Canadian Association of Palynologists
Association Canadienne des Palynologues
NEWSLETTER
Volume 44 Number 1 May 2021

President's Message

As summer is around the corner, many of us would normally be preparing for fieldwork, as well as planning out laboratory work for the next few months. We would also be meeting colleagues at conferences and workshops in Canada and abroad. Instead, COVID-19 is still rampant, and it remains to be seen if and when we can return to 'normal'.

One facet of academic life that has changed this past year is the connectivity through online meeting platforms such as Zoom. Whether we love or hate them, these communication tools have, in some ways, allowed for greater connectivity across our community. This was apparent during our AGM last year when CAP members participated from a variety of time zones across Canada and from abroad. Since many major conferences, for example EGU and AGU, are being held virtually or in a hybrid format in 2021, it remains to be seen whether or not our AGM can go ahead as a physical meeting this year. Some Canadian conferences, such as GAC-MAC, are, at the time of writing, planned as physical gathering later this year. There may therefore be some opportunity to hold a physical or hybrid CAP AGM associated with this meeting or other conferences. Stay tuned for more information.

It is my distinct pleasure to congratulate Scott Cocker from the University of Alberta on receiving the CAP Student Award 2021. Scott is working on his PhD in the Department of Earth and Atmospheric Sciences, studying the paleoenvironments of Beringia by a variety of approaches, with palynology (pollen analysis) forming an integral part of his doctorate. Scott's project is outlined on pp. 9 of this newsletter. As in previous years, we encourage applications from CAP student members to our annual Student Award, which celebrates the achievements of students in palynology. Applications are due on March 1st each year, and details of the award, along with the profiles of awardees, are found on our website: https://capacp.wordpress.com/student-award/.

I would like to take the opportunity to thank the CAP Executive for their ongoing dedication to, and work for, the Association: Florin Pendea (President-Elect), Francine McCarthy (Secretary-Treasurer), Manuel Bringué (Website Editor), Estelle Allan (Newsletter Editor), and Terri Lacourse (CAP Councilor to IFPS). Your commitment to CAP is very much appreciated!

Last but not least, we encourage all CAP members to provide feedback and ideas that will promote the field of palynology both nationally and internationally. Please do not hesitate to use our website, bi-annual newsletter and twitter account to share content and opportunities.

With best wishes for the summer!
Sincerely,

Anna Pieńkowski
Norwegian Polar Institute

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: S. Cocker, K. Gajewski, R. Mathewes, V. Pospelova, P. Richard, J. Vallerand, X.Wu.

Deadline for NextCAP Newsletter

Please submit items for the next issue of the CAP Newsletter (Volume 44, Number 2, December 2021) by December 15, 2021. 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:

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

Table of Contents

International seminar series on dinophytes

Because of the current pandemic, we have been unable to meet each other. This is a shame because such meetings are crucial to keep our community connected.
To overcome this, in line with the DINO/ICHA-conferences, we invite you to participate in our biweekly 20 minute seminars + 10 minute questions via ZOOM, starting in May 2021. This can be about anything related to dinophytes / dinocysts (for example about taxonomy, phylogeny, evolution, life-history, toxins, pigments, transcriptomics, (paleo)ecology, stratigraphy, functional traits, ...).
We'll try to choose timeslots that are convenient with your time zone.
If you would like to attend these seminars or present such a seminar, please contact kenneth.mertens@ifremer.fr, and we'll provide you the necessary information.
We specifically ask postdocs, PhD students, MSc students to propose seminars. This is a good way to showcase your research to a group of specialists.
The organising committee (Kenneth Mertens, Vera Pospelova and Marc Gottschling)

Thursday 6 May 12:30pm GMT+2. Prof. Shauna Murray, University of Technology, Sydney, Australia – Ciguatera and *Gambierdiscus* species in Australia and the Pacific.
Wednesday 19 May 4pm GMT+2. Dr. Coralie Zorzi, Université de Bordeaux, France – Paleoceanographical changes of the Plio-Pleistocene based on marine palynology at ODP Sites 882 and 887, western and eastern North Pacific.
Tuesday 1 June 4pm GMT+2. Prof. Linda Medlin, Marine Biological Association of the UK, Plymouth, UK – Recent advances in biosensors for the detection of toxic algae.
Tuesday 15 June at 5pm GMT+2. Francesc Rubió Garrido, Universitat de Barcelona, Spain – *Ostreopsis* cf. *ovata*: A friendly dinoflagellate who likes to attach to different macroalgae and Bryozoa.
Thursday 1 July at 5pm GMT+2. Dr. Natalia Annenkova, Limnological Institute, Siberian Branch of the Russian Academy of Sciences, Irkutsk – Dinoflagellates, which live or probably live in the ancient Lake Baikal: single cell and DNA metabarcoding studies.
Thursday 15 July at 5pm GMT+2. Dr. Peta Mudie, NRCan Geological Survey, Canada Atlantic, Halifax, NS, Canada – Adaptation strategies in Arctic pack ice dinoflagellates with cysts.

Un 88e Congrès entièrement virtuel

Le prochain congrès de l'ACFAS se déroulera en ligne du 3 au 7 mai 2021.La session suivante, présidée par Matthew Peros de Bishop's University, Jeannine-Marie St-Jacques de l'université Concordia, Pierre J.h. Richard de l'université de Montréal et Elisabeth Levac de Bishop's University, pourrait vous intéresser : 201 - De la fin de la période glaciaire jusqu'à l'Anthropocène dans l'est de l'Amérique du Nord : nouvelles méthodes, questions et perspectives.
https://www.acfas.ca/evenements/congres/programme/88/200/201/c

CAP item from former president Rolf Mathewes, Simon Fraser University.

A brief note from an old (literally) president of CAP. At 74 I am still working full time with teaching and research at SFU. As current vice-president of the Humboldt Association of Canada, I want to briefly update you on my research activities in Germany, funded by Alexander von Humboldt Foundation research fellowships.

Just prior to our current covid-19 problems, in the Fall of 2019 I spent time in the lab of Prof. Thomas Litt, at the University of Bonn conducting field work and pollen analysis in the northern Black Forest

I am analyzing pollen from two cirque lake cores, along with plant macrofossil analysis to reconstruct forest disturbances and vegetation changes over the last few millennia. The project started many years ago, with the aim of seeing if the political debates over "Waldsterben" (Forest death) and air pollution in the Black Forest during the 1970's and 80's were unique or had forerunners, and how detectable the recent changes are compared to past events.

The results so far are very interesting and I am now working to collate them for publication. If they get published, I will let you know. The attached photo is from the fall of 2019 in the Bonn Christmas market. I am enjoying a hot mulled wine with postdocs and graduate students from the Steinmann Institute of Geosciences in Bonn before I returned to Canada.

Pollen records of shrubbification and treeline dynamics in eastern North America: an update

K Gajewski
Laboratory for Paleoclimatology and Climatology (LPC)
Department of Geography, Environment and Geomatics (GEG)
University of Ottawa

Latitudinal treeline is a major biogeographic boundary which is associated with the mean position in July of the Arctic front, and the variability in the position of the front, as well as the impact on the vegetation have been documented using meteorological data (Ladd and Gajewski, 2010). Using remote sensing and field measurements, studies have identified changes in production or density of the vegetation in northern Canada due to global warming, called "greening / browning" or "shrubification" (National Academies, 2017). Of course, paleo-studies can provide a longer-term context for these observations.

Since the work of Nichols and others in the 1960s in central Canada (Nichols, 1975) and Ritchie and colleagues in the Mackenzie Delta (Ritchie, 1984), work has only slowly progressed in documenting treeline variations in the Holocene (MacDonald & Gajewski, 1992; Gajewski and MacDonald, 2004; Gajewski et al., 2007). Treeline was located north of the present limit in the early Holocene in the Mackenzie Delta region and mid Holocene in central Canada; neoglacial cooling affected both of these regions. These studies showed dynamics of several scales and indicated that results from one region cannot be extrapolated to other area, but also identified that more work is needed to better understand the environmental history of northern Canada (Gajewski et al., 2007). Paleoclimate reconstructions based on pollen records from all of northern North America provide consistent results, showing the overall time-space evolution of the climate of region (Viau and Gajewski, 2009; Viau et al., 2008; Gajewski, 2015). More detail of the paleoenvironmental history is, however, needed and can be provided by regional studies.

A recent synthesis of work in northern Quebec has summarized the Holocene paleoclimate and vegetation history of eastern Canada (Gajewski 2019). Building on the classic studies of Richard in Ungava and the La Grande regions (Richard, 1979, 1981; Richard et al., 1982), and on a large body of work about the nature of treeline and its dynamics by Payette and associates (e.g., Payette 1983, 1993, Payette and Lavoie, 1994; Payette et al., 1989, 2001), this study was planned from the start to provide a detailed analysis of treeline dynamics in relation to past climate changes and to reconstruct past positions and intensity of the Arctic Front.

A transect of thirteen pollen records (Fig 1) was prepared from the lichen woodland to the shrub tundra and spanning the forest tundra, which in this region extends over three degrees of latitude. Because there was a dense transect of sites, the intensity and gradient of the polar front could be reconstructed. In this region, treeline didn't "move" north or south with climate changes. Migration of

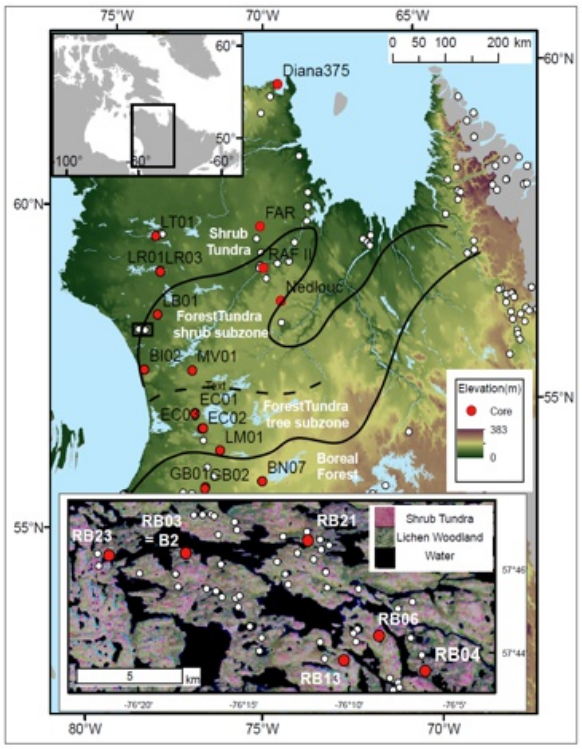

Fig 1. Sites discussed in the study. White dots are modern pollen samples from the North American Modern Pollen Database (Whitmore et al 2005; www.lpc.uottawa.ca) and Gajewski et al (2021; inset). Red dots are pollen cores from Gajewski (2019) or Richard (1981) (main map) and Gajewski et al 2021 (inset).

trees occurred immediately after deglaciation, as shown by the pollen records, and also by a detailed analysis of stomates in cores from across the area (Leitner and Gajewski, 2004). Although the limit of spruce has been stable in the area over the past 7ka, the vegetation density and productivity on the landscape reproductive success, (as measured by pollen percentages and influx), and fire history (as measured by charcoal) varied within the forest tundra zone in response to Holocene climate variability. Maximum spruce abundance and reconstructed temperatures (Fig 2) were found between ~3-5ka. During the neoglacial, both pollen and charcoal influx decreased, as tree abundance and production decreased, the forest-tundra opened as tundra covered more of the landscape, and as fires removed trees and krummholz-form spruce, with spruce not reproducing to the north.

In another study, six pollen diagrams and 50 surface samples from an area 7-16 km were analyzed at high temporal resolution. In this area near Hudson Bay, the major climate gradient was east-west, and the climate reconstruction showed the maintenance of the gradient of 1°C across a distance of 16 km. The major climate regimes of the neoglacial, including the Little Ice Age, the Medieval Warm Period, the Dark Ages Cold Period and the Roman Warm Period all affected the vegetation, as seen by the reconstruction of this variability by the pollen records. Neoglacial cooling was approximately 1°C, with century scale variability of approximately 0.2°C.

In Gajewski et al (2021), one lake had two complete pollen diagrams, collected and analyzed independently. Gajewski (2019) also analyzed pairs of lake records at three sites (within a few km of each other) which therefore provide replicated series. Replication is rarely attempted in paleo-studies, so these data, in addition to replicated modern pollen samples from the same lake (Gajewski, 1991; Gajewski et al., 2021) provide a dataset that can be used to determine the empirical confidence limits of paleo-records. The conclusion from these analyses is that the error bars of pollen records and climate reconstructions are much smaller than you may imagine, even in these sites with relatively few pollen levels counted and which

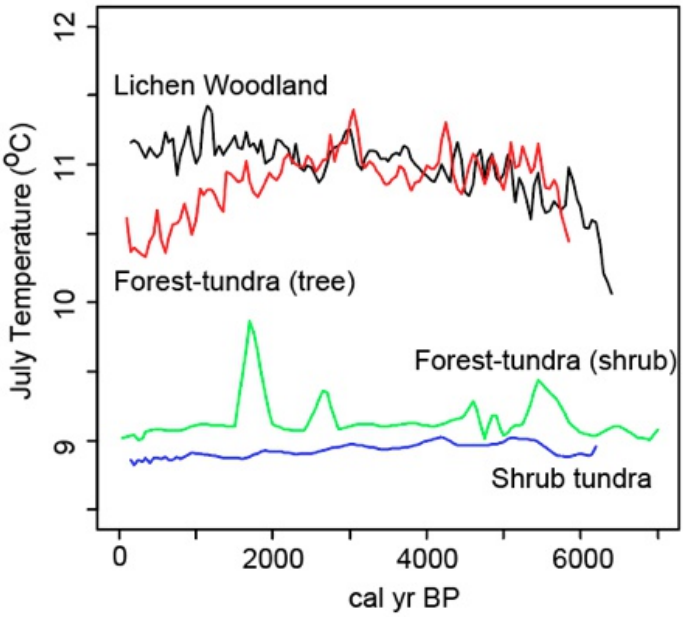

Fig 2. July temperatures in the four vegetation zones of northern Quebec (see Fig 1), reconstructed from the pollen data using the Modern Analogue Technique (Gajewski, 2019).

are relatively poorly dated. This is the case even though the study is from a disturbance-based ecosystem.

Several conclusions:

1) Pollen provides high spatial and temporal paleoenvironmental records, if the sediments are sampled appropriately (cf Gajewski, 2006). Charcoal and pollen influx can aid in interpretation of these changes. Even in regions where disturbances are an important part of the ecosystem dynamics, such as boreal regions, the past climate can be quantitatively reconstructed using spatial arrays of sites.

2) Pollen records from lake sediments can easily distinguish vegetation patterns on the order of km and temporal changes on the order of decades to centuries (even in non-varved sediments). Future work should continue developing very dense networks of sites sampled at high temporal resolution, and this should enable us to increase the typical resolution by an order of magnitude.

3) Although this discussion has emphasized the paleoclimate signal at an ecotone, climate changes impact vegetation across the entire range,

and you don't need to study ecotones in order to understand past climate changes (Gajewski, 1987, 1993; Gajewski et al., 2007; Viau & Gajewski, 2009). Indeed, spatial arrays are needed to define past climate patterns.

4) The supposed stability of the postglacial climate in northern Quebec, that was identified using paleolimnological records (discussed in Gajewski 2019), is not supported by these studies.

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Full citation

Gajewski, K., A Grenier and S Payette. 2021. Climate, fire and vegetation history at treeline east of Hudson Bay, Québec. Quaternary Science Reviews 254: 16794.

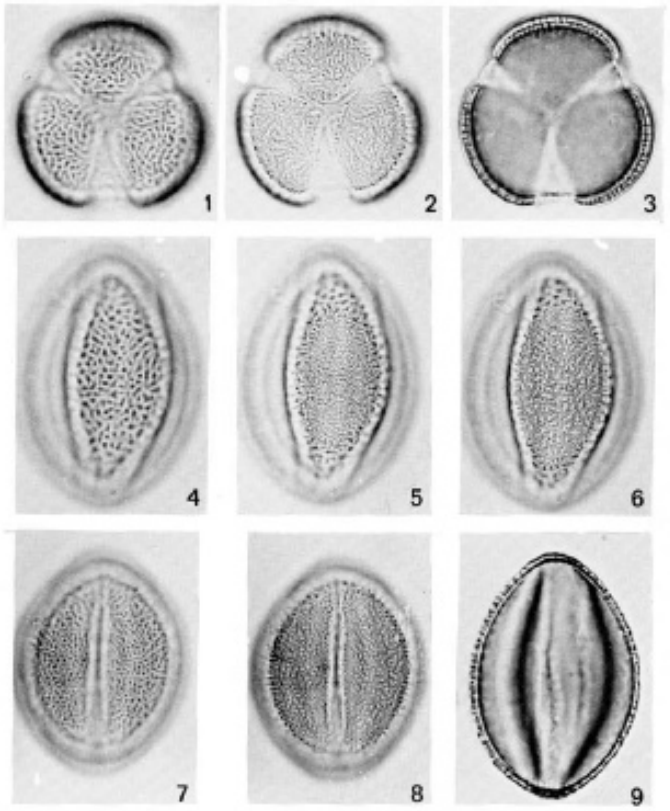
Palynfo

Merci à Pierre Richard qui a généreusement partagé une nouvelle version numérisée de l'Atlas pollinique des arbres et de quelques arbustes indigènes du Québec. Vous pouvez le retrouver sur notre site web :
https://capacp.wordpress.com/library-resources/atlas-pollinique-du-quebec/

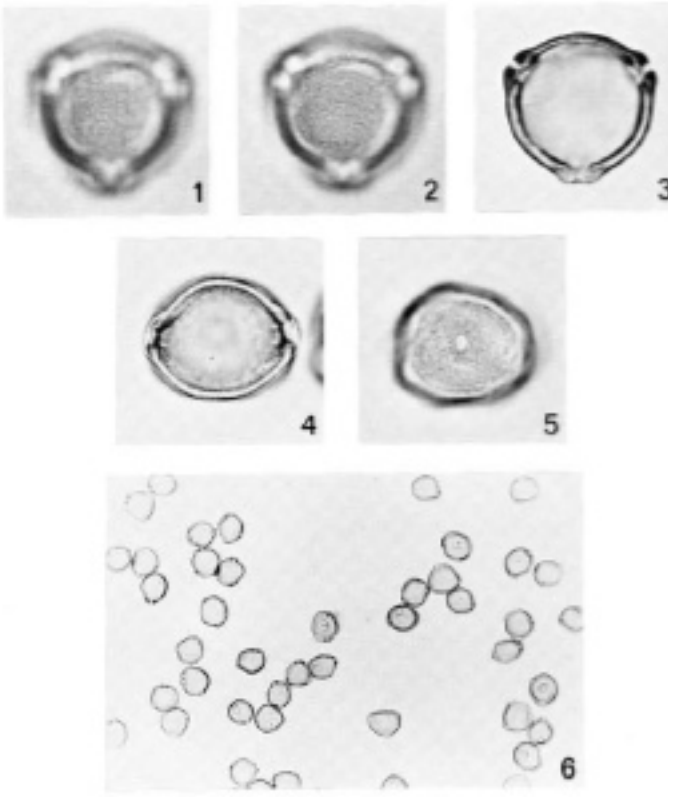
Thanks to Pierre Richard who generously shared a new digital version of Atlas pollinique des arbres et de quelques arbustes indigènes du Québec (Pollen Atlas of trees and shrubs of Quebec). You can find it on our web site :
https://capacp.wordpress.com/library-resources/atlas-pollinique-du-quebec/


Atlas pollinique des arbres et de quelques arbustes indigènes du Québec

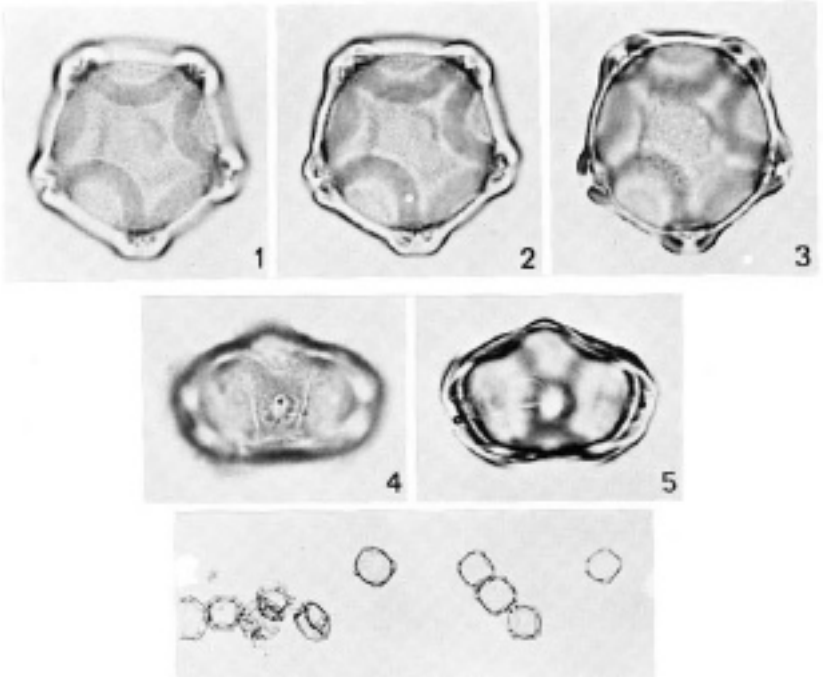
Exemple de ce que vous pouvez trouver dans l'Atlas pollinique des arbres et de quelques arbustes indigènes du Québec



Acer saccharum Marsh.



Betula populifolia Marsh.

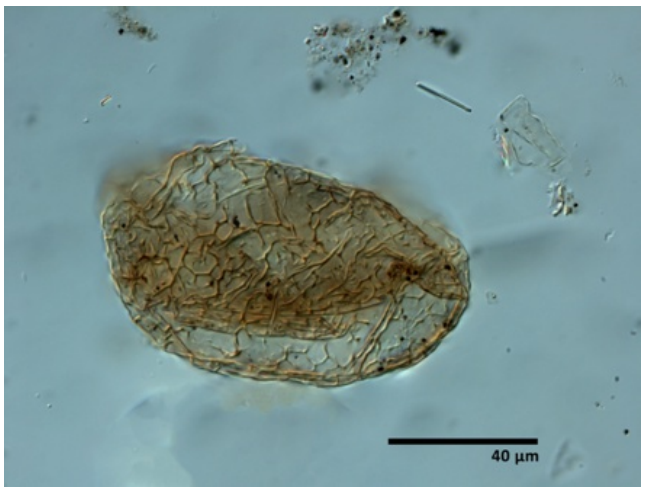


Afnus rugosa (Du Roi) Spreng.
var. *americana* (Regel) Fern.

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 Joan Vallerand, étudiante de maîtrise à l'UQAM. Un palynomorphe que l'on appelait œuf de copépode et qui ne serait vraisemblablement pas un œuf de copépode. On en retrouve souvent sur nos lames, d'une grosseur d'environ 100 µm, mais avec des ornementations de la paroi externe très variables, ces palynomorphes, souvent transparent avec une teinte brunâtre, sont très présents dans nos échantillons. 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 Joan Vallerand, MSc student at UQAM. A palynomorph that we used to call a copepod egg but that probably does not belong to this category. This type of palynomorph is often found in our slides. It about 100 µm long, and has variable ornamentation of the outer layer. These palynomorphs, often transparent with a brownish tint, are occasionally to frequently identified in our samples. Have you ever seen one? Have you already identified it? If so, please send us your comments, observations.



Dissertations

Mémoire de maîtrise/Master Thesis

Xiner Wu
Département des sciences de la Terre et de l'atmosphère
Université du Québec à Montréal

Direction : Anne de Vernal

Changements climatiques au cours des deux derniers millénaires dans le Golfe du Saint-Laurent, Canada atlantique.
"The signal of climate changes over the last two millennia in the Gulf of St. Lawrence, eastern Canada"

Résumé
Le contenu palynologique d'une séquence composite de sédiment marin (MSM46-03) prélevée dans le centre du golfe du Saint-Laurent a été analysé dans le but de reconstituer les changements de l'océan et du climat au cours des deux derniers millénaires. Les assemblages de dinokystes ont permis de reconstituer les conditions de surface de la mer, incluant la température, la salinité, la couverture de glace de mer et la productivité primaire, à partir de la technique d'analogue moderne et de la base de données de référence la plus récente, n = 1968 (de Vernal et al., 2020). Les grains de pollen et les spores proviennent des sources distales, ils n'ont donc pas été utilisés pour la reconstitution quantitative du climat, mais ont permis d'établir des relations avec l'histoire de la végétation des terres environnantes. Les résultats ont révélé un épisode particulièrement chaud datant de 1680 à 1300 ans calibrés BP (270-650 CE), suivi d'un refroidissement progressif d'environ 4°C dans les eaux de surface qui a culminé entre 200 et 40 ans calibrés BP (1750-1910 CE), ce qui correspondrait au signal régional du "petit âge glaciaire". Cet

intervalle froid est suivi d'un réchauffement important d'environ 3°C durant le dernier siècle. À l'échelle des derniers 2000 ans, les assemblages de pollen ont démontré une tendance qui peut être associée aux changements des régimes des vents marqués par une plus grande fréquence de masses d'air froid et sec, d'origine arctique dans l'est du Canada. Cette étude souligne l'influence déterminante de l'insolation sur les changements de température de surface en milieu marin au cours des derniers 2000 ans à l'échelle régionale. En outre, elle fournit un cadre hydrographique et climatique pour décrire l'environnement des communautés humaines ayant occupé les côtes du golfe du Saint-Laurent avant et depuis l'occupation des populations d'origine européenne.

Abstract
The palynological content of a composite marine sediment sequence MSM46-03 collected in the Laurentian Channel from the central part of the Gulf of St. Lawrence was analysed to reconstruct oceanographic and climatic changes during the past 2 millennia. Sea-surface conditions, including summer salinity and temperature, sea-ice cover, and primary productivity, were estimated from dinocyst assemblages. Results revealed a clear cooling trend of about 4°C after 1230 cal year BP (720 CE) and culminating with a cold pulse dated of 170-40 cal year BP (1780-1910 CE), which likely corresponds to the regional signal of the "Little Ice Age". This cold interval was followed by a rapid and significant warming of about 3°C. At the scale of the last 1700 years, the pollen record shows a trend that suggests changes in wind regimes marked by increased frequency of cold and dry Arctic air mass incursion over eastern Canada.

CAP Student Award

I am pleased to share with you that the 2021 CAP Student Competition received several applications from a diverse group of meritorious grad students. The Awards Selection Committee had a difficult job choosing among many strong candidates, but in the end the CAP Student Prize was awarded to Scott Cocker, PhD student at the University of Alberta.

Scott's thesis, titled "Late Pleistocene shrub expansion in east Beringia: a response to climate warming or megafauna extirpation?" focused on testing this climate driven hypothesis through analysis of preserved plant and animal communities in permafrost cores from the Klondike region of Yukon Territory and sites around Fairbanks, interior Alaska. High precision chronologies from lake sediment cores are too poor to resolve whether the shrubs expanded prior to or following extirpation/extinction of the grazing megafauna. To further our understanding of shrub expansion, this project will use greater chronological control from permafrost due to the exceptional preservation of dateable organic material. The overall goal of the project is to understand the long-term impacts of Arctic shrub expansion on northern ecosystems by expanding our understanding of the temporal and spatial range of shrub expansion in east Beringia (Yukon and Alaska) at the end of the Pleistocene.

Recent Publications

** denotes a CAP member*

*Allan, E., *de Vernal, A., Seidenkrantz, M. S., Briner, J. P., Hillaire Marcel, C., Pearce, C., Meire, L., Røy, H., Mathiasen, A. M., Nielsen, M. T., Plesner, J. L. & Perner, K. (2021). Insolation vs. meltwater control of productivity and sea surface conditions off SW Greenland during the Holocene. Boreas.

Asteman, I. P., *Van Nieuwenhove, N., Andersen, T. J., Linders, T., & Nordberg, K. (2021). Recent environmental change in the Kosterhavet National Park marine protected area as reflected by hydrography and sediment proxy data. Marine Environmental Research, 166, 105265.

Aubry, A. M., *de Vernal, A., & Knutz, P. C. (2021). Baffin Bay late Neogene palynostratigraphy at

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Axford, Y., *de Vernal, A., & Osterberg, E. C. (2020). Past Warmth and Its Impacts During the Holocene Thermal Maximum in Greenland. Annual Review of Earth and Planetary Sciences, 49.

*Cocker, S. L., Pisaric, M. F., *McCarthy, F., Vermaire, J. C., Beaupre, P., & Cwynar, L. (2021). Dung analysis of the East Milford mastodons: dietary and environmental reconstructions from central Nova Scotia at ~75 ka yr BP. Canadian Journal of Earth Sciences, (ja).

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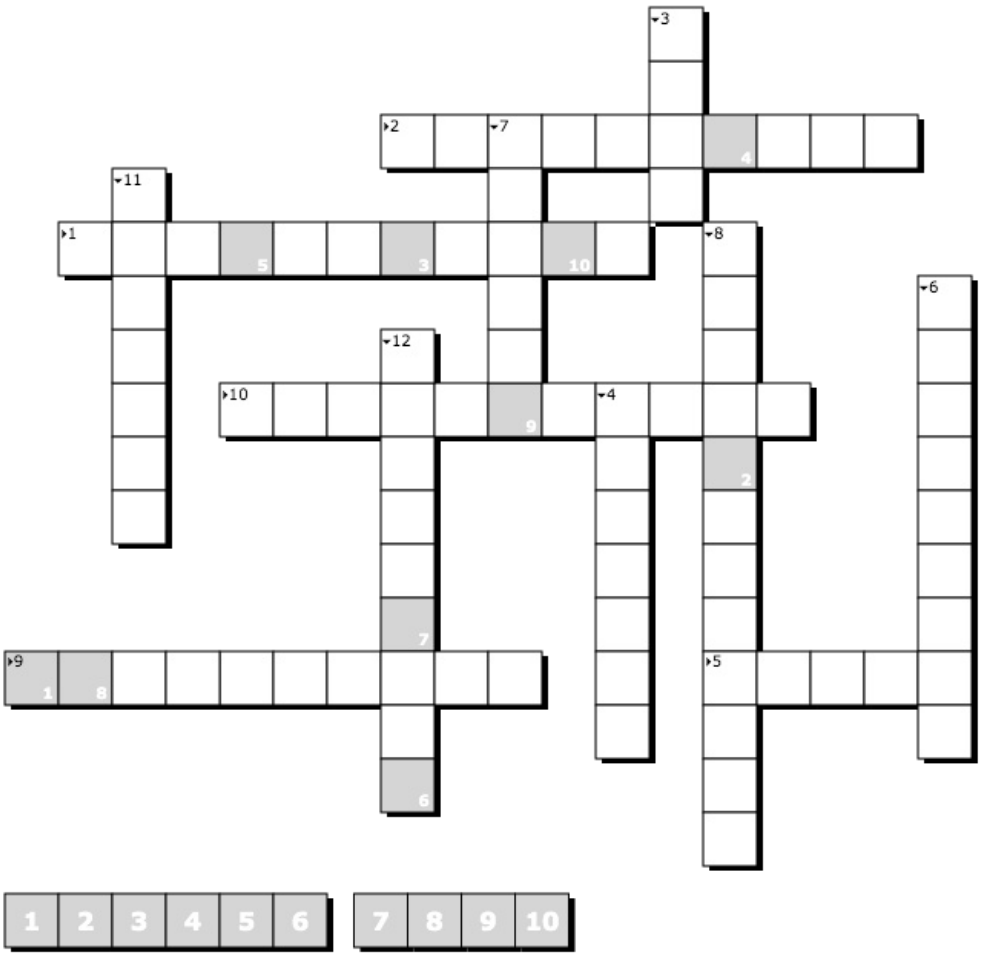
Editor's Game

1. A collection of things or a group of people or animals.
2. Scientific discipline concerned with the study of plant pollen,spores, and certain microscopic planktonic organisms, in bothliving and fossil form.
3. Large system of ocean currents that carry warm water fromthe tropics northwards into the North Atlantic.
4. Seasonal reversing wind accompanied by correspondingchanges in precipitation.
5. Form of repetitive sedimentary rock stratification, either bed orlamination, that was deposited within a one-year time period.
6. Group of trees and shrubs that live in the coastal intertidalzone.
7. Body of water separated from larger bodies of water by anatural barrier.
8. The rate at which energy is converted to organic substances.
9. Instrument for making enlarged images of minute objects.
10. Many species superficially resemble mosquitoes, but they arenot!11. Any of two or more forms of a chemical element.
12. Thing that has been washed onto a shore or beach of a sea,lake, or river by the action of winds, tides or waves.

Favorite Rolf drink?



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