The Canadian Botanical Association Bulletin

Bulletin de l'Association Botanique du Canada

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President's Message



Dear CBA members,

I hope you have had a restful and productive summer! The summer got off to a fantastic start with the annual CBA conference held this year in collaboration with three other societies as BL2021 in early July (see article inside for more details!). At this conference, we had the opportunity to hold a joint awards ceremony with the other societies, and I was very proud to see our students recognised not only by the CBA-ABC, but also by the American Bryological and Lichenological Association. I was also deeply honoured to confer the Lawson Award for a remarkable career in Botany to the unforgettable Patrick von Aderkas of the University of Victoria, who is a leader in both botanical teaching and research.

Unfortunately, I was not able to confer the Mary Elliot award for service to the CBA or the Magister Award for teaching excellence as there were no nominations for these awards this year. I encourage you all to nominate colleagues for our major awards – the deadline is the end of February 2022, so there is plenty of time to get organised! I also suggest that you think about those colleagues who may not have been nominated for awards yet, or at all. CBA-ABC member and past-president Liette Vasseur was a co-author on a report highlighting gaps between females and males in a number of major academic awards and prizes in Canada and around the world. In fact, despite a trend in increasing representation of women as award winners, the majority of awards still go to men. The report finishes with a number of recommendations for increasing the representation of women among awardees. While this report highlights the gap between men and women, obviously the gaps for other under-represented groups are also present and many of the recommendations would also encourage a broad range of awardees in the future. With this in mind, I encourage you to think about nominating a colleague for one of our major awards in 2022!

The Canadian Botanical Association Bulletin

The CBA Bulletin is issued three times a year (March, September and December) and is freely available on the CBA website. Hardcopy subscriptions are available for a fee.

Information for Contributors

All members are welcome to submit texts in the form of papers, reviews, comments, essays, requests, or anything related to botany or botanists. For detailed directives on text submission please contact the Editor (see below). For general information about the CBA, go to the website: www.cba-abc.ca

Executive Editor

Dr. Erin Zimmerman

cba.abc.bulletin@gmail.com

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Next issue

Texts for the next issue, 54(3), must be received by November 15, 2021

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Bulletin de l'Association Botanique du Canada

Le Bulletin de l'ABC paraît trois fois par année, normalement en mars, septembre et décembre. Il est envoyé à tous les membres de I'ABC.

Soumission de textes

Tous les membres de I'Association sont invités à envoyer des textes de toute nature concernant la botanique et les botanistes (articles, revues de publication, commentaires,requêtes, essais, etc.). Tous les supports de texte sont acceptés. Pour des renseignements détaillés sur la soumission de textes, veuillez consulter le rédacteur (voir ci-dessous). Infos générales sur I'ABC à l'url suivant: www.cba-abc.ca

Rédactrice en chef

Dr. Erin Zimmerman

cba.abc.bulletin@gmail.com

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Prochain numéro

La date de tombée des textes du prochain numéro, le no 54(3), est le 15 novembre 2021

Have a wonderful fall,

Nicole

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Chers membres de l'ABC

J'espère que vous avez passé un été reposant et productif ! L'été a commencé de manière fantastique avec la conférence annuelle de l'ABC qui s'est tenue en collaboration avec trois autres sociétés cette année sous le nom de BL2021 au début du mois de juillet (voir l'article à l'intérieur pour plus de détails !). Lors de cette conférence, nous avons eu l'occasion d'organiser une cérémonie de remise des prix conjointe avec les autres sociétés et j'ai été très fière de voir nos étudiants et étudiantes reconnus non seulement par l'ABC mais aussi par l'American Bryological and Lichenological Association. J'ai également été très honorée de décerner le prix Lawson pour une carrière remarquable en botanique à l'inoubliable Patrick von Aderkas de l'Université de Victoria qui est un leader dans l'enseignement et la recherche en botanique.

Malheureusement, je n'ai pas été en mesure de remettre le prix Mary Elliot pour les services rendus à l'ABC ou le prix Magister pour l'excellence en l'enseignement, car il n'y a pas eu de nominations pour ces prix cette année. Je vous encourage tous à proposer des collègues pour nos principaux prix. La date limite est fixée à la fin du mois de février 2022, vous avez donc tout le temps de vous organiser ! Je vous suggère également de penser à vos collègues qui n'ont peut-être pas encore été nominés pour des prix, ou qui ne l'ont pas été du tout. Liette Vasseur, membre et ancienne présidente de l'ABC, a été co-auteure d'un rapport mettant en évidence les écarts entre les femmes et les hommes dans un certain nombre de récompenses et de prix académiques importants au Canada et dans le monde. En fait, malgré une tendance à l'augmentation de la représentation des femmes parmi les lauréats, la majorité des prix sont toujours décernés à des hommes. Le rapport se termine par un certain nombre de recommandations visant à accroître la représentation des femmes parmi les lauréats. Bien que ce rapport mette en évidence l'écart entre les hommes et les femmes, il est évident que les écarts pour d'autres groupes sous-représentés sont également présents et beaucoup des recommandations, si appliquées, favoriseraient d'ailleurs une plus grande diversité de lauréats à l'avenir. Dans cette optique, je vous encourage à penser à proposer un collègue pour l'un de nos principaux prix en 2022 !

Passez un excellent automne,

Nicole
~~~

New Member Publications

Huynh, C.A. & Guinel, F.C. (2020) "Shoot extracts from two low nodulation mutants significantly reduce nodule number in pea." Plants. 9: 1505. doi.org/10.3390/plants9111505.

Jones, J.M.C., Guinel, F.C. & Antunes, P.M. (2021) "Carbonatite rock can enhance plant growth and nutrition depending on crop traits." Plant Soil. doi.org/10.1007/s11104-021-05001-z.

CBA/ABC Master Plant Science Team Sponsorships for 2021-2022

By Deborah Metsger

CBA/ABC is pleased to be a sponsoring society for the Botanical Science of America's "Planting Science Program 2021-2022." This is an international program in which plant scientists mentor middle- and high-school students as they conduct their own hands-on plant science projects. The "Master Plant Science Team" is made up of graduate students who are sponsored by societies to support this program. Each MST member is trained to work with participating teachers to match student teams with scientists, and help keep student/scientist conversations for all of a teacher's teams going strong. In return, they get an insider-view of science mentoring, and practical experience in program coordination.

This year CBA/ABC has accepted three Master Plant Science Team students:

- Chloe Melo-Gavin, University of Toronto, Toronto, Ontario Canada,
- Gregory Robinson, University of Lethbridge, Lethbridge, Alberta, Canada, and
- Timileyin Sodiq SUNMONU, University of Ibadan, Ibadan, Nigeria

In recognition and support of the work that they will do, CBA-ABC has provided them a free annual membership and a 50% reduction in the registration fee for the 2022 annual meeting.

We have asked each student to contribute an article about themselves and their experience with the Master Plant Science Team in the upcoming issues of the Bulletin, and as posts for CBA/ABC social media.

Chloe, Gregory and Timileyin, welcome to CBA/ABC! We wish you a successful year and look forward to hearing all about it.

Happy Mentoring!

Call for Papers: Advances from Early Career Researchers in Plant Sciences

This special issue aims to highlight the work of researchers at the beginning of their academic career working in the fields of climate change relating to all segments of plant sciences. We encourage submissions that are interdisciplinary in nature and focus on aspects like physiological adaptation, ecological response, and development of plants.



Submission guidelines:

- This special issue accepts manuscripts in the form of an original research article or a review where the first author is a postdoctoral fellow or first year faculty member at the time of submission.
- Maximum article length = 10,000 words (excluding title page & references).
- The manuscript must report new (should not be considered for a publication elsewhere) and previously unpublished results.
- Manuscripts must be submitted by January 15, 2022 to be considered for the issue. Papers submitted after the deadline that cannot be included in the issue will be scheduled for publication in a subsequent issue of Botany.
- Authors are asked to send an email to the editors-in-chief (Dr. Christian Lacroix, lacroix@upei.ca and Dr. Liette Vasseur, lvasseur@brocku.ca) with the tentative title of the manuscript, and an extended abstract (approx. 1000 words) in order to confirm the suitability of the submission for this Special Issue.
- Accepted papers selected for this special issue will be published in the journal as open-access papers (100% open access fee waiver).
- Early Career Researchers will also get a chance to showcase their work and talk about their career paths and challenges in an interview that will be published on the Canadian Science Publishing Blog.
- Authors guidelines: Follow Botany Authors Guidelines at https://cdnsciencepub.com/journal/cjb/authors#guidelines
- For any other queries, please contact Sherestha Saini (Managing Editor, Botany) at sherestha.saini@cdnsciencepub.com.

Guest Editors

Dr. Liette Vasseur – lvasseur@brocku.ca
Dr. Christian Lacroix – lacroix@upei.ca

The Canadian Bryomonitoring Project: Pick moss for science!



The Canadian Bryomonitoring project is a citizen science initiative that hopes to engage interested people of all backgrounds to help us collect moss to study air pollution. Did you know that bryophytes are effective biomonitors of atmospheric pollutants? This is because unlike vascular plants, bryophytes rely on the atmosphere around them for the majority of their moisture and nutrients. By collecting and analyzing the tissues of certain moss species, we can gather data regarding a whole suite of atmospheric pollutants and piece together the spatial trends across large regions. This type of data is typically collected through the installation of monitoring stations, these stations are predominantly situated around urban areas, which in a large country like Canada, omits large portions of the country from this type of monitoring. These monitoring stations can also be quite expensive to install and must be regularly maintained, which can be challenging in remote and rugged areas typical of the majority of Canada's landscape; in contrast, collecting moss is easy and inexpensive! This method of moss biomonitoring has been widely used over the past 30 years in Europe to measure the spatial and temporal trends of atmospheric deposition across the continent. Data generated from these repeated large scale country wide moss surveys have been published in a multitude of journals at local, regional and country-wide scales.

There are only two species of mosses that are well known to be effective biomonitors: *Hylocomium splendens* and *Pleurozium schreberi*; but fear not, as these species are commonly found and easily recognizable. We hope that if you find yourself out hiking, exploring, or doing field work this summer or next, that you will take a few minutes to collect a sample for us. The Canadian Bryomonitoring team have put together a website which describes the project and how to get involved.

To become a participant, we have created an easy-to-follow three step process which allows you to:

1. Reserve your turf! This is done through an interactive map of Canada.

2. Spot your moss! We provide a multitude of resources to help you find and identify these common species of moss.

3. Pick and package! We present a list of required supplies, so you can either gather these supplies yourself (most are common household items), or request a sampling kit, which we will mail to you. Once you pick you sample and let it dry, then simply package and send to us at Trent University in Ontario.

With the help of the citizen science community, we hope to carry out this first-ever large-scale moss biomonitoring survey in Canada! If you would like to get involved, please visit our website (www.bryomonitoring.ca) and join our mailing list to be kept up to date with the latest Canadian Bryomonitoring Project news.



www.bryomonitoring.ca

www.twitter.com/bryomonitoring

Horror at a Museum – New Developments

Members of CBA/ABC may remember a resolution presented and supported at the June 2020 AGM, and posted subsequently on the Association website expressing our concerns regarding the future of the Natural History Museum in Budapest, Hungary[1]. The Hungarian government decided to move the museum to Debrecen, a much smaller town 200 km away from the capital, despite strong opposition expressed by museum staff, local and foreign colleagues, and the presidium of the Hungarian Academy of Sciences[2]. The situation is getting even worse, however. According to a new journal report[3], and several direct contacts with Hungarian researchers, it is not the collection itself which is in immediate danger. The new director of the museum, an archaeo-anthropologist without a PhD, appointed on political grounds in 2019, seeks to eliminate all opposition by creating an intolerable and unbearable atmosphere for the museum curators – thus preparing the ground for an easy transfer to the new site highly favoured by the current government. After taking office he openly said to everyone that "there will be no democracy here, you will do what I want you to do." Research is practically suspended, and decree-like memoranda instruct the staff-members to spend most of their time with inventory. As a result, a total of 80 employees have left the museum in the past 18 months, and 30 newly hired people also left after few months of work. Losses include the previous director general, the former head of the botany department, and the curators of several major collections – leaving at least five million specimens of plants and animals without care. This is an unprecedented case in the history of the institute, and probably also in the history of natural history museums worldwide.

The situation at the Natural History Museum in Budapest is unfortunately just one of many examples of how the Fidesz government of Prime Minister Victor Orban seeks to create an authoritarian, nationalistic state by rejecting the generally liberal values of the European Community and politicizing scientific and cultural discourse[4,5]. The experiences of our Hungarian colleagues should remind members of the CBA/ABC how important it is to resist efforts to make science subservient to ideological goals.

J. Podani, Budapest & T. A. Dickinson, Toronto

Postscript, 10 April 2021:

According to the most recent news[6], the government decided to the integrate the Natural History Museum into a larger, general museum, the National Museum of Hungary. That is, Natural History Museum will cease to exist as an independent institution, and therefore will be even more vulnerable to any action, including the move to Debrecen. At moment, we do not have any explanation and we cannot even guess the motivation behind this decision.

1- Here is the link to the CBA/ABC web page linking to the resolution: https://www.cba-abc.ca/resources/agm-minutes/ The direct link to the file is https://www.cba-abc.ca/wp-content/uploads/2020/06/ABC-CBAresponsetomoveofHungarian-MuseumofNaturalHistory-Approved.pdf

2- https://www.nature.com/articles/d41586-020-00490-x

3- https://hang.hu/tudomany/2021/02/12/termeszettudomanyi-muzeum-fluktuacio-menekules-bernert-zsolt/ The English translation is available at http://podani.web.elte.hu/HNHMEnglish.pdf

4- Oktatói_Hálózat. 2020. Hungary Turns Its Back on Europe: Dismantling Culture, Education, Science and the Media in Hungary 2010-2019. Budapest: Oktatói Hálózat. Available online: http://oktatoihalozat.hu/wp-content/uploads/2020/03/angol.pdf

5- https://www.nytimes.com/2021/03/03/world/europe/orban-hungary-eu-conservatives.html

6- https://hang.hu/kultura/2021/04/10/a-kormany-osszevonja-a-nemzeti-muzeumot-es-a-termeszettudomanyi-muzeumot/

Obituary: Erika E. Gaertner

Botanist, Author, and, as she described herself in her latest book, World Traveler

September 1921 – April 2021

By Frédérique Guinel and Mihai Costea, Department of Biology, Wilfrid Laurier University

In two of the last issues of the Bulletin, we wrote a blurb and a review enticing the CBA members to read the newest book written by Dr. Erika Gaertner, who was going to celebrate her 100th birthday. Sadly, Erika died at the end of April, and we wanted to remember her as a loyal CBA member, a remarkable woman, and an independent scientist.



Karsh © 1970 Ottawa

Erika's photograph taken on April 7, 1970. When the photographer heard that the photo was to be used on the jacket of books about plants, he asked Don Fraser, Erika's husband, to go and get a microscope and some greenery at the Experimental Farm in Ottawa. This photograph has been used in the later editions of her first book, *Harvest without planting*, and in her other two books, *Reap without sowing* and *From the heart of Europe to the wonders of Canada* (Gaertner and Fraser 2020).

As mentioned in Bulletin 53 (2), Erika was among the longest supporters of our Association. Perusing the Bulletin issues, one quickly grasps that she had been an active writer for the CBA newsletter, as she wrote for it several reviews of books (Bulletins 12 (2) – 1979; 17 (2) – 1984; 25 (2) – 1992; 38 (3) – 2005), generally dealing with edible and poisonous wild plants. She had also reported on a conference she attended at St-Mary's University in Halifax (Bulletin 9 (4) – 1976); in this report of the 56th Annual Conference of the Agricultural Institute of Canada, one realizes that Erika was thinking ahead of her time, as she was already bringing up the issue of the finity of our oceans' resources. Her talent as a good story-teller is illustrated in the report she did on a Russian trip in 1983 with her husband (whom she referred to as her "colleague"), Don Fraser (Bulletin 17 (2) – 1984).

She attended several CBA meetings; the first one may have been in the context of the International Botanical Congress which was held in Seattle in 1969, where she presented a paper (see Gaertner and Fraser 2020). During that meeting, members of the CBA gathered for an informal social hour and salmon dinner and we trust that Erika, who loved food and socializing, would not have missed these events for anything. She presented a talk at the meeting held in 1979 at Carleton University on an issue close to her heart, the use of wild plants for food purposes. Her talk was actually printed as a stand-alone communication (Bulletin 14 (2) – 1981) because it was a topic of high relevance at the time. Erika was well-versed in the uses of wild plants and she always read with interest the articles written on the subject by Ernest Small and Paul Catling (Bulletin 30 (2) – 2006). She was not shy to speak her mind and criticize established researchers. In that issue of the Bulletin, she wrote a letter to the editor mentioning that she did not agree with Small and Catling's statements about the *Viburnum* species palatability. She clearly and elegantly made her point.

We have summarized in Bulletin 53(2) Erika's influential contribution to the study of *Cuscuta* after defending her PhD at Cornell University, in the early 1950s. She pioneered our current understanding of the germination

biology and host range of dodders and wrote at least one ground-breaking paper (Gaertner 1950). One of Erika's constant interests in life was, however, in economic botany, specifically in native edible plants, their harvesting, "nibbling," preparation and presentation at the dinner table. In 1967, she wrote "*Harvest without planting – Eating and nibbling from the land,*" a miniature guide on how to harvest and cook a variety of plants (and animals!) from the wild. In the preface of her next book (Gaertner 1995), she confessed that *Harvest without planting* was an act of "self-defence": "My reputation as a hostess who served beaver with milkweed shoots and as a speaker on survival in the bush was interfering with my fun." To those who kept pestering her with questions about foraging and preparing wild food, she suggested: "Buy my book!"(Gaertner 1995). J.F.M (i.e., J. F. M. Hoeniger), who reviewed the book in Economic Botany (1968, 22(3): 308), called her contribution "folksily authentic," but was rather disconcerted by her recipes where wild animals were cooked along with plants.

During the subsequent years, she published articles on the same topic in Economic Botany, e.g., "Breadstuff from fir" (Gaertner 1970) and "The history and use of milkweed" (Gaertner 1979). In 1995, she published a more comprehensive book: "*Reap without sowing – Wild food from nature's cornucopia.*" In Bulletin 29(2), the late Joe Gerrath from the University of Guelph wrote an interesting and delightful review of this book where he captured Erika as "a person with a very special combination of talents and background." Having been raised in Europe, she "had absorbed the hunter-gatherer tradition" of collecting wild plants and animals, and "having raised a family, she obviously knows her way around the kitchen." In his review, Joe highlighted two of Erika's attaching attributes: her love of telling stories ("The chatty style of the writing makes this book a joy to read") and her love of offering food ("The author's skill as a hostess comes through"). Joe was taken by the balsam fir bread, especially since the first line of the recipe called for locating a logging operation where the fir tree is harvested. Joe gave an A+ rating to this book.

We both met Erika in 2017 during the CBA Annual Meeting organized that year at Wilfrid Laurier University. She had contacted us earlier from Copenhagen where, as was typical of her, she was visiting the Botanical Garden, to let us know that she would attend the Banquet. Ahead of the Banquet, held at the Royal Botanical Gardens in Burlington, 96 year-old Erika found the energy and interest to join the tour of one of the local wetland restoration projects. At the Banquet, Erika made a great impression on the Costea lab members, whom she greeted as "Cuscuta friends." Sitting at the same table with the author of a seminal article published nearly 70 years earlier (Gaertner 1950) felt surreal to the students Anna Ho and Magdalena Olszewski who were studying *Cuscuta* at the time. Erika asked about the status of knowledge regarding the transmission of viruses by *Cuscuta* to the hosts, demonstrating that she had kept informed about the parasitic plants she had studied during her youth.

As a final note, when Erika read the review of her latest book in the last Bulletin issue (54 (1) -2021), she responded by mentioning that were there to be another edition, she would think of reorganizing the photographs as this was one of the comments mentioned in the review. The message with these words was written on March 29th, one month before her death!

This latter anecdote illustrates perfectly who Erika was; she was relentless. She pursued her interests without timidity or inhibition and managed to leave behind a botanical legacy without progressing through the academic ranks. One can only guess what she could have achieved if she had the chance of a permanent position as a professor or researcher at an institution. Yet, we have never sensed a trace of regret or bitterness in her writings. On the contrary, she lived her life fully and was a scholar on her own terms, pursuing her intellectual curiosity unhindered by the conventions of the time.

E.E. Gaertner's list of major publications

[a complete list can be found in her latest book (Gaertner and Fraser 2020)]

Gaertner, EE. 1949. *Cuscuta pentagona* vs. *Cuscuta campestris*. AOSA Newsletter, 23(4): 14.

Gaertner, EE. 1950. Studies of seed germination, seed identification and host relationships in dodders. *Cuscuta* spp. Cornell University Agricultural Experiment Station Memoir, 294: 1-56.

Gaertner, EE. 1952. Observations on the host range of *Cuscuta europaea* among the Compositae. Canadian Journal of Botany, 30(6): 682-684.

Gaertner, EE. 1953. Key to "seeds" of fleshy fruits. Transactions of the Royal Canadian Institute, 30(1): 33-46.

Gaertner, EE. 1956. Dormancy in the seed of *Cuscuta europaea*. Ecology, 37: 389.

Gaertner, EE. 1960. Some recent developments in forest research. Quarterly Journal of Forestry, LIV: 293-294.

Fraser, DA and Gaertner EE. 1961. Microenvironmental studies in Canadian forests. Invited paper for the Symposium on "Concepts and Instrumentation for Microenvironmental Studies," IX International Botanical Congress, in Recent Advances in Botany, 1391-1396, University of Toronto Press.

Fraser, DA and Gaertner EE. 1961. Use of radioisotopes in forestry research. Invited paper for the Symposium on "Radiation Ecology," International Botanical Congress, in Recent Advances in Botany, 1381-1387, University of Toronto Press.

Gaertner, EE. 1962. Freezing, preservation, and preparation of some edible wild plants of Ontario. Economic Botany, 16(4): 264-265.

Fraser, DA and Gaertner, EE. 1962. Use of radioisotopes in forestry research. Tropical Ecology, 111: 106-115.

Gaertner, EE. 1963. Water relations of forest trees. *In* The water relations of plants – A symposium of the British Ecological Society. Ed. AJ Rutter and FH Whitehead. New-York Wiley. pp 366-378.

Fraser, DA and Gaertner, EE. 1963. Micro-environmental studies in forest habitats. Tropical Ecology, 4: 61-71.

Gaertner, EE. 1964. Tree growth in relation to the environment. Botanical Review, 30(3): 393-436.

Fraser, DA and Gaertner, EE. 1968. The international training course in the use of radioisotopes and radiation in forestry research. Forestry Chronicle, 42(2): 199-202.

Gaertner, EE. 1967. *Harvest without Planting: Eating and Nibbling off the Land*. Book. EE. Gaertner Publisher, Pembroke, Ont.

Gaertner, EE. 1968. Additions in the list of wild edible plants preservable by the deep freeze method. Economic Botany, 22(4): 369-370.

Gaertner, EE. 1969. Forcing wildflowers. Trail and Landscape, 3(1): 5-7.

Gaertner, EE. 1970. Breadstuff from Fir (*Abies balsamea*) Economic Botany, 24(1): 69-72.

Gaertner, EE. 1970. Fresh, cooked or frozen. The Herbarist, Publication of the Herb Society of America. Boston, MA. Vol. 36.

Fraser, DA and Gaertner, EE. 1972. Glimpses of interest to the forester. Journal of Forestry, 70: 168-172.

Fraser, DA and Gaertner, EE. 1972. The water cycle over two decades on several forest sites at Chalk River, Ontario, Canada. International Geography, I: 230-231.

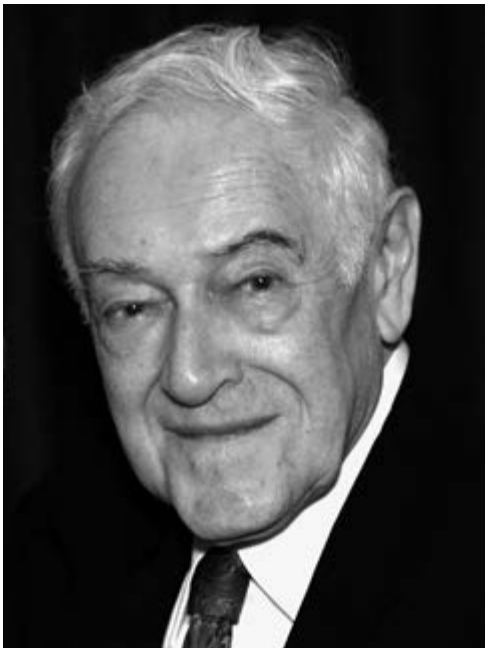
Gaertner, EE. 1973. Is bigger better? Agrologist, 2 (6): 19.

Gaertner, EE. 1979. History and use of milkweed (*Asclepias syriaca* L.) Economic Botany, 33 (2): 119-123.

Gaertner, E.E. 1995. *Reap without Sowing: Wild Food from Nature's Cornucopia*. General Store Publishing House, Renfrew, ON.

Gaertner, E.E. with S. Fraser. 2020. *From the Heart of Europe to the Wonders of Canada - A Story of One Woman's Century.* Burnstown Publishing House, Burnstown, ON.

Obituary: Marvin Weintraub, 1924 - 2021



Dr. Weintraub in 2014

On April 2, 2021, renowned Canadian plant virologist, Dr. Marvin Weintraub gently passed away in his beloved Vancouver at the age of 96. Marvin was one of Canada's most accomplished plant virologists, a talented administrator and inspiring educator.

Marvin was born in Radom, Poland in 1924, the son of Rachel and Abraham Weintraub, a religious tanner who orchestrated the emigration of his family before the destruction of millions of Polish Jews. Arriving in Toronto in 1930, Marvin, with his only sibling Jerry, received a first-rate education at the public school of Harbord Collegiate. Marvin claimed he could still speak Polish when hypnotized, even though he left Poland as a 6-year-old. He thrived with student life and was an inveterate reader of anything he could get his hands on – from Westerns to the most profound philosophy.

Always the humanist, he first considered a career teaching Latin and Greek, but switched to science at the University of Toronto ("U of T"). Marvin received his B.A. in Honours Biology in 1947 and his Ph.D. in Botany 1950. His thesis, *Leaf Movements in Mimosa*, was published two years later in *New Phytologist*, the first of over 70 publications he authored and co-authored. During his studies, he not only wrote a high school text on Botany, but married his future wife of 72 years, Rita Enushevsky, who was then a brilliant M.A. sociology student at U of T.

After receiving his Ph.D., Marvin was ultimately successful in joining the highly regarded Laboratory of Plant Pathology in St. Catharines, then under the Directorship of G. H. Berkeley.

Seventy years later, after an illustrious career, the Legislative Assembly of British Columbia recognized his 95th birthday in Standing Order 25B:

> *"…. Dr. Weintraub was elected a fellow of the New York Academy of Sciences and lectured around the world for scientific exchange programs. His scientific work has contributed to fighting agricultural diseases around the world, helping reduce world hunger and assisting farmers in finding solutions to complex agricultural problems. Awarded the Queen's Silver Jubilee Medal in 1977 for his scientific achievements, he was at that time recognized as one of Canada's leading scientists."*

In his research capacity, Marvin focused on two primary areas – the role of virus inhibitors on virus infection and the cytopathology of virus-infected plants using electron microscopy. His work on the effect and nature of virus inhibitors led to the co-discovery with Dr. J.D. Gilpatrick of a novel type of systemic acquired resistance in Carnation. They published their findings in 1952 in *Science,* which opened up new areas of research, generating hundreds of papers. Their research established that upper asymptomatic leaves from Carnation infected with an isolate of Carnation mosaic virus that caused local lesions were resistant to subsequent infection with the virus. More interesting was that these compounds provided broad spectrum antiviral activity (including some RNA and DNA viruses as well as viroids). They also proved that the resistant leaves did not contain transmissible virus and later, with W.G. Kemp, that the antiviral activity could move across graft unions (1955 to 1961).

Later in the 1960's, with Dr. H. Ragetli, Marvin was able to purify two organic compounds, which they suggested were proteinaceous with antiviral activity when applied to the leaf surface prior to infection. The two proteins were later purified by Stirpe *et al.*, (1981), and since shown to be type 1 ribosome-inactivating proteins similar to saporins. These compounds are now being investigated to design targeted toxins for tumor therapy.

In 1956, Marvin spent a sabbatical year as a Research Fellow, Virus Laboratory at UC-Berkeley, where he worked with Nobel Prize winner Dr. Stanley and C.E. Yarwood. It was there that he developed his lifelong interest in electron microscopy and its application to the study of plant viruses.

In 1960, Marvin was asked to head the Virus Chemistry and Physiology Section of the newly opened Vancouver Research Station ("VRS"). Dr. Ragetli also joined what became affectionately to be known by family and friends as "The Lab." One of Marvin's first accomplishments was establishing an electron microscopy facility for the study of plant viruses. Hundreds of students were treated to personalized tours of the famed Philips Electron Microscope with the constant cigarette dangling and Petri dishes being used as ashtrays. Marvin, with his dignified but warm presence, made science exciting to legions of students.

In 1971, he was asked to become Director of the VRS and illustriously served in this capacity until his retirement in 1989. It was as Director that his remarkable talent for administration came to fruition. Marvin advanced a strategic plan to develop the VRS as a center for virus research, with scientists in all three Units of Virus Chemistry, Plant Pathology and Entomology involved in some aspect of virology. He stressed the importance of collaboration across all three Units. VRS became the "crown jewel" of Canada's agricultural research. By all accounts, under his tenure, the VRS became a leading plant virus research station.

As Director of VRS, Marvin was responsible for the 'family-like' work environment that was welcoming to all. He pioneered the elevation of the technician to a position of peer and shared co-author status with them in papers. Notwithstanding his onerous administrative duties, he continued research into metabolic and fine structural changes in virus infected cells and continued to publish. He initiated and participated in exchange programs such as the 1981 Canada-France Scientific Exchange Program and most notably, his multi-year support of Peruvian agricultural research and his work in Nicaragua and China.

His most moving science travel adventure was being designated as the 1968 Eminent Scientist on Exchange to USSR under the National Research Council of Canada during the height of the Cold War. His meetings with eminent virologists at the leading centres led to his fascinating 40-page Report to the NRC. All who are interested in the history of plant science in the Soviet Union under communism will find his Report a fascinating read. It was on this trip that he was given an electron microscope photo of a bacteriophage in the shape of a Star of David by a renowned virologist, unable to otherwise disclose her Jewish heritage. Fifty years after his visit, he still carried in his wallet a slip of paper with key Russian words



A bacteriophage in the shape of a Star of David.

Marvin was impassioned in his encouragement of VRS scientists to develop their own collaborations. During his tenure, there were over thirty scientists from all parts of the globe on sabbaticals working with VRS scientists.

Marvin was an Honorary Professor at UBC in the Department of Plant Science and collaborated with UBC Plant Sciences Department and Simon Fraser University to offer the joint course in Plant Virology. He was appointed by the Minister of Agriculture as the Chief Liaison officer to the Department of Agriculture for B.C., aligning national and provincial priorities.

Marvin was an Associate Editor of *Virology* and reviewed plant virus manuscripts for the *Canadian Journal of Botany, Canadian Journal of Plant Pathology, Phytopathology,* and *Science*. He was a member of many Department of Agriculture national and international committees and was external thesis advisor for students at numerous institutions, including the University of Madras, Natal and Hebrew University. There were in fact few aspects of Canadian plant virus research, academia, or administration without his participation, and therefore his wise and kindly imprint. Marvin was awarded the 1977 Queen's Silver Jubilee Medal for his scientific contributions.

Marvin and Rita raised four children, Laura, Mark, Lisa and John, though tragically Laura and Lisa predeceased him, as did his beloved granddaughter Dani. His only true love, Rita, predeceased him in 2020.

Marvin was a highly revered leader in the Jewish community and actively opposed to discrimination of all kinds. He loved opera, classical music, art, and travel. He had a wonderful, though sometimes dry, sense of humour and took immense pleasure in telling stories. Marvin was the quintessential "family man" and never failed in weaving into a story something about his wife Rita, his children and their spouses, and his grand- and great-grandchildren.

Marvin found the most satisfying career in plant virology. He would wish all our readers as meaningful, creative and stimulating a career as he was blessed to experience. He gave much to the field, but was always grateful for the support of the Canadian Department of Agriculture and many international agencies and governmental departments in other countries, his fellow scientists, the publishers, academics, technicians, stenographers, and physical plant maintenance workers, but perhaps most importantly, the students with whom he could share all of his hard-earned knowledge and wisdom and to whom the future beckoned.

A man of Dr. Weintraub's rigorous mind, open heart, and impassioned determination in all of his endeavours is indeed rare. All who knew him benefitted, all who knew him will forever miss him.

Dr. Robert Martin

Dr. Sara Spiegel

Dr. Steve Haber

Dr. Robert Lewis

Mark Weintraub Q.C.

Julia Roudakova

John Weintraub

Marvin's son Mark will be more than pleased to hear from any of our readers about his father and will send, upon request to msw@cwilson.com, the Report on Marvin's Eminent Scientist 1968 visit to the USSR, Marvin's 28 page of history of the VRS, a comprehensive list of his publications and a photograph of the Star of David Bacteriophage noted above.

Tales from the Field



Break in! The Paris (P) Job

By Julian Starr

As I sprinkle the golden nuggets of my knowledge and experience upon my students, I have come to realise that one dictum in particular stands out as among the most useful and wise – "Never assume it is locked." This maxim has saved me countless time and money over the years because when I feel I have the right (permits, written permission, etc.), I will try just about any door, gate or window, rather than give up. And so it was on one bright morning in Par-ee (Paris, France) that Étienne Léveillé-Bourret and I found ourselves at the Jardin des Plantes facing the herbarium with not so much as a clue as to how we were going to get in.

Paris (P) is quite simply an amazing herbarium. Countless millions of specimens from every corner of the world (the spoils of empire), and shockingly, every one of them has been scanned and is available on the internet – even the indets! I am not sure how they convinced the French government to do it, but when I was a doctoral student, the collection was shut down to loans for years, put in boxes and shipped to a company to be scanned. Even the labels were transcribed – and accurately no less – which is no small feat given the scrawl and scratches, also known as "writing," of 19th century botanists.



Fig. 1. Mining the collection after the break in - Étienne in his prison stripes.

Étienne and I had been trying to contact the herbarium for weeks through their newly created online contact system, and though we had a single reply, our contact had gone dead as soon as we reached the capital. As luck would have it, we landed in Paris at the beginning of a long weekend, so with nothing else to do and time to kill, we visited Versailles, Ste-Chapelle and the rest of Paris. But when Tuesday rolled around, I was determined – we were getting in.

Emails had again gone unanswered, and we had tried the onsite reception for the public Museum nearby without success. We then moved on to the building, a mammoth-sized monument to 19th century science. I bet that back in the day of Antoine-Laurent de Jussieu the place was a bloody beehive, but today, not so much as a bryologist could be found. I was getting desperate to get at the collection – we had crossed an ocean, and after an intercom system couldn't wake the dead (everybody buzzed), we moved on to desperate measures – it was time to test the doors. Nope for number one; locked! for number two (for sure, I pulled really hard twice); number three… "Étienne! Not when the public is looking!", and then, number four… it opened like a charm, and the piece of paper someone had jammed into the door strike fell to the floor. You can always count on a carefree student to pull that old trick.

We were in! But now what do we do – will a hearty "Bonjour!" do the job? Well, it seemed imprudent because the place was an echo chamber, so with our ears wide open, we could just faintly hear people talking somewhere at the top of a huge winding staircase. Sure enough, as we climbed each floor, the voices got stronger until it was clear they were coming from behind a door right in front us. So with as much bravado as we could muster, we opened the door to four completely stunned individuals mounting herbarium specimens. "Hello, hello, we're from Canada! And we would like to use the collection!" Again, a rather shocked look, followed by the obvious question, "How did you get in?" Well, after all was explained, and security informed that another crackdown on the Sorbonne crew would be necessary, they led us to the Cyperaceae collection where we spent four wonderful days mining one of the world's great plant collections for its historical treasures (Fig. 1). It was an unmitigated success, and it led us to many wonderful discoveries in the years to come, both in the lab and field. So remember, for the love of science, never give up! Parks and scientific organisations worldwide are understaffed, so there will always be a least one door, dock or window unlocked.

Undergraduate Botany Awards 2021

The Canadian Botanical Association promotes botany at all the stages of education, including at the undergraduate level, recognizing that encouraging "budding" botanists/plant biologists is essential. Every year, CBA awards prizes for the best poster and oral presentation at regional undergraduate biology/science conferences held in five major regions of Canada. Up to 10 meritorious undergraduate students can be rewarded nationally every year! The students do not need to be members of the CBA, and each award is valued at $100. Starting in 2022, winners will also receive a one-year membership in our association. This year, CBA participated in online undergraduate events organized by the University of Victoria, Ontario Biology Day (McMaster University) and the Maritime Provinces (Science Atlantic https://scienceatlantic.ca/recognition/conference-awards/biology/). Please help us to locate such events held at your university in 2022. In particular, British Columbia, Alberta, Saskatchewan, Manitoba, and Quebec currently lack province-wide undergraduate biology meetings. If your Faculty of Science or Department coordinates such an event, please let us know (Mihai Costea: mcostea@wlu.ca). If multiple universities within a region organize undergraduate competitions, we shall establish an annual rotation.

We congratulate the winners of 2021 and wish them all the best in their future plant-related careers. Here are their own words in the spring, immediately after the winners were announced.

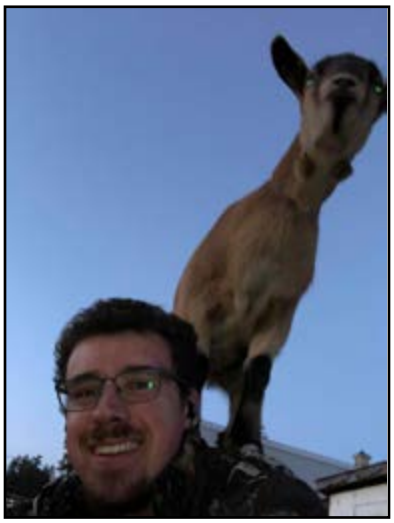
University of Victoria, Faculty of Science competition (February 26, 2021)

Best poster/short presentation: Taylor Holt
Title: Fear no weevil: white pine weevil resistant traits in Sitka Spruce
Supervisor: Dr. Patrick Von Aderkas


Taylor Holt

I am a fourth-year forest biology honours student at the University of Victoria. Currently, I am working on an honours project focusing on the anatomical defence characteristics of weevil resistant Sitka spruce trees. I am interested in the abundance of stone cells in the cortex, in relation to their defence properties against stem feeding insects, such as weevils. In April, I will be graduating from UVic and am hoping to pursue a Masters of Science in Forestry at UBC in the fall. I have been accepted into Dr. David Montwé's silviculture lab to carry out research on thinning and fertilization trials of Lodgepole pine trees to determine forest resilience to drought and frost damage in a changing climate. This summer, I will be working for the Ministry of Forests monitoring and evaluating the conditions of resource values, as well as assisting with the set-up of fertilization trials and hemlock looper sprays. Currently in Victoria, my days consist of sample analysis and researching, keeping my houseplants happy, and exploring the island with my dog Moose.

Best poster/short presentation: Parker Volk
Title: The root of a solution: lavender root as treatment for iron overload
Supervisor: Dr. Juergen Ehlting


Parker Volk

I'm majoring in biology with a minor in philosophy at the University of Victoria. Currently I'm working with Dr. Juergen Ehlting on my honours project on the benefits of iron chelators in plants. Iron is a key part of human health, but too much iron is linked to many illnesses and health problems. One main treatment of this iron overload is chelator therapy. Iron chelators are molecules that bind to iron and allow it to be excreted. The problem is that many chelators in use have harmful side-effects. One source of new, less harmful chelators is plants, who use chelators to import iron into their roots. My project looks at if chelators extracted from lavender can be used to lower intracellular iron in cells and how harmful they are to said cells. So far, I have had some promising results, and hopefully this pattern continues. When not in the lab, I enjoy running, swing dance, video games, model United Nations, and reading (with topics ranging from science fiction to biology to history).

Ontario Biology Day (March 20-21, 2021)


Travis Tribble

Best "Long talk": Travis Tribble, University of Western Ontario
Title: A phylogenetic analysis of arogenate dehydratases from fully sequenced photosynthetic organisms
Supervisor: Dr. Susanne Kohalmi

I am a fourth-year honours biology student at Western University, specializing in Genetics & Biochemistry. For the Honours thesis, I am looking at a family of enzymes, called arogenate dehydratases (ADT), required for phenylalanine biosynthesis. Specifically, I am looking at the sequences of ADT isoforms to investigate if one can predict their differential involvement in enzymatic and non-enzymatic functions. Throughout my undergrad, I have discovered a love for research and find it to be very exciting! As such, I am looking forward to pursing an MSc. in the fall, with the hopes of starting a career in research.


Stephanie Absalom

Best "Short talk": Stephanie Absalom, Wilfrid Laurier University
Title: Shared and unique plant uses of two indigenous groups in North America: the Iroquois and Ojibwa
Supervisor: Dr. Mihai Costea

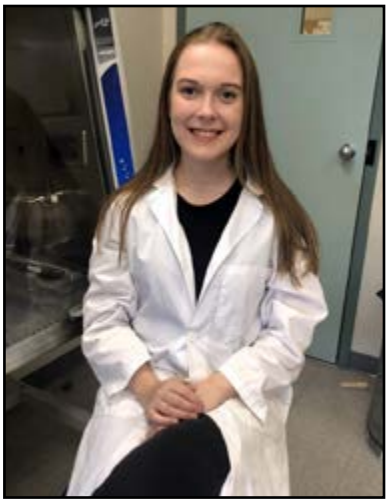
I am an Indigenous student at Laurier; Haudenosaunee with heritage from the Mohawk Nation. I enjoy participating and learning more about Indigenous cultures. I love to garden, horseback ride, and spend time outdoors during the warm weather. I was so fortunate to work with Dr. Costea this year and explore the plant uses of the Iroquois (Haudenosaunee) and Ojibwa (Anishinaabe) for an undergraduate thesis project.

Best talk: Terrell Roulston, Saint Mary's University
Title: The comparison of pollinator assemblages between dyke and saltmarsh in the Bay of Fundy Dykelands.
Supervisor: Dr. Jeremy Lundholm


Terrell Roulston

I've been a member of the Ecology of Plants in Communities (E.P.I.C.) lab since 2018, supervised by Dr. Jeremy Lundholm. I have contributed to a number of plant community ecology projects, ranging from habitat restoration to controlled green roof experiments. My current work involves a comparison of pollinator assemblages found in the Bay of Fundy dykelands. This project has a personal significance, as this research takes place in the area I grew up - and as such I know I am contributing to my community. I am generally interested in pollination ecology and conservation, as well as botany. This coming fall, I will begin a MSc. at UBC supervised by Dr. Risa Sargent.

Best poster: Brooke Dauphinee, Mount Saint Vincent University
Title: Roles of temperature and blue light in aerobic methane emissions from canola plants.
Supervisor: Dr. Mirwais Qaderi


Brooke Dauphinee

Prepared by: Mihai Costea, mcostea@wlu.ca

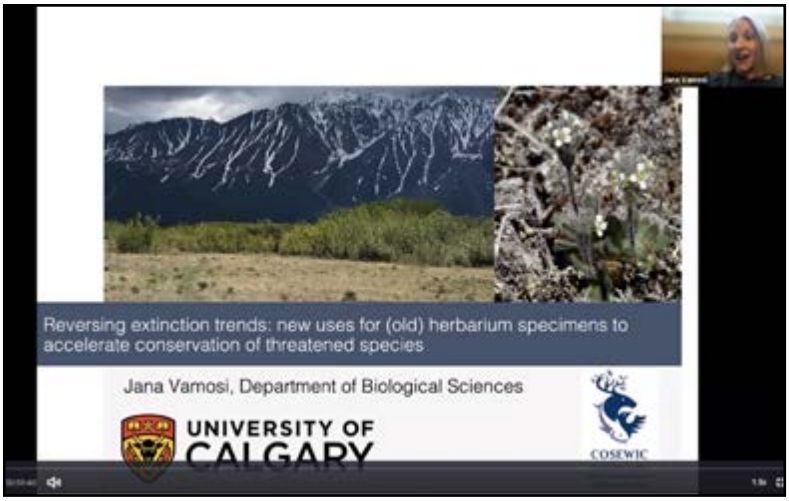
The 2021 Annual Conference of the CBA-ABC: BL2021

The annual CBA-ABC conference was held virtually July 6-9th in collaboration with the International Association of Bryologists, the American Bryological and Lichenological Association, and the Société Québécoise de la Bryologie.

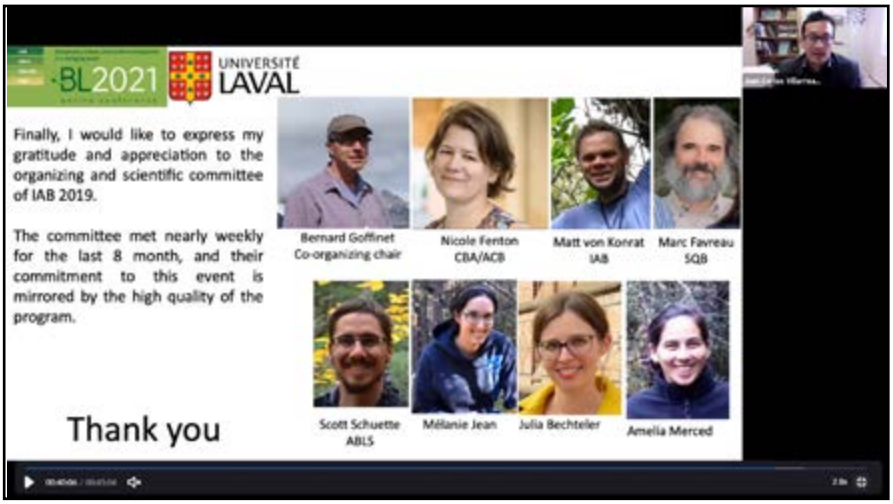
The conference was resounding success! A total of 303 people participated in the meeting, including 55 CBA-ABC members. The program included four plenary speakers (two CBA members, Jana Vamosi - University of Calgary and Mélanie Jean - Université de Moncton), eleven symposia (two organized by CBA members), 62 general oral and 41 poster presentations, and four workshops (three organized by CBA members), by contributors from 16 countries.



Twenty-two student presentations and posters were evaluated for the student prizes (see article that follows) and the CBA-ABC was delighted to award the Lawson Award (in recognition of a remarkable career in Botany) to Dr Patrick von Aderkas (University of Victoria). Congratulations!



A couple of shots from this year's conference, including talks by Jana Vamosi and Juan Carlos Villarreal Aguillar.



Student Award Winners at the CBA/ABC meeting, BL2021

Everyone is familiar with our two annual meeting awards: Lionel Cinq-Mars for the best oral presentation, and Iain and Sylvia Taylor for the best poster. This year, we listened to you and we tried something new. We subdivided each of these two awards in two sub-categories to reflect the major milestones encountered in any research project: proposal and results. This gives a winning chance to students found at an early stage in their research, and it improves the evaluation of papers by the judges. Do not forget to take advantage of these subcategories next year! This summer the competition was fierce, with a great number of talks and posters battling for the top spots. The oral presentations were pre-recorded and both talks and posters were uploaded online, while questions and comments from the audience were put forward via chat. Especially in the casa of the presentations, the pre-recording aspect made for very elaborate and well-scripted talks, which were hard to differentiate by the judges. Congratulations to everyone who participated; you were truly outstanding!

–Mihai Costea, mcostea@wlu.ca

Here are the happy winners, with an introduction in their own words.

Lionel Cinq-Mars, best oral presentation had only the "results level."

Judges: Mihai Costea, Moira Gallaway, Scott Lagreca, Étienne Léveillé-Bourret, Marc-Frédéric Indorf, Mélanie Jean, Deb Metsger, and Mélissande Nagati

Two students were tied with the same score, and also close the winner, therefore, the judges decided to also recognize them with "Honorable mentions".

Winner: **Juanita Carolina Rodríguez-Rodríguez**, Université du Québec, Abitibi-Témiscamingue (UQAT)



Title: "Tree-forest composition drives bacterial associations with feather-mosses"

Supervisors/collaborators: Nicole Fenton, Yves Bergeron (UQAT); Steven Kembel, Université du Québec à Montréal (UQAM)

It is a great honor to have received this award in a conference on the topic I'm the most interested in!! My research has been focused on bryophytes throughout my career, evaluating the biological activities of bryophytes (antibacterial, antioxidant and anticancer activities) during my bachelor thesis in Biology in Colombia and their potential use in biotechnology during my MSc in France/Germany. Now, during my PhD in Environmental Sciences in Quebec, we demonstrated that the forest type drives the moss-associated bacteria composition regardless of moss-host identity and that Cyanobacteria were highly abundant in broadleaf forests in contrast to coniferous forests, contrary to expectations! Our results highlight how changes in tree-canopy composition greatly impact moss-associated bacterial communities and their essential ecological roles (e.g., N2-fixation by moss-associated cyanobacteria) in the boreal system. I have been very lucky to meet and work with awesome people and I'm looking forward to start new challenges next year after my PhD, as well as to continue building up projects to understand the great tiny-world of bryophytes and associated organisms!

Honorable Mention Winners:

Natalie Vuong, University of Waterloo



Natalie Vuong

Title: "Investigating the relationship between tree ecophysiology and hosted communities of epiphytic bryophytes and lichens"

Supervisors/collaborators: Julie Messier, University of Waterloo; Nicole Fenton and Fabio Gennaretti (UQAT).

I have completed my B.Sc. at the University of Waterloo ('21) in Environmental Sciences (Ecology) and I am currently working as a lab technician in the Plant Functional Ecology Lab at UW. My present research focuses on tree ecophysiology and epiphytic bryophytes and lichens, as well as evolutionary trends in leaf venation. I am broadly interested in functional ecology and conservation, and I hope to pursue graduate studies in the Fall of 2022 and continue working towards uncovering large-scale ecological patterns, perhaps in population dynamics of kelp or northern temperate trees. When I am not struggling with R, you can find me climbing or eating too many chicken nuggets – sometimes simultaneously.

Kasia (Katarzyna) Zgurzynski, Brock University

Title: "Native plant and beneficial insect communities along perimeter plantings and interiors of vineyards"

Supervisor: Dr. Liette Vasseur



Kasia Zgurzynski

My passion for plants was really ignited while I lived in a tent in the temperate rainforest of Tofino, on Vancouver Island. After returning to Ontario, and eventually attending the Niagara Parks School of Horticulture, I was a grower and a landscape horticulturist, running a business for a time, before working as a botanist for a consulting company. I decided to return to school and complete a degree, and recently finished my B.Sc. (Hons) at Brock University, in Biological Sciences. During this time, my honours thesis focused on plants and insects in some of the many vineyards in the Niagara Region. In my study, plant and insect species in both organic and conventional vineyards were surveyed within their perimeters and vineyard interiors. Native and invasive plant species were identified, as were beneficial and pest species of insects. Native plants and beneficial insects were highly positively correlated, and there was a slight correlation with native plants and pest insects, as well as overall insect abundance. Invasive plants did not show significant correlation with either group of insects, though was correlated to insects that were not pests or beneficials. Biological insect control is just one of the ecosystem services that landscapes rich in native plants can provide. Starting my M.Sc. in the fall, I'll be looking at the ability of certain planted species to attract beneficial and pest insects in vineyards. This will compare native species to commonly used introduced plant species, to see which may be having a greater role in biological control. Hopefully, this type of research can contribute to a greater understanding of how to work with the ecology within a vineyard, in order to make more informed decisions about planting practices. I'm very grateful for the honourable mention, as this research has excited me tremendously, and I'm happy to share it with the botanical community.

Iain and Sylvia Taylor, best poster had only "proposal level"

Judges: Richard Caners, Shelley Hepworth, Santokh Singh, and Patrick von Aderkas

Winner: **Corey Burt**, Wilfrid Laurier University

Title: "Discerning friend from foe: systematic revision of *Cuscuta* L. section *Indecorae*: a combined ecological, morphometric and phylogenetic approach".

Supervisor: Mihai Costea



Corey Burt

My name is Corey Burt and I am currently completing an MSc. in Integrative Biology at Wilfrid Laurier University, with Dr. Mihai Costea. I am studying the systematics of a clade of Dodder (*Cuscuta* L.) known as section *Indecorae* using a combined molecular, morphological, and ecological approach. Prior to studying at Wilfrid Laurier University, I worked in the herbarium at Royal Botanical Gardens, and have conducted botanical inventories while working at Credit Valley Conservation Authority and at WSP Canada Limited. In the future, I hope I will pursue a role as herbarium curator or field botanist at a Canadian institution.

The Porsild-Consaul Award

This award was established honoring the memory of two eminent Arctic botanists: Alf Erling Porslid and Laurie Lynn Consaul. It is awarded in recognition of the best paper published in the field of systematics and phytogeography. Because the award was not given in 2020, there are two winners this year.

This year, the Porsild-Consaul award went to:



Andréanne Bouchard

Andréanne J. Bouchard, Paul B. Hamilton, Amanda M. Savoie & Julian R. Starr. 2020. Molecular and morphological data reveal hidden diversity in common North American *Frustulia* species (Amphipleuraceae). Diatom Research, DOI: 10.1080/0269249X.2019.1704889

Andréanne Bouchard is currently working with the Canadian Intellectual Property Office as an Intellectual Property Examiner, in Gatineau.



María Esther Nieto-Blázquez

María Esther Nieto-Blázquez, Lourdes Peña-Castillo, and Julissa Roncal. 2021. Historical biogeography of Caribbean *Podocarpus* does not support the progression rule. Journal of Biogeography, 48:690–702. DOI: 10.1111/jbi.14034

Maria Esther is now a postdoc with the Molecular Ecology Group at the Senckenberg Biodiversity and Climate Research Center (SBiK-F). Her current research is on the population genomics of wildcat (*Felis silvestris*) and beech (*Fagus sylvatica*).

The Luella K. Weresub Memorial Award in Mycology

Tegan Padgett M.Sc. is the winner of the 2021 Luella K. Weresub Memorial Award, which recognizes the best paper in Canadian mycology published by a student in the year preceding the CBA-ABC annual meeting. She completed her MSc degree in Biology under the supervision of Yolanda Wiersma, Ph.D. at Memorial University in St. John's, NL, in the Landscape Ecology and Spatial Analysis Laboratory. Her Masters thesis was entitled 'Macrolichen community structure in boreal forested wetlands on the island of Newfoundland, Canada' and she won the award for her high-quality related publication: Importance of boreal forested wetlands for epiphytic macrolichen communities, Tegan Padgett and Yolanda F. Wiersma. 2020. Can. J. For. Res. 50: 1333–1339 dx.doi.org/10.1139/cjfr-2020-0042.

Tegan is an active field mycologist; she discovered two calicioid lichens species new to Newfoundland (*Chaenotheca brachypoda* and *Sclerophora peronella*): 'Tegan Padgett, André Arsenault and Richard Troy McMullin. 2020. Two Calicioid Lichens New to Newfoundland and Labrador from Terra Nova National Park. Evansia 37(2):61' and worked as a wildlife biologist with the British Columbia Conservation Foundation. She will start a position as Ecosystems Biologist with the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development in September.

Congratulations Tegan for winning this prestigious award and for your investment in the field of mycology. The CBA-ABC Mycology Section wishes you every success with your new projects!



Tegan Padgett
Photo credit: Parks Canada Agency

– Mélissande Nagati and Allison Walker, CBA-ABC Mycology Section

The J. Stan Rowe Award

This award was established to celebrate the life and work of Stan Rowe, eminent Canadian plant ecologist.

WINNER: Crofts, A.L., and Brown, C.D. 2020. The importance of biotic filtering on boreal conifer recruitment at alpine treeline. Ecography 43: 1–16. doi: 10.1111/ecog.04899



Anna Crofts

Anna L. Crofts is currently completing doctoral studies at the Université de Sherbrooke under the supervision of Dr. Mark Vellend. Her thesis is entitled "Predicting plant-community and below-ground processes in Québec's southeastern forest using aerial hyperspectral imagery."



Laureen Echiverri

HONOURABLE MENTION: Echiverri, L.F.I., Macdonald, S.E., and Nielsen, S.E. 2020. Disturbing to restore? Effects of mounding on understory communities on seismic lines in treed peatlands. Canadian Journal of Forest Research 50: 1340–1351. doi: 10.1139/cjfr-2020-0092

Laureen Echiverri is currently completing doctoral studies at the University of Alberta. Her thesis is entitled "The effect of seismic line fragmentation on the understory vegetation in Alberta's boreal forests."

MARY E. ELLIOTT AWARD: ITS INSPIRATION, HONOREES AND TROPHY

Frédérique Guinel[1] and Jennifer Doubt[2]
1. Professor Emerita, Biology Department, WLU University
2. Curator, Botany, Canadian Museum of Nature

Most of us have heard about the Mary E. Elliott Award given to CBA members who distinguish themselves by providing outstanding service to the Association. At the Annual banquet, when the Award recipient is announced, the presenter often reminds us that Miss Elliott was a mycologist with great expertise on the Sclerotiniaceae (for a list of her publications, see Bulletin 10-1), who died unexpectedly in September 1976 when she was to become the Past-President of the Association. We are also told that she had previously served the Association as its Secretary (1972-1973), Chair of the Constitution Committee (1973), Vice-President (i.e., President-Elect) (1974-1975), and President (1975-1976). We are currently preparing a package of information related to the Mary E. Elliott Award for Library and Archives Canada, and we thought to share with you a few highlights of this part of the CBA's rich history.

Who was Mary E. Elliott?

When one types Mary Elizabeth Elliott into an internet search engine, not much comes up; and this is surprising and a bit frustrating for someone used to doing rapid searches. Sure, there is a Wikipedia page focussed on her career, but this is not a place where one can learn anything about her character. A single article written after her death, however, gives us some ideas about who Mary Elliott was. Savile and Weresub (1977) depict her as a person genuinely interested in people and in their culture. As an example, they tell us that she decided to learn French on her own, as a way of opening a door onto a different culture. She was friendly, kind, and generous of her time; she was also meticulous and capable. As the authors state, "she would know, she would do it, she would find it." As any good scientist, she was curious at heart and strived continuously to learn more. With her technician job secure in the fifties at the Experimental Farm, she thought of graduate school to deepen her expertise in fungi. At that time, staff at the Farm were generally encouraged to gain higher degrees, and so she asked her superiors for a leave of absence to allow her to pursue her studies. Sadly, her request was refused and this raises at least two questions. Was the refusal based on her gender? Where would graduate school have led Mary? That negative answer may have cost Canadian mycology a great deal.

Elliott lived through the Women's Liberation Movement, but was not one of its strongest proponents (Savile and Weresub, 1977). As many scientific women of her time, she was single; but unlike many of these women, she did not mind being called Miss Elliott. She was amused by those people who thought that for a female to live alone was an affliction (Savile and Weresub, 1977), when one could see it as freedom. Moreover, she was not frightened to take a stand for what she believed; for example, when making a purchase in a store, she chose to always present as proof of identity her citizenship card instead of the preferred but less reliable driving license. Reading this article gave substance to Mary Elliott and made her a very likable person with traits that we would admire in any friend.



Figure 1: Presentation of a George Lawson Medal to Dr. D.B.O. Savile by our President Miss Mary Elliott (1976 as in Bulletin 9(4)). From left to right A.N. Langford, M.E. Elliott, D.B.O. Savile, J.A. Poulin. Photograph courtesy of the Sherbrooke Record.

Miss Elliott's life was cut short; she was 53 years-old when she died. The award named after her is a fitting remembrance of an intelligent, elegant, and caring person who led by example in the CBA and in Canadian mycology and plant pathology. The last official task she performed for the Association was hosting the banquet during the June 1976 annual meeting at Bishop's University. At that meeting, a photograph (Fig. 1) was taken when she presented the Lawson Medal to Doug Savile (Bulletin 9-4), a photograph quite poignant because it was published in the same issue of the Bulletin announcing her death.

Recipients of the Mary E. Elliott Awards

The M.E. Elliott Award was created in 1977 and presented for the first time at the annual conference held in 1978 at Memorial University, St. John's. To date, 33 members, a third of them women, have been recognized for their services to the CBA (https://www.cba-abc.ca/awards/mary-e-elliott-award/past-recipients-of-the-mary-e-elliott-award/), 12 recipients being from Western Canada and 21 from Eastern Canada.

According to the recipients' citations published in the Bulletin issues,

- At least seven recipients were founding members of the Association
- Seven recipients were rewarded for their work as Bulletin Editor, two as French Associate-Editors
- Seven recipients were recognized for their work as Treasurer
- One person received the award for having acted as both Bulletin Editor and Treasurer, which was an enormous time commitment
- Fifteen awardees were honoured for the work they performed as President
- Five awardees became President after they received the Award
- Seven recipients (all male) also received (generally later) the Lawson Medal for their scientific achievements
- Three awardees were recognized for the work they did for plant conservation in Canada

As a note, in 1976, the year Miss Elliott died, at least three now-renowned CBA persons became members of the Association (Bulletin 9 (4)). While Larry Peterson and Roy Turkington received a Lawson Medal in 1993 and 2017, respectively, Vipen Sawhney was recognized with an Elliott Award in 1999.

The Mary E. Elliott Trophy

With respect to the origin of the trophies awarded to recipients, one can distinguish three "periods" since the Award's inception.

During the **Early period**, i.e., 1978-1988, the awardee received a simple triangular block made of wood (Fig. 2). On one side, next to the insignia of the CBA, one could read the following inscription:

PRIX
MARY E. ELLIOTT
AWARD
PRESENTED TO PRÉSENTÉ À

On the other side was inscribed:

THE CANADIAN BOTANICAL ASSOCIATION
FOUNDED IN 1964

The **Larson Period** is named after Dr. Doug Larson, a CBA member from the University of Guelph, who crafted the trophies between 1989 and 2007. Fifteen awards, all different except for two, were hand-made by Doug who, because of his knowledge of the recipients, personalized each award (see Bulletin 41 (2), 2008, for more details). An example of one of Doug's creations is seen in Fig. 3.



Figure 2: Trophy awarded to Sylvia Taylor in 1985 for the work she performed as Editor of the Bulletin between 1980 and 1985 (Bulletin 18(4)).

It should be noted that one award during that period was not made by Doug; it is that given to Geraldine Allen, who in 2003 was recognized among other things for her work as Treasurer (1997-2002). That year, the CBA met in Antigonish, NS, in conjunction with the first-ever meeting of Plant Canada. It is likely that the Award Committee met late that year, and that Doug was not given enough time to create anything. As an award, Gerry received a platter made of pottery. In 2008, Doug himself was recognized with an Elliott Award, for which he received a wooden box holding an album filled with images of all the trophies he had created, along with photographs of their recipients.



Figure 3: Trophy awarded to Hugues Massicotte in 2001 for having served several terms as Director and as the exceptional auctioneer of the Association. Hugues was also recognized for his work in the Structure and Development Section (Bulletin 34 (3)).

We are currently in the **Sweet Period**. Since 2009, David Sweet, a gifted woodturner from BC, has created seven trophies. Five of these have been made with bigleaf maple, *Acer macrophyllum*, a tree David particularly likes because of its astoundingly beautiful grain patterns. He has also used red alder, *Alnus rubra*, and an exotic type of wood, the monkey pod tree, *Samanean saman*. An illustration of one his beautiful creations is seen in Fig. 4.

David Sweet is not a CBA member but, through conversations we had with him, we learned that he shares a few traits with Mary Elliott. Like Mary, David is a generous, skilled person who was a student inspired by someone who was active in the CBA. While Mary was taught by Dr. J. Walton Groves, a CBA founding member who died in 1970, David was taught Botany by none other than our own beloved Dr. Iain Taylor. David has the soul of a teacher and we do not doubt that Mary, as a mycologist, had the same. In the article following, we are reporting on the fascinating interview we had during

the spring with David Sweet. We hope you will enjoy reading it as much as we did conducting it!

We would like to thank all the persons who provided photographs for this article, Doug Larson and David Sweet for filling some of the blanks we had in our "photographic timeline", and Scott Redhead and Yolande Dalpé from Agriculture and Agri-Food Canada, based at the Central Experimental Farm, for providing information on Mary E. Elliott.

If you have information to share in relation to any aspect of the CBA, we would love to consider including it in the Archives! Please contact Frédérique Guinel (fguinel@wlu.ca).



Figure 4: Trophy, made of red alder, awarded to Jane Young in 2014 for her work as Chair of the Plant Development Section from 2007 to 2009 and as Treasurer from 2008 to 2014. Of note, Jane was the person behind the inclusion of Graduate Student Profiles in the Bulletin.

TURNING OUT TROPHIES – MEET WOODTURNER DAVID SWEET

Frédérique Guinel[1] and Jennifer Doubt[2]
1. Professor Emerita, Biology Department, WLU University
2. Curator, Botany, Canadian Museum of Nature

While researching the Mary E. Elliott Service Award, it was our great pleasure to interview Dr. David Sweet, the woodturner who has created the custom trophies given to honorees since 2009. David is a patient and a generous man with whom we learned a lot. As we were setting up the interview, David cleared up a few terms for us, non-experts. He explained the difference between woodcarving and woodturning: although both crafts use the same tools, such as sharp knives and gouges to change the shapes of small or large pieces of wood, the processes and products are very different. In woodcarving, the tools move into, along the surfaces of, and out of the surface of a piece of wood which is held stationary. In contrast, in woodturning, both the wood and the tools are moving. As the wood is spun on a lathe at high speed, the artist moves sharp tools across the surface to produce various shapes and contours.

David comes from Cranbrook (population 6000), a small rural area in BC. When he was an undergraduate at UBC, his Professor in Biology 101 was Iain Taylor (himself the 1989 Mary E. Elliott Awardee), seeding a friendship that lasts to this day (Fig. 1). It was this connection that brought David into his unique role in the CBA. David has retired from clinical practice in dentistry in 1984, after which he undertook a teaching and research career at UBC's Faculty of Dentistry that culminated with his retirement as a tenured professor and laboratory director in 2020, giving him more time to enjoy his favorite pastimes, among them woodturning.

Here is an edited and abridged version of our conversation with David.



Figure 1: Photo taken in 2017 when Iain Taylor came to visit David Sweet to collect his latest creation for that year's recipient.

DID YOU ENJOY BEING TAUGHT BOTANY?

I grew up very close to nature, spending much time in the bush or the forest, fishing and horse-riding, and working on the family farm, haying or harvesting. After high-school, I wanted a university education to enlarge my point of view. When I arrived at the University of British-Columbia, I was keen to learn as much as I could. This is where I met Iain Taylor, whose teaching style I appreciated as he was so plain-spoken and down to earth compared to other first-year professors. He made me want to learn more from him.

So, back in 1972, as a pre-med student, I enrolled in a 2nd-year Botany lecture and laboratory course. I took a 3rd-year course as well! I found the subject of Botany amazing, especially because Iain's approach was to look at the cellular level. I enjoyed learning plant biology, plant cellular physiology, and about the manifest destiny of organelles and cellular processes. This learning had quite an impact on me as I was inspired to go on to study Biochemistry, Genetics and Human Physiology as an undergrad.

In one of the Botany lab courses I took, one of the TAs noticed that I was very good at doing things with my hands. As we discussed the topic, I told the TA that I had grown up working with tools in my father's blacksmith shop. He asked me why I wanted to go to med school when I could use my hands better in dentistry. That conversation turned out to plant an important seed for my future career development.

YOU WERE A DENTIST EARLY IN YOUR CAREER, AND THEN LATER ON, YOU WORKED AS A FORENSIC DENTIST. HOW WERE YOU DRAWN TO CRAFT MARY E. ELLIOTT AWARDS?

I also studied medicine and forensic medicine and so my laboratory at UBC, with its dual focus in forensic dentistry and forensic medicine, brought me in contact with criminal investigations both across Canada and various regions throughout the world. I saw some of the worst of human nature, the most heinous crimes imaginable. As a retreat away from the stresses and impacts of this type of casework, I used my woodturning studio and my free time to create beautiful things and occupy my mind with nicer things. It has worked very well for me as a coping mechanism.

With respect to the Mary E. Elliott Award, as Iain Taylor knew of my love for woodworking, he mentioned the Award to me when Doug Larson decided to stop crafting the Elliott trophy. Because Doug had made the awards from wood, I believe Iain had the idea that I might be able to also design and produce awards for recipients.

HOW MUCH DO YOU KNOW ABOUT THE AWARD RECIPIENT BEFORE YOU BEGIN YOUR WORK?

Back when Iain asked me to produce my first Mary E. Elliott Award in 2009, I had the idea that I should try to customize it for the recipient, to attempt to make the piece I created even more meaningful. I did not know then that Doug Larson also did this. It just occurred to me that in situations in which the award recipient may have worked during their career with a particular tree species, it would be nice for them to receive an award made from that species. Iain agreed and so he continually would tell me something about the focus of each recipient's research or study (Fig. 2).

Another thing that I considered was that each recipient was receiving a very high honour from the CBA and thus each would be at the height of their career. It was my feeling that at the height of one's career, one is most likely past the point of accumulating and in all probability is in a position of attempting to streamline. Thus, I wanted to create a piece that could be functional as opposed to hanging on a wall or sitting on a mantle. A platter, a bowl, or a serving plate that could be used with guests to share food or snacks and with the included CBA and annual medallions attached is what I thought. The award would be a conversation piece during use. This is how I came up with the idea of dual-purpose Mary E. Elliott awards. I like to think that my pieces don't only sit on a shelf but are used and enjoyed; this makes me smile!



Figure 2: Trophy made in 2013 for Rodger Evans – Because one of Rodger's interests is the floral character evolution in the Rosaceae, David carved a rose on the rim of this platter made from quilted bigleaf maple (*Acer macrophyllum*).

WHEN DID YOU BEGIN TO TURN WOOD?

My first experience with a woodturning lathe was in high school woodworking classes in the 1960s. However, during one of the classes, I had a bad experience with a lathe, so it took me some time to return to it. It is in 2004 that I went back to turning wood in earnest and bought my first lathe and associated turning tools. Between high school and 2004, I always had a workshop and my wife supported my hobby. Before 2004, I was a "flat work" woodworker; I made tables, dressers, benches, and other pieces of furniture. Projects were lengthy, taking 3-4 weeks to make the piece and another 3-4 weeks to finish it. Then in 2004, I made my first bowl, a much faster process (2 hours) to produce something beautiful and functional. I was hooked! It is said that woodturning is the "crack cocaine of woodworking", and this is true! When you make a bowl, you interact with the wood. Under your hands, the bowl grows and evolves, taking sometimes the turner in a different and unexpected direction because the wood wants you to move in that direction.

CAN ANY TYPE OF WOOD BE USED FOR TURNING?

The best woods for turning are from hardwood trees such as the bigleaf maple tree. Another tree that I like very much is the *Arbutus* tree, which typically grows within 8 km of the Pacific Ocean; it is a hard, dense wood that can be used for artistic reasons more than for functional reasons. It has a nice light colour that readily accepts embellishments (e.g., carving, colouring, burning). The colour or stain of the grains of a wood can be emphasized by painting the wood black, sanding it to lightly re-expose the grain, and then adding different colours.

Conifer wood, known as softwood, is generally not good for fine woodworking; it is useful for certain functional projects such as tool handles, a doorstop, or various shapes or jigs to be used around the studio as forms, etc. to enable specific tasks. An artisan often must make custom tools for particular projects and these softer woods lend themselves to these uses.

After a piece is turned to its final shape and size, the different density exhibited by summer and winter wood is a characteristic often exploited with wood-burning embellishments. One can burn second-growth cedar or Douglas fir, which removes the less-dense summer wood more quickly than the more-dense winter wood, so that when you brush away the ash, the surface of the project becomes textured in artistic ways that emphasize the grain patterns.

First-growth trees in the rainforest have very dense wood as they grew very slowly and their fibres are very tight. These tight grain patterns are exceptionally beautiful because the growth rings are so fine. However, nowadays, these first-growth forests are protected. In second-growth forests, trees grow much faster, their fibers are not as tight, and the wood is less dense. But wood from second-growth trees is still valuable and beautiful in its own right.

Typically one doesn't choose one type of wood over the other, i.e., heartwood over sapwood, because the darker and lighter aspects of the tree appearing in the same turned piece add drama and beauty. So we don't select and discard one or the other, we try to incorporate both.

WE NOTICED THAT IN THE DESCRIPTION OF THE WOOD YOU TURNED YOU USED THE TERM "FIGURED WOOD." WHAT IS IT?

Wood exhibits variations in the appearance of its grains. Caused by the stresses that the tree encounters when it is alive, they only become apparent when the timber is turned. The wood with its visual characteristics is known as figured wood.

There are different categories of figured wood. One type is known as *quilted* and recalls ripples on water (Fig. 2), while another type referred to as *spalted* wood shows patterns created when a fungus infects a piece of timber as it is decaying. I like to use the latter because of the spectacular random patterns produced as the fungi create zone lines and colours in the wood fibres as part of the process (Fig. 3a).



Figure 3: Trophies made in 2014 for Jane Young (Fig. 3a; top view) and in 2012 for Marian Munro (Fig. 3b) – The wood used on the left is spalted red alder (*Alnus rubra*) while on the right, it is figured bigleaf maple burl.

A third type of figured wood is *burr* or *burl* wood, which actually is my very favourite wood to work with (Fig. 3b). This is because I am a

cancer survivor, and a burl on a tree is thought by some to be an example of a type of cancer (tumour). I was diagnosed with and fought a very bad cancer in 2011. We all thought the surgical and chemotherapy treatments were successful, but in 2012 the cancer returned and it was now inoperable. In May 2012, I was not expected to live more than 6 months. After intensive medical help in battling the disease, we are now in spring of 2021 … and I am thriving! So, for me, turning a piece of hardwood burl into a creative or functional piece is a wonderful experience.

WHERE DO YOU GET THE WOOD YOU TURN?

Timbers that I use for my turned pieces come from two sources, in general.

One source is ornamental hardwood trees that are felled by the City of Vancouver crews when the trees become ill or have reached the end of their lifespan. After the trees are felled, by special arrangement with some members of the woodworking community, their wood is left lying on city boulevards for woodworkers and woodturners to harvest for their hobbies. This is the result of a fortuitous conversation between one of us and a tree-removal foreman who was to cut a wind-felled Japanese cherry tree in the neighborhood. We asked what would happen to the wood and learned that it would be ground to be disposed of. Now we are fortunate, as when a tree is felled we are allowed to choose the pieces we want. This wood can be used for furniture-making, wood turning, or as fire wood.



Figure 4: Trophy made of figured monkey-pod tree (*Samanea saman*) from Hawaii in 2017 for Frédérique Guinel.

The second source is from trees on farms in the Fraser River valley at the outskirts of Vancouver. Wood blocks from bigleaf maple, wild cherry, London plane, cottonwood trees, etc. that fall in severe winter storms or are cleared for land-use projects are harvested by a group of woodworkers that I am a part of.

An alternative is to purchase both exceptional local and exotic timbers, but these may turn out to be quite expensive. The only exotic (non-native) wood species that I use are from ornamental trees from the streets of the City of Vancouver, such as plum, cherry, etc., or timbers that I have been gifted from friends in foreign lands (Fig. 4). However, there are many stores in Canada that import and sell exotic wood species. Nowadays woodturners, in their desire for sustainable forests and best harvesting practices, will ask about wood provenance, and they will share information about the products they obtain with other members of their guilds, forums and clubs.

IS ANYONE ALLOWED TO PICK UP ANY PIECES OF WOOD ANYWHERE?

No, one cannot just pick up wood anywhere. The woodworking groups that I belong to must have the permission of the City of Vancouver crews or the property owners. One of the reasons is the potential spreading of diseases, but even more worrisome is the insect infestations that are common in older trees that are felled. To prevent the infestation spreading, the timbers are always worked on in an outside space. One can choose to remove the bark, which is then disposed of by burning. An alternative is to use the bark, which becomes a feature of the turned piece; in this case, insecticides are used to arrest the infestation. The Ambrosia beetle produces exceptionally beautiful patterns in green wood, for example, but we don't want to bring home these beetles or other insects!

When the wood is imported, either the bark has to be removed or the wood timber has to be quarantined and then examined for potential diseases.

WHEN IS THE BEST TIME TO HARVEST WOOD FOR WOODTURNING?

The best harvesting time is in the winter when the tree is dormant and there is little to no flowing sap. Even then it is still necessary to dry the wood before completing any projects with it. Once the piece of wood is collected, it is rough-turned to speed up the drying process by reducing its mass, increasing its open surface area, and reducing its thickness.

As one knows, wood timbers are like bundles of drinking straws with phloem oriented in parallel. If the ends of these straws are sealed, the moisture is then lost through the walls of the phloem. This is a preferred way of drying the timber as the process is slower and more controlled than when water escapes through the straws' open ends. Because the moisture loss is slowed down, sealing also helps to protect the wood from cracking while it dries. As it dries, the wood changes its shape and distorts; from a round shape when it is taken from the lathe, it becomes an oval. The wall of the rough-turned wood is left quite thick; for example, for a bowl that will ultimately have a 30 cm diameter and a 5 mm thick wall, the piece may be rough-turned with a temporary 30 mm thick wall during drying so that one can compensate for distortions that appear during moisture loss.

HOW LONG DOES THE DRYING PROCESS TAKE?

For timber to be stable for turning, its moisture content should be between 12 and 15%. On average, for the moisture content of most wood species to decline from 35% (green, fresh wood) to 15% (dry wood), the rule of thumb is one year for each 1" of wood thickness. Since most rough-turned pieces have a wall thickness that is approximately a tenth of the overall diameter, and since most pieces are in the 10-12" diameter range (with a wall thickness of 1 to 1-1/4"), this translates to about one year of drying for most rough-turned pieces. Generally, woodturners like to air-dry their pieces rather than kiln-dry them, which would be much faster. The natural air-drying process, although slower, seems to result in less internal stresses in the timbers and the production of less dust when working the wood.

WHEN YOU COLLECT THE WOOD TIMBER, DO YOU ALREADY SEE IN YOUR MIND THE END-PRODUCT? OR DOES THIS COME AS YOU ARE TURNING THE DRY PIECE OF WOOD?

There are not many different ways that the trunk of a tree can be cut to harvest useable wood for projects. And the orientation of most turned pieces within the tree trunk is a given to a certain extent. Yes, I can envision the final form within the tree while I am harvesting the piece to be turned (known as a blank), but the standard approach to cutting into the trunk is to follow accepted practices that avoid the cracking of the harvested pieces and produce grain patterns in the final form that are pleasing to look at. One always assesses the particular tree after it is felled, and then harvests the very best woodturning blank first. Then one proceeds to the next best blank, followed by the next best, etc. Thus, it is comical in some cases to watch a turner during this process continually moving and rotating the tree trunk to cut a section here, then a section there, etc.

WHAT HAPPENS WHEN YOU MAKE A MISTAKE?

One of the great joys of working with wood is that it is an organic, living substrate which contains internal stressors; the wood reacts to these stressors and to other forces, such as changes in ambient humidity, by moving its fibers and by changing shape over time.

Sometimes the wood timber wishes to be something that is not the same as what I want it to be. This is wonderful! And I celebrate this each time it happens. In some instances, the piece I am working on will change contour as stresses relax and move the wood while it is on the lathe spinning, or at rest between turning sessions. So that becomes the new direction for me to take for the piece, following the wood's desires. I work together with the

piece of wood.

Additionally, there are no mistakes possible, only "design opportunities". The contours I am cutting into the wood with my tools unfold extremely quickly, and so I can and am always adapting, evolving the design, and feeling what the wood is saying. I change the shape often as it spins in front of me and I see how it is developing. The end product may or may not be precisely what my original vision was. It certainly will be close, but may not (and probably will not) be exactly the same.

HAVE YOU EVER USED THE KNOWLEDGE RECEIVED IN YOUR BOTANY CLASS IN YOUR ACTIVITIES AS A FORENSIC DENTIST AND AS A WOOD- TURNER?

I remember an interesting case that came to me from a retail food outlet, in which a fragment of something had been found in a customer's lunch meal. It appeared to be a fragment of broken tooth and I was asked to determine if this was true and, if so, if it had come from the customer's mouth. Alternatively, was it a foreign body that somehow had made its way into the manufacturing process? Following detailed examination in my lab, I considered the possibility that it was a dicot seed. I called Iain Taylor in his lab, told him about the case, and asked him to collaborate. Neither of us could determine from macro or micro examination what we were looking at, so Iain made a suggestion that I will never forget: "Let's just plant it to see if it germinates!" Of course, we could not do this because it may have resulted in the submitted item being changed into a different form, contrary to the legal chain of custody. As I worked down the list of possibilities using non-destructive testing methods, it eventually became clear that this was a fragment of acrylic broken from a bakery machine. Isn't it interesting how things that I learned in undergrad Botany were still important in this differential diagnosis within a forensic laboratory.

ON THE BOTTOM OF EACH PLATE/BOWL, THERE IS AN INSIGNIA WITH YOUR NAME AND MAPLE LEAVES; IS THIS SPECIFIC TO THE M.E. ELLIOTT AWARDS OR DO YOU PLACE THIS ON EACH OF YOUR CREATIONS?

These signature disks (Fig. 5) are ordered from a company that prints them for me, using a dye-sublimation printer, to my specifications. It is a way for me to "sign" the piece but also to record the year of its production. Because I worked as a forensic scientist during my career and because I use so much bigleaf maple in my creations - plus the maple tree is the symbol of Canada - I included a magnifying glass looking at maple leaves in my logo. I use this signature disk on all of my turned pieces, not just for the Elliott Award. I also try to record the wood species on the bottom of my creations. This is again part of the provenance of the piece. And I think that botanists, in particular, would find this interesting, especially given the amazing grain and figure in some of the pieces. The first question that I envision someone asking is "What kind of wood is this?"



Figure 5: The underside of the trophy awarded to Jane Young in 2014 – Below each of its creation, David inscribed the tree used, the year of creation (here mentioned on the CBA disk), and an insignia which he used as a signature).

However, I have recently built a website for my wood-turnings under the name Wood Bee Turnings https://woodbeeturnings.ca/. Thus, my signature disk has recently changed to include that name and logo, etc. I will still continue to use wood-burning tools to write the wood species and year on the bottom of each piece.

DO YOU CONSIDER YOURSELF AS AN ARTIST?

As a student in university, I took a theoretical course in Fine Arts, but this is the only formal training in art that I have ever received. As such, and when I began woodturning, I did not think I was an artist. I was always making pieces that were functional, such as bowls to share food. It was important to me that there was a utility to the turned piece. However, as I grow, I am seeing more and more opportunities to express both what I envision and what the wood timber is telling me it would like to become; so I pay more attention to the form and the shape of the piece by focusing on the grain patterns, for example. In doing so, I am adding much more of my vision and creativity and thus I am starting to feel more of an artist.

I do believe woodturning is a dying art – and I would like to share my passion with younger people. I would like to give them a better appreciation of this type of work, the challenges of working with a living substrate that moves and changes over time, and the joy of creating lasting pieces.

We would like to thank sincerely David Sweet for his generosity, kindness and patience. We truly enjoyed learning about his craft. The entire conversation we had with him will be part of the package about the M.E. Elliott Award that will be submitted to Library and Archives Canada.

From Models to Mummies: Combating Plant Awareness Disparity Through Museum Exhibits

By Dr. Diana Bizecki Robson, Curator of Botany
Manitoba Museum, Winnipeg, MB

Plants are some of the most underappreciated species on the planet. While many people enjoy the shade of a tree, or smelling a flower, for the most part, humanity's love of the natural world is focused firmly on the fuzzy creatures: droopy-eared dogs, bamboo-eating pandas, and ferocious predators. Such creatures are called "charismatic megafauna," and part of me hates them, because when they are around, plants just fade into the background, unnoticed and unappreciated. So, when the Manitoba Museum's Executive Director announced we would be renovating the old Grasslands Gallery to celebrate our 50th anniversary in 2020, I knew it would be a challenge to create plant exhibits that people would actually look at.

Plant Projections

Many natural history museums feature ecosystem dioramas, but, unfortunately, we couldn't build any large ones for this project because our Diorama Artist retired in 2015. So instead, we thought that the gallery itself could mimic a prairie landscape. By painting the walls sky blue, putting in green carpeting, hanging birds from the ceiling, and projecting an animated video of mixed grass prairie on one wall, the gallery achieves this objective. The 24-minute long video rotates through all four seasons, allowing us to show how the colours of prairie plants change over the year. In total, 15 different species of wildflowers bloom during the appropriate season: the Prairie Crocuses (*Pulsatilla patens*) of spring give way to the Western Red Lilies (*Lilium philadelphicum*) of summer, and eventually, to the Hairy Golden-asters (*Heterotheca villosa*) of autumn. Large pollinators, like bumblebees and butterflies, periodically visit the flowers. Prairie sounds, including screeching hawks, thunderstorms and buzzing mosquitoes, are part of the video, adding to the ambiance. And, since people really do like charismatic megafauna, several important prairie animals, including bison and wolves, make appearances.



Figure 1. Good design, and a video projection, makes the whole gallery feel like a diorama. © Ian McCausland

Plant Reproduction

Another challenge with interpreting plants and fungi is that the public considers them to be passive and boring. But, if there's one thing that I've learned in all my years of teaching students about botany, it's that sex sells! So, we created an exhibit about reproduction called "Travelling Plants and Flying Fungi." The interpretive text describes how plants and fungi use animals and wind to move their pollen, fruits, seeds, and spores around the landscape. To make the exhibit aesthetically appealing, we decided to create plant models and display them in a case, along with specimens preserved in three dimensions.

Although our Diorama Artist had retired, her apprentice was skilled at creating plant models. However, the

model-making process is very time consuming, so the work had to begin many years before the gallery opened. In brief, making a model requires collecting a fresh plant, creating molds of each individual plant part (e.g. petals, leaves, etc.), making casts of those parts, then reassembling and painting them. We made models of plants with a variety of pollination mechanisms: the wind-pollinated Blue Wildrye (*Elymus glaucus*), and the animal-pollinated Saline Shootingstar (*Dodecatheon pulchellum*), Andrew's Bottle Gentian (*Gentiana andrewsii*), Stiff Goldenrod (*Solidago rigida*) and Golden Alexanders (*Zizia aurea*). We even attached the correct pollinator species to the plants: long- and short-tongued bees, a beetle, a butterfly, a fly and a Ruby-throated Hummingbird (*Archilochus colubris*).

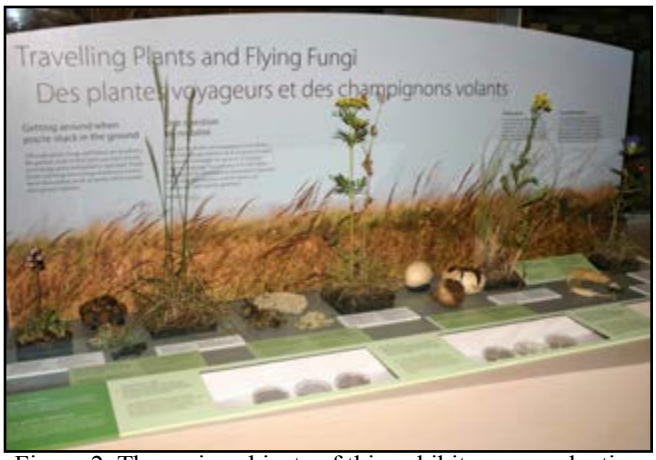
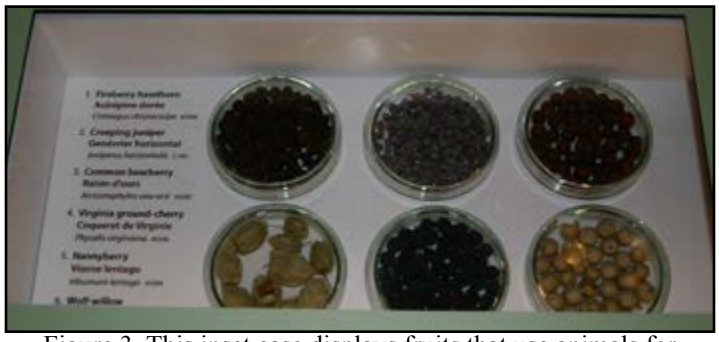


Figure 2. The main subjects of this exhibit on reproduction are plants and fungi. © Manitoba Museum

In addition to pollination, we also highlight propagule dispersal by displaying specimens of fruits and seeds, grouping plants with similar strategies together. One section highlights species with fleshy fruits that disperse in animal feces (e.g. Silverberry or *Elaeagnus commutata*), a second with burs that catch onto animal fur (e.g. Wild Licorice or *Glycyrrhiza lepidota*), and a third with seeds possessing structures to help them harness the wind (e.g. Three-flowered Avens or *Geum triflorum*). To add some interactivity, visitors can push a button that activates a fan and causes Dwarf Milkweed (*Asclepias speciosa*) seeds to fly to the top of a clear tube.

Although most specimens in the Museum's botanical collection are pressed flat, some are dried in three-dimensions for display purposes. To do this, we use a drying oven, electric dehydrator, or silica gel to dry the specimen, depending on how quickly it normally disintegrates. For example, to preserve auto-digesting Shaggy Mane (*Coprinus comatus*) mushrooms, I had to place the specimens in silica gel almost immediately after collection, to dehydrate them quickly. I collected and preserved whole plants, fungi, lichens and even cyanobacteria for this exhibit.

Another way we challenge people's perception that plants and fungi are passive and immobile, is to use videography. Since plants and fungi move in ways that are not easily detectable to the human eye, we show time lapse videos on a touchscreen near the display case. Shaggy Mane (*Coprinus comatus*) mushrooms grow, and then dissolve, Pincushion Cactus (*Escobaria vivipara*) flowers bloom, a seed sprouts, lichens absorb rainwater and swell, and pollinators of goldenrod (*Solidago*) get attacked by an ambush bug (*Phymata* sp.).


Figure 3. This inset case displays fruits that use animals for dispersal. © Manitoba Museum

Adapting to the Prairie Elements

Another major theme we cover is how prairie plants have adapted to obtain water and food in an environment subject to periodic droughts and wildfire, and grazing by large herbivores. To illustrate just how deep prairie roots go into the soil, we decided to dig some up. In the summer of 2019, a small team went to Spruce Woods Provincial Park, to dig up the entire root systems of some plants eroding out of the sand dunes. Since drying the plants would result in fragile, discolored specimens, we decided to mummify them instead. Shortly after digging out the plants, we immersed each one in a pickling solution for the trip back to the Museum. After several months of pickling, the plant mummies were pliable and ready to paint.

The case containing our mummified plants, "Anchoring the Earth," shows the root architecture of three species with different adaptations for survival. Big Bluestem (*Andropogon gerardi*) is a warm season (C4) grass that needs deep roots to get water in late summer. In contrast, the cool season (C3) June Grass (*Koeleria macrantha*) has short, hairy roots to absorb spring rainwater. Finally, the tap-rooted legume, White Prairie-clover (*Dalea candida*), depends heavily on mycorrhizal fungi and nitrogen-fixing bacteria to obtain adequate resources (i.e. water and minerals) for its growth. A panel in the case illustrates and describes these soil microorganisms, along with several others, highlighting their importance for plant and ecosystem health.

Endangered Plants

Ultimately, the story of the prairies is a tragic one. In Manitoba, more than 99% of the tall grass prairie and more than 90% of the mixed grass prairie, has been lost to agriculture and development. Near the end of the gallery, we tell the story of how Manitoba's wild prairies became endangered, in a case titled "Breaking the Land." The case features both plant and animal species that are now extinct, extirpated, endangered, or rare. It includes plant models of three rare species: Western Prairie Fringed Orchid (*Platanthera praeclara*), Small White Lady's-slipper (*Cypripedium candidum*), and Red Threeawn (*Aristida purpurea*). We also mounted a monarch (*Danaus plexippus*) on a Dwarf Milkweed (*Asclepias ovalifolia*) model, to tell the story of this rare butterfly, and the plants it depends on for survival.

One section of the case, "Following the Plow," describes how exotic species threaten the remaining native prairie grasslands and wetlands. We featured the invasive European subspecies of Reed Grass (*Phragmites australis* ssp. *australis*), because the flowering stems could simply be dried for display. We also included specimens of Burdock (*Arctium* spp.), as these non-native plants have invaded riparian habitats in Manitoba, and sometimes ensnare small songbirds that land on their prickly inflorescences looking for food. The specimens we show have dead songbirds stuck to them, graphically illustrating that exotic species can, quite literally, kill native ones.



Figure 4. Mummified plant specimens were displayed in this exhibit on plant roots. © Ian McCausland

The end result is a visually spectacular case that tells the melancholy story of how an ecosystem that once covered millions of hectares became a mere remnant of its former greatness. The plight of both prairie plants and the animals that depend on them will hopefully elicit an emotional response, encouraging visitors to support prairie conservation efforts. Near this case, we show a video interview with biologist Rebekah Neufeld from the Nature Conservancy of Manitoba, to highlight current prairie conservation efforts, so that the gallery ends with a message of hope.

Altering Visitor Perceptions

How interpretive text is written can completely change one's perspective of the organism. Plants are often portrayed as being victims of animal's voracious appetites, not as creatures that have developed effective defensive strategies. To counter this perception, we emphasized that some plants grow spines or produce toxins to protect their leaves from animals.

As well, scientists tend to use a passive voice to describe organisms, but writing this way in exhibit text makes the species you are talking about sound boring. "Seeds blow away in the wind" is passive and dull. "Seeds harness

wind to travel across the land" is active and exciting. Humans also tend to talk about plants in terms of their usefulness to animals (including ourselves). But by flipping the narrative, from "**birds** eat fruit" to "**plants** use birds to disperse their seeds," we see that it is actually the plants that are manipulating the animals through bribery.

I also think that anthropomorphizing, just a little bit, can help elicit empathy for plants. For example, in one of our programs for grade 3 students, we describe all the ways in which plants are like people: they need water and food, they try to have families (i.e. reproduce) and they try to avoid getting eaten. We have found that visitors are more sympathetic to the plight of plants when you highlight similarities between them and animals.



Figure 5. The story of how the prairies became endangered is told in the final case. © Ian McCausland

Conclusion

In most Museum displays, plants are not the main subject, instead merely serving as an attractive background for animals, contributing to plant awareness disparity. By creating new, plant-focused exhibits and public programs, the Manitoba Museum is helping to instill a sense of awe and fascination with prairie plants in our visitors. The interpretive approaches taken by our Museum to make plants and fungi more exciting, can be used by any botanist when talking to the general public, to elicit support for the research and conservation of these often-overlooked creatures.

TOP CANADIAN ORNAMENTAL PLANTS. 29. Crocus

ERNEST SMALL[1, 2]

Crocus is one of the early-flowering spring perennials emerging from "bulbs," perhaps second in popularity only to the tulip. Many of the species are exquisitely beautiful, and extensive breeding has made a very wide range of cultivars available. The exceptional tolerance to cold of most of the plants makes them especially suited to Canada.

Names

Scientific name: The genus name *Crocus* traces to the Greek Crocus or Krokus. Various explanations have been given of why the word was adopted. Krokos in Greek means wire, filament, or hair, and it has been proposed that the word originally referred to the filamentous stigmas of the saffron crocus, employed as a spice. Alternatively, it has been claimed that the modern word crocus traces to a Greek myth in which a youth, Crocus, frustrated in his love life, was transformed into a flower bearing his name.

English names: Crocus; plural: crocuses, croci. The name "Dutch crocus" reflects the widespread supply from the Netherlands; "snow crocus" is based on the frequent early development of the flowers through a covering layer of snow. *Crocus* is a member of the Iridaceae. Some species in other families also have crocus in their common names. "Autumn crocus" usually refers to the genus *Colchicum* (of the Colchicaceae), which has about 160 species, notable for the toxic alkaloid colchicine used to treat gout and in doubling the chromosome number of plants. Sometimes the phrase autumn crocus is employed to designate crocuses that flower in late summer and autumn, often before the foliage appears. Prairie crocus (*Anemone patens*) of the Ranunculaceae is the floral emblem of Manitoba. "The Crocus Trail," a Manitoban section of the Trans-Canada Trail (aka The Great Trail) which connects the Atlantic and Pacific Oceans, is based on prairie crocus. Similarly, Manitoba's honorary "Order of the Crocus" is named for this species.

French names: Crocus; saffron (*C. sativus*) = safron cultivé.



Figure 1. Crocuses emerging from snow in the early spring. (a) Public domain photo by M.W., Pixabay.com. (b) Photo by Peter Stenzel (CC BY ND 2.0).



Figure 2. An attractive bed of mixed crocuses. Public domain photo by G. Gerhard, Pixabay.com.

1 Science and Technology Branch, Agriculture and Agri-Food Canada, Neatby Bldg., Central Experimental Farm, Ottawa ON, K1A 0C6
2 © Government of Canada. Verbatim redistribution for personal, non-commercial use is permitted.

Symbolism

The saffron crocus (*C. sativus*) has been important as a spice for millennia, and has an extensive history of symbolic use, but is not discussed here because it is a very minor ornamental. In Canada, symbolic or emblematic usage of "crocus" is often based on the indigenous prairie crocus (*Anemone patens*), rather than on introduced *Crocus*, and sometimes they are confused. Because of its usually early flowering, the true crocus is widely considered to represent spring, rebirth, youth, and cheerfulness. Yellow crocuses are sometimes said to represent Easter. In Great Britain and Ireland, it was customary to paint the little finger of children with a purple dye to indicate that they had received the life-saving polio vaccine. In the latter 20th century, the Rotary organization noted a resemblance of the spreading dye on fingers to the petals to an opening purple crocus and consequently adopted the crocus as a symbol for the campaign to eradicate polio. On World Polio Day (October 24), millions of purple crocus bulbs were frequently planted throughout Britain.

Wild *Crocus* species



Figure 3. *Crocus* in the High Alps of France. Photo by Claude Perso (CC BY SA 2.0).

Most authorities accept between 100 and 160 species of *Crocus*, but the most recent monograph (Rukšāns 2017) recognizes 235. Crocuses are native to woodland, scrub, and meadows from sea level to alpine tundra (some species occur at altitudes over 3,000 m), from Western Europe and Northwestern Africa to Western China. The centre of species diversity includes the Balkan Peninsula and Turkey. Many of the species are under threat of genetic erosion because of urbanization and global warming, and a few are Red-listed as endangered.

Garden catalogues sometimes state that crocuses naturalize readily. In biogeography, "naturalized" means that a foreign species has become well established in a wild area without deliberate human assistance; in horticulture, the word often refers to an ornamental species deliberately established on managed or private property but with minimal or no subsequent care in the hope that it will survive and reproduce on its own. Crocuses have been naturalized in Canada in the horticultural sense of the word, but not in the biogeographical sense. In areas of North America with mild winters, cultivars and some wild species that have been planted in gardens sometimes persist and even reproduce in or near their original sites. E-Flora BC lists *C. tommasinianus* as a "non-established vascular plant in BC."



Figure 4. A honeybee pollinating *Crocus vernus*. Attribution: httpwiresstock.io.

Crocuses are charming dwarf plants, the flower stalks rarely exceeding 15 cm, although the foliage may be much longer. The leaves are semi-erect, long, narrow, and lance-shaped like blades of grass, with a white or silvery stripe (due to cells lacking chlorophyll) running along the centre. The stripe differs in width depending on species but is characteristic of the genus *Crocus*. Some species or cultivars will produce just one flower, many produce several. Crocus flowers have six petals in two whorls of three, the outer set often somewhat larger and attractively marked. The petals are arranged into a cup (much more obvious in the wide-petalled species), which closes at night and in cloudy weather. Floral colours vary extensively, often shades of white, yellow or purple, sometimes in combinations. There are three stamens and a pistil with a style divided into three stig-

ma-tipped branches. Pollination is by bees, moths and beetles, and many of the species are scented. Most ornamental crocuses are spring-flowering, although some are autumn-flowering. Spring-flowering plants have a long floral tube, the ovary situated below ground where it is protected from adverse weather and herbivores. Flowering of an individual plant may extend from 1 to 3 weeks. As the seeds ripen the subterranean ovary elevates, pushed up by lengthening of the stem beneath it, so that the ripe seeds can be dispersed above ground.



Figure 5. Corms of *Crocus*. Photos by Mariluna (CC BY SA 3.0). (a) *Crocus sieberi*. (b) *Crocus chrysanthus* 'Dorothy'.

Crocuses are perennials, at least with respect to the underground parts, which survive an inclement season by dormant underground "corms." These produce new foliage and flowers when environmental conditions become suitable. In horticulture, so-called "bulb crops" include a variety of plants with underground storage structures from which the plants regenerate after a period of dormancy. The storage structures may be modified roots, stems, or a combination of stem and leaf tissues, associated with bud meristems that can produce new roots and stems. Many herbaceous plants whose tops are killed annually survive a dry or cold season simply by conventional underground stems and/or roots, but many also produce specialized structures that are strongly swollen to store food reserves (commonly starch). These are distinguished technically as bulbs, corms, rhizomes, and tubers. True bulbs (exemplified by onion, tulip and daffodil) are spheroidal masses made up mostly of modified fleshy storage leaves ("scales") which appear as rings in a cross section. Corms (e.g. crocus, banana) are similar in shape but made up mostly of a solid mass of compacted stem tissue, lacking internal layers like true bulbs. Rhizomes (e.g. ginger, iris), like corms are made of fleshy stem tissue, but unlike corms which orientate vertically, rhizomes elongate laterally quite substantially. "Stem tubers" (such as potato and true yam – *Dioscorea* species) are essentially short (i.e. not substantially elongated), compact, swollen rhizomes. "Root tubers" or "tuberous roots" (such as sweet potato, cassava, daylily, and dahlia) are simply swollen roots, and are internally composed of root tissues. All of these storage structures produce both shoot and root meristems from the outer part of the storage organ (e.g. eyes of a potato). In the horticultural industry, the term "bulb" usually includes all fleshy underground storage structures. Crocus corms have a covering formed from expanded leaf bases, termed a tunic, which may be fibrous, papery, or eggshell-like. The roots emerge from a smooth area at the base known as the basal plate. A new corm often develops above the old crocus corm (once a given corm produces a shoot or shoots, it has used up its energy reserves and dies). Because new corms are produced annually above the old corms, the plants would eventually pop out of the ground. To prevent this, crocuses and many other bulb-like plant develop "contractile roots." These are modified adventitious roots, growing from the base of the stem, and they shorten to pull the corm or bulb down to a suitable level. Depending on species, corms may generate small offshoots known as daughter corms or cormels which like the corms reproduce the plant vegetatively.

Domesticated *Crocus* species

About 98% of recent scientific publications on the genus *Crocus* deal only with the saffron crocus (*C. sativus*), a reflection of its economic importance. The saffron crocus is a very old sterile cultigen, its stigmas employed as a spice by the classical Egyptians, Jews, Greeks, Romans, Hindus, and Moslems. Serious cultivation of ornamental *Crocus* species, however, appears to trace only to 16th century Netherlands, from which the garden use of crocuses spread across Europe.

About 3 dozen species of *Crocus* are cultivated significantly, and there are cultivars of many of these. Cultivars identified as given species in fact are often hybrids with other species. The alpine species *C. vernus* ("Dutch crocus"), is the chief ancestor of commonly planted garden crocuses, but cultivars so identified are likely to be hybrids with other species. Dutch yellow crocus (*C. flavus*), from stony slopes in Southeastern Europe, is another popular spring-flowering species. Other important species include the golden or snow crocus (*C.*



Figure 6. Saffron crocus (*Crocus sativus*), and its product, saffron (stigmas). (a) Illustration from: Redouté, P.J. 1805. Les liliacées. Digitally enhanced by Rawpixel (CC BY 4.0). (b) Commercial field in Iran, the source of most of the world's saffron. Photo by Ammar5971 (CC BY SA 4.0). (c) A worker with a container of flowers, on a saffron farm in Iran. About 160 flowers are required to produce 1 gram of dry saffron, which in Canada typically sells for about $10.00. Photo by Safa Daneshvar (CC BY SA 3.0). (d) The spice saffron (stigmas). Photo by Salonik Saffron (CC BY SA 4.0).



Figure 7. Examples of container-grown ornamental crocuses. (a) *Crocus tommasinianus* 'Whitewell Purple'. Photo by Ghislain 118 (CC BY SA 3.0). (b) *Crocus sieberi* 'Firefly'. Photo by Averater (CC BY 4.0). (c) *Crocus chrysanthus* 'Cream Beauty'. Photo by JOHN19701970 (public domain). (d) *Crocus olieveri.* Photo by Averater (CC BY 4.0).

chrysanthus), the Tommie crocus (*C. tommasianus*), the tricolor crocus (*C. sieberi* 'Tricolor'), and the silvery crocus (*C. biflorus*). As with most ornamentals, breeding has been particularly concerned with flower size, colour, and longevity, and modern cultivars have been changed considerably by comparison with their ancestors. Cultivars of the popular *C. vernus* develop notably large flowers – up to 8 cm in width (hence the name "giant crocus," reminiscent of "jumbo shrimp," since the plants are dwarves).

Economic importance

The saffron crocus (*C. sativus*), grown for saffron production, is the most important species in the genus, but is not commonly grown as an ornamental. Saffron is simply the dried stigmas of the plant, and is widely employed as a spice (sometimes rivalling the value of gold on a weight basis) and a pharmaceutical. Occasionally the species is grown as a garden curiosity (it flowers in the autumn). It is not cold-tolerant, and in eastern Canada it requires a sheltered location, such as near a house wall (it can be grown in Toronto).



Figure 8. Commercial crocus fields in the Netherlands, producing corms for the international trade. Photos (public domain) by Jan Nijman, Pixabay.com.

In the Netherlands, large quantities of corms of the ornamental species are generated for international trade, and corms are marketed throughout the temperate world. In Canada, crocuses may be the most popular of the very early-flowering bulbs, although tulips and daffodils, which flower later, dominate spring bulb sales.

Ornamental use

Most ornamental crocuses are spring-flowering, although there are species and cultivars that bloom in late fall and early winter in mild climates. Crocuses are mostly planted outdoors for their colourful flowers, and are rarely employed commercially as cut flowers. Spring-flowering crocuses are very widely employed as short-season ephemerals in lawns and under deciduous trees and shrubs. Some cultivars show up through melting snow to take advantage of the lack of competition with other plants. These first-flowering plants are appreciated not only by people but also by bees and other pollinators, lacking other floral sources. Because they are very short, crocuses are inappropriate for mixed planting with most other ornamentals, although they do blend well with other species of spring-flowering bulbs and are superb in rock (or alpine) gardens. They are very attractive in dedicated beds or borders that can be left fallow for most of the year, or replanted with other ornamentals. Crocuses are especially suited to containers, since their limited height is not a handicap. Potted crocuses can be employed as temporary flowering houseplants, and the corms can be forced for out-of-season flowers, and indeed are marketed for this purpose. The period of flowering is relatively short, but mixing cultivars can extend the period of blooming.

Medicinal use

Numerous studies have been conducted of potential medical applications of saffron (from *C. sativus*), particularly in Iran, the centre of world production, where it is relatively available. There are many claims of medicinal values, and saffron has been employed in folk medicine for millennia. However, because it is so expensive, its pharmaceutical usage is negligible.

Toxicity and culinary usage

Saffron (from *C. sativus*) is potentially quite toxic, and when employed as a spice it should be used sparingly. However, little information is available on the relative safety of most *Crocus* species. The corms of true *Crocus* species are often consumed by wildlife, and have occasionally been employed as food by indigenous people, but are not recommended and may cause gastrointestinal upset. The shoots (stems, foliage, flowers) of true *Crocus* species are also sometimes consumed by wildlife, but are not recommended for livestock. There is danger of people confusing the relatively harmless fall-flowering species of *Crocus* (often called "Autumn crocuses") with the extremely toxic *Colchicium* species (also called Autumn crocuses).

Care of outdoor plants

Purchasing

Crocus corms are available in most garden centers in the fall for autumn planting to produce spring flowers. Rarer varieties are available from bulb catalogs on the Internet. Larger corms should be sought, and bargain-basement offerings are unlikely to be desirable. As noted in the following discussion of temperature, since crocuses are grown as perennials, varieties should be chosen that are suited to one's climate.

Planting & location



Figure 9. A clump of *Crocus sieberi* 'Tricolor'. A concentrated planting of corms such as this produces a large floral display, compensating for the small flowers of crocus. Photo by Meneerke Boem (CC BY SA 3.0).



Figure 10. A trail of crocuses established in a large public lawn. Public domain photo by Ellen26, Pixabay.com.

Spring blooming cultivars are planted in early autumn. In beds, the corms of most varieties are planted 10–13 cm deep, 5–10 cm apart, pointed (upper) end up. The pointed end can be difficult to identify, but if not planted correctly the shoot will simply turn and grow upwards. For a concentrated display in a given location, corms may be planted very closely – a dozen or so in a large hole. They can be scattered randomly in turf or a natural area that is open in the spring, but this will necessitate delaying mowing of lawns in the spring until the plants senesce. In very large lawns (public or private estate) trails of crocuses are sometimes established. Planting in pots provides the flexibility of locating them in different places, and indeed facilitates keeping the dormant plants out of sight after they flower. Crocuses display well in alpine and rock gardens and in containers.



Figure 11. Crocuses emerging in the spring under deciduous trees in a park in England. Photo by Julian Smith (CC BY 2.0).

Crocuses do best in full sun. They tolerate partial shade but should not be located on the north side of a building, or in dense shade. They are often planted under deciduous trees because their early growth in the spring is not highly shaded. In protected situations they may bloom weeks earlier than in open exposed areas. Because they go dormant, a bed of crocuses can leave the area they occupy looking rather desolate. Gardeners concerned about this will interplant other low-growing flowering plants, restrict the size of the bed, or simply scatter the plants in lawns.

Propagation

Crocus seeds are slow to germinate, and the seedlings also grow slowly, so practically it is preferable to plant corms. The more attractive cultivars are hybrids that will not breed true to type from seeds; these must be reproduced vegetatively. Crocuses are relatively short-lived in many areas, and need to be replanted (preferably not in exactly the same location, to prevent disease accumulation). Natural vegetative reproduction often occurs by offsets (baby corms on the sides of the mother corm). These can be separated and replanted after the foliage deteriorates. In some locations self-sowing of seeds may occur (but the resulting plants may not be true to type).

Soil & moisture conditions

Moist soil promotes growth during the spring and summer. However, a well-draining soil is important as crocus poorly tolerates wet soils, especially after the plants go dormant. Clay should be avoided. Drier soils discourage rot when the corms are dormant, but in locations where snow cover is not present in winter some watering may be required. Well-grown corms have sufficient energy to produce flowering plants, so fertilization is not essential. However, in poor soils a light application of a bulb fertilizer may be added at planting time. Soils with pH 6.0–7.0 are recommended.

Temperature

Most crocus cultivars prefer cool climates and are not heat tolerant. The freeze tolerance of the ornamental species and cultivars varies considerably, so it is important to obtain planting stock from sources that reli-

ably identify the ability of the plants to overwinter in the local climate. The corms usually require a 12 to 15 week period of cold (2–7 °C) to set blooms. The flowers fade in heat. Mulching overwinter may be desirable to protect less hardy cultivars.

Tips



Figure 12. Pest animals consuming crocuses in England. (a) Squirrel. Photo by Nmahieu (CC BY ND 2.0). (b) Duck. Photo by Tim Schofield (CC BY 2.0).

The leaves will deteriorate after flowering, but should not be cut back until they yellow naturally. When planted in lawns, mowing should be delayed until the flowers have faded and the leaves are yellowing and withering, in order to allow the corms to store up energy for the next spring growing season (some authorities recommend not mowing until 6 weeks after flowering). In some locations, squirrels, chipmunks, voles, and other rodents will feed on the plants, which may require protection in cages, by screening, or by a scent deterrent. *Crocus tommasinianus* ("Tommies"), unlike most crocuses, are claimed to contain a bitter-tasting alkaloid that repels squirrels.

Care of indoor plants

Potted flowering crocuses are often available cheaply in stores for use as short-term houseplants. When purchasing potted plants they should be free of viruses (a particular problem for crocuses), as evidenced by distortions, streaking, or buds that won't open.

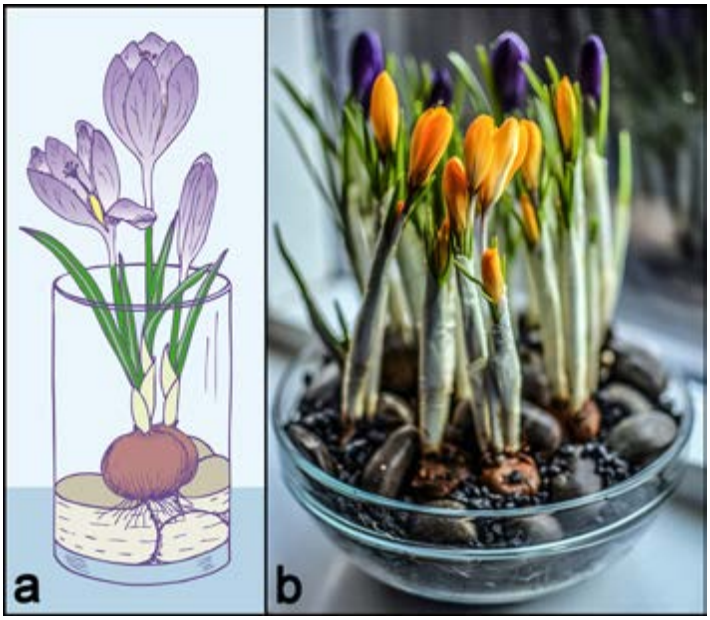


Figure 13. Crocus corms are suitable for forcing in containers of water, using rocks and pebbles as a stabilizing substrate. (a) Public domain diagram from Macrovector/Freepik. (b) Public domain photo from Pixabay.com.

It is also possible to force corms harvested from one's garden during the summer (or simply purchased) to bloom indoors during the winter. Large corms should be employed, and they need to be vernalized (8–15 weeks of chilling are recommended for crocus). The corms may be potted about 3 cm deep in a pot of well-watered soil in the autumn, and chilled in a dark location for 2 to 3 months at 3.3 to 7.2 °C. Moderate watering should be applied during this period. More simply, chilling of bulbs can be done by putting them in damp sphagnum moss in a paper bag, maintained in a refrigerator. Subsequently transferred to room temperature, the crocuses should bloom in about a month. Alternatively to soil, chilled crocuses (and other bulb-like plants) can be forced by maintaining the bottom 7 to 14 mm of the corm in water. A substrate of pebbles can be employed to "root" the plants, or specialty clear hourglass-shaped vases can be used to stabilize the corms so that the plants don't flop over, while also allowing the roots to be viewed. Roots will grow into the water and the flowers will develop from the upper portion. Forced plants have little energy left and are not ideal for transplanting outdoors.



Figure 14. Part of the enormous display of Husum crocuses (termed "*Crocus napolitanus*" but likely *C. vernus*) in Husum Park, Germany. Photo credit: Genet at de.wikipedia (CC BY SA 3.0).

Curiosities of science and technology

- The maritime city of Husum in Germany, near Denmark, is known as "the flower wonder of the north" for its Husum crocuses (identified as "*C. napolitanus*", but likely *C. vernus*). In the spring, around 4 million purple-flowered plants bloom on the grounds of Husum Castle, on an area of around 5 ha, transforming the park into a sea of purple.

- "Alchemy" refers to a set of medieval philosophical and quasi-scientific initiatives, best known for attempts to transform base metals into gold. Alchemists created a huge vocabulary of terms (http://www.3rd1000.com/alchemy/alchemyterms1.htm), most of which are obsolete. One of these is "crocus," which meant "any solid of a saffron or reddish colour."

- Crocus enthusiasts are known as "croconuts."

- The financial community sometimes calls companies or economic sectors that recover early after an economic downturn as "crocuses" in reference to the plant's ability to thrive in the early season.

- "Nyctinasty" is movement of plant parts – usually in response to environmental conditions such as temperature but sometimes controlled by internal rhythms. One example of this is the "sleeping" of flowers, commonly at night. *Crocus* flowers open in sunny conditions and close when the sky is overcast. In *Crocus* there is evidence that the phenomenon protects the flower's pollen.

- Why do crocus leaves have a central white stripe? According to Crocus Group Bulletin No. 51, Summer/Winter 2019, http://files.srgc.net/CGBulletinarchive/CGBulletin51.pdf, "The distinctive white stripe down the centre of many Crocus species leaves is an adaptation that allows sunlight to penetrate deep into the interior of the leaves, like a light well allowing sunlight into a building. The walls of the stripe are loaded with chlorophyll (the pigment that allows plants to harness the energy of sunlight) vastly increasing the surface area of the leaf and making it super-efficient."

Key publications

Abu-Izneid, T., Rauf, A., Khalil, A.A., Olatunde, A., Khalid, A., Alhumaydhi, F.A., et al. 2020. Nutritional and health beneficial properties of saffron (*Crocus sativus* L.): A comprehensive review. Crit. Rev. Food Sci. Nutr. https://doi.org/10.1080/10408398.2020.1857682

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Key websites

Alpine Garden Society, Crocus pages by Tony Goode, "the largest online resource for the genus *Crocus*" – http://archive.alpinegardensociety.net/plants/Crocus/

Challenger, C. 1996. The pleasures of crocus. New Zealand Garden Journal 1: 12–17. http://www.rnzih.org.nz/pages/crocus.htm

Edgewood Gardens website (has numerous photos) – http://www.edgewoodgardens.net/Plants_album/The%20Plants%20-%20%20Complete%20Collection/Iridaceae/Crocus/Subgen%20Nudiscapus%20Ser%20Biflori/index.html

"Guide to… plant societies around the world that focus completely or partially on bulbs" – https://www.pacificbulbsociety.org/pbswiki/index.php/Societies

Pacific Bulb Society (general information + numerous photos) – https://www.pacificbulbsociety.org/pbswiki/index.php/Crocus

World Saffron & Crocus Collection (germplasm information) – http://crocusbank.uclm.es/Information%20System.html

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marc-frederic.indorf@uqat.ca

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Dept.of Biological Sciences,
212B Bio-Sci Bldg., Univ. of Manitoba,
Winnipeg, MB R3T 2N2, Canada
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Bulletin Editor — Tyler Smith
Agriculture & Agri-Food Canada,
960 Carling Avenue, Ottawa ON
K1A 0C6, Canada
tyler@plantarum.ca

Webmaster — Zoe Panchen
Dept of Biology, Dalhousie University,
1355 Oxford Street,
Halifax NS B3H 4R2, Canada
zoe.panchen@ubc.ca