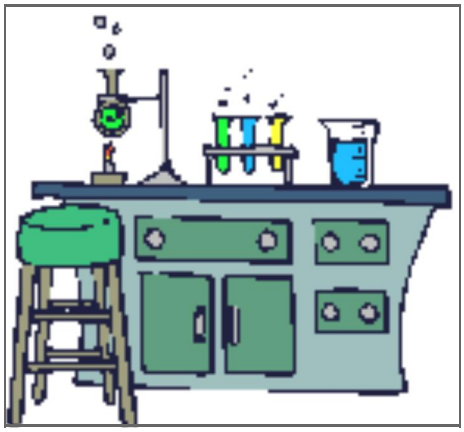

News
from the Laboratory for Paleoclimatology and Climatology (LPC), Department of Geography, Environment and Geomatics, University of Ottawa

The LPC project "*Ecosystem Evolution of North America from the Full Glacial through the Anthropocene*" advanced this year with the publication of a study plotting the time-space distribution of population of North America for the past 15,000 years (see ref list). Ongoing work on archaeological radiocarbon dates as indicators of paleo-population size and spatial distribution has led to an update of the Canadian Archaeological Radiocarbon Database (CARD) which is now available at www.canadianarchaeology.ca/. This database contains more than 30,000 radiocarbon dates spanning North America. These data are available for downloading and new submissions are welcome.

Ph.D. student Michelle Chaput and Dr. Konrad Gajewski are leading a research program on prehistoric land cover change in North America as part of the international PAGES LandCover6k working group. Land cover change will be analyzed using the REVEALS model which quantitatively reconstructs regional vegetation abundance from pollen assemblages from large (>100 ha) lakes (Sugita, 2007, *Holocene*, 17: (229-241)). Results will be synthesized with similar reconstructions from South America, Europe, Africa, Eurasia and Australia as well as estimates of land use change obtained from parallel international working groups. Efforts are being made to globally aggregate evidence of prehistoric land use and land cover change so that future models of early anthropogenic activity may be improved.

Björn Kriesche, a PhD student from the Department of Stochastics at Ulm University travelled to the LPC in October, 2015 (funded by the German Academic Exchange Service). His visit was part of an ongoing collaboration to study paleodemographic change in North America and the influence of prehistoric land use on vegetation composition. Work is in progress to compare these results to pollen records from NEOTOMA and identify relationships between population density and vegetation change.

Brazilian international undergraduate student Shirley Maria Lima Sabino was a student at the LPC from May to December, 2015 working with PhD student Karen Neil on Holocene precipitation and droughts in the Ottawa-Gatineau region.

Dr. Ekaterina Ershova from Moscow also visited the LPC this autumn working on various pollen projects.

Recent Publications

*Bringué, M., V. *Pospelova, S.E. Calvert, R. J. Enkin, T. *Lacourse, and T. Ivanochko (in press). High resolution dinoflagellate cyst record of environmental change in Effingham Inlet (BC, Canada) over the last millennium. *Palaeogeography, Palaeoclimatology, Palaeoecology.* 441(4), p. 787-810.

*Chaput, M, B Kriesche, M Betts, A Martindale, R Kulik, V Schmidt and K * Gajewski. (2015) Spatio-Temporal Distribution of Holocene Populations in North America. *Proceedings of the National Academy of Sciences (USA)* 112:12127-12132. doi:10.1073/pnas.1505657112.

*Chaput, M.A., and *Gajewski, K. (in press) Radiocarbon Dates as Estimates of Ancient Human Population Size. *Anthropocene*. doi:10.1016/j.ancene.2015.10.002

Fortin, M-C, AS Medeiros, K *Gajewski, EM Barley, I Larocque-Tobler, DF Porinchu and SE Wilson (2015) Chironomid-environment relations in northern North America. *Journal of Paleolimnology* 54: 223 -237. doi: 10.1007/s10933-015-9848-0.

*Gajewski, K. (2015) Quantitative reconstruction of Holocene temperatures across the Canadian Arctic and Greenland. *Global and Planetary Change* 128: 14-23. doi: 10.1016/j.gloplacha.2015.02.003.

*Gajewski, K. (2015) Impact of Holocene Climate Variability on Arctic Vegetation. *Global and Planetary Change* 133: 272 -287.doi:10.1016/j.gloplacha.2015.09.006.

Kaufman, DS Y Axford, A. Henderson, N McKay, WW Oswald, C Saenger, RS Anderson, H Bailey, B Clegg, K *Gajewski, FS Hu, M Jones, C Massa, C Routson, A Werner, M Wooller, Z Yu. (in press) Holocene climate changes in eastern Beringia (NW North America) – a systematic review of multi-proxy evidence. *Quaternary Science Reviews.*

Keizer, P, K *Gajewski and R McLeman. (2015) Forest dynamics in relation to multi-decadal Holocene climatic variability, eastern Ontario, Canada. *Review of Palaeobotany and Palynology* 219: 106-115. http://dx.doi.org/10.1016/j.revpalbo.2015.04.001.

Ladd, M., R.G. Way, and A.E. Viau (2015) The impact of using different modern climate data sets in pollen-based paleoclimate reconstructions of North America. *Quaternary Science Reviews*. 112: 78-85.

*Mathewes, R. W., O.B. Lian, J.J. Clague, and M.J. Huntley (2015). Early Wisconsinan (MIS 4) glaciation on Haida Gwaii, British Columbia, and implications for biological refugia. *Canadian Journal of Earth Sciences*, *52*(11), 939-951.

Medeiros, AS, K *Gajewski, J Vermaire, D Porinchu and B Wolfe (2015) Detecting the influence of secondary environmental gradients on chironomid-inferred paleotemperature reconstructions. *Quaternary Science Reviews* 124: 265-274. 10.1016/j.quascirev.2015.07.010.

Mertens, K.N., Y. Takano, H. Gu, A. Yamaguchi, V. *Pospelova, M. Ellegaard, and K. Matsuoka, (2015) The cyst-theca relationship of a new dinoflagellate with a spiny round brown cyst, *Protoperidinium lewisiae*, and its comparison to the cyst of *Oblea acanthocysta*. *Phycological Research,* 63, p. 110–124.

*Pendea, I.F., H. Harmsen, D. Keeler, E.B.

Zubrow, G. Korosec, E. Ruhl, I. Ponkratova, and E. Hulse (2015) Prehistoric human responses to volcanic tephra fall events in the Ust-Kamchatsk region, Kamchatka Peninsula (Kamchatsky Krai, Russian Federation) during the middle to late Holocene (6000–500 cal BP). *Quaternary International*, DOI:10.1016/j.quaint.2015.07.033.

*Pospelova, V., A.M.*Price, T.F. Pedersen, (2015) Palynological evidence for late Quaternary climate and marine primary productivity changes along the California margin. *Paleoceanography*, 30(7), p. 877–894, DOI: 10.1002/2014PA002728.

Zonneveld, K.F. and *Pospelova, V. 2015. A determination key for modern dinoflagellate cysts. *Palynology*, 39, p. 387-409. http://dx.doi.org/10.1080/01916122.2014.990115

* denotes a CAP member

I recently received a question from Randal Mindell at Douglas College regarding the processing of Mesozoic samples:

Are there sample preparation and staining methods to distinguish the chitinous fraction of a Mesozoic sample from the sporopollenin fraction?

If you can help Randal, please let me know (ifpendea@lakeheadu.ca) and I'll be sure to pass your answer to him.
Thank you in advance for your help!

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PAN CONFERENCE REPORT

The 8th Annual International Conference of the Palynological Association of Nigeria (PAN) was held from May 4-6, 2015 at the University of Ibadan, Ibadan, Nigeria. The theme of the conference is: *The Versatility of Pollen and Spores: Dead or Alive*.
The conference commenced with a one-day workshop (the first of its kind) to further sensitize and reawaken the knowledge of participants on key aspects of palynology. The workshop was conducted by key resource persons on: (i) *Palynology and its Application to Sequence Stratigraphy*; (ii) *Philosophy and Principles of Palynology* and (iii) *Data Processing Techniques*.
Prof Francisca Oboh-Ikuenobe of the Missouri University of Science and Technology (Missouri S&T), Rolla, USA set the workshop rolling by taking the participants through an exercise that provided the steps to building sequence models of classic shoreline depositional systems using a measured section from the Book Cliffs of Utah as example.
On her part, emeritus Professor M. A. Sowunmi dwelled on the philosophy and principles of palynology while Drs O. Emuobosa (UI) and P. A. Adeonipekun (UNILAG) rounded up the sessions with palynological data processing techniques.
At the opening ceremony, the keynote speaker, Professor Francisca Oboh-Ikuenobe gave an insight into *Applied Palynology*. Many of the presentations at the technical sessions illustrated the theme of the conference and the wide application of palynology in such fields of apiculture, environmental studies, archaeology and public health.
At the Business Meeting of the association, the next conference has been scheduled to come up at the University of Lagos, Lagos, Nigeria in May, 2017.

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

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