Canadian Association of Palynologists
Association Canadienne des Palynologues
# NEWSLETTER
Volume 44 Number 2 December 2021

## *President's Message*

I am writing this message on behalf of our outgoing president, Anna Pieńkowski, who is unavailable at this time due to personal matters. It is a great honour and privilege to take over from Anna on January 1, 2022, and to work alongside my fellow Executive members in guiding our association through its next chapter.

As 2021 comes to an end, I would like to thank all our members for their support and for their hard work in promoting the Canadian palynology through their research and teaching and through their participation on the international arena. I particularly would like to thank our Executive members, Francine McCarthy, for her hard work as Secretary-Treasurer, Manuel Bringué, for his dedication to updating and improving our association's website, Estelle Allan for her passion and hard work as Newsletter Editor, and Terri Lacourse for representing us on the international stage as IFPS councillor.

Many of us had a chance to meet recently for our Annual General Meeting held on November 4th (2021) in conjunction with the Geological Association of Canada/Mineralogical Association of Canada meeting that took place in London (ON). We had a great meeting and a good time together discussing a range of issues affecting our association. One of the most pressing issues identified at the meeting was that of our future as an association, in particular our waning membership and decrease in member participation and involvement. In response to this situation, all members gathered agreed to the creation of a new position – that of Engagement Officer – to promote and increase the visibility of our association on the national and international stage and to recruit new members, in particular early career palynologists. It is my great pleasure to introduce you to our first Engagement Officer, Diana Tirlea, who will be leading this effort in the next period. Together with Nick Riddick, Diana has already started to spearhead several initiatives geared towards attracting new interest in our association. In support of Diana's work, I would like to take this opportunity to ask everyone, especially the heads of labs around the country to encourage their colleagues, students and postdocs to join our association and to help us promote Canadian palynology as widely as possible.

In the spirit of this renewed effort to boost our visibility, CAP is continuing its efforts to prepare a bid for holding an upcoming IPC conference – the IPC 2028 - in Canada. To this end, please let us know if you have ideas or suggestions regarding venues, special sessions or any other initiatives that could help make our bid successful.

Lastly, I would like to take this opportunity to wish you all a happy and safe holiday season and many successes in the year to come.

Florin Pendea
CAP President-elect
ifpendea@lakeheadu.ca

## CAP EXECUTIVE 2021

*President:* Anna Pieńkowski
*President-elect:* Florin Pendea
*Newsletter Editor:* Estelle Allan
*Secretary-Treasurer:* Francine McCarthy
*Website Editor:* Manuel Bringué
*IFPS Councillor:* Terri Lacourse

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## *Editor's Notes*

Thanks a lot to all who contributed material for this edition of the CAP Newsletter: J. Bek, B. Fréchette, K. Gajewski, S. McLachlan, L. Perrier, V. Pospelova, P. Richard, D. Tirlea, J. Vallerand.

## *Deadline for NextCAP Newsletter*

Please submit items for the next issue of the CAP Newsletter (Volume 45, Number 1, May 2022) by April 15, 2022. Conference reports, announcements, field trip reports, notices of new books, dissertation abstracts, book reviews, news, unidentified palynomorphs and essays on topics relevant to Canadian palynology are all welcome. Please send contributions to:

**Estelle Allan**
**CAP *Newsletter* Editor**
estelle.allan@mcgill.ca

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## *International seminar*


14th International Conference on Paleoceanography 2022 will take place in Bergen, Norway, from 29 August 2022 to 2 September 2022. All Abstracts must be submitted by 3 April 2022 ICP14 will cover all topics and disciplines relevant for the study of the past ocean and for understanding the ocean's role in the Earth Climate System. Following the tradition of ICP, all science will be presented during invited talks in plenum and extended poster sessions.



PAGES
6th Open Science Meeting (OSM)
4th Young Scientists Meeting (YSM)
"Learning from the past for a sustainable future"
Online meeting the 6th OSM from 16-20 May 2022 and the 4th YSM 9-13 May 2022


2021 CAP AGM attendees (Alwynne B. had to leave before the group picture).

## *Minutes, Annual General Meeting, Canadian Association of Palynologists Thursday, November 4, 2021, 12:00 PM EST, GAC-MAC/hybrid meeting*

Members present:
Florin Pendea (Meeting Chair, President-Elect and outgoing Newsletter Editor), Manuel Bringué (Meeting Secretary, Website Editor), Estelle Allan (Newsletter Editor), Alwynne Beaudoin, Francine McCarthy (Secretary-Treasurer), Sandy McLachlan, Peta Mudie, Matthew Peros, Nicholas Riddick, Diana Tirlea, Cesar A. Vera Florez. Quorum reached.

Meeting called to order by Florin P., 12:00 pm EST

1. Acceptance of agenda
Peta M. moved to accept the agenda, seconded by Diana T. Motion carried, agenda accepted.

2. Reading of the Minutes of the 2019 Annual General Meeting, Québec, QC
Florin P. gave members in attendance a few moments to read the Minutes of the 2020 CAP Annual General Meeting.

3. Business arising from Minutes
Francine M. reminded members in attendance that CAP still plans on submitting a bid to host an upcoming IPC conference in Canada, only now for the 2028 meeting as the Prague meeting, delayed due to the pandemic, will take place in 2024. Given the new timeline, Francine remains happy to help but won't lead the effort. Manuel B. will update the webpage to reflect the new timeline.

4. President's report, Anna Pieńkowski (*in absentia*)
There is no President's report due to extenuating circumstances. There may be a statement in the December Newsletter.

5. Secretary/Treasurer's report, Francine McCarthy
Francine M. provided a summary of her report as Secretary Treasurer. Membership is stable at ~ 35 members, which is still quite low and reiterates the need for a new Engagement Officer to boost CAP membership. E-transfers make things much easier. Membership dues are barely enough to cover the CAP Student Award.

6. Auditor's statement, Diana Tirlea
Diana T. provided a summary of her audit, things are in order. She brought up that no donation helped fund the Student Award this year, which constitutes a potential risk for future years if membership cannot offset the Student Award.

7. Newsletter Editor's reports, Estelle Allan and Florin Pendea
Two reports were provided this year, since Estelle A. relieved Florin P. as Newsletter Editor in the winter of 2021.
Florin P. read a summary of his Newsletter Editor's Report, thanking contributors such as Peta M. Diana T. thanked Florin for his numerous years of service and dedication to producing high-quality Newsletters for CAP; all in attendance echoed Diana T.'s comment.
Estelle A. provided a summary of her report, thanking several contributors including Rolf Mathewes, Konrad Gajewski and Pierre Richard. Besides her commitment to continue including "fun" items in the Newsletter, Estelle invites contributions in French for a better representation of diversity within CAP ranks. Francine M. suggested adding a "mot caché" to her cross-words to promote French in the Newsletter. Estelle A. was congratulated and thanked by all for taking on this position.

8. Website Editor's report, Manuel Bringué
Manuel B. gave a summary of the Website Editor's report. CAP's web presence is healthy, and the Opportunities page remains a great way to reach the membership (and beyond) about openings in Canadian palynology labs. The CAP membership form was recently converted to an electronic format, which should ease to process of joining/renewing. Francine M. and Florin P.

thanked Manuel B. for modernising the CAP website.

9. CAP Councillor to IFPS' report, Terri Lacourse (*in abstentia*)
No news from IFPS to report.

10. Appointment of auditor
Florin P. moved to nominate Diana T. and Sarah Finkelstein as possible auditors for next year's review. Francine M. seconded. Everyone was in favor, motion was carried.
The purpose of the second nomination was to ensure no conflict of interest would arise in case Diana T. becomes a member of the Executive (see item 13), as the review of CAP's finances should remain "external".

11. Location of 2021 AGM
CANQUA (UNBC, Prince George, August 2022), GAC-MAC (Halifax, May 2022) and GSA (Denver, October 2022) were suggested as possible venues. A hybrid (online) format is to be adopted no matter which venue is chosen.
Matter was put to the vote: 8 were in favor (1 abstaining) of CANQUA, 2 in favor of GAC-MAC. CANQUA (UNBC, Prince George, August 2022) was thus chosen as the preferred option for a hybrid AGM.
Francine M., as CAP Secretary-Treasurer, will formally ask CANQUA President Matthew P. by email, to inquire if the organizing committee would agree.
Alwynne B. and Diana T. suggested proposing a CAP special session to encourage attendance and showcasing Canadian palynology, provided there is still time to do so.

12. Vacancy on Executive
The position of President-Elect will be vacant as of January 2022, when current President-Elect Florin P. will relieve CAP President Anna Pieńkowski. A call for nominations will be put forth in the December Newsletter. The new President-Elect will be elected at the 2022 AGM.
Manuel B. intends to nominate Dr Jennifer Galloway (Geological Survey of Canada) who previously expressed interest, which Francine M. would also support. Additional nominations are of course welcomed.

13. New executive position: Engagement officer
As discussed at the 2020 AGM and within the Executive, there is a need for a new Engagement officer, to boost membership and increase engagement among our community and beyond. For practical reasons, it was decided that creating an *ad hoc* position would be far easier than creating a new position on the Executive.
Peta M. moved to create an *ad hoc* position of Engagement Officer for CAP, seconded by Alwynne B. Motion passed.
Manuel moved to nominate Diana T. for the position of Engagement Officer, seconded by Francine M. Everyone was in favor, motion was passed.
Diana T. will take on that new role and gather a team that will help her in her tasks: Nicholas R. volunteered and Scott Cocker had also previously expressed interest.

14. Priorities and Goals
CAP's priority remains to boost membership. Newly appointed Engagement Officer and her team will tackle this pressing issue.
Florin P. suggested to compose more personal/targeted emails to the heads of palynological labs, promoting the association to their group members.

15. Other Business
Peta M. asked if donations to CAP were tax-deductible. Francine M. confirmed the associated is registered as a non-for-profit and she can issue official receipts upon request, but she will confirm at a later date.

16. Adjournment
Francine M. moved to adjourn the AGM, seconded by Florin P. Meeting adjourned at ~ 1:15 pm EST.

## *Executive reports*

### *Secretary/Treasurer's report*

This is my second year in this stint as Secretary Treasurer for CAP and it has been relatively uneventful. We are in the black by only $100.58 (an odd total due to foreign exchange rates) and although our financial status remains relatively healthy, we will have to recruit new and loyal members for the association to thrive into the future. The number of members in good standing is 29, down slightly from 31 at the last AGM, although I have had assurances from several long-time members that they would be renewing upon realizing that they are not in good standing when the AGM notice was sent out). Diana Tirlea will be helping me send out reminders to CAP members whose membership expired in the past few years (unless we have received word of formal withdrawal) and we will brainstorm on ways to enlarge our membership. I have not received a request for transfer of fees to IFPS for 2021 or 2022, but we will send these if/ when we receive the invoice.

Sincerely,

Francine M.G. McCarthy

**Summary of Financial Transactions Since Last AGM, as at midnight November 1, 2021**

**Account Balance October 27, 2020 $6943.70**

**Revenue:**

Membership dues 12* $40 (3-yr) $480.00
Membership dues 1*$60 (4-yr -incl 1 year catch-up) $60.00
Donations $74.08

**TOTAL REVENUE $614.08**

**Expenditures:**

Corporations Canada Filing (2021) ($12.00)
Banking fees ($1.50)
CAP Award ($500.00)

**TOTAL EXPENDITURES ($513.50)**

**NET Revenue $100.58**

**Account Balance October 27, 2020 $7044.28**

### *Newsletter Editor's Report 1*

This is my last report as CAP Newsletter Editor. Dr. Estelle Allan took over from me on January 1, 2021. In this cycle, I have edited one issue of the newsletter.

The December 2020 Newsletter (Vol. 43, No. 2) had 26 pages and was distributed to CAP members on December 27th, 2020. This issue included notes and reports from our AGM held on October 29th, 2020, and a series of articles and announcements from our professional community. Most notably, the issue featured a very interesting article on neglected Arctic NPP by Peta Mudie and a celebration of our distinguished colleagues Anne de Vernal and Pierre Richard for their recently obtained honours.

I wish to take this opportunity to thank Estelle Allan for her willingness to continue this important work and wish her a successful tenure as Editor of our newsletter.

Respectfully submitted,

Florin Pendea
Orillia (ON), October 18, 2021

### *Newsletter Editor's Report 2*

I took over as Newsletter Editor this winter. I had the chance to be in charge of the last Newsletter (Volume 44, Number 1, May 2021), distributed on May 4th. The Newsletter has 12 pages and included information about some upcoming meetings relevant to Canadian palynologists: a nice note from Rolf Mathewes, a very interesting article from Konrad Gajewski named "Pollen records of shrubbification and treeline dynamics in eastern North America: an update", as well as short announcements and new dissertations. I also took the liberty of adding two new items to the Newsletter, a crossword and a mystery palynomorph.

Do not hesitate to send me your ideas of what you would like to see in our Newsletters. Merci à toutes les personnes qui m'ont envoyé des

encouragements.
Contributions (en français ou en anglais) for the next issue of the CAP Newsletter (Volume 44, Number 2, December 2021) will be accepted until December 15, 2021.
Bien à vous,

Estelle Allan
CAP Newsletter Editor

### *Website Editor's Report*

CAP continues to maintain a healthy online presence through the CAP website, hosted by WordPress (capacp.wordpress.com) since 2017. I am reporting here on the last year, since the last "virtual" AGM on October 29, 2020. Below is a chart (Fig. 1) of monthly views since the beginning of 2020, and the period reported on here is indicated by the red rectangle.
Over the last year, the website was accessed 2,410 times, with an average of ~ 200 monthly views. This represents a ~ 28% increase in views compared to the last reporting period, and brings us even slightly above pre-pandemic levels. Most viewers accessed the site from Canada, but the website also attracted viewers from the US, India, Pakistan, the UK and several other countries (Fig. 2).
Overall, the most viewed pages over the last year were the Home page (385 views), Opportunities page (373 views), CAP Newsletters (280 views) and Equipment and Laboratory Supplies (261 views). Most downloaded files so far in 2021 are CAP Newsletters (multiple issues, including four with > 200 downloads) and the Lycopodium batch 3862


**Fig. 1.** Total monthly views (all pages combined) from May 2018 to October 20, 2020. Current reporting period indicated with red rectangle.

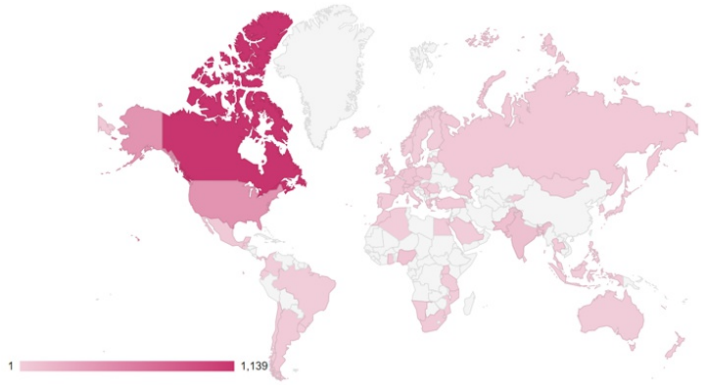


**Fig. 2.** CAP website views per country over the last 365 days (ending on Oct. 29, 2021). Out of a total of 2,410 views, Canada accounted for 1139, the US 433, India 101, Pakistan 94, the UK 86; all other countries identified on the map had less than 67.

information (216 downloads), CAP newsletters (multiple issues, up to 184 downloads per file) and opportunities announcements. Most "clicks" to external content were related to links on the Opportunities page.
I have just finished converting the CAP Membership form to an online format (capacp.wordpress.com/membership/), which still needs to be tested, but will hopefully ease the Secretary/Treasurer's task at the beginning of each calendar year. Feedback is always valued and appreciated.
Thus the CAP website continues to serve the Canadian palynological community well and provides relevant information worldwide. It continues to serve as a viable repository for past Newsletter issues, which contain most of the information relevant to curious or prospective palynologists. This report also highlights that the Opportunities page can be a powerful tool to anyone who wants to post or inquire about potential positions across our network. New submissions to the Newsletter and/or website are always welcomed!
Respectfully submitted,

Manuel Bringué
CAP Website Editor
October 29, 2021

## *CAP Financial Audit*

October 30, 2021
RE: Fall 2020-2021 Auditor's Financial Report for the Canadian Association of Palynologists (CAPS)

Review Period: September 25, 2020 (Balance $6858.70) until October 14, 2021 (Balance $6,864.28)

Dear Executive Board and Members:

For auditing purposes, Francine McCarthy (Secretary-Treasurer, CAPS), provided me, Diana Tirlea (Member, CAPS), with two documents on October 28, 2021: a bank statement dated October 26, 2021 (BMO, Stoney Creek) and a spreadsheet of all financial transactions up until October 14, 2021. Upon review of these documents, they appear to be complete, fair, and a transparent representation of CAPS financial records to date.

The provided bank statement and recorded financial transactions indicates that CAPS is in good and secure financial standing, to support reoccurring annual expenditures of bank and corporation fees, and awarded student grants. The current balance is $6,864.28. Unlike last year's audit review, where charitable donations offset all of the annual costs, for this audit period the majority of revenue accrued mainly through annual membership fees ($440.00), and less-so through donations ($79.08). However, together, fees and donations offset all annual costs for this review period including the corporation filing fees ($12.00), bank fees ($1.50), and the awarded 2021 CAPS Annual Student Research Award ($500.00).

It will be important to continue to obtain regular memberships and donations, to offset yearly costs, including any awards provided by CAPS. With the $40 3-year renewal option for memberships, there may be years were current members are not renewing, which may reduce revenue from membership to pay annual expenses. To reduce risks here, CAPS can encourage new members and former members to update their memberships, use the reserve funds, bring awareness about the organization, fundraise, and/or obtaining donations from supporters.

Thank you for the opportunity to review the provided financial and transaction records for CAPS.
Sincerely,

Diana Tirlea, MSc (she/her)
Quaternary Environments, Royal Alberta Museum
diana.tirlea@gov.ab.ca
https://royalalbertamuseum.ca/

## *Call for contributions-manuscript*

Call for contributions-manuscript in a special issue of Review of Palaeobotany and Palynology concerning reproductive organs of fossil plants (Paleozoic to Tertiary) and their in situ spores and pollen (Jiří Bek, Evelyn Kustacher, Barry Lomax and Hendrik Nowak) for more information please contact Jiří Bek; bek@gli.cas.cz.

***Reproductive organs of fossil plants and their spores and pollen: aspects, trends and perspectives***

Dispersed spores and pollen provide a vast amount of information about the vegetation of the past and its changes through time. However, in order to fully utilize this information, we need to understand linking of spores and pollen i.e. isolated from reproductive organs of extinct and extant plants with biological plant groups. This requires knowledge about spores and pollen i.e. isolated from reproductive organs of extinct and extant plants. Conversely, detailed analyses of the reproductive organs of fossil plants and their in situ spores and pollen are often crucial for the precise identification and classification of the whole plant. Important is contribution for reconstructions of plant forests including ecological interpretations of

phytocenoses. In addition to classic morphological and ultrastructural descriptions, chemometric analyses of spores and pollen have recently proven useful for deriving information on the identity and ecological context of the parent plants. Discussions regarding increased occurrences of teratological grains during periods of mass extinction events show how important it is to also understand the intraspecific and ontogenetic variability within taxa, including deviations from the norm and their conditions. The combination of palaeobotanical, neobotanical, and palynological studies thus contributes to a better understanding of the biology, geological distribution, and environmental context of past floral elements, and of the evolutionary relationships between major plant groups.

## *Palynfo*

PhD positions in marine palynology and geochemistry for environmental and paleoclimatic reconstructions at the University of Minnesota
This is to announce that I am currently recruiting graduate students for fall 2022. Multiple Ph.D. positions are available in my new Paleoenvironmental Laboratory at the Department of Earth and Environmental Sciences, the University of Minnesota. Research projects involve applications of marine palynology for environmental and paleoclimatic reconstructions. The Graduate Record Examination (GRE) is NOT required! Interested students should contact Dr. Vera Pospelova by e-mail (https://paleoenvironmental.esci.umn.edu/student-and-postdoc-opportunities).

## *A great loss*

Thane Anderson passed away on October 12, 2021. Thane was a Quaternary palynologist, a great research scientist who worked for many years with the Geological Survey of Canada (Terrain Sciences Division). He will be missed, and our thoughts are with his family and friends.

https://www.arbormemorial.ca/capital/obituaries/thane-wesley-anderson/72800

## *Featured Article*

Joan Vallerand & Anne de Vernal
Department of Earth and Atmospheric Sciences
University of Quebec in Montreal

### *Climate oscillations of eastern Hudson Bay over the past three thousand years from marine and terrestrial palynological tracers*

Hudson Bay can be considered a climate barometer. By its northern geographic position, this singular ecosystem is very interesting because it is bordered by the northern tree line (Smith and al., 1992) and because seasonal sea ice extends for more than half of the year (Environment and Climate Change Canada, 2021). To document the climate changes in the area, we investigated the palynological content of a sediment core AMD0509-20 (56°23.0340°N -76°34.8180°O) located north of the village of Kuujjuarapik in Nunavik, in eastern Hudson Bay (Figure 1). The analysed section spans the last 3300 years. The quantitative paleoclimatic reconstructions were based on dinocysts, pollen grains, and spores. Reconstructions of sea surface conditions were performed with the Modern Analog Technique (MAT) applied to dinocyst assemblages and using the updated reference database of the Northern Hemisphere that includes 1968 reference sites (de Vernal et al., 2020).

The palynological assemblages are dominated by phototrophic taxa, the cyst of *Pentapharsodinium dalei* being dominant, ranging from 41.4% to 92.1%. The accompanying taxa include *Spiniferites ramosus* (up to 26.1%), *Operculodinium centrocarpum* (up to 23%), *Spiniferites elongatus* (up to 6.9%) and *Spiniferites* spp (up to 2.1%). Although heterotrophic taxa were found in low abundance (3.6 to 22.5%), they record high diversity of species, including *Brigantedinium* spp., *Islandinium minutum*, *Islandinium*? *cezare*, *Islandinium brevispinosum*, the cyst of *Protoperidinium americanum*, *Selenopemphix quanta*, cf. *Polykrikos* of arctic type, cf. *Echinidium*

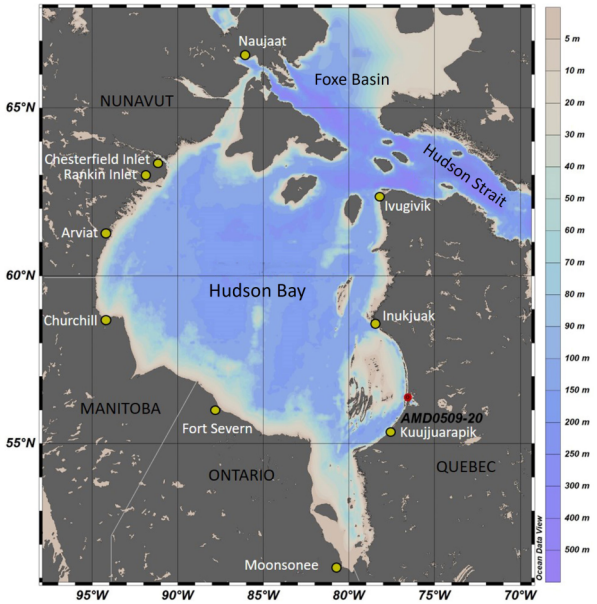


Fig. 1: Map of the study area, and bathymetry from the World Ocean Atlas, 2018 (WOA18). The red dot indicates the location of the coring site AMD0509-20.

*karaense* and *Echinidium* spp.

From ~3300 to 2600 cal yr BP, *Spiniferites ramosus* and *Operculodinium centrocarpum* together record high percentages. The MAT led to reconstruct salinity of 27.7 psu on average and sea-surface temperature of 8.5°C, which is about 2°C higher than today (Figure 2). From ~2600 to 1800 cal yr BP, there is a transition to assemblages dominated by the cyst of *Pentapharsodinium dalei* (51.9 to 80.5%; Figure 2). The MAT-based reconstructions indicate decrease in summer sea-surface temperature from 8.5 to 6.9°C (Figure 2). The salinity does not follow the same pattern and gradually decreases from ~ 30.3 psu, at the end of the warm period 2600 years ago, to nearly 25.4 psu around 1800 cal yr BP (26.5 psu on average). This transition suggests anticorrelation between surface temperature and salinity. After 1800 cal yr BP the dinocyst assemblages are stable and largely dominated by the cyst of *Pentapharsodinium dalei* (>66%; Figure 2). The reconstructions based on modern analogs show summer sea-surface temperatures close to modern values, around ~6,7°C, while salinity decrease reaching values lower than 23 psu at ~600 cal yr BP (Figure 2).

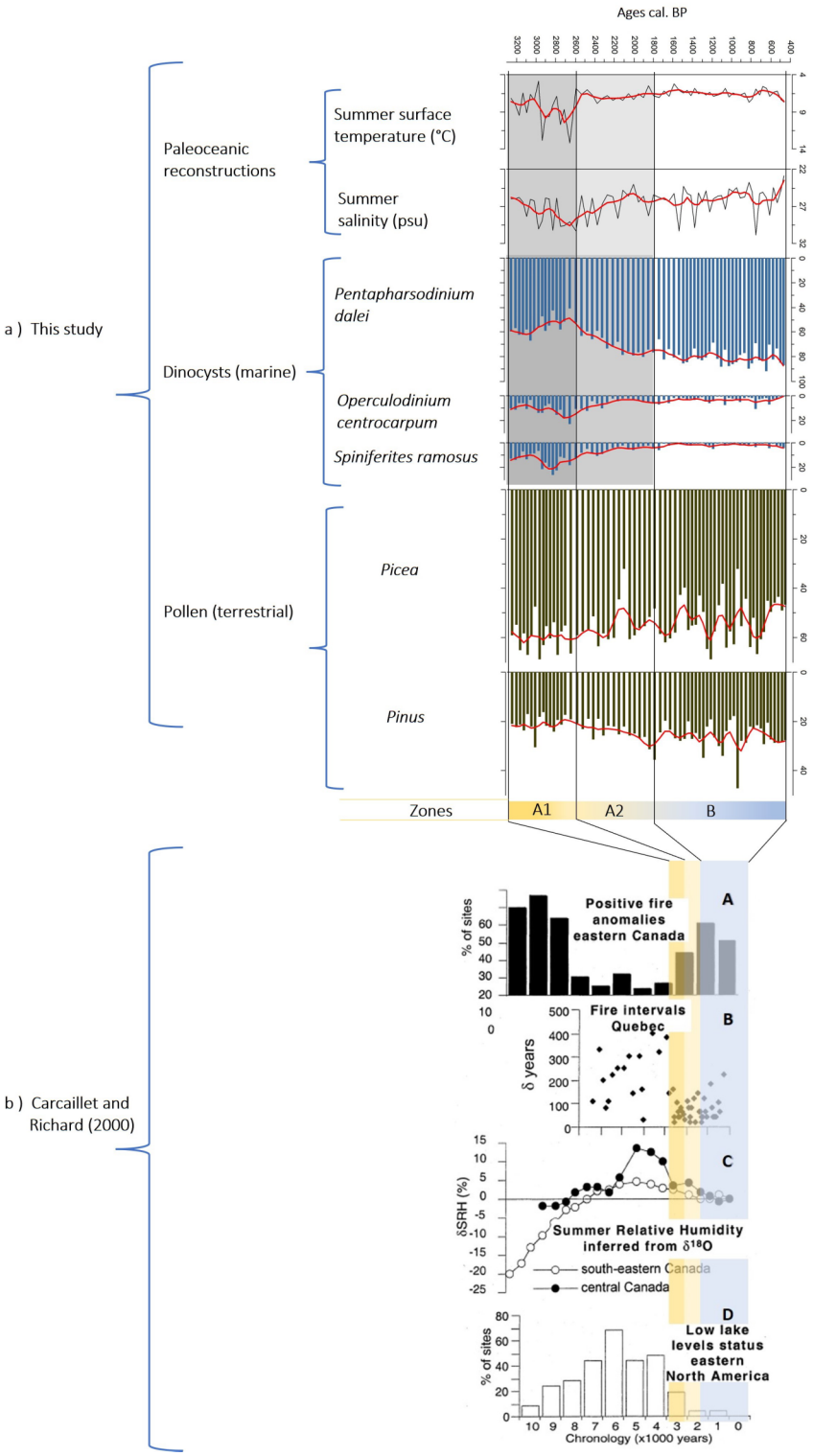


Fig 2: a) Sea surface reconstruction of summer sea-surface temperatures (°C) and salinity (psu) based on dinocyst assemblages. Relative abundance of dominant dinocyst taxa, Picea and Pinus in core AMD0509-20 (Vallerand, 2022). We distinguished two zones (A, B) and two subzones A1 and A2 based on dinocyst assemblages, as shown in dark yellow (~3300 to ~2600 years BP), pale yellow (~2600 to ~1800 years BP) and blue (~1800 to ~460 years BP). b) figures from Carcaillet and Richard (2000) illustrating hydroclimatic seasonality during the Holocene: A-B. Abundance and frequency of fires in western Quebec deduced from micro-charcoal flows; C. summer relative humidity deduced from isotopic analysis of tree rings (data from Edwards et al., 1996): D. The percentage of sites with low lake levels in eastern Canada (Laird et al. 1996).

The pollen and spore assemblages are dominated by *Picea* and *Pinus*, which are accompanied by *Betula*, *Alnus*, and *Salix*, some herbaceous plants, and *Sphagnum*. The percentage of *Picea* is particularly high from ~3000 to ~2650 cal yr BP (around 60%) before decreasing until ~460 cal yr BP. On the contrary, Pinus records an increase. Gajewski et al. (1993; 2021) have also reported similar trends and a maximum of Picea at 2000-3000 cal yr BP in northern Quebec and between 1500 to 2500 cal yr BP on the east coast of Hudson Bay. The decrease of *Picea* pollen abundance could result from an opening of the forest canopy due to cooling as recorded at other sites in the middle and high latitudes of the Northern Hemisphere (e.g., PAGES 2K, 2013; Kaufman et al. 2020). Based on charcoals from numerous sites, Payette and Gagnon (1985) proposed that fire-induced deforestation began about 3000 years ago. This hypothesis was supported by Gajewski et al. (2021). The decline of *Picea* could therefore account for more frequent fire cycles due to dry climate favoring jack pine (Richard, 1979; Desponts and Payette, 1992; Payette and Lavoie, 1994; Lavoie and Sirois, 1998).

The seasonal distribution of precipitation is another parameter that needs to be taken into consideration. Based on charcoal fluxes and lake levels at 30 sites in Quebec and the northern Appalachian Mountains, Carcaillet and Richard (2000) proposed that the lake levels are primarily controlled by winter precipitations while occurrences of fires depend upon summer rainfall. In eastern Canada, the last 2,500 years were marked by enhanced frequency of forest fires (Figure 2), which coincides in our record with lower sea surface temperatures and dense sea-ice cover. A climate with lower evaporation could have led low summer precipitation and overall dryer conditions, thus causing more frequent fires (Carcaillet and Richard, 2000). The low salinity of our reconstructions may reflect the melting of larger sea-ice volume and could also suggest increased freshwater inputs related to precipitations concentrated in the winter season.

In conclusion, our results allow us to propose relationships between continental climate and surface conditions in the marine environments, with the main summer cooling in surface waters occurring between 2600 and 1800 cal. yr BP, making the transition towards dryer summers impacting forest fire regimes.

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## Charcoal on pollen slides and studies of fire history

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You are all certainly aware of the importance of fire in ecosystem dynamics, and also that paleo-studies have provided information about the history of fire during the Holocene. Global databases of lake sediment charcoal have been established (e.g., Power et al 2008) and this work is continuing; there is a new initiative in progress run by Sandy Harrison at Reading U. However, if you try to do a regional analysis, you quickly find that there are actually few charcoal time series available. My question: are you all routinely analyzing and publishing the charcoal on your pollen slides when you do a pollen study? This doesn't take too much time, but the accumulation of these studies can provide important information about environmental history. So I would encourage all pollen studies to include an analysis of the charcoal on the slides and publish this with the pollen data.

Analyzing charcoal is quite easy (e.g., Whitlock & Larsen, 2002). Micro-charcoal can be analyzed on the same slides used for pollen analysis. You can use an image analysis setup, but also can simply use a grid in your eyepiece and estimate the area of charcoal per slide. These are converted to concentrations and influx in the usual way using marker grains. Although there are some programs available to process these data (Blarquez et al., 2014; Higuera et al., 2010), simple plots can also be helpful.

One thing that occurred to me – it may be possible quickly accumulate many charcoal series by analyzing charcoal from previously published pollen studies. Most of us have shelves full of boxes with pollen slides from older published studies. I would encourage people to pull out the old slides, and analyze the charcoal, publish it in some way, and make the data available for synthesis studies (where they would be cited). Down the road, these can be added to NEOTOMA or other database projects, and would be extremely useful to further understanding of ecosystems dynamics. If you wish to discuss this, or need more information, let me know.

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## *Mémoire de l'Est*

Fréchette, B., Richard, P.J.H., Lavoie, M., Grondin, P., Larouche, A.C., 2021. Histoire postglaciaire de la végétation et du climat des pessières et des sapinières de l'est du Québec et du Labrador méridional. Gouvernement du Québec, ministère des Forêts, de la Faune et des Parcs, Direction de la recherche forestière. Mémoire de recherche forestière no 186, 170 p.; Suppléments : 91 p.

https://www.mffp.gouv.qc.ca/documents/forets/recherche/MRF186.pdf
https://www.mffp.gouv.qc.ca/documents/forets/recherche/MRF186-Supplements.pdf

Cette recherche vise à dresser un portrait de l'histoire postglaciaire de la végétation et du climat des pessières et des sapinières de l'est du Québec et du Labrador méridional. Elle repose sur les assemblages polliniques de 35 lacs du domaine bioclimatique de la pessière à lichens et des sous-domaines orientaux de la pessière à mousses, de la sapinière à bouleau blanc et de la sapinière à bouleau jaune. Nous avons examiné les assemblages polliniques des sédiments lacustres, reconstitué la végétation et le climat postglaciaires des sites, puis résumé les résultats à différentes échelles spatiales et temporelles. Les reconstitutions s'appuient sur la méthode des analogues modernes et sur une base de données de 2 418 sites de l'est de l'Amérique du Nord et du Groenland, pour lesquels le climat actuel, l'assemblage pollinique et la végétation sont connus.

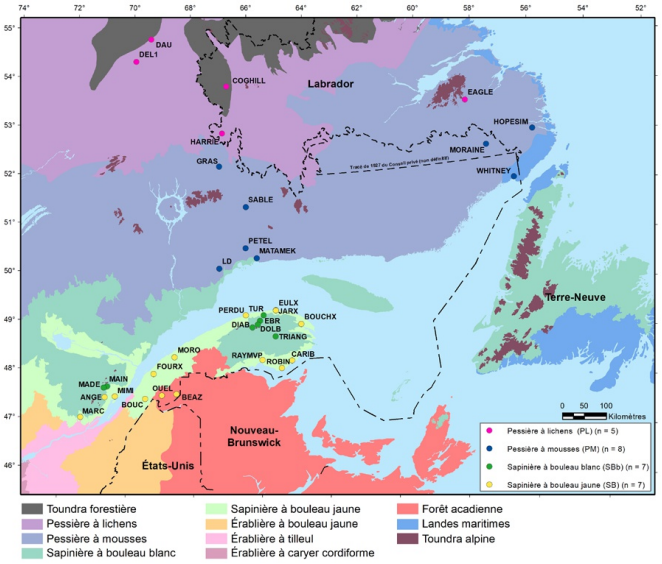
L'histoire de la végétation du territoire comporte 3 phases : une phase non arboréenne de toundra (antérieure à 11000 ans avant aujourd'hui, ou AA), une phase d'afforestation (de 11 000 à 9 000 ans AA) et une phase forestière (de 9 000 ans AA à aujourd'hui). Au début de la période postglaciaire, la mer de Goldthwait submergeait les côtes de l'estuaire et du golfe du Saint-Laurent à l'est de Québec, et des lambeaux du complexe glaciaire des Appalaches persistaient dans le centre de la Gaspésie. Le couvert végétal à proximité du fleuve était alors clairsemé : herbes, ensuite saules (*Salix* sp.) herbacés et bouleaux (*Betula* sp.) arbustifs se sont implantés, constituant des toundras. À l'époque de l'afforestation, les épinettes noires (*Picea mariana* (Mill.) B.S.P.), les peupliers faux-trembles (*Populus tremuloides* Michx.) et les sapins baumiers (*Abies balsamea* (L.) Mill.) étaient présents partout dans les paysages de la Gaspésie, du Bas-Saint-Laurent/Témiscouata et de Charlevoix/Laurentides. Les épinettes noires étaient rares sur la Côte-Nord, mais les épinettes blanches (*Picea glauca* (Moench) Voss.) étaient déjà présentes dans le sud du Labrador. Au début de la phase forestière, le sapin baumier dominait les peuplements de l'est du Québec et du sud du Labrador.

L'âge du début des forêts est asynchrone à travers le territoire en raison de l'emplacement des sites par rapport au front de la calotte glaciaire, alors en récession, ainsi que des conditions de surface des eaux du golfe du Saint-Laurent et de la marge épicontinentale de la mer du Labrador. Pendant la phase d'afforestation et au début de la phase forestière, la composition de la végétation des sites bordant le bas estuaire et le golfe du Saint-Laurent se démarquait de celle des sites en amont et à l'intérieur des terres. Les aulnes crispés (*Alnus crispa* (Aiton) Pursh, synonyme de *Alnus alnobetula* subsp. *crispa* (Aiton) Raus) abondaient dans la région du golfe, et la végétation présente en haute Gaspésie se comparait davantage à celle en Côte-Nord qu'à celle rencontrée à la baie des Chaleurs et du Bas-Saint-Laurent/Témiscouata. Par la suite, de 7 000 à 5 000 ans AA, une répartition de la végétation semblable à celle observée aujourd'hui

s'est mise en place, et le contraste de végétation observé s'est amoindri entre la haute Gaspésie et la baie des Chaleurs. Depuis environ 4 000 ans AA, les populations de pins blancs (*Pinus strobus* L.) déclinent dans le paysage forestier au profit des espèces boréales comme l'épinette noire.
Les reconstitutions climatiques montrent un réchauffement graduel de la température de juillet de 4 °C jusque vers 7 000 ans AA, suivi d'un refroidissement de 1 °C. Les précipitations annuelles ont augmenté de 500 mm de 11 000 à 5 000 ans AA, puis sont demeurées relativement stables jusqu'à nos jours. Une transition climatique est notée vers 7 500 ans AA. Dans l'est du Québec, le climat du début de la phase forestière était alors plus chaud et plus sec qu'aujourd'hui; la circulation atmosphérique d'ouest en est s'est intensifiée et la nébulosité estivale a augmenté. Cela pourrait s'expliquer par un plus grand échange d'humidité entre l'océan et l'atmosphère, entraînant une fréquence accrue d'épais brouillards. La fin des apports d'eau de fonte glaciaire dans le fleuve et le golfe du Saint-Laurent, l'instauration des conditions actuelles des eaux de surface dans la mer du Labrador, et une circulation atmosphérique de source davantage polaire expliqueraient la transition climatique observée vers 7 500 ans AA.

The aim of this research is to produce a complete picture of the postglacial history of the vegetation and climate in spruce and fir forests in eastern Quebec and southern Labrador. The study is based on pollen assemblages from 35 lakes in the spruce–lichen bioclimatic domain and the eastern spruce–moss, balsam fir–white birch and balsam fir–yellow birch subdomains. We analyzed the pollen assemblages from lake sediments, reconstructed the postglacial climate and vegetation of the sites, then summarized the results at different spatial and temporal scales. These reconstructions are based on the modern analogue technique and on a database of 2 418 sites in eastern North America and in Greenland for which the pollen assemblage, vegetation and climate are known.

The history of the study area's vegetation can be divided into 3 phases: a non-arboreal tundra phase (predating 11 000 years before present, or BP), an afforestation phase (11 000 – 9 000 years BP) and a forest phase (from 9 000 years BP until today). At the beginning of the postglacial period, the Goldtwaith Sea submerged the coasts of the Estuary and the Gulf of St. Lawrence in eastern Quebec, and patches of the Appalachian Glacier Complex persisted in central Gaspésie. The vegetation cover near the river was sparse: grasses, then herbaceous willows (*Salix* sp.) and birch (*Betula* sp.) shrubs set in, forming tundras. During the afforestation phase, black spruce (*Picea mariana* (Mill.) B.S.P.), trembling aspen (*Populus tremuloides* Michx.) and balsam fir (*Abies balsamea* (L.) Mill.) were present everywhere in the landscapes of the Gaspésie, Bas-Saint-Laurent/Témiscouata and Charlevoix/Laurentides regions. Black spruce was rare in the Côte-Nord region, but white spruce (*Picea glauca* (Moench) Voss.) was already present in southern Labrador. At the beginning of the forest phase, balsam fir dominated stands of eastern Quebec and southern Labrador.




Carte de la répartition des 35 sites d'étude à l'échelle des domaines bioclimatiques et informations sur les 9 secteurs et les 4 régions discutées dans le texte
Distribution map of the 35 study sites across bioclimatic domains and information on the 9 sectors and 4 regions discussed in the text (Fréchette et al., 2021)

The age of forest onset is asynchronous across the territory due to the location of the sites in relation to the front of the receding ice cap, and to the surface water conditions of the Gulf of St. Lawrence and of the epicontinental margin of the Labrador Sea. During the afforestation phase and at the beginning of the forest phase, vegetation composition at the sites bordering the lower estuary and the Gulf of St. Lawrence differed from that at sites located upstream and inland. American green alder (*Alnus crispa* (Aiton) Pursh, synonym of *Alnus alnobetula* subsp. *crispa* (Aiton) Raus) was abundant in the Gulf region, and the vegetation present in haute Gaspésie was closer to that of Côte-Nord than to that of the Chaleur Bay and Bas-Saint-Laurent/Témiscouata regions. Then, between 7 000 and 5 000 years BP, a distribution of vegetation similar the one known today took hold, with less contrast in the abundance of plants between the Haute-Gaspésie and Chaleur Bay regions. Since around 4 000 years BP, white pine (*Pinus strobus* L.) populations have declined in the forest landscape to the benefit of boreal species such as black spruce.

Our climate reconstructions show a gradual 4 °C warming of July temperatures until 7 000 years BP, followed by a 1 °C cooling. Annual precipitation increased by 500 mm from 11 000 to 5 000 years BP, then remained relatively stable until today. A climate transition is noted around 7 500 years BP. In eastern Quebec, the climate at the start of the forest phase was warmer and drier than today; atmospheric circulation from west to east was more intense, with greater summer cloudiness. This could be explained by a greater moisture exchange between the ocean and the atmosphere, resulting in an increased frequency of thick fog. The end of glacial meltwater inputs in the St-Lawrence River and the Gulf of Lawrence, the establishment of current surface water conditions in the Labrador Sea and the circulation of polar air could explain the climate transition observed around 7 500 years BP.

## *Dissertations*

***PhD Thesis***

Sandy McLachlan

***Dinoflagellate cysts across the Cretaceous–Paleogene (K/Pg) boundary in the North Pacific; biostratigraphy, diversity, and paleoenvironmental reconstructions***

University of Victoria, supervisor Prof. Vera Pospelova

The central objective of this study is to understand phytoplankton community response following the global mass extinction event at the Cretaceous–Paleogene (K/Pg) boundary. The objective is approached through analysis of dinoflagellate cyst assemblages across the boundary interval in the North Pacific region. Dinoflagellate cysts are powerful tools for deep time paleoenvironmental reconstructions and this group of microfossils has been vastly underutilized in this region of the world. On this premise, comprehensive marine palynological surveys were undertaken for the Oyster Bay Formation of eastern Vancouver Island, British Columbia, Canada and Shatsky Rise in the northwest Pacific. The Oyster Bay Formation work resulted in the discovery of the first K/Pg boundary succession west of the Rocky Mountains based on biostratigraphic controls and refined taxonomy for the genus *Cannosphaeropsis* found within these strata. Three new taxa are described: *Cannosphaeropsis franciscana* subsp. *vacuoseptata* subsp. nov., *Cannosphaeropsis franciscana* subsp. *vesiculata* subsp. nov. and *Phelodinium fensomei* sp. nov. The cyst assemblages reveal endemic associations and signals of transition between offshore coastal to estuarine settings in keeping with global eustatic trends. Oyster Bay Formation results and interpretations

are compared to analyses of core samples from Deep Sea Drilling Project Site 577 at Shatsky Rise. Contrast is seen between a diverse, highly productive coastal to estuarine environment in the Oyster Bay Formation as represented by organic-walled taxa and an oligotrophic bathyal environment at Shatsky Rise during the same interval as represented by a small number of calcareous taxa. These two regions form the basis for comparison between differing assemblages in order to ascertain the extent to which phytoplankton communities were affected by changes in sea-surface and water mass conditions in conjunction with the K/Pg event. The findings reveal measurable impacts of climate and paleoenvironmental change reflected by shifts in assemblage composition and cyst morphology. A lack of extinction among many forms is consistent with studies from around the globe as presented in an exhaustive review of the literature. The dinoflagellates were marginally impacted with the most specialized taxa presenting a record of sea-surface temperature fluctuation, nutrient supply and opportunistic niche exploitation.

***Mémoire de maîtrise / Master Thesis***

Léonie Perrier

***L'influence du forçage climatique sur le développement écohydrologique holocène des tourbières maritimes de l'île d'Anticosti, dans le golfe du Saint-Laurent, est du Canada***

***The influence of climate forcing on the Holocene ecohydrological development of maritime peatlands on Anticosti Island, in the Gulf of St. Lawrence, eastern Canada***

Département de Géographie, Université du Québec à Montréal, direction : Michelle Garneau

L'île d'Anticosti, située dans le golfe du Saint-Laurent (GSL, Québec, Canada), est recouverte par approximativement 25% de tourbières. Malgré leur importante superficie, les conditions associées à leur mise en place et leur développement demeurent inconnues. Les conditions ́ecohydroclimatiques (successions végétales et variations de la nappe phréatique) et les taux d'accumulation de carbone ont été reconstituées à partir de deux tourbières maritimes (Pointe de l'Est et Pluvier) situées sur la pointe est de l'île d'Anticosti, influencées par des conditions de surface du GSL en interaction avec la circulation atmosphérique pendant l'Holocène. Le taux apparent d'accumulation de carbone à long terme (LORCA, g C $m^{-2}$ $a^{-1}$) de Pluvier (13,3) et Pointe de l'Est (16,8) est inférieur à la valeur moyenne des tourbières nordiques (22,9), probablement en raison d'une forte exposition au vent. Les résultats montrent que malgré la mise en place de la tourbière Pluvier (9440 cal. BP; alt. 61m) avant celle de Pointe de l'Est (6250 cal. BP; alt. 74m), la transition fen-bog des deux tourbières a été pratiquement synchrone (4540 et 5070 cal. BP respectivement), ce qui indique des conditions hydroclimatiques favorables à la transition du régime trophique. Le ralentissement de l'accumulation de la tourbe combiné à des conditions hydrologiques sèches et variables après ~3300 cal a BP dans les deux tourbières coïncide avec la transition de l'Holocène moyen vers le refroidissement du Néoglaciaire. La transition entre l'Anomalie climatique médiévale (MCA) vers le Petit âge glaciaire (LIA) autour de 800 cal a BP s'exprime par le passage d'une dominance des sphaignes vers des assemblages ligneux. Les périodes froides caractérisées par une diminution du rayonnement solaire incident et l'incursion de masses d'air arctique froid et sec dans la région du GSL se sont exprimées par une diminution de l'accumulation de tourbe. Ceci a été observé plus particulièrement dans la tourbière Pluvier, en raison de sa plus grande exposition au vent. Inversement, les épisodes plus chauds associés à une température de l'air plus élevée et à des vents de sud-ouest auraient favorisé une augmentation des degrés-jours de croissance et une productivité accentuée des sphaignes résultant en une plus grande accumulation de la tourbe. Le Ministère de

l'Environnement et de la Lutte contre les changements climatiques (MELCC), responsable de l'inscription d'Anticosti au patrimoine mondial de l'UNESCO, souhaite publier l'histoire du développement des tourbières au futur centre d'interprétation à Port-Menier.

Anticosti Island, located in the Gulf of St. Lawrence (GSL; Quebec, Canada), is covered by approximately 25% peatland ecosystems. Despite their relatively large surface area, conditions supporting their establishment and development in the regional landscape remain unknown. Here we present the first reconstructions of the ecohydrological conditions (vegetation successions and water table variations) and related carbon accumulation of two maritime peatlands (Pluvier and Pointe de l'Est) located on the eastern part of Anticosti Island, which developed under the influence of the GSL sea surface conditions in interaction with atmospheric circulation during the Holocene. Long-term apparent Rate of Carbon Accumulation (LORCA, g C $m^{-2}$ $a^{-1}$) in Pluvier (13.3) and Pointe de l'Est (16.8) are lower than the mean value for global northern peatlands (22.9) probably due to high wind exposition. Results show that despite the earlier peat inception of Pluvier (9440 cal a BP, alt. 61m) before Pointe de l'Est (6250 cal a BP, alt. 74m), the fen-bog transition of both peatlands occurred almost synchronously (4540 and 5070 cal a BP respectively), pointing to favorable hydroclimatic conditions for these trophic regime transitions. A slowdown in peat accumulation combined with dry and variable hydrological conditions after ca. 3300 cal a BP in the two studied peatlands coincided with the transition from the mid-Holocene to the Neoglacial cooling. At ca. 800 cal a BP, the shift from wet Sphagnum peat to dry ligneous peat correspond to the transition from the Medieval Climate Anomaly to the Little Ice Age. Cooling periods characterized by a decrease in incident solar radiation and the incursion of cold and dry Arctic Air masses in the GSL are expressed with a decrease in peat accumulation, especially in Pluvier peatland, due to its higher wind exposition which influenced snow cover thickness and frost penetration and duration through the peat. Inversely, warmer episodes associated with higher air temperature and southwesterly winds have favored an increase in growing degree days and in Sphagnum productivity with higher rates of accumulation. The Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC) involved in suggesting Anticosti a World Heritage site (UNESCO) is interested to publish the information related to peatland development in the future interpretation center in Port-Menier.

## *Student Award*

The Canadian Association of Palynologists Annual Student Research Award was established in 2009 to recognize students' contributions to palynological research. The award is open to any undergraduate or graduate student who is a member, in good standing, of CAP, regardless of their nationality or country of residence. The intent of the research award is to support student research with a strong palynological component. The award consists of a three-year membership in the Association and $200 to $500 CDN, to be put toward some aspect of the student's research.

The application should consist of: 1) a one-page statement outlining the nature of the research project, its scientific importance, the approximate timeline to completion of the project, and the aspect of the research the funds would be directed toward; (2) a CV; and, (3) a letter of support from the student's supervisor.

Applications may be submitted in French or English and should be submitted by email. Completed applications are due by March 1.

Submit applications by e-mail to Florin Pendea, CAP President-elect
ifpendea@lakeheadu.ca

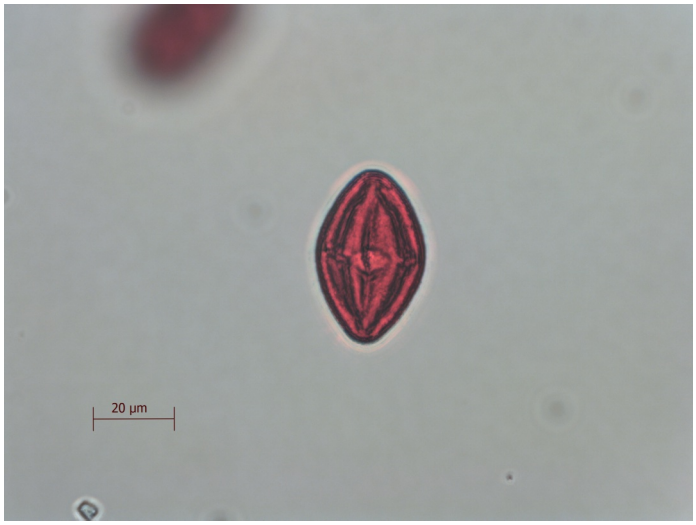
## *Avez-vous déjà vu cela ?*
## *Have you ever seen this?*

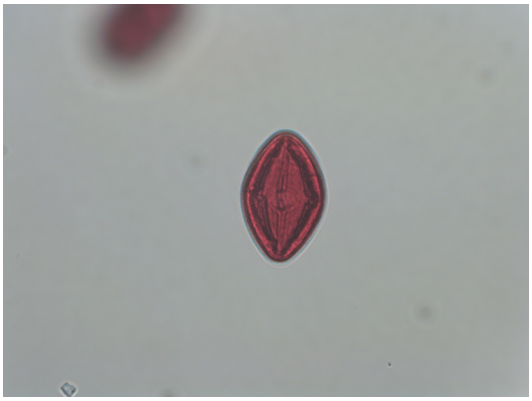
Nous avons tous des palynomorphes non identifiées sur nos lames ! Envoyez-moi vos photos, estelle.allan@mcgill.ca, elles seront publiées dans les prochaines éditions de la Newsletter.

Pour cette édition une photo prise par Diana Tirlea, Musée royal de l'Alberta.
Description : vue équatoriale, 48 µm X 25 µm, type de pollen, forme rhombique allongée, surface scabreuse, exine d'épaisseur modérée, ouvertures tricolporées, zone poroïde large et/ou possiblement un sillon transversal ? (mais aspect ovale large), âge moderne (d'une étude pollinisateur-pollen sur les abeilles domestiques et les pollinisateurs indigènes), collecté dans le sud de l'Alberta, pâturage (prairies), méthodes de traitement standard incluant acétolyse & colorant (pas de HF). En avez vous déjà vu? L'avez-vous déjà identifié ? Si oui, merci de nous envoyer vos commentaires, observations.

We all have unidentified palynomorphs on our slides! Send me your pictures, estelle.allan@mcgill.ca, they will be published in the future editions of the Newsletter.

For this edition, we have a picture taken by Diana Tirlea, Royal Alberta Museum.
Description: equatorial view, 48 µm X 25 µm, type pollen, shape rhombic prolate, surface scabrate, exine moderate thickness, apertures tricolporate, poroid area large and/or possibly a transverse furrows? (but large oval appearance), age is modern (from a pollinator-pollen study on honeybees and native pollinators), collected in southern Alberta, rangeland (prairies), processed standard methods including acetolysis & dye (no HF).
Have you ever seen one? Have you already identified it? If so, please send us your comments, observations.



## *Recent Publications*

** denotes a CAP member*

Axford, Y., *de Vernal, A., & Osterberg, E. C. (2021). Past Warmth and Its Impacts During the Holocene Thermal Maximum in Greenland. *Annual Review of Earth and Planetary Sciences, 49*.

Baranyi, V., *Mudie, P. J., Magyar, I., Kovács, Á., Sütő-Szentai, M., & Bakrač, K. (2021). Revision of the endemic dinoflagellate cyst genus Pontiadinium Stover & Evitt, 1978 from Lake Pannon and the Paratethys realm (Late Miocene–Early Pliocene, Central Europe). *Palynology*, (just-accepted), 2014367.

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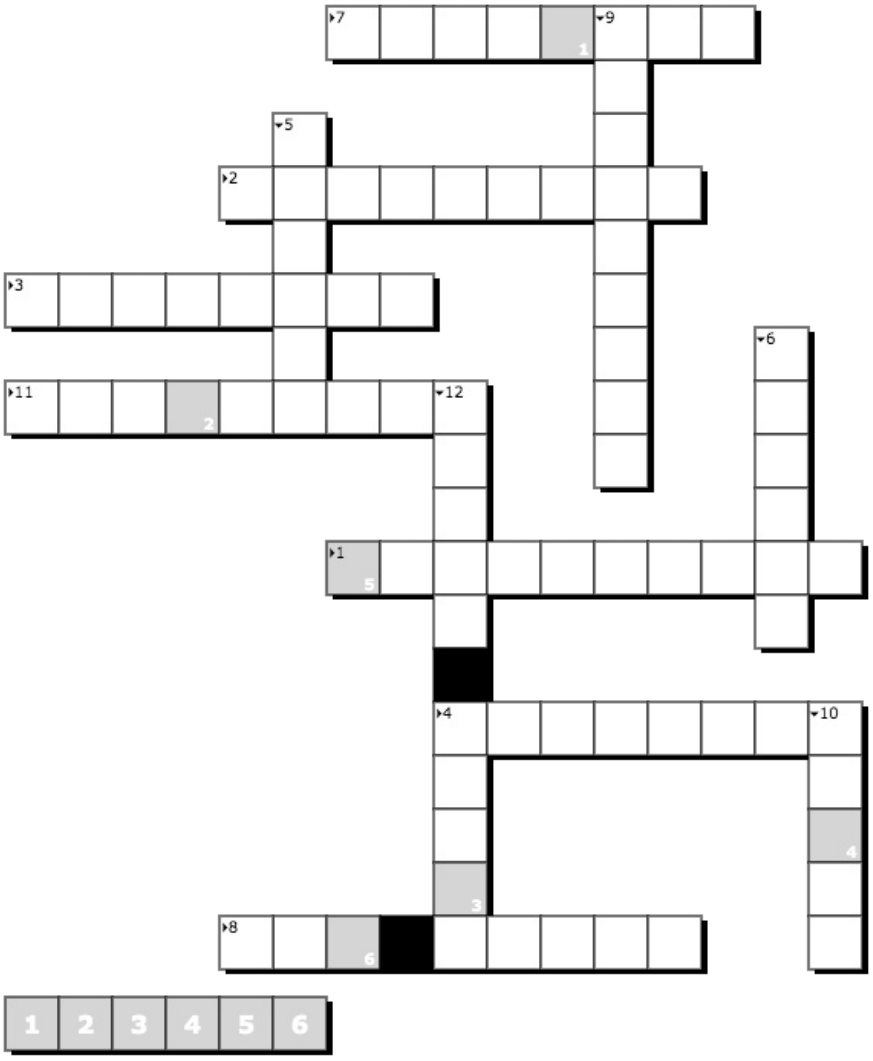
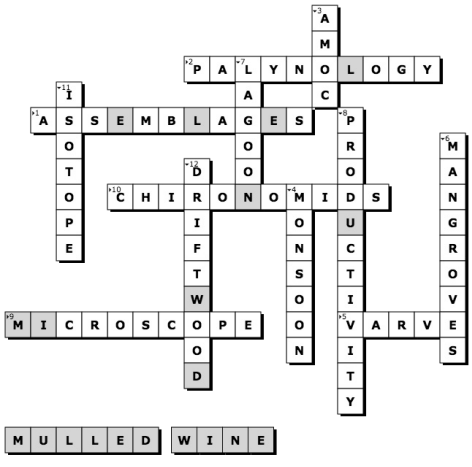
## *Editor's Game*

1. The measurement of depth of water in oceans, seas, or lakes.
2. Instrument measuring atmospheric pressure, used especially in forecasting the weather and determining altitude.
3. A porous black solid, consisting of an amorphous form of carbon.
4. An effect whereby a mass moving in a rotating system experiences a force acting perpendicular to the direction of motion and to the axis of rotation.
5. The branches and leaves that spread out at the top of a group of trees forming a type of roof.
6. A vast, flat, treeless Arctic region of Europe, Asia, and North America in which the subsoil is permanently frozen.
7. Water or other liquid diffused in a small quantity as vapor, within a solid, or condensed on a surface.
8. A permanent layer of ice covering an extensive tract of land, especially a polar region.
9. A rising of seawater.
10. A woody plant which is smaller than a tree and has several main stems arising at or near the ground.
11. Produced by single-celled algae classified as Pyrrhophyta.
12. Plump jolly old man with a white beard who is dressed in a red suit and delivers presents to good children.

French word:
A brown deposit resembling soil, formed by the partial decomposition of vegetable matter in the wet acidic conditions of bogs and fens, and often cut out and dried for use as fuel and in gardening.




May 2021 solutions



# *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 $15 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 for a reduced amount of $40. To join or renew, please fill out this membership form (by hand or in Adobe Reader®) and send your payment via either: a) a cheque (Canadian bank only) or money order payable to CAP along
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Dr. Francine McCarthy, Interim CAP Secretary-Treasurer, Dept. of Earth Sciences, Brock University, St Catharines, ON, L2S 3A1, CANADA

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Lab page URL:

Do you permit your name/address/email address to be included in the printed "World Directory of Palynologists" being compiled by IFPS? Yes ☐ No ☐