Canadian Association of Palynologists
Association Canadienne des Palynologues

NEWSLETTER

Volume 48 **Number 2** **December 2025**

Advancing all aspects of palynology in Canada since 1978

CAP Newsletter ISSN 1188-3596

Table of Contents

Editor's Notes

I'm delighted to presenting you a full and rich December Newsletter, especially thanks to the amazing contributions from Anne de Vernal and Manuel Bringué, Rob Fensome and Graham Williams, Rolf Mathewes, Zhen Li, and Pjotr Meyvisch. I'm also grateful to Francine McCarthy, Maria Velez and Meagan Gilbert, Christopher K. West and Jan Henissen for sharing information about upcoming meetings of interest. Happy readings and please send me your contributions anytime to:
vania,correia@nrcan-rncan.gc.ca

Vânia Correia

Call from our Outreach Officer:

CAP is on Instagram!
Follow us and Tag us here **https://www.instagram.com/canadianpaly/**!

Email us photos and content you want to share at **canadian.palynology@gmail.com** (Subject Line: **CAP IG Post Content – ADD**) and we will get it posted!

Diana Tirlea

President's Message

Calgary, Dec. 2, 2025

Chers membres de l'ACP – dear CAP community,

'Tis the season again! Greetings from Calgary where, following an enjoyably mild and sunny fall, winter has finally claimed the landscape with a puffy cover of silver snow. I wish every single one of you to spend as much time as possible with your dearest family members and friends over the holidays. Personally, my recent family visit to Gatineau (QC) was a reminder of how much seasonal transitions have shifted over my (not so long) lifetime: when I was a kid in the 1980s, forests harbored full-blown fall colours in late August, but this year, leaves had barely started turning in late September. Beside some tremendous newly forged memories with my family, I flew back with a renewed drive to understand and quantify the effects of climate change on our natural environment.

I would like to start on CAP matters with welcoming Zhen Li as our new President -Elect! Thank you to all members who cast their vote (unanimously in favour). Zhen comes with great experience in both terrestrial and marine palynology and CAP will undoubtedly greatly benefit from her leadership. In a nutshell, the role of the President-Elect is to work with the Executive, become familiar with the duties of the President, and adjudicate CAP's Annual Student Research Award. Zhen joins a (now full) Executive that works hard to promote Canadian palynology: Francine McCarthy as Secretary-Treasurer, Vânia Correia as Newsletter Editor, Julia Hattaway as Website Editor, Diana Tirlea as Outreach Officer (always supported by Nick Riddick) and Vera Pospelova as Councillor to IFPS. I am extremely grateful for the time, energy and "grey matter" these dedicated individuals proactively invest in our cause – it is truly a blessing to be able to count on their support.

There are two upcoming conferences to put in your 2026 calendar. The first is CANQUA (Canadian Quaternary Association Biennial Meeting, Montréal, June 3-6), co-hosted by McGill and GEOTOP; CAP will hold its 2026 AGM there and we strongly encourage members to participate. The second is CPC (Canadian Paleontological Conference, Regina, August 24-26), hosted by the U. of Regina, ideal to showcase pre-Quaternary palynology. The CPC organizing committee specifically reached out to CAP for special sessions and training courses, so don't hesitate to propose one! For more details, see Francine's "CAP update" email dated November 10, and Maria Velez' contribution in this Newsletter.

CAP's sight is still set on the XVI International Organization of Palynology / XII International Organization of Palae-

obotany meeting in Calgary, AB (2028 IOP/IOPC). Francine and Chris West (Royal Tyrrell Museum) are looking into synergies with the IGC (International Geological Congress) which will take place right after IOP/IOPC. A first circular by Chris and Francine is in the works – stay tuned for more to come in the spring.

Recently, I had the pleasure to meet with CAP's latest Distinguished Member Anne de Vernal for an interview. Anne was very generous with her time and kindly answered all my questions with her thoughtful perspective. I must admit I'm always a bit star-struck with Anne – she was, after all, my first "dino mentor's mentor" and positively influenced my early career – but thanks to Anne's genuine interest and humility, we had a great time exchanging ideas. If I had to summarize our chat in two words, it would be: "be curious". You will find the interview (in French) in this Newsletter, and don't hesitate to ask me if you'd like to hear Anne's insights in English.

I will conclude this message with another anecdote. I was chatting with an invited speaker at a fun event in town called "Nerd Nite" whose passion for (high school) education struck me as out-of-the-ordinary. When I asked him what was his secret was for keeping this "fire" alive, he simply said that he picked his topics to keep things interesting for him first, and student engagement naturally followed. Much like safety instructions in airplanes to put on your oxygen mask first before helping anyone, it was a good reminder to feed our own curiosity with fodder that will truly resonate with our interests first, especially in a world saturated with information. So as we recharge over the holidays, I invite everyone to find yourself some questions that hold personal meaning. It can be as grand as "how many times in Earth's history has an atom of carbon cycled through the biosphere", as practical as "what session can I propose at CPC" or as simple as "is the Christmas tree in Home Alone in New York a fir or a spruce"?... Find a palynological angle and tackle it with renewed energy in the new year!

With my warmest wishes,

Manuel Bringué
Geological Survey of Canada - Calgary

Future Meetings of Interest

The next CAP– ACP AGM will be held in conjunction with CANQUA 2026, Montréal

The Canadian Quaternary Association 2026 Biennial Meeting will be co-hosted by McGill University and the Geotop Research Centre in Montreal, June 3 to 6, 2026. https://event.fourwaves.com/canqua2026/pages

Not surprisingly, several CAP members have proposed special sessions, so **we hope to see you there—at least online at the CAP AGM— time, date and location to be announced in the May Newsletter**

Francine McCarthy

Dino13, Bremen

The 13th International Conference on Modern and Fossil Dinoflagellates (DINO13) will take place at MARUM (Bremen, Germany), 5 – 10 July 2026. Co-hosts are Karin Zonneveld (MARUM/U Bremen) and Francesca Sangiorgi (Utrecht U). https://www.marum.de/Dino-13.html

Francine McCarthy

CPC 2026, Regina

Canadian Paleontology Conference 2026 (CPC 2026) will be held August 24–26, 2026, at the University of Regina in Regina, Saskatchewan. CPC 2026 is intended to bring researchers, students, and professionals from across Canada and beyond to share new discoveries, methods, and perspectives in Canadian paleontology.

We are currently accepting proposals for conference sessions, field trips, and short courses. Submissions are welcome from all areas of paleontology and related disciplines, including but not limited to vertebrate and invertebrate paleontology, paleobotany, ichnology, stratigraphy, geochemistry, paleoecology, and quantitative and computational approaches. Student-led sessions and proposals are strongly encouraged.

Details regarding submission guidelines and deadlines, as well as the dates and times of field trips and short courses, will be announced in the coming months.

Maria Velez and Meagan Gilbert
Organizing Committee

IOP-IOPC 2028, Calgary

The 16th IPC and 12th IOPC will be held August 7–11, 2028, in Calgary, Alberta, Canada. The meeting will take place at the Calgary TELUS Convention Centre, located in the heart of downtown Calgary. Potential field trips may include visits to the Royal Tyrrell Museum of Palaeontology, the Late Cretaceous deposits in Dinosaur Provincial Park (a UNESCO World Heritage Site), the K–Pg boundary exposure at Dry Island Buffalo Jump Provincial Park, and several Paleocene fossil plant localities of the Paskapoo Formation.

Christopher K. West
Royal Tyrrell Museum of Palaeontology

SAPP and AASP-TPS 2026, Argentina

✨ Call for Thematic Sessions ✨

Great news! The **19th Argentine Symposium on Paleobotany and Palynology (SAPP)** and the **58th Annual Meeting of AASP – The Palynological Society (AASP-TPS)** are extending the deadline for Thematic Session proposals—and we're excited to share that submissions are already coming in from around the world!

New important dates:

- Submission deadline: *February 15, 2026*
- Notification of selected proposals: *February 28, 2026*

Thematic Sessions offer a unique platform to spotlight emerging research areas, innovative applications, and international collaborations in palynology and paleobotany. Whether you want to focus on a specialized topic, highlight a collaborative network, or spark discussion on cutting-edge methods — we want to hear from you!

Proposals must be submitted via the following Google Form:
https://forms.gle/aWUCndMPSWqcyxwU8

Proposals not selected as Thematic Sessions may be included in the **regular scientific program**.

Speakers and Chairs

Each Thematic Session may last up to 120 minutes, which can be split into two blocks of different lengths, with a *coffee break* in between. Sessions may include one extended talk (optional) and three to five shorter presentations, selected from the submitted abstracts. Additional contributions may be included as posters.

Presentation time (including Q&A) will be 30 minutes for the extended talk and 20 minutes for regular presentations. These times may be slightly adjusted to fit the final schedule. Sessions must be moderated by at least one registered participant (*chair*). A second person (*co-chair*) will be assigned by the organizers to provide technical, logistical, and/or scientific support.

Upon acceptance of the Thematic Session, the speaker delivering the extended talk must submit an abstract by March 30, 2026, and complete registration by May 1, 2026.

Rooms and AV Equipment

Standard conference rooms will be assigned to Thematic Sessions, with necessary AV equipment and on-site technical support.

For questions or further information please write to: trelew2026@gmail.com

Check our website https://palynology.org/58th-aasp-tps-and-19th-sapp/ for the latest information regarding the event.

Get ready! The Second Circular is out with more updates and details.

See you in Trelew!

Organizing Committee

Canadian Association of Palynologists
Annual General Meeting Minutes

Recorded by Sandy McLachlan
Held during ISTA11/CAP-Niagara in St. Catharines, ON (June 23-27, 2025) and online (Teams)

When: Monday June 23, 2025 at 4–6 PM EDT (Eastern Daylight Time); that is:

- 5–7 PM ADT (e.g., Halifax)
- **4–6 PM EDT** (e.g., **in person in St. Catharines**, Toronto, Ottawa)
- 2–4 PM MDT (e.g., Calgary, Edmonton
- 1–3 PM PDT (e.g., Vancouver)

Where: In person: Brock University, South Block STH 201. Online: Teams

Members in attendance at commencement: Aaron Alderson, Alwynne Beaudoin, Manuel Bringué (CAP President, meeting chair), Vânia Correia (CAP Newsletter Editor), Pierre Richard, Sarah Finklestein, Julia Hathaway (CAP Website Editor), Elisabeth Levac, Zhen Li, Francine McCarthy (CAP Secretary/Treasurer), Sandy McLachlan (Recording Secretary), Peta Mudie, Lauren Nesbitt, Saif Al Silwadi and Vera Pospelova (CAP Councillor to IFPS). Joined later: Nick Riddick. *Quorum reached.*

Call to Order – 4:12 PM EDT

1. Acceptance of agenda

MOTION: to accept agenda; Vera moves and Elisabeth seconds. *Motion carried.*

2. Minutes of the 2024 Annual General Meeting

MOTION: to accept the Minutes of the 2024 AGM: Vera moves Zhen seconds. *Motion carried.*

3. Business arising from Minutes
No business arose.

4. President's report, *Manuel Bringué*
Manuel thanked all executive members, and Francine in particular for filling different roles and logistical planning over the last year.

Of note, the recent special recognition of Anne de Vernal. Francine collected tributes to Anne, and Manuel expressed an interest in interviewing Anne for next newsletter on reflections from her time in the field and those who influenced her career.

Manuel relayed that conversations are ongoing with Christopher West (of the Royal Tyrrell Museum) with regard to planning for the next International Palynological Congress-International Organization of Palaeobotany Congress (IPC-IOPC) meeting to be held in Calgary in 2028.

Manuel mentioned that the 2025 CAP Student Research Award recipient is Stephen Magohe (PhD student at the University of Calgary) for his research contributing to paleoenvironmental reconstructions of Pleistocene early *Homo* habitats in Tanzania, East Africa.

5. Secretary/Treasurer's report, *Francine McCarthy*
Francine opens with financial break down noting CAP membership declining. We need more members in good standing and members encouraging their students to join.

Francine emphasized the international reach of the field and how much mentorship is essential to the integrity and future of the professional palynological community. Francine proceeded to read a series of tributes submitted in honour of Anne de Vernal highlighting her illustrious career of over 22 years and her efforts to encourage her students to take an active role in CAP.

Francine was pleased to announce that CAP has been the recipient of $5000 through the generous donation of Pierre Richard. So, the society's bank account has effectively doubled.

Manuel noted that two CAP student awards (2024 and 2025) were cashed this reporting period.

Manuel worked with Francine a lot behind the scenes as to ensure that everything has been settled with the CAP account held with the Bank of Montreal.

6. Auditor's statement, *Kelly Biagi*
Manuel noted Terri Lacourse's recommendation of an auditor external to the association. Auditor confirmed the financial statement is in order. Kelly Biagi was thanked for her help.

7. Newsletter Editor's report, *Vânia Correia*
Vânia relayed that the December newsletter featured a dedication letter for Rob Fensome who was recently the recipient of the *AASP-TPS Medal For Scientific Excellence*, and that the May issue highlighted Graham Williams having received the highest award of the Atlantic Geoscience Society, the *AGS Distinguished Scientist Award 2025 (Gesner Medal)*. Rob wrote a dedication letter for Graham. The May issue also featured an article by Stephen Magohe on his PhD research.
The implementation of the 'Paly Gallery' space was highlighted, which is a section of the newsletter where images of palynomorphs can be featured. Manuel noted that these images should be unpublished as to avoid copyright infringement, and also that short things like images relating to members' research can be pulled from the newsletter in an effort to gain societal traction on social media via the Outreach Officer.

8. Website Editor's report, *Julia Hattaway*
Julia relayed that she is becoming accustomed to the role, and that the website received almost 1000 views so far in 2025. The Homepage ranks first for most views and the Opportunities page ranks second. Also, an announcement for 2025 Student Award has been posted. Additionally, a tab has been added to the top menu of the website for the 2028 IPC-IOPC conference. As always, palynomorph photos are being soliciting for the website.

9. CAP Councillor to IFPS' report, *Vera Pospelova*
No news to report.

10. CAP Outreach Officer Report, *Diana Tirlea*
Relayed via Manuel, efforts are being made on the platform Instagram toward social media outreach with the assistance of Nick Riddick. Manuel noted that he has now joined Instagram to this end, and that Jen Galloway (GSC-Calgary), who is savvy with social media, has offered to help with postings in an unofficial capacity, which will help maximize exposure on the platform.

MOTION: to accept all director reports; Zhen moves seconded by Vânia. *Motion carried*.

11. Appointment of auditor, *Francine McCarthy*

Kelly Biagi, who has now reviewed CAP's finances twice and is familiar with the process, will likely be willing to help again next year.

12. Vacancy on Executive, *Manuel Bringué*

Manuel announced that Zhen Li has put herself forward for the position of CAP President-Elect, the only current vacancy on CAP's Executive. Sandy questioned if there should be a formal nomination process and vote to instate the President-elect. Francine noted that there will be an email sent out introducing Zhen to the broader membership, along with any possible other nominee, followed by a vote by email.

13. The Future of CAP - Priorities and Goals

Manuel relayed that the venue has been booked for the IPC-IOPC at Telus Convention Centre in Calgary for August 7–11, 2028. This will see the conference take place over the week preceding the International Geological Congress (IGC), which will have a large draw, and IPC-IOPC stands to capitalize off of the momentum leading to the IGC. CAP will likely contribute to field trips. Christopher West emphasized that fundraising as crucial at this juncture. Jen Galloway, adjunct at U-Calgary, will assist in this effort. Manuel also indicated that help will be needed with respect to members sitting on scientific committees for reading abstracts. Furthermore, the planning committee is open to ideas for special sessions (i.e. marine and terrestrial environments).

Francine suggested that CAP could target the Royal Alberta Museum in Edmonton as a partner and to assist with support. Francine also inquired if a field trip(s) could happen during a weekday, such as on the Thursday or Friday, so as to not conflict with IGC field trips.

Manuel spoke to strategies for increasing membership and ways to bolster the ranks, noting that a full executive is crucial to signal a dynamic and successful organization.

The idea of a shared spreadsheet on Google Docs was revisited, which would serve as a resource for the management and organization of membership and contact information. Vera suggested a shared folder hosted by an institution is one way, while Vânia said that another approach would be to have a single association account accessible to all executive members with permission. Manuel will look into the options.

14. Other business

Discussion on whether to decrease the amount of CAP student award

Vera noted that major expense to the society has been the annual Student Award, and that the increase to $500 did not really result in increased applications as intended. Vera proposed a discussion to decrease the amount by half to ease the burden on CAP's finances.

Francine argued against reducing the amount for the reason that the goal is more so to financially support students of palynology and encourage their scientific pursuits,

2025 CAP AGM attendees. *Top panel: in-person attendees at ISTA11/CAP-Niagara in St. Catharines, ON; from left to right: (bottom row) Peta Mudie, Anne de Vernal; (2nd row) Sarah Finkelstein, Francine McCarthy, Martin Head; (top row) Aaron Alderson, Nick Riddick, Lauren Nesbitt and Saif Al Silwadi. Bottom panel: online attendees; from top left to bottom right: Manuel Bringué, Vânia Correia, Julia Hathaway, Zhen Li, Vera Pospelova, Sandy McLachlan, Alwynne Beaudoin, Pierre Richard and Elizabeth Levac.*

not to reel them in as future members. Francine also noted precedent of $500 being split into two $250 Student Awards.

Manuel stated that the wording is currently $300–500 for the award, and that it could be reverted back to 300 + a 1-year subscription, although Vera suggested cutting it to $100–200 + a 1-year subscription.
In light of the fact that Pierre Richard's generous donation to CAP was primarily to support students, Manuel made the decision to leave the award description as is; however the discussion served as a healthy reminder that the amount to be awarded is contingent to the number and quality of applications at the discretion of the adjudication committee and does not need to default to the higher range.

Outreach

Zhen noted that the Geological Survey of Canada (GSC) – Pacific has in-person outreach activities and wondered if it was possible to use such activities to conduct outreach on CAP matters, for instance showcasing members' research in palynology. Nick Riddick mentioned that social media is the conduit for this form of outreach. Zhen said that she has some ideas as to how to promote CAP at GSC–Pacific events.

Francine says she will volunteer to do some outreach at the Royal Ontario Museum, which has an opportunity starting September 27th with regard to Crawford Lake. This is geared toward school kids and the general public.

15. Adjournment

Meeting adjourned – ~ 5:25 PM EDT

2025 CAP Executive reports

President's report, *Manuel Bringué*

Chers membres de l'ACP, dear CAP community,

Welcome to the 2025 AGM! Your team of Executives is happy to convene and connect with all CAP members, a bit earlier in the year than usual, to review the year, acknowledge excellence in our ranks, and set our eyes on the horizon ahead.
I will start with turning the spotlight on one of the most influential leaders in our field who will be officially recognized at the AGM, CAP Distinguished Member Anne de Vernal (UQAM, GEOTOP). A true pillar for palynology in Canada and beyond, Anne has conducted world-class research and pioneered new methods for quantitative paleoreconstructions, established bridges with several key disciplines in Quaternary research, led large research teams and trained generations of students, myself included. Many thanks to Francine McCarthy who spearheaded CAP's special recognition of this very special member, and in-person attendees will gather for dinner in Port Dalhousie (St. Catharines lakefront) – congratulations Anne, and thank you so much for the positive impact you continue to make to the benefit of the entire palynology community!

I must thank every member of the Executive for their valuable contributions to the association. CAP was in great hands with Past President Jennifer Galloway who successfully led our bid to host the 2028 IOPC-IPC in Calgary, together with the paleobotany community (Christopher West of the Royal Tyrrell Museum). Thank you Francine McCarthy, for holding CAP's finances in good shape, maintaining CAP's records with Cor-

porations Canada, and keeping the membership informed on important developments throughout the year, among many other things. Francine also mentored Vânia who has now done a great job in producing a full (May) Newsletter on her own, adding her personal touch to the backbone of our community. Julia Hattaway is updating the association's website regularly and Vera Pospelova continues to represent CAP's interests on the international level at IFPS. Finally, our newest official member of the Executive, Diana Tirlea, has been working with Nick Riddick to reach out to (potential) members and connect with the community through social media to increase CAP's membership – try Instagram, CAP's posts are great fun! When the world seams in turmoil and times are uncertain, know that the Canadian palynology community stands strong and that your Executive works hard on your behalf.

About the joint 2028 IPC-IOPC, Christopher West informed us that the meeting is going to be held at the Telus Center in downtown Calgary from August 7 to 11, that is, immediately preceding the 2028 IGC (International Geological Congress), a major conference bound to attract large crowds. Chris mentioned fundraising is a priority, and CAP, though it does not have deep pockets, will contribute as it can. I invite everyone in the association to (1) mark the date in their calendar, (2) plan to attend and present their recent advances in palynological research to showcase to the international community, and (3) consider submitting special sessions. CAP will also contribute to the scientific organisation of the conference and field trips.

This year's CAP Student Research Award recipient is Stephen Magohe (PhD student at the University of Calgary) for his research contributing to paleoenvironmental reconstructions of Pleistocene early Homo habitats in Tanzania, East Africa. If you haven't already, please check his fascinating contribution to the May Newsletter! Congratulations Stephen, and all the best for this summer's field work and following research.

I look forward to gathering with you all at the AGM and discussing priorities going forward. We invite nominations for the position of President-Elect to join our team at this important time ahead of the IPC-IOPC.

Au plaisir de vous voir tous lundi !

Bien à vous,

Manuel Bringué
Geological Survey of Canada - Calgary

Report of the Secretary-Treasurer,
Francine McCarthy

Since our 2024 AGM held in association with the CANQUA – CGRG Meeting in Regina on August 19, 2024, we have welcomed two new members: Lauren Nesbitt (Brock University - paleolimnology, fire history, vegetation dynamics, insect outbreaks) and Kali Wade (University of Calgary- archaeobotany, microbotanical environmental reconstruction). Our membership is down to 24, although I have reminded a few longtime members of their status while preparing for the St. Catharines meeting and expect to see that number climb to around last year's total with a more determined effort at reminding busy people of their membership status. That is still significantly below the 35 -36 members required to fund the CAP

Award and our minimal costs (Corporations Canada annual returns and WordPress website maintenance- although note that we upgraded to provide a better user experience this year, which is reflected in a higher cost).

Donations substantially outweighed membership revenue and our expenses including the cashing of the cheque for the 2024 CAP Award as well as the 2025 CAP Award (and associated Interac transaction fee) and the loan of $2000 toward the ISTA-CAP Meeting in St. Catharines (with funds to be repaid to the account minus costs incurred from the de Vernal Symposium). The balance in the account slipped briefly below the $5000 threshold to avoid monthly bank charges and since I had assured the Executive that this would not happen (having forgotten the implications of the double CAP Award payments) I have donated sufficient funds to bring us over that threshold.

I am extremely happy to see young members of the association stepping onto the Executive, particularly our Newsletter Editor Vania Correia who apprenticed to co-produce the December 2024 Newsletter and produced our most recent newsletter with little oversight. This is encouraging as we work toward hosting the International Palynological Congress in Calgary in August 2028. I was part of the delegation from Canada that lobbied for Calgary as the location of the 38th IGC, and you have probably already heard that we were successful! There should be opportunities and synergies to be exploited between that much larger congress and the IPC/IOPC, so we have begun discussing these.

Francine M.G. McCarthy

Summary of Financial Transactions since Last AGM Report & Audit, as at midnight June 13, 2025

Account Balance August 2, 2024	**$7429.10**
Revenue:	
Membership dues 6* $40 (3-yr)	$240.00
Donations	$470.00
TOTAL REVENUE	$710.00
Expenditures:	
CAP Awards (2024 and 2025)	($1000)
Website annual fee (WordPress)	($105.00)
Corporations Canada Annual Return (for 2024)	(12.00)
Bank fees	(6.50)
Deposit – ISTA-CAP Conference (LOAN)	($2000)
TOTAL EXPENDITURES	($3123.50)
NET Loss*	($2413.50)*
Account Balance June 13, 2025	**$5015.60**

*note: net revenue does not reflect funds that will be reimbursed minus costs associated with de Vernal Symposium

Auditor's statement, *Kelly Biagi*

Brock University

Faculty of Math and Science
Earth Sciences

Niagara Region
1812 Sir Isaac Brock Way
St. Catharines, ON
L2S 3A1 Canada

Date 16 June 2025

Re: Auditor's Report, June 2025

To the Board and Membership of the Canadian Association of Palynologists,

Thank you for the opportunity to review the financial statements of the Canadian Association of Palynologists (CAP).

For auditing purposes, Francine McCarthy (Executive, Secretary-Tresurer, CAP), provided me, Kelly Biagi (Assistant Professor, Brock University) a spreadsheet listing all transactions, as well as a facsimile of the bank statement corroborating the amounts on June 11, 2025. Upon review of the financial documents, all appear complete, fair and transparent. The membership spreadsheet has been updated to reflect deposited funds received to date.

Revenue totaled **$710** from membership dues ($240) and donations ($470). Expenditures totaled **$3123.50** which included awards ($1000), website fees ($105), ISTA-CAP conference loan ($2000) and miscellaneous fees ($18.50). The **net loss** is **$2413.50**.

I consider the statements to be a fair statement of CAP's financial affairs, and I consider them to be in good order.

Sincerely,

Dr. Kelly Biagi
Assistant Professor
Brock University
Kbiagi@brocku.ca

Newsletter Editor's report,
Vânia Correia

At the present date, I edited the CAP Newsletter of May 2025 (Volume 58, Number 1, May 2025), and assisted Francine McCarthy, then acting Newsletter Editor, with the December 2024 issue (Volume 57, Number 2, December 2024).

The 24-page long December 2024 issue was distributed to CAP members on December 19th, and included, as usual, the Minutes and Reports from the 2024 AGM. This volume also comprised three beautifully illustrated reports from scientific meetings: the first from the Workshop on Dinoflagellate Cysts, at Vigo, Spain; the second from the 56th Annual Meeting from the AASP-The Palynological Society, at Montpellier, France; and the third from the GSC Palyno Workshop, at GSC Atlantic, Dartmouth. Under the "Awards" section was featured the dedication letter for Rob Fensome that was read out during the meeting at Montpellier, where he received the prestigious *AASP-TPS Medal For Scientific Excellence*.

The May 2025 issue with 18 pages long was distributed to the CAP membership on May 29th. The updated cover with a vivid green (the same colour as the CAP logo) represents the strength, commitment and passion in our mission to promote *all aspects of palynology in Canada,* as well as gathering us under a dynamic and resilient scientific community. In this volume was highlighted the participation of CAP members at the Atlantic Geoscience Society (AGS) Colloquium (7, 8 February, Dartmouth), especially to celebrate the long and prolific career of Graham Williams, one of the founding members of CAP in 1979, and who received the *AGS Distinguished Scientist Award 2025 (Gesner Medal)*. Under the "Awards" section was also featured an overview of the ongoing research of the PhD student Stephen Magohe, presently based at the University of Calgary, who is the recipient of the 2025 CAP *Annual Student Research Award*. In this issue was created the section "Paly Gallery", a space especially dedicated to show the beauty of palynomorphs that we are working on. Ideally, this is a short article (1 or 2 pages) composed by a photograph or plate with the highlighted palynomorph or assemblage, a brief description, and a full reference if the material is already published. Included in this issue are two contributions that fit well with the "Paly Gallery" purposes, one from Peta Mudie, presenting distinctive Quaternary dinoflagellate cysts from estuarine areas of the Marmara Sea (Turkey), and other from myself, illustrating the key Jurassic dinoflagellate cysts from the Lusitanian Basin (Portugal).

We are grateful to all who contributed to these CAP Newsletters, and I encourage members to send me news from your work or institution, articles (longer or shorter!) about your research, recent publications, or anything you would like to share within the association. That will keep us connected!

Sincerely,

Vânia Correia
Geological Survey of Canada - Atlantic

June 3, 2025

Website Editor's report,
Julia Hattaway

The CAP website is doing well. Overall, views of the website are up 3% and visits to the website remain stable. We included a tab for the IOPC-IPC 2028 meeting and an announcement congratulating Stephen Peter Magohe as this year's student award winner. I encourage advertisements for graduate or faculty positions and/or any recent pollen photographs to add to the website.

Julia Hattaway,
June 13, 2025

CAP Outreach Officer Report,
Diana Tirlea
Members: Diana Tirlea (Outreach Officer, Volunteer), Nick Riddick (Outreach Committee, Volunteer)

During the 2024-2025 period, the Outreach Officer and Committee, has prepared and delivered a Membership email-out to current and former members and has maintained the CAP Instagram account (https://www.instagram.com/canadianpaly/), launched in August 2022. The email-out was specific to the annual CAP Student Award, as well as to encourage membership renewal. Currently the CAP Instagram account has a total of 140 followers, with a total of 80 posts. The three main goals for 2025-2026 is; a) to increase frequency of posts to weekly (or more); b) to engage with current and former members to contribute to posts and; c) to increase new memberships and engagement across the palaeoenvironmental communities and beyond, through the CAP Instagram account and email-outs.

Diana Tirlea,
June 16, 2025

Entrevue avec Anne de Vernal, Membre distinguée de l'ACP, le 26 novembre 2025

With *Manuel Bringué*

Anne de Vernal est Professeure au Département des sciences de la Terre et de l'atmosphère à l'Université du Québec à Montréal (UQAM), et au Centre de recherche sur la dynamique du système Terre (GEOTOP); elle est aussi Professeure associée à l'Institut des Sciences de la Mer de Rimouski (ISMER -UQAR). Anne est reconnue mondialement pour ses contributions majeures dans les domaines de la palynologie et des paléoenvironnements du Quaternaire.

À l'occasion de son investiture en tant que Membre distinguée de l'Association Canadienne des Palynologues (ACP) en 2025, Anne a gentiment accepté de répondre à quelques questions pour l'association. L'entrevue s'est déroulée cordialement via Teams le 26 novembre 2025, entre Manuel Bringué, Président de l'ACP, à Calgary, et Anne à Montréal.

Peux-tu nommer les personnes qui ont le plus influencé ta carrière ? De quelle manière t'ont-ils influencé?

Claude Hilaire Marcel certainement, qui m'a influencée, et qui m'a encouragée, dès que j'avais une idée un petit peu farfelue, à aller l'explorer. Pierre Richard qui m'a stimulée pour apprendre la palynologie. Alors là ça a été une découverte fabuleuse. La première lame palynologique, c'était dans un paléosol des Torngat; j'avais l'impression de découvrir le monde. C'est vrai, c'est comme si on rentrait dans un nouveau monde. J'ai adoré. J'ai fait mes armes avec Peta Mudie qui a certainement joué un rôle; ça a été une expérience.

En Europe, ça a été Jean-Louis Turon. Auparavant, les dinoflagellés étaient très méconnus. Les gens connaissent le mot mais sans plus. Peta m'avait aiguillée au début, mais c'est surtout Jean-Louis Turon qui venait de finir sa thèse qui m'a bien aidée sur les dinoflagellés.

Et j'ai eu la chance de suivre un cours avec Bill Evitt à Stanford. C'était au cours de mon post-doc. Je me suis dit qu'il fallait que j'en apprenne davantage sur la morphologie comme telle, et je suis allée passer deux semaines à Stanford pour un cours intensif avec Bill qui était déjà, je crois, à la retraite et émérite. Cela a vraiment été très formateur : j'ai appris beaucoup de choses sur la tabulation, les archéopyles, et le fondamental qu'on n'utilise peu dans le Quaternaire parce qu'on a une diversité qui est vraiment réduite par rapport au registre fossile. Il y a des formes magnifiques dans le Crétacé par exemple, des morphologies marquées par des tabulations, les formes qui sont cavates, très diverses… En termes de morphologie et de diversité, il y a beaucoup plus de choses à regarder dans le Crétacé que dans le Quaternaire.

Enfin, il y a Joël Guiot pour tout ce qui est traitement de données. Sans lui, je serai encore en train de faire de la description de diagramme de façon qualitative. J'aurais peut-être été explorer de moi-même, mais il a donné un sacré coup de main.

Quelles qualités cherches-tu chez les étudiant(e)s gradué(e)s ? En d'autres mots, qu'est-ce qu'une étudiante ou un étudiant qui t'approche pour une maitrise ou un doctorat devrait mettre de l'avant pour maximiser ses chances ?

Sans hésitation, la curiosité.

Quand un étudiant est en cours, qu'il a des données devant lui et qu'il me dit : « là il y a quelque chose que je ne comprends pas, il faut absolument que j'aille plus loin pour comprendre ». À ce moment-là, je me doute que j'ai un chercheur en face de moi et j'adore ça. J'entends davantage « qu'est-ce que je vais bien pouvoir écrire ? », mais ça arrive de temps en temps. Et parfois, les étudiants qui d'emblée sont vifs et s'expriment beaucoup font flop dès la première épreuve, alors que ceux qui paraissent au premier abord plutôt réservés, qui ne disent pas grand-chose si ce n'est « ah moi j'aimerais bien un peu aller explorer davantage », à un moment donné, ils arrivent dans ton bureau avec quelque chose de nouveau et intéressant. Mais vraiment, il est quasiment impossible de jauger un étudiant avant de commencer à travailler ensemble.

Peux-tu partager le secret de ton succès ? Est-ce affaire de se poser les bonnes questions, de s'entourer des bonnes personnes… ou de se saturer le système de caféine ?

Pas le café, non… Difficile question. Je ne sais pas ce qu'on appelle succès. Pour le moment, il y a tellement de choses que j'ai l'impression de pas avoir fini, qui sont en suspens, que la notion de succès semble tout à fait relative.

Je dirais que d'abord, il faut sortir de sa zone de confort. Là où ça a bien marché, c'est quand j'ai travaillé à l'intersection entre les disciplines – là il y a un terrain fertile. Passer du milieu terrestre au milieu marin, se rendre compte que les enjeux sont différents, essayer de d'utiliser ce qu'on connaît du milieu terrestre pour le milieu marin, alors que les océanographes n'ont jamais regardé les choses de cette façon-là… Travailler avec des taxonomistes mais ensuite

passer à un nouveau traitement de données qui n'a rien à voir...

Ne jamais s'arrêter sous le prétexte des critiques, parce qu'on en a toujours. Dès qu'on fait quelque chose de nouveau, on est critiqué, mais on avance, et ça finit par fructifier. J'ai subi beaucoup de critiques, et je crois que d'autres se seraient arrêtés. Donc une forme de persévérance... et bien sûr, couplée à la curiosité.

Bien que tu n'aies pas été impliquée officiellement dans la supervision de mes travaux de recherche de 1er cycle et de maîtrise, je suis issu de ton « école » par l'intermédiaire d'André Rochon. Dans toutes nos interactions au GEOTOP, tu as toujours réussi à valoriser mes contributions et à me faire sentir que mes efforts étaient importants. Quels conseils peux-tu fournir aux chercheurs – jeunes et moins jeunes – pour promouvoir des relations saines et productives avec les étudiant(e)s qu'ils (ou elles) dirigent ?

Je suis contente d'entendre que j'ai pu t'encourager. Déjà, respecter l'autre qui est en face de nous, qui est une grande personne, un adulte. Encourager celui qui veut aller plus loin, toujours. L'écoute est primordiale à chaque étape.

Quel est ton palynomorphe préféré ?

J'ai commencé par le pollen, j'adore le pollen. Mais je crois que les dinoflagellés exercent une attirance particulière en raison de leur morphologie, leur façon de pas être symétrique... Pour moi sont des objets qui sont assez uniques, assez étranges. J'ai un faible pour le genre *Impagidinium*. J'aime travailler en milieu de basse latitude pour voir beaucoup d'*Impagidinium* qui sont des indicateurs intéressants. Au moins dans le Quaternaire, *Impagidinium* a des traits de caractère qui sont plus reproductibles que *Spiniferites*, par exemple, qui a beaucoup plus de variation intraspécifique.

Une de tes contributions majeures aux domaines de la palynologie marine et des géosciences du Quaternaire, est le développement des fonctions de transfert qui permettent des estimations quantitatives des paramètres de surface à partir des assemblages de kystes de dinoflagellés dans les sédiments, en s'appuyant sur une vaste base de données de référence. Quelle est la prochaine étape dans leur développement ?

Ce serait bien d'aller à l'échelle globale, et je pense qu'on y arrivera. Par contre, on a de moins en moins de gens qui font de l'observation et de l'acquisition de données. On a de plus en plus de gens qui font des biomarqueurs, de l'ADN. J'ai un peu peur que le type d'observation que l'on fait ne soit un peu désuet.

Si je devais développer un nouveau laboratoire aujourd'hui, je m'arrangerais pour jumeler l'observation avec les biomarqueurs. Et question pratique, ça prend une journée pour étudier une lame, alors que les analyses de biomarqueurs sont beaucoup plus rapides. Donc il serait peut-être prudent de faire du débroussaillage avec des traceurs biomarqueurs qui répondent à des questions spécifiques, avant de sortir notre vieille artillerie.

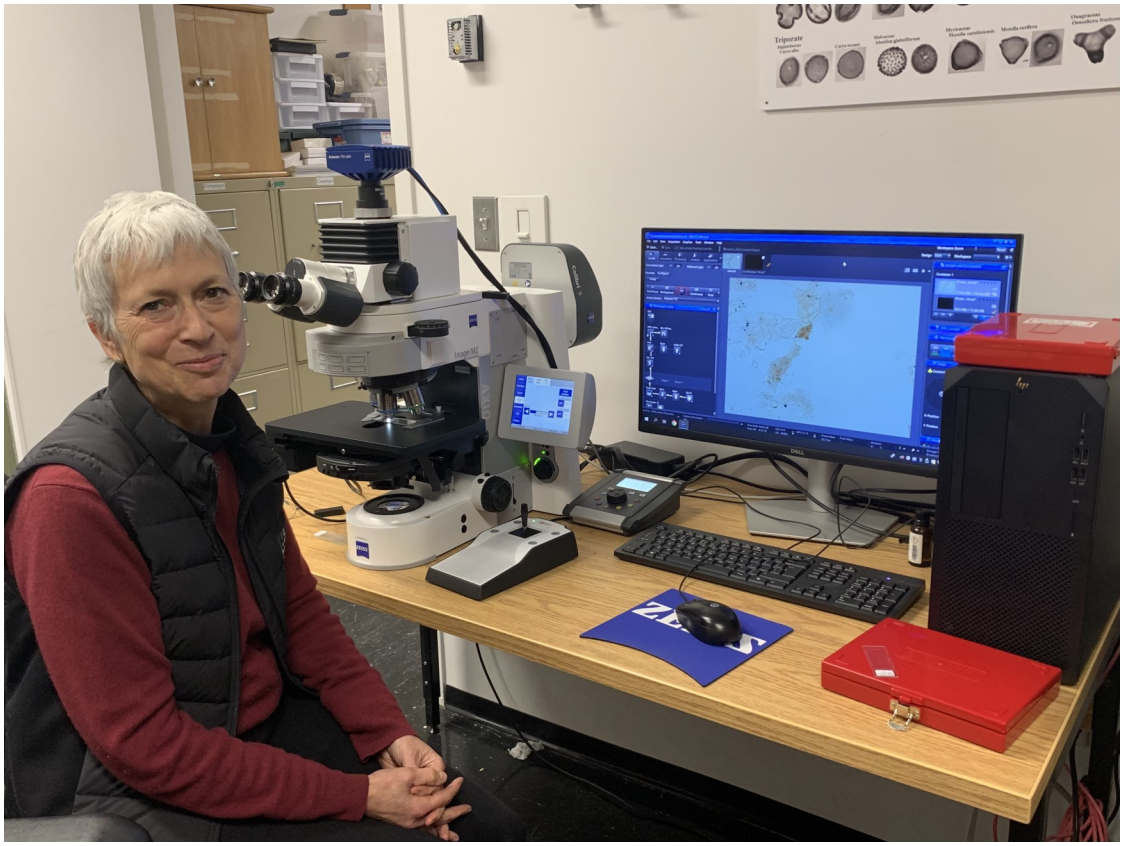
Sans prétendre prédire le futur, penses-tu que l'intelligence artificielle va bénéficier ou nuire à la re-

cherche en géosciences – je pense à la palynologie mais aussi à tout l'éventail des approches pratiquées au GEOTOP ?

Eh bien, les deux, mon commandant. C'est un outil qui est fabuleux. Puis on s'en sert déjà d'une façon ou d'une autre. On pourra peut-être reconnaître automatiquement nos objets au microscope. L'analyse automatique des objets est d'ailleurs un sujet qui m'intéresserait à développer mais c'est très difficile. C'est beaucoup plus rapide maintenant pour faire une revue de littérature; avant, il fallait aller à la bibliothèque, commander les articles… Par contre, tout ce qui n'est pas numérisé n'existe plus, et je crains que beaucoup de connaissances ne soient en train de s'effacer. Peut-être que nous, qui faisons la transition du monde avant AI au monde AI, devrions essayer de numériser tous les vieux documents.

Maintenant on ne sait plus où regarder – on est noyé par l'information, la désinformation, même dans les publications. Les éditeurs ont des problèmes en ce moment : ils reçoivent plein de manuscrits qui sont des copies de créations artificielles, donc là on a un vrai problème. Et comme enseignant, c'est affreux. Avec l'intelligence artificielle, on ne demande plus de travaux écrits aux étudiants parce qu'on sait pas qui les écrit, donc ça nous complique la vie. On ne fait plus passer d'examens normaux, on revient au papier ou au crayon… mais les étudiants ne savent plus écrire à la main et la syntaxe est souvent mauvaise. Il faudra probablement se limiter à des vrai-ou-faux ou des questions beaucoup plus simples.

C'est donc un bilan mitigé, mais c'est à nous de faire en sorte que l'intelligence artificielle nous ouvre plus de portes qu'elle n'en ferme!



William (Bill) Colin MacMillan (9 November 1950 to 28 August 2025): a tribute

By *Rob Fensome and Graham Williams* (NRCan—GSC Atlantic)

It is with great sadness that we note the passing of Bill MacMillan, whose association with GSC Atlantic spanned over 53 years.

Born at Inverness, Cape Breton Island, Nova Scotia, Bill grew up in East Lake Ainslie on Cape Breton Island, a rural setting that sparked his life-long interest in rocks and the outdoors. He enrolled in the Mineral Technology Program at what is now Cape Breton University in Sydney, where he graduated as a geological technologist in 1972. Jobs related to his qualifications were more common in the Halifax area, so Bill moved there after graduation and, that same year, accepted a job with the Eastern Petroleum Geology Section of the Geological Survey of Canada (GSC), located on the campus of the Bedford Institute of Oceanography (BIO) in Dartmouth. Bill started work at GSC on 4th July 1972, having been hired as a technologist to work in the palynology laboratory. In 1975 he was joined by a new hire, Bernie

Crilley, and the two concentrated on processing samples from Canadian east-coast offshore exploration wells until 1995. During those 20 years, they produced thousands of palynology slides from rock samples taken from the wells for palynologists Sedley Barss (retired 1987), Jonathan Bujak (moved to industry ~1982), Ed Davies (moved to industry ~1986), Rob Fensome (from 1984) and Graham Williams. The production of so many slides over that time, working in a windowless third-floor laboratory in BIO's Murray Building, involving the use of dangerous chemicals, is a testimony to Bill's diligence and fortitude. Largely as a result of his dedicated lab work, Bill was co-recipient of a GSC Logan Medallion in 2019.

With lab production pressures reducing somewhat in the mid 1990s, Bill took an interest in databases and graphics, becoming skilled in the application of the drafting program Corel Draw, and he became indispensable for his work on graphics for publications, geological meetings and field trips. Bill retired on 27 August 2010, but continued his work as a volunteer at GSCA until his passing.

Many papers that we have published in the past 25 or more years bear witness to Bill's contributions. For example, he drafted all 800 figures (including many that are multi-component) in the publication "A glossary of the terminology applied to dinoflagellates, acritarchs and prasinophytes, with emphasis on fossils" published as the American Association of Stratigraphic Palynologists Contribtions Series, no 37 in 2000. Bill's graphic accomplishments reached a peak in his contributions to three popular geology books: two editions of *The Last Billion Years: A Geological History of the Maritime Provinces of Canada* and *Four Billion Years and Counting: Canada's Geological Heritage*. Many of the graphics in these milestone books were Bill's work.

In the 1970s, Bill became active in the newly formed Atlantic Geoscience Society. (AGS is the primary society for those involved and interested in geoscience in the Maritimes.) As well as serving as Secretary for several years, he was involved in several society projects; the first Geological Highway Map of Nova Scotia (AGS Special Publication No.1), which literally put the Society on the map, was produced largely through the efforts of Jonathan Bujak and Bill, together with Howard Donohoe and Bob Grantham. Bill and Jonathan travelled the province extensively, logging the geology along the highways, and they played major roles in developing and designing the map and the accompanying panels.

Bill enjoyed keeping up with the news, weather and sports and could discuss aspects of these at great length when engaged. Golf was a great passion of Bill's and, although he enjoyed playing, his great contribution was as a volunteer. He was a significant contributor to the Nova Scotia Golf Association (NSGA) from 1985. Throughout his tenure he acted as a referee, course rater, national board member, NSGA executive committee member, President, Vice-President, Governor with Golf Canada, and Chair of Golf Canada's Handicap and Course Rating Committee.

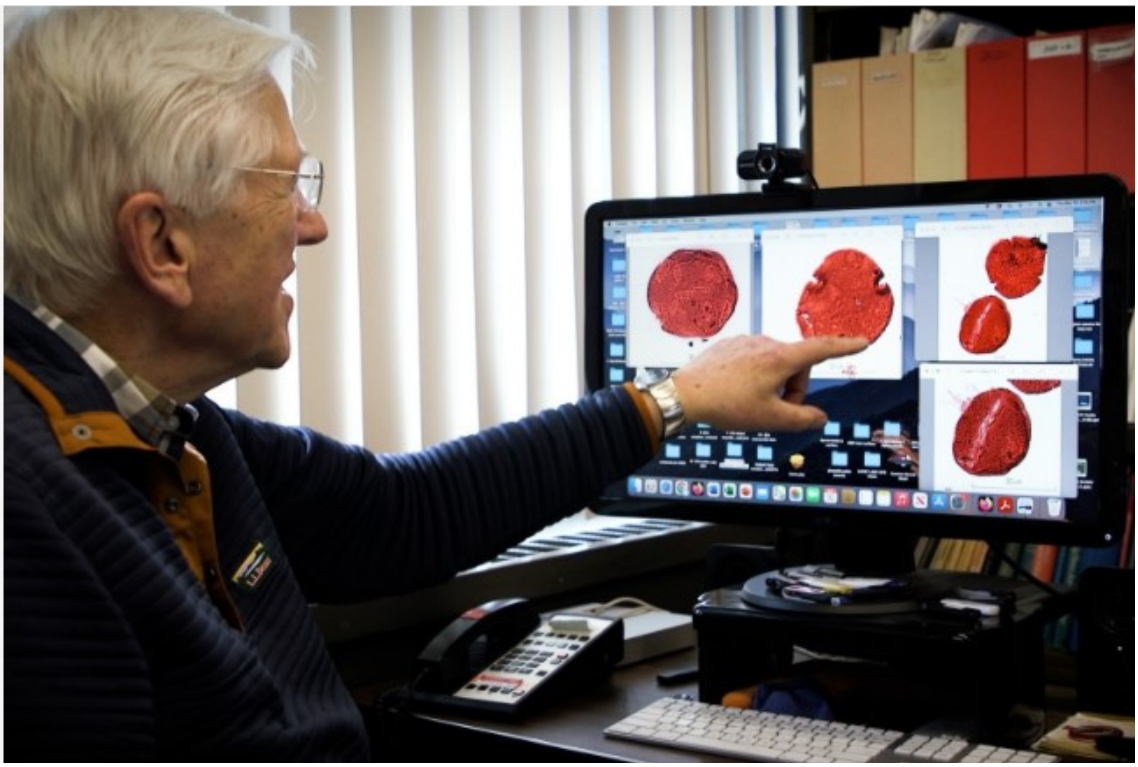
Bill's dedication, productivity and attention to detail were his great strengths and we will greatly miss these and, above all, his collegiality and friendship.

Please see also https://haverstocks.com/tribute/details/6008/William-MacMillan/obituary.html

Rob Fensome and Graham Williams

Palynology Laboratory Update

By *Rolf Mathewes* (Simon Fraser University)



It has been too long since I posted anything on the CAP Newsletter, a valuable and enjoyable read for all us palynologists. Part of that delay has been dealing with several bouts of blood cancer (lymphomas) that have responded well to treatment so far, allowing me to carry on with my teaching and research at Simon Fraser university. In recent years, my research focus has shifted from Quaternary palynology and paleoecology to the Paleogene, using both megafossils as well as pollen and spores and fossil insects, in collaboration with Dr. Bruce Archibald. We are both interested in past climate (who isn't?) and a multi-proxy approach is proving very promising.

Recent renovations at SFU have forced me to move laboratories. As a result, I no longer have access to my specialized acid-free fume hood and plumbing for HF preparations. I still have many uncounted slides from earlier preparations that will keep me going until I retire. I am also finishing up with my forensic botany collaborations on homicide cases, many of which included some level of palynological analysis. Perhaps a small book summarizing my forensic botany experiences will get finished in the near future.

I attach an image of me looking at pollen grains from the Eocene sediments of Burnaby Mountain, copied from the Biological Sciences web page at SFU. Maybe some of you may recognize an older former president of CAP?

Rolf Mathewes

Geodiversity Fest Highlights Palynology for the Public

By *Zhen Li* (NRCan—GSC Pacific)

At this year's Geodiversity Fest, held at the Royal British Columbia Museum in Victoria, palynology captured public attention through engaging displays and hands-on outreach activities.

Members of the Geomorphology and Chronology Research Lab in the Department of Geography at the University of Victoria, including Dr. Sophie Norris and Chris Hebda, organized activities showing ice-age paleoenvironments. These included a microscope station featuring late Pleistocene pollen assemblages from Vancouver Island, as well as 3D-printed pollen grains and other micro- and macrofossils that illustrated environmental change across British Columbia at the end of the last glaciation (Photos 1–3).

Dr. Randy Enkin, Dr. Zhen Li, and a co-op student Navinder Hundal from the Geological Survey of Canada–Pacific Division, Natural Resources Canada, displayed dinoflagellate cysts, pollen and charcoals in slides from marine sediments, besides sediment cores and rock samples. These materials allowed visitors to explore how microscopic indicators preserved in sediments reveal remarkable stories about past climates and environments (Photo 4).

This outreach event provided a rare and valuable opportunity for the public to interact directly with palynological materials, fostering greater awareness and interest in the microscopic evidence of environmental and climatic change.

Geodiversity Fest is part of a global registry of events celebrating Earth's natural diversity (https://www.geodiversityday.org/organise-an-event).

In Canada, only five events were registered this year. The palynology exhibition in Western Canada highlighted the unique contribution of micropaleontology to public geoscience outreach.

Photos (1-3 by Dr. Sophie Norris; 4 by Dr. Randy Enkin):
1. Interactive sieving activity mimicking the extraction of pollen from sediment.
2. 3D-printed models of pollen and other fossils.
3. Participating members from Dr. Sophie Norri's Geomorphology and Chronology Research Lab.
4. Dr. Zhen Li explained the palynomorphs visible in the microscope's view field to a young visitor.

A Novel Chemo-Analytical Approach to Palynology: Highlights from My PhD Research at Ghent University (Belgium)

By *Pjotr Meyvisch*
Postdoctoral researcher, Department of Earth and Planetary Sciences,
Johns Hopkins University, Baltimore, US

Introduction

During my years as a geology student at Ghent University, I developed a keen interest in paleontology—particularly in palynology, a field long established in the department's teaching and research. After completing my master's thesis on Upper Ordovician chitinozoan biostratigraphy, I was fortunate to join the department in 2018 as a doctoral researcher and teaching assistant. This position granted me a luxurious six years of research (plus a half year-long COVID extension) with remarkable academic freedom under the supervision of Prof. Dr. Stephen Louwye (Department of Geology, Ghent University), Dr. Kenneth N. Mertens (Ifremer, France), and Prof. Dr. Ir. Henk Vrielinck (Department of Solid State Sciences, Ghent University). Eager to expand my scientific horizons, I ventured into the wonderful field of **chemo-analytical palynology**, hereby continuing the efforts of Dr. Pieter Gurdebeke (my direct predecessor in function at the department), who experimented with applying infrared (IR) spectroscopy primarily to dinoflagellate cysts (dinocysts) and ciliate remains to probe their macromolecular composition. This early decision ultimately led to a PhD dissertation bearing the title: "*Infrared Spectroscopic Analysis of Modern and Fossil Organic-Walled Microfossils – A Comparative Study of Dinoflagellate Cysts and Other Palynomorphs"*, from which I summarize some key findings here.

Before delving into the results, a brief outline of the analytical method—IR spectroscopy—will help set the stage (illustration in **Fig. 1**). This technique essentially probes the vibrational modes of chemical bonds by measuring their absorption of IR radiation. Each vibration has a specific geometry (stretching, bending, wagging, etc.) and occurs at characteristic wavelengths that correspond to functional groups or structural motifs ("moieties") within the molecule such as aromatic rings, aliphatic chains, or carboxyl groups. These moieties can ultimately be linked to larger biomolecular building blocks like carbohydrates, lipids, and proteins. The intensity of absorption is broadly proportional to the abundance of each moiety, making IR spectroscopy a semi-quantitative tool for macromolecular characterization. In Fourier transform infrared (FTIR) spectroscopy, our preferred method, all unabsorbed wavelengths are collected simultaneously as a complex signal (interferogram), which is then mathematically transformed into an interpretable absorption spectrum (**Fig. 1**). Each spectrum acts as a semi-quantitative macromolecular fingerprint of the sample. When combined with microscopy, **micro-FTIR** enables the analysis of individual organic-walled microfossils (palynomorphs). The next section describes how these palynomorphs are prepared for micro-FTIR analysis, and discusses the technique's main benefits and limitations—as this encompasses the first phase of my PhD research focused on methodological development.

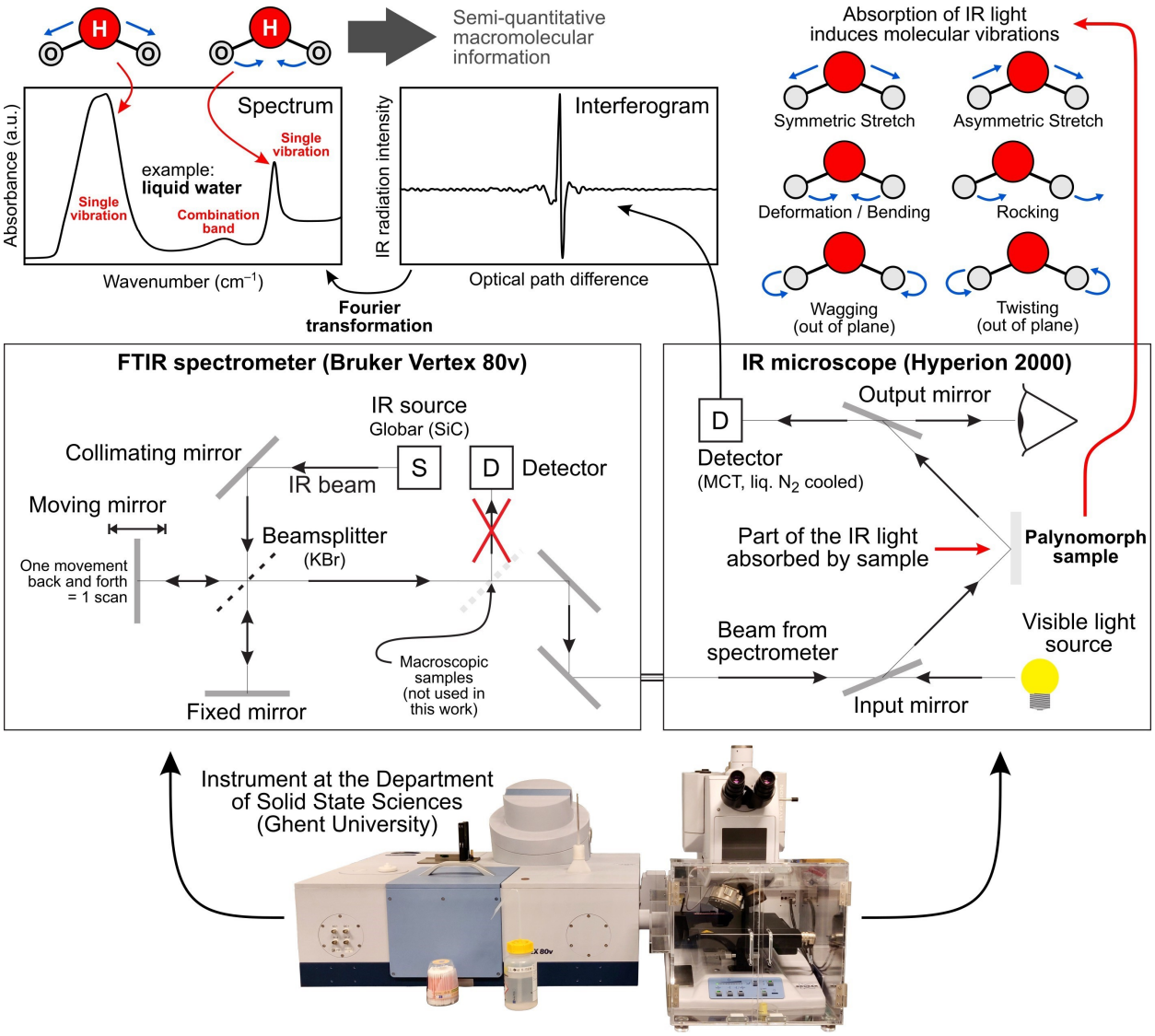


Figure 1. *Illustrated outline of the principles behind micro-FTIR spectroscopy. The photograph (bottom) shows the main instrument used during my PhD. Figure from PhD Chapter 1.*

Highlight 1 – A New Methodological Framework Overcomes Reproducibility Issues

The first year of my PhD was a steep learning curve. Compared to the relatively large chitinozoans I had previously positioned on SEM stubs with a single-haired brush, the smaller (~50 µm) dinocysts, pollen, and spores demanded greater dexterity. Guided by Pieter and Kenneth, I learned to manipulate palynomorphs in water droplets under an inverted microscope using a narrowed glass Pasteur pipette attached to a rubber suction tube (**Fig. 2**). This mouth-controlled tool allowed precise isolation and even minor physical cleaning of specimens before imaging and deposition—usually onto a (prelabeled) gold-coated mirror substrate, which reflects ~99% of incoming IR radiation and minimizes spectral contamination (**Fig. 2**).

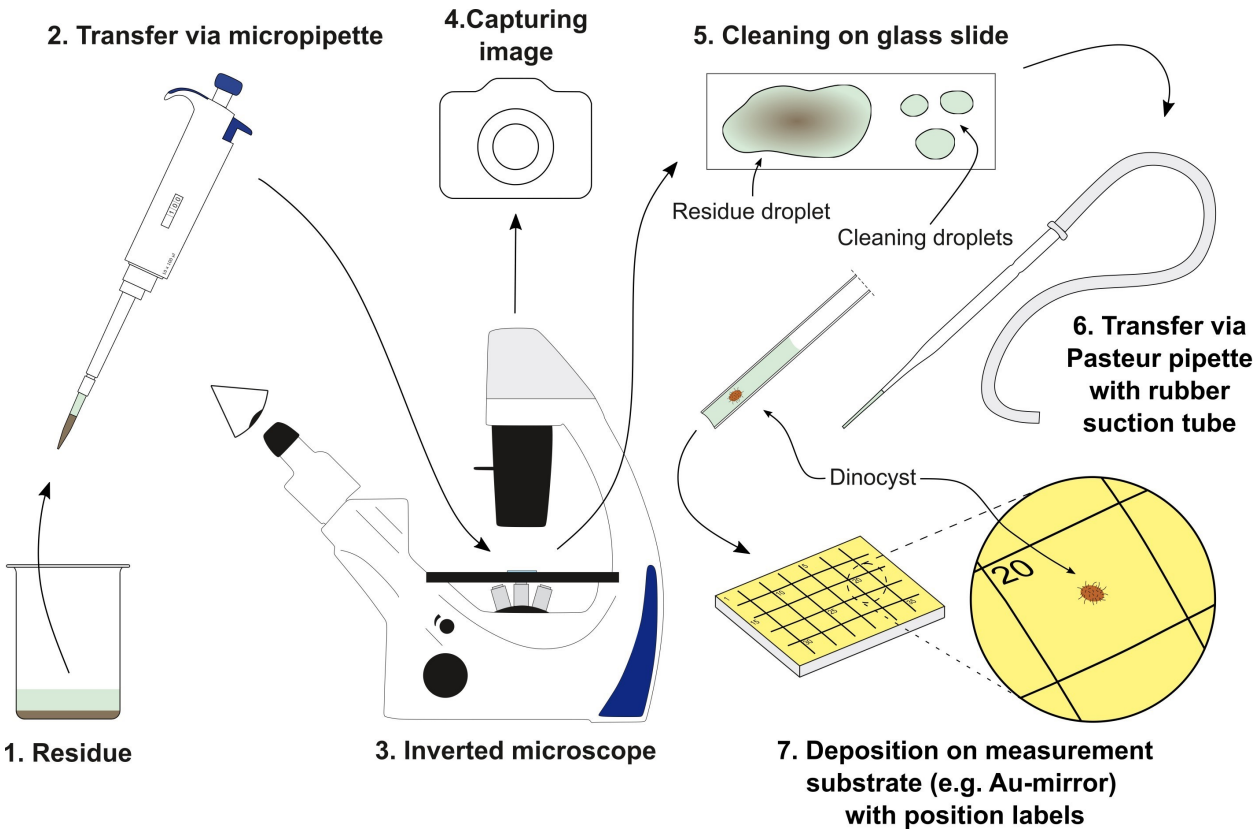


Figure 2. *Schematic illustration of the isolation procedure of individual palynomorphs for micro-FTIR analysis. Figure from Meyvisch et al. (2022) (= PhD Chapter 2).*

These prepared mirrors were then carefully transported—often a nerve-wracking 500 m walk—to Henk's micro-FTIR laboratory. For the first year (2019), we focused on isolating modern dinocysts and mainly used **transflection micro-FTIR** for their analysis, where the IR beam passes twice through the sample, reflecting off the underlying substrate (**Fig. 3**). This setup enhances signal strength compared to a single-pass **transmission** mode and facilitates comparison with previous dinocyst studies, which typically used the same method.

However, after collecting spectra from numerous modern dinocysts and some other palynomorphs, I started noticing reproducibility issues; bands in spectra from specimens of the same species often varied significantly in shape, position, and intensity, obscuring intercomparison and interpretation. Through literature—particularly biomedical micro-FTIR studies—I learned that such distortions are often caused by scattering and interference effects arising from the IR beam interacting with rough or heterogeneous surfaces. Coincidentally and around the time of this realization (early 2020), I was introduced to a third spectroscopic configuration, **attenuated total reflection (ATR) micro-FTIR**, during a research stay at MARUM (Bremen, Germany) with Dr. Gerard J. M. Versteegh and Prof. Dr. Karin Zonneveld. In this approach, a flat-tipped, high-refractive-index crystal (often germanium, diamond, or zinc selenide) is pressed against the sample and spectra are generated from the interaction between the sample

and an evanescent IR wave produced at the crystal interface (**Fig. 3**). This destructive ATR setup effectively flattens the specimen into an "organic pancake," theoretically reducing scattering and improving spectral reproducibility.

Comparing all three configurations using cultured *Lingulodinium machaerophorum* cysts, we indeed found that **ATR micro-FTIR** (on Au-mirror substrates) **produced the most reproducible data**, with minimal distortion (Meyvisch et al., 2022). Transflection—commonly used in earlier studies—proved the least reproducible, likely due to its many refractive index boundaries increasing the probability for scattering effects to occur (**Fig. 3**). While this outcome limited the interpretative value of my earlier transflection dataset (and some prior literature), it established a clear methodological path forward for collecting high-quality chemical information from individual palynomorphs.

Subsequent work focused on refining every step of the ATR micro-FTIR process (Meyvisch et al., 2022; unpublished PhD Chapter 3), as each one presented inherent methodological challenges. The most critical factors were:

1. **Specimen purity after isolation** – Even barely visible, attached particulate (in)organic contaminants or 'drying spots' ("coffee-ring" residues; Yunker et al., 2011) can obscure true chemical signals. Careful palynological maceration (using hydrochloric and hydrofluoric acids), ultrasonication, sieving, and heavy-liquid separation help, but selecting the cleanest specimens and ensuring rapid droplet evaporation remain essential. The latter correlates directly with Pasteur pipette handling skills.

2. **Specimen size and roughness during analysis** – Small (< 30 µm) and/or highly ornamented may not fully cover/contact the ATR crystal, producing noisy or slightly deformed spectra. We described these deformations as "physical artifacts" (PhD Chapters 2 and 3). Fortunately, clustering several specimens or increasing contact pressure can largely mitigate these issues.

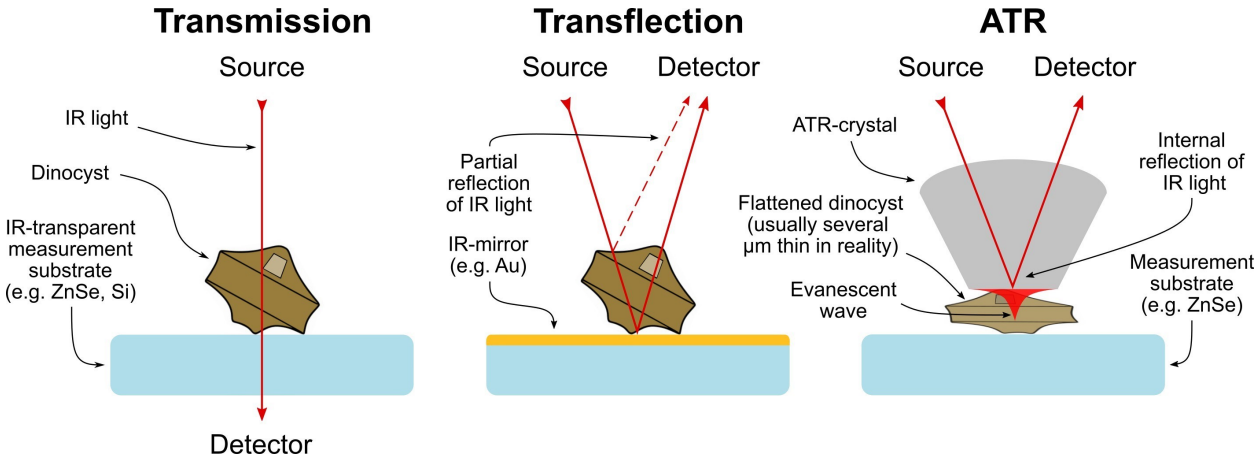


Figure 3. *Schematic illustration of the three main data collection modes in micro-FTIR spectroscopy. Figure from Meyvisch et al. (2022) (= PhD Chapter 2).*

3. **Data processing pipelines** – Raw spectra require polishing in order to become fully interpretable and intercomparable via statistical methods. These data processing pipelines can be fairly complex and should be tailored for each application (e.g., spectral plotting, dimensionality reduction via principal component analysis)—hence, they are not discussed in full detail here. However, frequently reoccurring correction steps include: atmospheric compensation (removal of CO_2 and H_2O vapor bands), smoothing (removal of noise, while preserving signal), spectral truncation (removal of uninformative regions), baseline correction (removal of non-flat background trends), and normalization (scaling of intensity values to account for variations in sample thickness and concentration).

Highlight 2 – Dinocyst Wall Chemistry is Diverse and Reflects Diverse Biological and Geological Factors

With the methodology established, I turned to exploring the chemical diversity of dinocyst walls. Earlier studies had proposed that their resistant biopolymer, **dinosporin**, is a cross-linked, carbohydrate-based macromolecule (Versteegh et al., 2012), showing variability among species (Bogus et al., 2012; Gurdebeke et al., 2018), and with trophic mode (Bogus et al., 2014). We sought to test with ATR micro-FTIR whether cysts produced by heterotrophic dinoflagellates could truly be distinguished from those of photoautotrophs on the presence of nitrogen, as previously suggested by Bogus et al. (2014).

We compiled a dataset of 211 spectra from 50 modern dinocyst species spanning photoautotrophs, mixotrophs, and heterotrophs[1] (Meyvisch et al., 2023). The results revealed that **nitrogen is ubiquitous** among dinocysts and not limited to heterotrophs. Instead, wall pigmentation emerged as the main driver of chemical variability. Taxa with unusual pigmentation in respect to feeding strategy—such as the brown photoautotroph *Parvodinium umbonatum* or the transparent heterotroph *Trinovantedinium applanatum*—clustered among others with similar pigmentation rather than diet (**Fig. 4**), invalidating the trophic proxy proposed by Bogus et al. (2014).

In addition, the dataset revealed that dinosporin is not a static compound, but rather a variable biomacromolecular suite encompassing different types. In Meyvisch et al. (2023) we identified four **dinosporin types** (**Fig. 4**) and speculated on their bioecological functions in protecting resting cyst contents:

Transparent dinosporin – Highly cross-linked, cellulose-like material characteristic of gonyaulacoid cysts, likely conferring long-term protection during extended dormancy[2].

Aromatic dinosporin – Found in *Trinovantedinium applanatum*, enriched in aromatic moieties akin to ferulic and *p*-coumaric acids in sporopollenin[3], likely providing similar protection against harmful ultraviolet (UV) radiation (Fraser et al., 2014).

Aliphatic dinosporin – Present only in cysts of the freshwater species *Fusiperidinium wisconsinense* and *Peridinium limbatum*, composed of long chain aliphatic (lipid) moieties reminiscent of algaenan[4].

Colored dinosporin – Identified in all light to dark brown cysts, typically including protoperidinioids and occasional gymnodinioids and peridinioids.

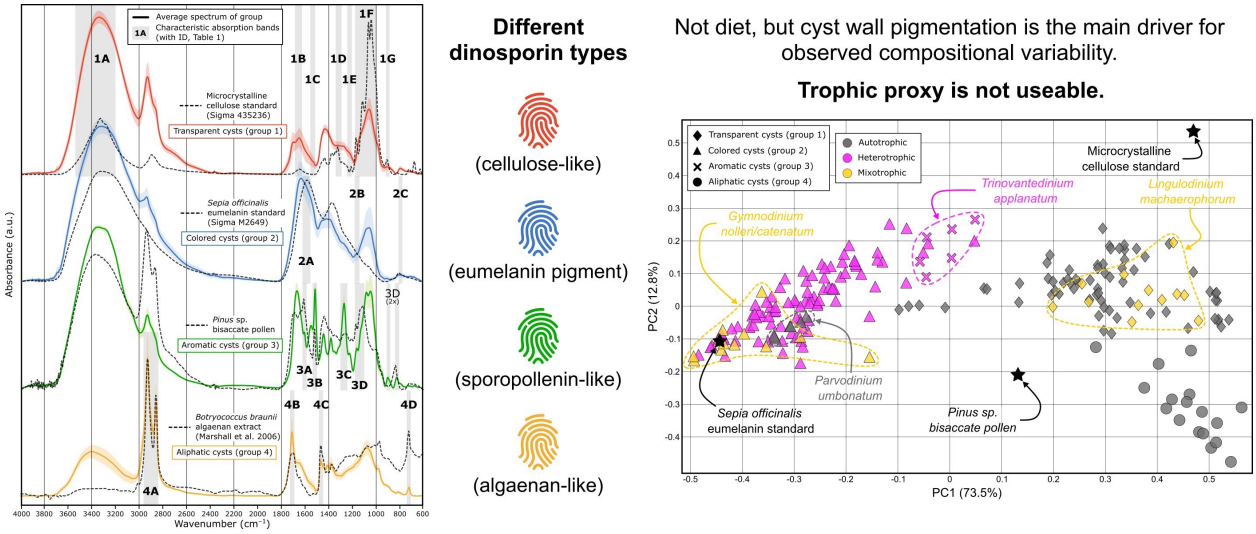


Figure 4. *Average ATR micro-FTIR spectra of different dinosporin types (left) and a principal component analysis plot of all 211 spectra revealing clustering in the compositional space (right). Figure modified from Meyvisch et al. (2023) (= PhD Chapter 4).*

Through dinocyst bleaching (photo-oxidation) experiments and comparison with a standard, we found that the pigment likely responsible for the color in colored dinosporin is **eumelanin** (**Fig. 5**)— marking it the first report of this compound in protists. Eumelanin likely contributes to UV screening and microbial resistance (Song et al., 2023), possibly offering a more short-term protection to dinocysts dwelling near the water surface. Moreover, because eumelanin is weakly autofluorescent, our results suggest that the reduced autofluorescence of predominantly brown-colored heterotrophic cysts stems from pigment-induced fluorescence quenching, not diet—casting doubt on longstanding trophic interpretations based on fluorescence (Brenner and Biebow, 2001). All in all, it seems that there is currently no robust way to infer the feeding strategies of extinct dinoflagellates.

Between 2021–2024, extensive experiments at the **SMIS IR beamline (Synchrotron SOLEIL, France)** — in collaboration with Dr. Ferenc Borondics, Dr. Christophe Sandt, Dr. Gergely Németh, and Dr. Francesco Capitani — enabled additional high-resolution and *in situ* thermal analyses of dinocysts and other palynomorphs. Using optical photothermal infrared (O-PTIR) spectroscopy, we achieved submicron resolution (~500 nm) and demonstrated compositional homogeneity within dinocyst wall layers at this scale (Meyvisch et al., 2023). In addition, heating experiments (to 350 °C) under oxic and anoxic conditions allowed to monitor the thermal degradation and transformation of modern biomacromolecules to compare them against naturally fossilized counterparts. To test how accurately these experiments simulated dinosporin fossilization, we compiled an ATR micro-FTIR reference dataset from 636 dinocysts (two-thirds fossil, up to Triassic in age) covering most major lineages with fossil representatives (these data are presented in PhD Chapter 6, which is currently being prepared for publication).

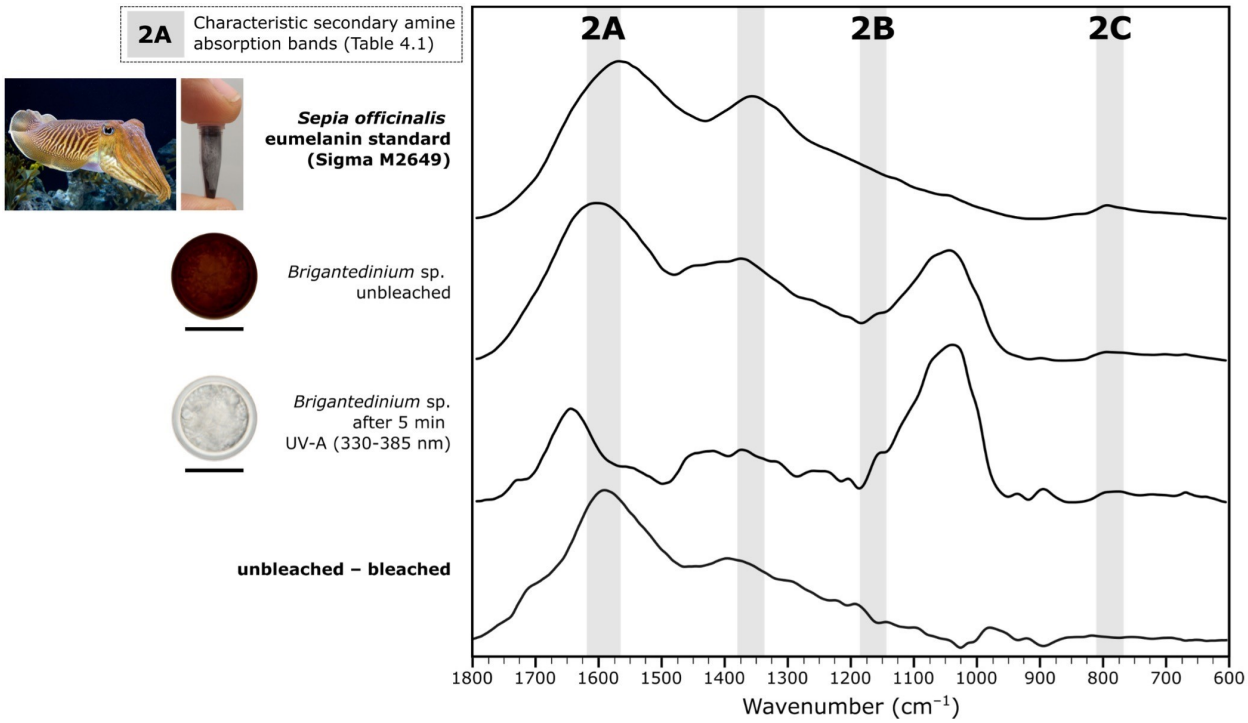


Figure 5. *ATR micro-FTIR spectra of a eumelanin standard from cuttlefish, and a protoperidinioid dinocyst before and after bleaching with UV-A radiation. The difference spectrum (bottom) is strongly similar to that of the standard (top). Figure modified from Meyvisch et al. (2023) (= PhD Chapter 4).*

Among pigmented dinocysts (predominantly gymnodinioids) in this dataset we identified a fifth dinosporin type, **proteinaceous dinosporin**, being notably enriched in protein moieties—for reasons yet unknown. Furthermore, we confirmed cellulose in the cyst wall of *Gymnodinium impudicum*, a gymnodinioid species lacking cellulosic thecal plates but with demonstrated access to the compound's biosynthetic pathways. From all organic compounds, only transparent, colored, and aliphatic dinosporin were found in pre-Quaternary cysts, though in progressively altered state with increasing age and thermal maturity. Interestingly, experimental pyrolysis results matched these natural degradation trends, with notable compositional similarities between pyrolytic end products and biomacromolecules exposed to late diagenetic–catagenetic conditions. Cellulose, aromatic, and proteinaceous dinosporin were restricted to Holocene cysts and were largely destroyed during pyrolysis—demonstrating reduced degradation resistance. The combination of empirical and experimental data allowed a more accurate unraveling of the **molecular taphonomy** of dinocyst wall compounds and assessment of their relative **preservation potential**, invaluable information for explaining occurrence patterns in the fossil record.

Mapping out dinosporin types for most major dinoflagellate families also revealed new clues for **phylogenetic relationships**, with most patterns aligning with inferences made on the basis of morphological and ge-

netic evidence (Medlin and Fensome, 2013). Another outcome of particular relevance to palynologists was the detection of subtle, species level chemical variability in both modern and fossil dinocysts composed of the same dinosporin type—suggesting the feasibility of **chemotaxonomy** at low taxonomic ranks. Further research is needed to better understand the extent and intricacies of this variability, particularly within species complexes and in relation to thermal maturity.

What Comes Next?

These results of my PhD research highlight only some aspects of what can be learned from studying modern and ancient biomolecules and cover a fraction of the tree of life. This work contributes to the growing field of **molecular paleobiology**, which integrates a vast array chemical, biological, and geological approaches to study life's molecular record (see Greenwalt, 2023, for an comprehensive overview on historical developments and major breakthroughs in the field). I am now continuing this line of research as a **postdoctoral fellow at Johns Hopkins University**, in the PaLEO lab of Prof. Dr. Jasmina Wiemann, an expert on metazoan biomolecules. My current work extends chemo-analytical approaches—including, for example, complementary **Raman spectroscopy**—to a wider range of organic-walled microfossils (including acritarchs). I am particularly interested in samples with low thermal maturity and exceptional preservation (increased chances for retrieving recognizable biomolecules), as well as high diversity (increased chances for finding different compounds). If you are working with such material and are interested in collaboration, I would be delighted to hear from you!

Notes:

[1] A more contemporary view distinguished only mixotrophs and heterotrophs (García-Moreiras et al., 2025).

[2] Gonyaulacoid taxa, such as *Lingulodinium machaerophorum*, have demonstrated viability after multi-decadal dormancy periods (Lundholm et al., 2011).

[3] The resistant biomacromolecule making up the walls of plant pollen and spores (Li et al., 2018).

[4] The resistant biomacromolecule making up the walls of green algal resting stages (de Leeuw et al., 2006).

[5] Eumelanin is predominantly present in animals and fungi, and in some bacteria and plants (Song et al., 2023).

[6] Cellulose was previously reported from division cysts of the freshwater kryptoperidinoid species *Unruhdinium penardii* var. *robustum* (Mertens et al., 2021).

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