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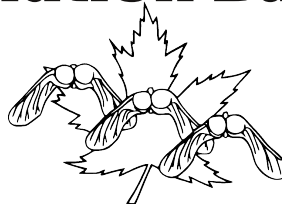
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# The Canadian Botanical Association Bulletin



## Bulletin de l'Association Botanique du Canada

December/Décembre 2013. Volume 46 N°3

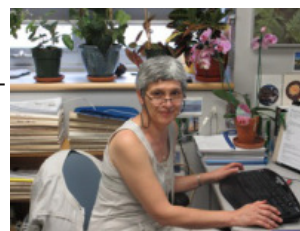
Dear CBA Members:

It seems that every year is just as busy as the one before, and I fear that it has almost become a cliché – nevertheless, I hope that your fall term has been productive and that you still found time to relax a bit and enjoy life. I wish you all a good Holiday Season and best wishes for the coming year.

2014 will be a momentous year for our Association as we will celebrate our 50th birthday! Anne Bruneau and Denis Barabé have been busy planning this important meeting, which will be held in Montreal June 15-19 at the Montreal Botanical Garden. A time during which many of the Garden's collections will be in full bloom! The title of the meeting is "Fifty years of Botany in Canada". All the Section chairs have been active in planning symposia that will be linked to the past but also open to the future of Botany in Canada. The program appears really interesting. This is a meeting not to be missed and I invite you all to come and celebrate. I hope to see you in June!

Montreal 2014 will see the presentation of two new awards which were voted last year at the Annual General Meeting in Kamloops. For the first time in 2014, we will be rewarding with the CBA/ABC Magister Teaching award a CBA member who has demonstrated a consistently high level of teaching excellence. Nominations will be accepted until March 1st for this prestigious award. We will also be offering the Laurie Consaul Canadian Arctic Research Scholarship, and more about it will be announced very soon via email to our members. The scholarship will be given to a student doing field-work in the Arctic who has demonstrated excellence in or potential for research. An initial call for a proposal is now being prepared for this scholarship and the deadline is likely to be February 15th. I would also like to take this opportunity to invite you to think about nominations for the Lawson Medal and the Mary E. Elliott Award. This is one way for you to get involved and recognize meritorious colleagues or professors.

The Continuance Process under the new Not-for-profit Corporations Act of Industry Canada is still underway. We have now retained a law firm that is currently helping us organize the steps to ensure full compliance with the new act. The process is much slower than anticipated and this is why you have not yet been called to comment on the revised By-Laws as proposed in the last Bulletin. I invited Liette Vasseur and Hugues Massicotte to help me work with the lawyer to ensure that our revised By-laws are in accordance with the new act. As a result, you will first have to vote on an amendment of our current By-Law which should make the final vote easier. Once the lawyer has given us the green light, we will send you electronically the revised By-Laws for you to read and comment if necessary. We will take a vote on these By-Laws in Montreal during the Annual General Meeting – another important reason for you to attend.



Frédérique Guinel

## The Canadian Botanical Association Bulletin

The CBA Bulletin is issued three times a year (March, September and December) and is available to all CBA members in electronic format, or, for an additional fee, in hard copy.

### INFORMATION FOR SUBMITTING TEXTS

All members are welcome to submit texts in the form of papers, reviews, comments, essays, requests, or anything related to botany or botanists. Any medium is acceptable for submission but electronic documents are likely to speed up the publication. For detailed directives on text submission please contact the Editor (see below). For general information about the CBA, go to the web site: <http://www.cba-abc.ca>

## 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 l'ABC.

### SOUSSION DE TEXTES

Tous les membres de l'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. L'utilisation de documents électroniques peut accélérer la publication. Pour des renseignements détaillés sur la soumission de textes, veuillez consulter le rédacteur (voir ci-dessous). Infos générales sur l'ABC à l'URL suivant: <http://www.cba-abc.ca>

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### NEXT ISSUE / PROCHAIN NUMÉRO

Texts for the next issue, 47(1), must be received before February 21<sup>st</sup> 2014

La date de tombée des textes du prochain numéro, le no 47(1), est le 21 février 2013

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If you'd like to have a say in the future of the Association, then you must come and vote.

Finally, I would like to thank all of these people who have worked for the CBA this past year, the members who have taken new roles in the Executive and those who are continuing their terms. Without you, the CBA would not survive. We are looking forward to even more people stepping up in the coming years. A heartfelt thank you for your hard work and support!

Frédérique



Chers membres de l'ABC:

Il semble que chaque année se trouve plus remplie que la précédente, risquant de faire de «Une autre année bien remplie» un cliché, raison pour laquelle je ne l'emploierai pas. Néanmoins, j'espère que votre automne aura été productif et que vous aurez trouvé le temps de vous détendre un peu et de profiter de la vie. Je vous souhaite à tous une bonne saison des fêtes et mes meilleurs vœux pour l'année à venir.

2014 sera une année très importante pour notre Association puisqu'elle va souffler ses 50 bougies! Anne Bruneau et Denis Barabé ont été occupés à la planification de cette importante réunion, qui se tiendra à Montréal du 15 au 19 Juin au Jardin Botanique de Montréal. Un temps durant lequel de nombreuses collections du Jardin seront en pleine floraison. Le titre de la réunion est «Cinquante ans de Botanique au Canada». Tous les présidents de section ont joué un rôle actif dans la planification de colloques qui seront liés au passé, mais s'ouvriront sur l'avenir de la Botanique au Canada. Le programme semble vraiment intéressant. C'est une rencontre à ne pas manquer et je vous invite tous à venir célébrer. J'espère vous voir en Juin!

Montréal 2014 verra la présentation de deux nouveaux prix qui ont été votés l'an dernier lors de l'assemblée générale à Kamloops. Pour la première fois, nous récompenserons avec le prix d'Enseignement Magister un membre de l'ABC qui aura démontré un haut niveau d'excellence en enseignement. Les candidatures pour ce prestigieux Prix seront acceptées jusqu'au 1er Mars. Nous offrirons aussi la Bourse Laurie Consaul pour la Recherche dans l'Arctique Canadien à un(e) étudiant(e) qui travaillera sur le terrain dans l'Arctique et qui aura fait preuve d'excellence en recherche ou qui démontrera un potentiel pour la recherche. Nous vous enverrons très prochainement et par courriel plus d'information à propos de cette bourse. Un premier appel de propositions est en cours de préparation et la date-limite pour appliquer sera très probablement le 15 Février. Je voudrais saisir cette occasion pour vous inviter à penser à des candidatures pour la Médaille Lawson et le prix Mary E. Elliott. C'est une façon de vous impliquer et de reconnaître des collègues ou des professeur(e)s méritant(e)s.

L'exécutif travaille toujours sur le processus de transition en vertu de la nouvelle Loi sur les sociétés à but non lucratif d'Industrie Canada. Nous avons retenu un cabinet d'avocats qui nous aide actuellement à organiser ce que nous devons faire pour nous assurer que l'ABC est en bonne conformité avec la nouvelle loi. Le processus est beaucoup plus lent que prévu et c'est pourquoi vous n'avez pas encore été appelés à commenter sur la révision des Statuts, tel que nous l'avions proposé dans le dernier Bulletin. J'ai invité Liette Vasseur et Hugues Massicotte pour m'aider à travailler avec l'avocat. La première chose à faire sera de voter sur un amendement de notre règlement actuel et ceci devra rendre le vote final plus facile. Une fois que l'avocat nous aura donné le feu vert, nous vous enverrons électroniquement les statuts corrigés afin que vous puissiez les lire et les commenter si nécessaire. Nous aurons le vote final sur ces statuts à Montréal au cours de l'assemblée générale annuelle. C'est une autre raison pour vous de venir à la réunion de Juin prochain. Si vous voulez avoir un mot dans le futur de l'Association, venez et votez!

Enfin, je tiens à remercier toutes les personnes qui ont travaillé pour l'ABC cette année, les membres qui ont pris de nouveaux rôles dans l'exécutif et ceux qui poursuivent leurs termes. Sans vous, l'ABC ne survivrait pas. Nous espérons que vous serez nombreux encore à vouloir nous aider dans les années à venir. Un grand merci à tous pour votre bon travail et votre support!

Frédérique

# CONFERENCE ANNOUNCEMENTS

50th Meeting of the Canadian Botanical Association  
Montreal, June 15-18, 2014



50<sup>ème</sup> Congrès de l'Association Botanique du Canada

Jardin botanique de Montréal  
4101 Sherbrooke Est, Montréal

The *Institut de recherche en biologie végétale* (IRBV — Plant Biology Research Institute) and the Montreal Botanical Garden are delighted to host the 50<sup>th</sup> annual meeting of the Canadian Botanical Association on June 15-18, 2014. To celebrate this 50<sup>th</sup> anniversary, we have organized a one-day symposium on the history of botany in Canada. This symposium will cover the history of various botanical disciplines (History of the CBA/ABC, Ecology, Morphology and Development, Systematics, Taxonomy, Mycology, Bryology, Lichenology, Ethnobotany, the History of Botanical Gardens). This will be an ideal occasion to evaluate the current state as well as the future of these fields of plant biology in Canada. The symposia organized by the sections of the CBA will address related topics of interest.

This event will be held on the grounds of the Montreal Botanical Garden. Participants will thus be able to visit the Garden's collections, as well as other scientific institutions located nearby – the Biôme, Planetarium, Insectarium, Université de Montréal Biodiversity Centre and the Marie-Victorin Herbarium.

In June, many of the Garden's collections will be in full bloom, and Montreal will be the site of numerous festivals and special exhibits. We hope you will join us! Please consult the meeting's website regularly for more information (<http://www.irbv.umontreal.ca/cba-meeting>).

Anne Bruneau  
Vice-President

L'Institut de recherche en biologie végétale et le Jardin botanique de Montréal sont heureux d'accueillir le 50<sup>ième</sup> congrès de l'Association botanique du Canada, du 15 au 18 juin 2014. Pour souligner ce 50<sup>ième</sup> anniversaire, nous avons organisé un symposium d'une journée sur l'histoire de la botanique au Canada. Ce symposium traitera de l'histoire de différentes disciplines botaniques (Histoire de la CBA/ABC, Ecologie, Morphologie et développement, Systematique, Taxonomie, Mycologie, Bryologie, Lichénologie, Ethnobotanique, Histoire des jardins botaniques). Il s'agit d'une occasion idéale pour faire le point sur l'état et l'avenir de ces différentes disciplines de biologie végétale au Canada. À ceci s'ajouteront, bien entendu, les symposiums organisés par les sections de l'ABC.

Le congrès se déroulera sur le site du Jardin botanique de Montréal. Les participants pourront donc en profiter pour visiter, bien sur, les collections du Jardin, mais aussi le Biôme, le Planétarium, l'Insectarium, le Centre sur la Biodiversité de l'Université de Montréal et l'herbier Marie-Victorin.

Le mois de juin est certainement l'une des plus belles périodes pour visiter Montréal et le Jardin botanique. Nous vous invitons donc à venir en grand nombre à Montréal et à consulter régulièrement le site Web du congrès (<http://www.irbv.umontreal.ca/cba-meeting>) pour obtenir plus d'information.

Anne Bruneau  
Vice-Présidente



## Upcoming Student Conferences

### Science Atlantic Aquaculture & Fisheries and Biology

**Conference:** March 14-16, 2014 at Mount Saint Vincent University, Halifax, Nova Scotia. Contact: Lois Whitehead ([lois.whitehead@scienceatlantic.ca](mailto:lois.whitehead@scienceatlantic.ca)), Website: <http://scienceatlantic.ca>

**The BC Regional Undergraduate Conference:** March 28-29, 2014 at Thompson Rivers University (TRU) in Kamloops. Contact: Elizabeth Rennie ([erennie@tru.ca](mailto:erennie@tru.ca)).

**Ontario Biology Day 2014:** March 22-24, 2014 at the University of Toronto at Mississauga. Website: <https://secure.utm.utoronto.ca/obd-2014>

## MEMBERSHIP NEWS

### Obituary Notice: Dr. Judy (Canne) Hilliker (1943-2013)



Judy (Canne) Hilliker was born in Syracuse, New York in 1943. She attended the State University of New York at Geneseo where she received a BSc degree. She then taught high school biology for a number of years in Victor, New York before attending Ball State University where she obtained a MSc. Judy joined the then Department of Botany and Genetics at the University of Guelph in 1975 after completing a PhD in Plant Taxonomy at Ohio State University. The department name was changed back to Botany following the establishment of the new department, Molecular Biology and Genetics in 1984. Judy remained in the Botany Department until her retirement in 2002.

Judy was hired to teach courses in Plant Taxonomy and over the years she developed three undergraduate courses and a graduate course in this area. Students in these courses received an excellent background in plant identification, morphological characteristics of plants, and herbarium techniques.

At various times during her career she also taught Introductory Botany, Morphology of Vascular Plants, and Plants and Human Use. Judy had an excellent background in Botany and this was evident in her teaching.

Although Judy's research was centered on the family Scrophulariaceae, she also published articles on genera in other plant families including the Asteraceae. She did

extensive field work in North and South America, sometimes going into remote areas.

She and her graduate students used a variety of methods, including morphology, anatomy, floral development, chromosome counts, and pollination mechanisms to resolve taxonomic problems. They published a number of papers in international journals. Judy also contributed her expertise to the Flora North America project and to check lists of rare plants.

Judy was an active member of the Canadian Botanical Association and the Botanical Society of America. She also contributed to the regional Plant Development Workshop.

Judy served a term on the Editorial Board of the Canadian Journal of Botany and reviewed manuscripts for many systematic journals.

Judy took her role as Professor very seriously and set very high standards for herself and students. This is very clear from some of the messages received from former students who stressed that although Judy set the bar high and accepted no nonsense they learned a great deal from her and in several cases influenced their career paths.

Judy leaves behind her husband, Dr. Art Hilliker, Department of Biology, York University, and her daughter Katie.

Dr. R. Larry Peterson FRSC  
University Professor Emeritus  
Department of Molecular and Cellular Biology  
University of Guelph  
Guelph, Ontario N1G 2W1



### Obituary Notice: Professor Martin Canny

Professor Canny passed away in Canberra, Australia on October 29<sup>th</sup> after a short illness. Martin was well known for his stimulating and provocative hypotheses on water movement in plants. He was President of the Canadian Society of Plant Physiologists in 1992-1993, founding professor of Botany at Monash University, Australia, and Honorary Research Professor at Carleton University in Ottawa and The Australian National University. A full obituary will appear in a future issue of the CBA Bulletin.

## SECTION NEWS

### Report of the Outgoing Vice-President

The 49th Annual Meeting and Conference of the Canadian Botanical Association/L'Association Botanique du Canada (CBA/ABC) was held June 1 to 5, 2013 at Thompson Rivers University (TRU) in Kamloops, British Columbia. Christine Petersen and I co-chaired the Local Organizing Committee (LOC), and the two of us along with the entire LOC thank all who helped with and/or attended the conference. There are simply too many LOC members and sponsors to thank in this brief report, so please visit (or re-visit) the program booklet to see who helped with the event in Kamloops:

[https://www.tru.ca/\\_shared/assets/CBA28554.pdf](https://www.tru.ca/_shared/assets/CBA28554.pdf)

There were 104 participants at the conference, including our Keynote Speaker (Diana Beresford-Kroeger), our Luella K. Weresub Lecturers (Adolf and Oluna Ceska), our Symposium Speakers, and of course companions of CBA/ABC members. We had 91 paid registrants.

Overall, feedback we received – solicited and unsolicited – suggested participants enjoyed the Keynote presentation, the contributed oral presentations, the Weresub lecture, the field trips (to Lac du Bois, the Secwepemc Museum, and Wells Gray Park), the Art Show (curated by Dr. Lyn Baldwin and Ila Crawford), and the symposia, notably the special Canadian Science Publishing symposium organized by Dr. Frédérique Guinel and introduced by Dr. Christian Lacroix (Editor-in-Chief, *Botany*). We also received very favourable comments about the TRU campus in Kamloops, our student volunteers, the presentation rooms, and the overall quality of the meals. The CBA/ABC Live Auction, run by Auctioneer Dr. Hugues Massicotte, was also greatly appreciated!

Due to the competency of our Treasurer, Dr. Eric Littley, we crafted a very conservative conference budget, and as a result, have closed our LOC operating account with a notable surplus (**\$13,490**). All of those funds have been sent to the CBA/ABC.

There are always areas for improvement to any event. As some readers of the Bulletin may be involved in planning conferences at some point in their careers, I will include some key points to consider. Firstly, the conference should not be overfilled with talks or symposia, as overambitious planning will make it difficult to build unstructured breaks into the schedule. Admittedly people tend to make their own breaks, but cutting back on some aspects of the scientific portion would likely improve the overall attendance at late-afternoon talks. Also, be sure that enough time is built in so that members can have proper meals. People do prefer to sit at a table and eat leisurely. Finally, a room filled with attendees has a different acoustic quality to it – be sure to test your audiovisuals with a full house, if possible.

The experience of planning and running a conference alongside a highly-capable team and with constant support from the CBA/ABC Executive was enjoyable and fulfilling. I was proud to work with the folks at TRU and CBA/ABC to host the 49<sup>th</sup> Annual Meeting and Conference of CBA/ABC.

Sincerely,

Cynthia Ross Friedman, Ph.D.

### Plant Development Section News

CBA members conducting research in plant development are encouraged to continue submitting research profiles to Tyler Smith, editor of the Bulletin. Interesting profiles have been contributed by Cynthia Ross Freidman, Thompson Rivers University (December 2011, Vol 44, No. 3), a trio of biologists at St. Francis Xavier University (March 2012, Vol. 45, No. 1) and most recently, Christian LaCroix, University of Prince Edward Island (September 2013, Vol. 46, No. 2).

Students conducting research in plant development, structure or morphology are encouraged to submit applications for the Taylor A. Steeves Award, which annually recognizes the best student paper published in these areas. The award honours Taylor A. Steeves (1926-2011), whose many research and teaching accomplishments and contributions to the CBA were remembered in the December 2011 Bulletin (Vol. 44, No. 3). For further information or to submit applications or nominations, please contact Moira Galway, current Chair of the Development Section. Complete applications should be received by March 1st 2014. A complete application consists of a copy of the published research (undertaken while the candidate was a student), the candidate's curriculum vitae, a statement indicating that the candidate is enrolled in a degree program, or has completed the relevant degree program, as well as separate statements from the candidate, supervisor and any co-authors indicating the contributions made by each to the final publication. The judging committee considers originality, scientific significance, presentation and use of language. The judging committee consists of the Chair of the Plant Development section and two others. Any members interested in serving as judges for the upcoming competition should contact: Moira Galway at [mgalway@stfx.ca](mailto:mgalway@stfx.ca), Department of Biology, St. Francis Xavier University.

### Mycology Section News

The mycology co-chairs are busy with 2 main tasks at the moment. The first one is to consult regionally and invite a Weresub lecturer for our general meeting in Montréal. There is always an active community of mycologists in “La Métropole” and we are both very hopeful we will find our next speaker in this distinguished series.

The second task has been to design a symposium on “fungi as food and nutraceuticals”, or “mycophagy and nutritive value: humans and other animals”. As you can see, our ideas are still evolving conceptually since our discussions with the section meeting in Kamloops. At press time, we are still considering our options depending upon who can contribute in Canada and in the US.

As early notification, please be aware that nominations for the Weresub Award for best student paper in mycology published in 2013 must be received by March 1, 2014. We will remind again the mycologically-inclined as we approach this deadline.

Respectfully submitted,  
Hugues Massicotte and Shannon Berch  
Co-Chairs of the Mycology Section

# STUDENT POSITIONS

## MSc in Applied Science at Saint Mary's University

An M.Sc. position is available in the Department of Biology, Saint Mary's University, Halifax, Canada to work on a project that aims to characterize plant responses to multiple environmental factors, i.e. carbon dioxide concentration, temperature and drought. The candidate should be highly motivated, have a B.Sc. degree from a recognized university, and have excellent communication skills. A strong background in plant physiology/plant ecology is desirable/expected.

Interested applicants should submit a curriculum vitae, an informal transcript, a brief description of research interests and experience, and contact information for three references to Dr. Mirwais Qaderi (mirwais.qaderi@msvu.ca). Please find information on the application procedure at [http://www.smu.ca/academic/fgsr/grad\\_pro\\_app.html](http://www.smu.ca/academic/fgsr/grad_pro_app.html). The application deadline is February 1, 2014.



## Two MSc positions in Plant Physiology and Genetics at Memorial University

I am seeking two motivated master students to start a project on the ecological and genetic factors associated with the high antioxidant capacity in the wild partridgeberry (*Vaccinium vitis-idaea*: Ericaceae). This project aims at collecting understudied wild clones of partridgeberry across the island of Newfoundland and southern Labrador, analyzing the genetic diversity of clones using next-generation sequencing, and providing preliminary information on the genes associated with a high antioxidant capacity. The students will work under the mentorship of Dr. Julissa Roncal, and will interact with collaborating investigators from Memorial University (Dr. Lourdes Pena-Castillo is a bioinformatician, and Dr. Fereidoon Shahidi is a plant physiologist), as well as graduate and undergraduate students.

### Student's responsibilities:

- Conduct fieldwork to collect leaves and fruits from wild partridgeberry populations (teamwork task).
- Laboratory work include DNA extraction, a library

preparation for next-gen sequencing, and measurements of total phenolics/antioxidant capacity of fruits

- One student will conduct a phylogenetic tree of populations from single nucleotide polymorphisms (SNPs)
- The second student will identify genes based on sequence similarity (BLASTp) and associate them to metabolic pathways (dcGO)

### Student's qualifications:

- A BSc degree in a related discipline (e.g. biology, botany/physiology, molecular biology, bioinformatics, biotechnology)
- Experience in organismic botany, statistical analysis, phylogenetics and/or bioinformatics is highly desirable.
- Excellent analytical, organization and communication skills.

### Position characteristics:

Project start date is May 1st, 2014. The MSc program comprises two years with an annual stipend of \$17,500. The students will be expected to teach during the first half of their programs. The department of Biology at Memorial University has 29 faculty members and approximately 100 graduate students. Memorial University is Atlantic Canada's largest university offering a multicultural environment. The city of St. John's offers nice scenery with numerous walking trails close to campus, bars, concerts, and a very friendly, family-oriented community. Both positions are contingent upon the approval of funds by the Research and Development Corporation of Newfoundland and Labrador.

### How to apply:

Interested applicants should send their CV, a one-page statement of research interests and career goals, transcripts, and contact information of 3 references (who have agreed to be contacted) in a single pdf or word file to Dr. Julissa Roncal at Email: [jroncal@mun.ca](mailto:jroncal@mun.ca).

This is a newly formed lab with more information at: <http://www.mun.ca/biology/jroncal>

For instructions on how to apply to Memorial's graduate program visit:

<http://www.mun.ca/become/graduate/apply/index.php>

International students with strong credentials are welcome. Screening will begin immediately and will continue until the positions are filled.



# 2014 CBA AWARD COMPETITIONS

## Student Papers published in 2013

### PORSILD-CONSAUL MEMORIAL AWARD

Award honoring the memory of two eminent Arctic botanists: Alf Erling Porsild (1901-1977) and Laurie Lynn Consaul (1960-2012). Applications/nominations for students who published (as senior author) a paper in plant systematics and/or phytogeography during the previous year should be sent to the Chair of Systematics and Phytogeography section (Dr. Julian Starr, Dept of Biology, University of Ottawa, ON: jstarr@uottawa.ca) before March 1, 2014.

### J. STAN ROWE MEMORIAL AWARD

Award established to celebrate the life and work of J. Stan Rowe (1918-2004), eminent plant ecologist and writer. Applications/nominations for students who published (as senior author) a paper in plant ecology should be sent to one of the co-chairs of the Ecology section Dr. Liette Vasseur, Brock University, ON (lvasseur@brocku.ca) or Dr. André Arsenault (Andre.J.Arsenault@NRCan-RNCan.gc.ca) before March 1, 2014.

### TAYLOR A. STEEVES MEMORIAL AWARD

Award established to honor the numerous contributions of Taylor A. Steeves (1926-2011) to the CBA and botany in Canada. Applications/nominations for students who published (as senior author) a paper in plant development, structure or morphology should be sent to the Chair of Plant Development Section (Dr. Moira Galway, St. Francis Xavier University, NS: mgalway@stfx.ca) before March 1, 2014.

### LUELLA K. WERESUB MEMORIAL AWARD

Award established in memory of Luella Kayla Weresub (1918-1979), a well-known mycologist who worked at the Biosystematics Research Institute of Agriculture Canada. Applications/nominations for students who published (as senior author) a paper in mycology or lichenology should be sent to one of the co-chairs of the Mycology Section: Shannon Berch, BC Min of Environment: Shannon.Berch@gov.bc.ca) or Hugues Massicotte, UNBC (hugues@unbc.ca) before March 1, 2014.



## CBA Conference Awards

### STUDENT TRAVEL BURSARIES: JOHN MACOUN (GRADUATE) AND KEITH WINTERHALDER (UNDERGRADUATE)

The bursaries provide partial financial assistance for travel by a student (or students) to Annual Meetings to present a paper (Lionel Cinq-Mars competition) or a poster (Iain and Sylvia Taylor competition).

**Eligibility:** Open to all student members of the CBA; students must present a paper (Lionel Cinq-Mars) or a poster (Iain and Sylvia Taylor) at the CBA Annual Meeting; no student may receive more than one travel bursary while registered for the same degree; students must apply no later than the submission deadline for abstracts to the Annual Meeting.

**Evaluation:** The application must contain the following documents (pdf format): (a) A copy of the abstract of the paper to be given at the annual meeting; (b) A supporting letter from the student supervisor (must include a statement that the student is engaged in

research activities); (c) The student's curriculum vitae (one page); and (d) A letter or recommendation from another member of the student's research committee. Applications should be sent to the President of the CBA (Dr. Frédérique Guinel, Wilfrid Laurier University; email: fguinel@wlu.ca) before March 1, 2014.

### LIONEL CINQ-MARS AWARD

Award for best oral presentation by a student of his/her own research at Annual meeting.

**Eligibility:** Any bona fide (under)graduate student enrolled at a Canadian Institution of higher learning, as well as Canadian students at foreign institutions, are eligible.

**Evaluation:** Every effort will be made to ensure that each student in the competition has a fair evaluation and an equal chance of winning the award. The oral presentation will be evaluated by a panel of judges (with at least a member of each section), chaired by the president-elect. The merit of each paper will be judged on the basis of content (60%) and presentation (40%). All students who wish to compete for this award must indicate this by checking the appropriate box on the 2014 annual meeting abstract submission form.

### IAIN AND SYLVIA TAYLOR AWARD

Award for best student research poster presented at Annual meeting.

**Eligibility:** Any bona fide (under)graduate student enrolled at a Canadian Institution of higher learning, as well as Canadian students at foreign institutions, are eligible.

**Evaluation:** Every effort will be made to ensure that each student in the competition has a fair evaluation and an equal chance of winning the award. Posters will be evaluated by a panel of judges, chaired by the Vice-President (Dr. Anne Bruneau). All students who wish to compete for this award must indicate this by checking the appropriate box on the 2014 annual meeting abstract submission form. Abstract must be submitted for the Annual Meeting at which the student will compete for the Award.

### LAURIE CONSAUL CANADIAN ARCTIC RESEARCH SCHOLARSHIP

This research scholarship was established in the memory of Dr. Laurie Consaul (1960-2012) through the generous annual financial support of her husband Mark Armstrong. Laurie was an internationally recognized plant systematist, expert in Arctic plants and specifically *Puccinellia*.

**Eligibility:** this research scholarship is open to any Canadian undergraduate or graduate students who are doing field-work in the Arctic and who have demonstrated excellence in, or potential for, research. More details about this scholarship will be sent via email to the membership in the weeks to come. Applications for this award must follow the instructions in the official application form and must be submitted to the President of the CBA (Dr. Frédérique Guinel, Wilfrid Laurier University; email: fguinel@wlu.ca) before February 15, 2014. Decisions will be made public by mid-March at the latest to ensure that fieldwork can be conducted in appropriate times.

## CBA Major Awards

### THE LAWSON MEDAL

First awarded at the 1969 Annual Meeting, the Lawson Medal, the most prestigious award of the CBA, was established "to provide a collective, formal expression of the admiration and respect of botanists in Canada for excellence in the contribution of an individual to Canadian botany". It is named in honour of Dr. George Lawson, who is generally regarded as Canada's first professional botanist. Lawson was born in 1827 in Scotland and attended the University of Edinburgh. He obtained his Ph.D. from the University of Giessen in Germany in 1857, and accepted an appointment as Professor of Chemistry and Natural History at Queen's College (now University) in Kingston, Ontario. He was instrumental in establishing Canada's first botanical garden (1861) and the Botanical Society of Canada, which met from 1860 until 1862. In 1863 Lawson abruptly left Queen's for Dalhousie (we do not know precisely why). At Dalhousie he was active in the Nova Scotia Institute of Science and was a founding fellow of the Royal Society of Canada. From 1885-1895 he was Secretary of Agriculture for Nova Scotia (equivalent to a modern Deputy Minister). In 1891 he helped to establish the short-lived (1891-1910) Botanical Club of Canada, and was its President until his death in 1895.

Lawson Medals may be awarded each year in two categories of eligibility:

- (A) Recognition of a single outstanding contribution to botanical knowledge (monograph, book or series of papers) by a Canadian botanist at any stage of his career, and
- (B) Recognition of cumulative, lifetime contributions to Canadian botany by a senior researcher, teacher or administrator.

Nominations may be in either category and should be sent to the current President of the Association ([fguinel@wlu.ca](mailto:fguinel@wlu.ca)). Nominations should include the Curriculum Vitae of the nominee, a statement by the nominator concerning the nominee's contribution's to Canadian Botany, and at least three supporting letters from botanists who are familiar with the achievements of the nominee. Nominations for the Lawson Medal to be awarded at the next Annual Meeting should be submitted to the President of CBA before the end of February of the year in which the Award is to be presented.

### THE MARY E. ELLIOTT AWARD

The Mary Elliott Service Award is given to an individual for meritorious service to CBA. It was first awarded in 1978 in memory of Mary E. Elliott, who was a victim of homicide in September, 1976. She had just completed four consecutive years of service on the Board of Directors (as Secretary, Vice President and President), and was just at the beginning her term as Past President at the time of her death.

Mary Elliott was a plant pathologist and mycologist who spent 28 years with Agriculture Canada at the Central Experimental Farm in Ottawa. She was well known for her work on the taxonomy and biology of the Sclerotiniaceae. In 1975, she became Curator of the National Mycological Herbarium. Mary was also very active in identifying fungi for the public and in contributing to and editing (1970-71) a publication of the Biosystematics Research Institute for public information called Greenhouse-Garden-Grass.

Nominations should give an account of the contributions which the nominee has made to the Association in any capacity (e.g. Board of Directors, Executive Member, Editor, Committee member, etc.) which would make him/her a suitable candidate for receiving the Elliott Award. Nominations should be sent to the current President of the Association ([fguinel@wlu.ca](mailto:fguinel@wlu.ca)) before the end of February of the year in which the Award is to be presented.

### THE "MAGISTER" TEACHING AWARD

To commemorate 50 years of CBA existence, the Magister Teaching award is intended to recognize CBA members who have demonstrated a consistently high level of teaching excellence and teaching related activities over at least 10 years as a faculty. This award will be adjudicated by the Awards committee. Nominations shall be made jointly by the nominator with the Chair of nominee's department. More information about this award will be available on the CBA website soon. Nominations should be sent to the current President of the Association before the end of February of the year in which the Award is to be presented.





## Les articles publiés par les étudiants durant 2013

### LE PRIX COMMÉMORATIF PORSILD-CONSAUL

Prix honorant la mémoire de deux éminents botanistes de l'arctique: Alf Erling Porsild (1901-1977) et Laurie Lynn Consaul (1960-2012). La mise en candidature d'étudiant(e)s ayant publié (comme auteur principal) un article en systématique et/ou phytogéographie durant l'année précédente devrait être envoyée au président de la Section Systématique et Phytogéographie des plantes (Dr. Julian Starr, Dept of Biology, University of Ottawa, ON: jstarr@uottawa.ca) avant le 1er mars 2014.

### LE PRIX COMMÉMORATIF J. STAN ROWE

Prix établi pour célébrer la vie et le travail de J. Stan Rowe (1918-2004), un écrivain et éminent écologiste des plantes. La mise en candidature d'étudiant(e)s ayant publié (comme auteur principal) un article en écologie durant l'année précédente devrait être envoyée à un des co-présidents de la Section Ecologie des plantes : Dr. Liette Vasseur, Brock University, ON (lvasseur@brocku.ca) ou Dr. André Arsenault (Andre.J.Arsenault@NRCan-RNCan.gc.ca) avant le 1er mars 2014.

### LE PRIX COMMÉMORATIF TAYLOR A. STEEVES

Prix établi pour honorer les nombreuses contributions de Taylor Steeves (1926-2011) à la botanique et à l'ABC. La mise en candidature d'étudiant(e)s ayant publié (comme auteur principal) un article en développement, structure ou morphologie végétale durant l'année précédente devrait être envoyée à la présidente de la Section Développement végétal (Dr. Moira Galway, St. Francis Xavier University, NS: mgalway@stfx.ca) avant le 1er mars 2014.

### LE PRIX COMMÉMORATIF LUELLA K. WERESUB

Prix établi en mémoire de Luella Kayla Weresub (1918-1979), une mycologue canadienne reconnue qui travailla à l'institut de recherche en biosystématique d'Agriculture Canada. La mise en candidature d'étudiant(e)s ayant publié (comme auteur principal) un article en mycologie ou lichenologie durant l'année précédente devrait être envoyée à un des co-présidents de la Section Mycologie: Shannon Berch, BC Min of Environment (Shannon.Berch@gov.bc.ca) ou Hugues Massicotte, UNBC (hugues@unbc.ca) avant le 1er mars 2014.



## ABC Prix de Conférence

### BOURSES DE VOYAGE JOHN MACOUN (ÉTUDIANT GRADUÉ) ET KEITH WINTERHALDER (ÉTUDIANT DE PREMIER CYCLE)

Les bourses ont été établies pour aider à défrayer une partie des coûts de déplacement à la réunion annuelle pour un(e) étudiant(e) (ou des étudiants) qui présentent une communication orale dans la compétition Cinq-Mars ou une affiche dans la compétition Taylor.

**Eligibilité:** Ouvert à tous les membres étudiants de l'ABC; les étudiants doivent présenter une communication orale (compétition Cinq-Mars) ou une affiche (compétition Taylor) à la réunion annuelle de l'ABC. Aucun(e) étudiant(e) ne peut recevoir plus d'une bourse de voyage lorsque inscrit(e) au même programme d'étude. Les étudiants doivent soumettre leur candidature avant la date limite de soumission des

résumés à la réunion annuelle.

**Evaluation:** L'application doit contenir les documents suivants (format pdf): une copie du résumé de la communication prévue à la réunion annuelle; une lettre de support du directeur de thèse de l'étudiant(e) qui inclue aussi une déclaration que l'étudiant(e) est impliqué(e) dans sa recherche; le curriculum vitae de l'étudiant(e): une page; une lettre de support d'un membre du comité de direction de l'étudiant(e), autre que le directeur;

Les demandes doivent être envoyées à la Présidente de l'ABC (Dr. Frédérique Guinel, Wilfrid Laurier University; courriel: fguinel@wlu.ca) avant le 1er Mars 2014.

### LE PRIX LIONEL CINQ-MARS

Prix décerné à un(e) étudiant(e) pour la meilleure présentation orale de son propre projet de recherche, présenté à la réunion annuelle.

**Eligibilité:** Tout membre étudiant(e) de premier, deuxième ou troisième cycle inscrit(e) dans une institution canadienne, ou membre étudiant(e) canadien(ne) d'une institution à l'extérieur du Canada, est éligible.

**Evaluation:** Tous les moyens nécessaires seront utilisés afin d'assurer que chaque étudiant(e) participant à la compétition reçoive une évaluation juste et une chance égale de gagner la compétition. La présentation orale sera évaluée par un comité de juges (avec au moins un représentant de chaque section de l'ABC) sous la direction du Président Elu. Le mérite de chaque communication sera jugé sur le contenu (60%) et la présentation (40%).

Tous les étudiants qui souhaitent participer à cette compétition doivent indiquer leur intention en cochant la case appropriée sur le formulaire de soumission du résumé. Les résumés doivent être soumis pour la réunion annuelle 2014 à laquelle l'étudiant(e) participera à la compétition.

### LE PRIX IAIN ET SYLVIA TAYLOR

Prix décerné à un(e) étudiant(e) pour la meilleure affiche présentée à la réunion annuelle.

**Eligibilité:** Tout membre étudiant(e) de premier, deuxième ou troisième cycle inscrit(e) dans une institution canadienne, ou membre étudiant(e) canadien(ne) d'une institution à l'extérieur du Canada, est éligible.

**Evaluation:** Tous les moyens nécessaires seront utilisés afin d'assurer que chaque étudiant(e) participant à la compétition reçoive une évaluation juste et une chance égale de gagner la compétition. Les affiches seront évaluées par un comité de juges sous la direction de la Vice-Présidente (Dr. Anne Bruneau).

Tous les étudiants qui souhaitent participer à cette compétition doivent indiquer leur intention en cochant la case appropriée sur le formulaire de soumission du résumé. Les résumés doivent être soumis pour la réunion annuelle 2014 à laquelle l'étudiant(e) participera à la compétition.

### LE BOURSE LAURIE CONSAUL POUR LA RECHERCHE DANS L'ARCTIQUE CANADIEN

Bourse pour supporter les activités de recherche sur le terrain, honorant la mémoire de Laurie Lynn Consaul (1960-2012), grâce à la générosité de son époux, M. Mark Armstrong. Laurie était une systématiste reconnue, experte des plantes arctiques, particulièrement le genre

*Puccinellia*.

**Éligibilité:** tout membre étudiant(e) de premier, deuxième ou troisième cycle inscrit(e) dans une institution canadienne, ou membre étudiant(e) canadien(ne) d'une institution à l'extérieur du Canada, est éligible.

L'étudiant(e) doit planifier un volet de recherche sur le terrain. Plus d'information sera envoyé électroniquement aux membres de l'association dans les semaines à venir. Les applications doivent suivre les instructions sur le formulaire officiel et doivent être envoyées à la Présidente de l'ABC (Dr. Frédérique Guinel, Wilfrid Laurier University; courriel: fguinel@wlu.ca) avant le 15 février 2014. Les décisions seront prises et publicisées avant mi-mars afin de permettre les travaux de terrain pour la saison 2014.



### Prix de distinction

#### LA MÉDAILLE LAWSON

Décernée pour la première fois lors de la réunion annuelle de 1969, la Médaille Lawson, le prix le plus prestigieux de l'ABC, fut établi pour «Donner une expression formelle et collective de l'admiration et respect des botanistes au Canada dans l'excellence de leur contribution individuelle à la botanique Canadienne». Elle fut nommée en l'honneur du Dr. George Lawson, qui est généralement considéré comme le premier botaniste professionnel du Canada. Lawson est né en 1827 en Écosse et a fréquenté l'Université de Edinburgh. Il a obtenu son doctorat à l'Université de Giessen en Allemagne en 1857 et a accepté une charge de cours comme professeur de Chimie et Histoire de la nature au Collège Queen (maintenant Université) à Kingston, Ontario. Il a pris part à l'inauguration du premier jardin botanique au Canada (1861) ainsi qu'à la Société Botanique du Canada, laquelle s'est rencontrée de 1860 à 1862. En 1863, Lawson quitta subitement Queen pour Dalhousie (nous ne savons pas exactement pourquoi). À Dalhousie, il était actif à l'Institut de la Science de la Nouvelle-Écosse et a été un membre fondateur de la Société Royale du Canada. De 1885 à 1895, il était Secrétaire du département de l'Agriculture de la Nouvelle-Écosse (équivalent à un député d'un ministère aujourd'hui). En 1891, il a aidé à établir le Club Botanique du Canada, qui n'a pas survécu longtemps (1891 à 1910), et en a assuré la présidence jusqu'à son décès en 1895.

Cette haute distinction peut être discernée pour deux catégories de mérite:

- (A) La reconnaissance d'une contribution exceptionnelle à la botanique (sous la forme d'une monographie, d'un livre ou d'une série d'articles) d'un botaniste canadien à un moment quelconque de sa carrière, et
- (B) La reconnaissance d'une carrière entière dévouée au développement de la botanique canadienne par un chercheur émérite, un enseignant ou un administrateur.

Les nominations dans l'une de ces catégories peuvent être soumises au Président de l'Association (fguinel@wlu.ca). Une nomination en bonne et due forme comprend le curriculum vitae du candidat, un énoncé de nomination décrivant la contribution du candidat à la botanique canadienne et au moins trois lettres de support

de botanistes connaissant bien les réalisations du candidat. Les nominations pour la remise de la médaille Lawson à la prochaine conférence annuelle de l'ABC doivent être soumises au président de l'Association avant la fin février de cette même année.

#### LE PRIX DE SERVICE MARY E. ELLIOTT

Ce prix est offert à une personne s'étant illustrée par son dévouement à l'Association. Il fût attribué en 1978 en mémoire de Mary E. Elliott, victime d'un homicide en 1976. Elle venait de compléter quatre années consécutives de service pour le comité exécutif de l'ABC (comme secrétaire, vice-présidente et présidente) et était à ses débuts en tant que présidente sortante au moment de sa mort.

Mary Elliott, pathologiste végétal et mycologue, a travaillé durant 28 ans avec Agriculture Canada à la Ferme Centrale et Expérimentale à Ottawa. Elle était reconnue pour son travail sur la taxonomie et la biologie des Sclerotiniaceae. En 1975, elle devient curatrice de l'Herbier Mycologique National. Mary était aussi très active dans l'identification des champignons pour le public et a contribué de même qu'édité (1970-71) la publication de l'Institut de la Recherche Biosystématique pour l'information publique appelé Greenhouse-Garden-Grass.

Le dossier de nomination doit comprendre la liste des réalisations du candidat au service de l'Association à n'importe quel niveau de son organisation (par exemple bureau de direction, exécutif, bulletin, comités, etc.) qui justifie l'honneur du prix Elliott. Les nominations doivent être soumises au président de l'ABC (fguinel@wlu.ca) avant la fin février de l'année de la remise.

#### LE PRIX DE L'ENSEIGNANT "MAGISTER"

Pour commémorer 50 années d'existence de l'ABC, le prix de l'enseignant (Le Magister) a été créé pour souligner l'effort exceptionnel des membres de l'association dans l'excellence de leur enseignement ou activités reliées à l'enseignement des sciences botaniques, et cela pendant au moins 10 ans. Ce dossier de nomination sera évalué par le comité des prix.

Les nominations doivent être faites conjointement par un nominateur et le/la doyen/doyenne de leur département. De l'information supplémentaire sera disponible sur le site de l'ABC bientôt.

Les nominations pour la remise du prix Magister à la prochaine conférence annuelle de l'ABC doivent être soumises au président de l'Association (fguinel@wlu.ca) avant la fin février de cette même année.

# TOP CANADIAN ORNAMENTAL PLANTS. 6. CHRYSANTHEMUMS

Ernest Small<sup>1</sup>

The chrysanthemum is one of the leading ornamental plants in Canada and indeed in the world. Chrysanthemums are widely known as the “Queen of Autumn” and “Queen of Fall Flowers,” reflecting their domination of the late growing season for ornamental plants. The hardy cultivars suited for home gardens and public flower beds produce spectacular domes of yellow, burgundy, plum, white, pink, red, orange, and lavender blossoms that can endure early frosts. In addition, an astonishing array of non-hardy floral forms are raised in greenhouses for the cut flower and indoor potted plant industries.

## Names

**Scientific names:** Most ornamental chrysanthemums are hybrids identifiable as *Chrysanthemum* ×*morifolium* (synonyms: *C.* ×*grandiflorum*, *Dendranthema* ×*grandiflorum*, *D.* ×*morifolium*). The name *Chrysanthemum* is based on the Greek *chrysos*, gold + *anthemon*, flower. In the late 20th century, because of technical nomenclatural considerations, chrysanthemums were re-assigned to the genus *Dendranthema*. Because chrysanthemums were well known as the genus *Chrysanthemum*, in 1995 a formal proposal was made to the International Botanical Congress to conserve (“resurrect”) the genus name *Chrysanthemum*, the proposal was approved at the 1999 meeting of the International Botanical Congress, and published in the resulting 2000 “St. Louis Code of Botanical Nomenclature.”

**English names:** chrysanthemum, mum, chrysanth. “Garden chrysanthemums,” “hardy chrysanthemums,” and “fall mums” are phrases applied to cultivars hardy enough to overwinter outdoors; “florist’s chrysanthemums” and “florist’s daisy,” by contrast, produce showier flowers but the plants are rarely winter-hardy.

**French name:** chrysanthème.

*A chrysanthemum by any other name would be easier to pronounce*

—Goldie Hawn (American actress)

## Wild Species

*Chrysanthemum* is one of 108 genera of tribe Anthemidae of the Asteraceae (Compositae) family. The genus consists of about 40 species, distributed mainly in temperate East Asia. Flora of China recognizes 37 species, 22 (including 13 endemics) within the country. Some species are indigenous to northeastern Europe. In the past, *Chrysanthemum* included more species than it does at present. Many have been transferred to *Argyranthemum*, *Glebionis*, *Leucanthemopsis*, *Leucanthemum*, *Rhodanthemum*, and *Tanacetum*. *Chrysanthemum* species are herbaceous perennials or subshrubs, with characteristically palmately divided leaves, often with marginally toothed leaflets. The wild species have white, pink, or (especially) yellow petals. Many can be crossed with each other, and there are numerous hybrids in nature as well as in cultivation. Moreover, some intergeneric crosses are known between species of *Chrysanthemum* and species in allied genera, such as *Ajania*. Even more distantly related genera (notably *Artemisia*, also a member of the Anthemidae) can be crossed with *Chrysanthemum*, but embryo rescue techniques are necessary to obtain a viable hybrid.



Figure 1. Chrysanthemum show. ©Torontofiredancer (CC BY 3.0).

## History and Evolution

Dozens of *Chrysanthemum* species are grown, but almost all cultivated forms are hybrids. The main parent of modern hybrid chrysanthemums is *C. indicum* (*Dendranthema indicum*). It is widely dispersed in China, northern Russia, Southeast Asia, and Europe, occurring in diverse environments, including mountain slopes, grasslands, shrub lands, wetlands, roadsides, and coastal saline areas. The aerial portions are employed in traditional Chinese medicine, and overharvesting and heavy grazing in recent decades has decreased its occurrence. Other species that have been considered to have contributed to the ancestry of hybrid chrysanthemums include *C. chanelii*, *C. erubescens*, *C. japonense*, *C. lavandulifolium*, *C. makinoi*, *C. ornatum*, *C. sinense*, *C. vestitum*, and *C. zawadskii*.

Chrysanthemums have been cultivated in China for at least 1600 years, and soon after that in Korea and Japan. By the eleventh century, there were about 3 dozen cultivars in China. In 1990, more than 3000 cultivars from China were recorded. However, cultivars were not available in Europe and North America until the 1800s. Cultivars of garden chrysanthemum arose as hybrids of older cultivars, hybrids of cultivars with wild species, and

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**Figure 2.** Irregular Incurve type (class 1) of chrysanthemum inflorescence, showing a giant single flower head with upper ray petals loosely curving toward the top centre and less regular lower ray petals. Photo by Laitche (released into the public domain).



**Figure 3.** Bouquet of mostly reflex type (class 2) of chrysanthemum inflorescence, showing spherical flower head with ray petals curving downwards. Painting (public domain) from the 1861 Belgian journal *Flore des serres et des jardins de l'Europe*.



**Figure 4.** Regular incurve type (class 3) of chrysanthemum inflorescence, showing spherical flower head with ray petals curving upwards. Painting (public domain) from the 1895 Parisian journal *Le Moniteur d'horticulture*.



**Figure 5.** Pompon type (class 6) of chrysanthemum inflorescence, showing petite spherical flower heads. ©Elena Chochkova (CC BY 3.0 license).

as bud mutations from older cultivars.

The true flowers of the Asteraceae family are very small ("florets") and aggregated into heads ("capitula") that most people interpret as conventional flowers. As with the majority of the species, in *Chrysanthemum* the outermost flowers are "ray flowers," with a prominently elongated corolla, that is interpreted by most people as a "petal," and the central flowers in the head are "disk flowers," lacking a prominent corolla. In *Chrysanthemum*, both types of floret are fertile (capable of producing seeds), but the ray flowers are entirely male, while the disk flowers are bisexual, bearing both a stigma and anthers. Compared to the wild species, cultivated forms have showier flower heads, often bred to have several rows of ray flowers, rather than one row as in the wild species. As noted in the following, a spectacular variety of flowers and flower heads have been created by human selection. Petals may be strap-like, narrow and lacy, spoon-shaped, feathery, or

quill-shaped. The flowers may be so numerous that the plant takes on the appearance of a mound covered with blooms. Almost all colours of the spectrum are encountered (blue is noticeably absent), and flower hues may be solid, variegated, or multi-coloured.

### Classification of Ornamental Chrysanthemums

#### A. FLORAL CLASSES

The following floral classes of cultivars, recognized initially by the United Kingdom's National Chrysanthemum Society, are now accepted by most chrysanthemum societies throughout the Western world (these are illustrated at: <http://www.mums.org>, and the more obvious kinds are shown in this review).

**Class I - Irregular Incurve:** These are giant blooms. The ray petals loosely incurve (i.e., the petals curve upward toward the top centre of the flower head) and make fully

closed centres. The lower ray petals present an irregular appearance and may give a skirted effect. (Figure 2.)

**Class 2 - Reflex:** The ray petals in this class curve downward (the tips curving towards the bottom centre of the flower head, exactly opposite to classes 1 and 3) and overlap, reminiscent of bird plumage. The top of these blooms are full, but somewhat flattened. (Figure 3.)

**Class 3 - Regular Incurve:** A true globular bloom equal in breadth and depth. The ray petals smoothly incurve outwards and upwards to form a regular sphere of dense petals. (Figure 4.)

**Class 4 - Decorative:** A flattened bloom with short petals. As in the above classes, the central disk should not be visible. The upper ray petals tend to incurve, but the lower petals generally reflex.

**Class 5 - Intermediate:** This bloom class is smaller than the irregular incurve, with shorter ray petals, only partially incurving with full centres, but giving a more open appearance. Many of the popular commercial incurving types are in this intermediate class.

**Class 6 - Pompon:** A small globular bloom, somewhat flat when young but fully rounded when mature. Size ranges from small button types to large disbudded blooms almost 10 cm (4 inches) in diameter, but low bushes are frequent. The ray petals incurve or reflex in a regular manner and fully conceal the centre. (Figure 5.)

**Class 7 - Single and Semi-Double:** A daisy-like flower with a central disk and one or more rows of ray petals. These cultivars tend to be winter-hardy. (Figure 6.)

**Class 8 - Anemone:** These blooms are similar to the semi-doubles, but have a raised cushion-like centre which can extend up to half the diameter of the flower head. (Figure 7.)

**Class 9 - Spoon:** Essentially the same as the semi-double, except the ray flowers are like spoons at the tips. The central disk is round and visible. (Figure 8.)

**Class 10 - Quill:** The ray flowers in this type are straight and tubular with open tips. The bloom is fully double with no open centre.

**Class 11 - Spider:** Spiders have long tubular ray flowers

which may coil or hook at the ends. The florets may be very fine to coarse and drape gracefully at full bloom. The centre is not obvious. (Figure 9.)

**Class 12 - Brush or Thistle:** Fine tubular ray flowers which grow parallel to the stem and resemble thistles or an artist's paint brushes. (Paint brush type is shown in Figure 10.)

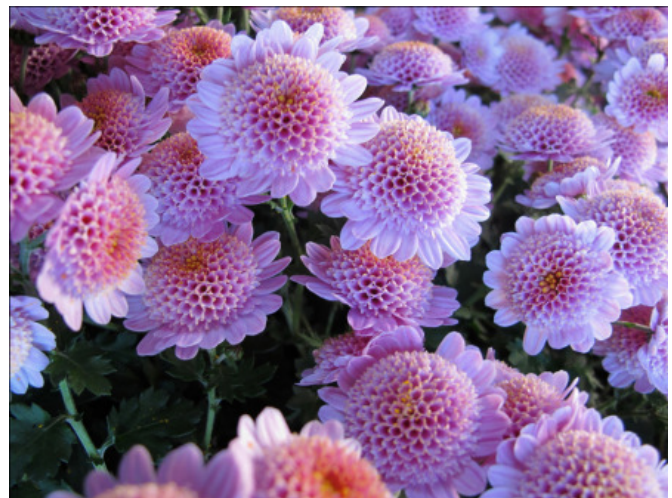
**Class 13 - Unclassified:** Those blooms which fit in none of the other classes. They are often exotic, with twisted ray flowers. They may also be a combination of two classes.

#### B. HARDINESS CLASSES

"Florist's chrysanthemums" are usually raised in greenhouses and sold for use as houseplants or as annual patio plants. They may have been treated with dwarfing agents to produce a compact appearance. They are relatively attractive, often with large flower heads (over 7 cm or 3 inches in diameter), but frequently they are not winter-hardy, and so usually they should not be transplanted outdoors in cold climates. By contrast, "garden chrysanthemums" or "hardy chrysanthemums" are temperature resistant enough to survive overwinter in a particular climatic zone, and will regrow in the spring from underground suckers. Many garden chrysanthemums are "cushion chrysanthemums" (sometimes called "azalea mums"; Figure 11); these are low (typically no higher than 30 cm or 1 foot), bushy plants with the appearance of a mound so fully covered with flowers that the foliage is obscured. Frequently single, pompon, and anemone floral types – all usually small-flowered – are winter-hardy. Hardy chrysanthemums have been selected to bloom before a killing frost, but they can usually survive mild frosts and still produce blooms (the flowers of florist's chrysanthemums may be killed under the same frosty conditions, or the plants may simply fail to come into flower before a killing frost). Moreover, florist's chrysanthemums will usually not regrow after a cold winter. Some gardeners in cold climates treat chrysanthemums as annuals, allowing more attractive, albeit less hardy, cultivars to be grown. Chrysanthemums are sometimes grown as bonsai, and occasionally grafting is employed to produce extraordinary combinations of



**Figure 6.** Single type (class 7) of chrysanthemum inflorescence, showing daisy-like flower head with one row of ray petals. Photo by Juliana Coutinho (CC BY 2.0 license).



**Figure 7.** Anemone type (class 8) of chrysanthemum flower head, showing raised cushion-like centre. Photo by Kristine Paulus (CC BY 3.0 license).



**Figure 8.** Spoon type (class 9) of chrysanthemum flower head, showing spoon-like ray petals. Photographer anonymous (CC BY 2.0 license).



**Figure 9.** Spider type (class 11) of chrysanthemum flower head, showing long tubular ray flowers hooked at the ends. Photo by tata\_aka\_T (CC BY 2.0 license).



**Figure 10.** Brush type (class 12) of chrysanthemum flower head, showing artist's brush appearance of ray petals. ©jam343 (CC BY 2.0 license).



**Figure 11.** Hardy "cushion chrysanthemums," illustrating the typical low, bushy, mound form covered with relatively small flower heads. Photo by JebulonOliBac (released into the public domain).

form and colour.

#### C. GREENHOUSE TRADE FORM CLASSES

"Standards" are plants with one large, terminal flower head, typically used for the cut flower trade. These are produced by removing all branches but one, and removing all lateral flower buds from that branch.

"Disbuds" are like standards, but with more than one main branch; these are multi-stem plants produced by pinching the growing points of rooted cuttings, and (like standards) all lateral flower buds are removed to develop one large terminal flower head on each branch. These are mostly used for production of potted plants.

"Sprays" are multi-stemmed plants with the terminal flower bud removed to stimulate all lateral flower buds to develop into flowering heads. These are also used for production of potted plants.

#### Photoperiodic flowering

Flowering in chrysanthemums is induced by photoperiod, and most cultivars are short-day plants, requiring short

days to flower. (The expression "short-day" is now established, but in fact length of the dark period is the determining factor, and plants that flower in response to shortening days should have been called "long-night plants.") Plants flower when the day-length is shorter than the critical day-length, but grow vegetatively otherwise.

It has been discovered that there are actually two critical photoperiods in chrysanthemums, one for floral initiation and a shorter day-length for flower development. Moreover, the critical photoperiod varies with temperature. Florist's chrysanthemums typically require 8 to 14 weeks of short days to flower, and the day-length period may be shorter than 11 hours or longer than 16 hours depending on cultivar. In practice, the greenhouse trade uses black cloth curtains to shade plants for 12–15 hours daily to induce flower initiation. Temperatures above 20°C (68°F) and below 22°C (72°F) will delay flowering.

Chrysanthemums are known as fall-flowering plants, but garden cultivars are available that will flower earlier, and so are more suited to cold climates. Garden cultivars typically require 5 to 7 weeks of short days (a shorter

period than needed by florist's chrysanthemums). Street lights or other sources of light at night can inhibit the formation of flowers.

### Non-ornamental Uses

Chop suey green (also known as Japanese green, garland chrysanthemum, and crown daisy; Figure 12), *Glebionis coronaria* (*Chrysanthemum coronarium*), is an edible species popular in Chinese, Vietnamese and Japanese cuisine. The vegetable form of the species has fleshier leaves than the kinds cultivated as ornamentals.

Although mainly an ornamental, the flowering heads of *C. ×morifolium* are also employed as a herbal tea in traditional Asian (especially Chinese) medicine, as an insecticide and parasiticide, and as a source of medicinally used essential oils and extracts.

Chrysanthemum petals are sometimes eaten, and are considered non-toxic. In a Chinese restaurant, "chrysanthemum tea" is likely to be a blend of chrysanthemum blossoms and conventional tea.

### Toxicity

Florists, nursery workers and gardeners occasionally develop contact dermatitis after prolonged exposure to garden chrysanthemums. Arcteglasin A, a sesquiterpene lactone, has been identified as a cause. Other lactones of this class are also present in chrysanthemums and indeed in many other species of the Asteraceae family. All parts of chrysanthemum plants have been claimed to be potentially toxic to dogs, cats, horses and other mammals, ingestion causing vomiting, diarrhea, salivation, or a lack of coordination. Although not considered particularly toxic, the recommendation has been made that pets and children should not be exposed to chrysanthemums. As noted above, the flowers of chrysanthemums (*C. ×morifolium*) are consumed by humans to a minor extent, and so is the foliage of "edible chrysanthemum" (*Glebionis coronaria*). Some people have experienced mild stomach upset from ingestion or a skin reaction from skin contact with *G. coronaria*.

*Tanacetum cinerariaefolium* (*Chrysanthemum cinerariaefolium*) is the source of pyrethrins, very widely used as a natural insecticide and insect repellent. Pyrethrins are relatively non-toxic to humans and warm-blooded animals, but cats and fish are notably susceptible. Many information sources (especially on the Web) consider *T. cinerariaefolium* to be a "chrysanthemum," and confound toxicity information for it with ornamental chrysanthemum (*C. ×morifolium*). Indeed, it is often difficult to know just what species are being referred to when the toxicity of "chrysanthemums" is being discussed.

### Economic Status

The success of chrysanthemum as a commercial greenhouse product is due to diversity of floral colour and form, lasting quality of the flowers, ease of cultivation, and ability to control and schedule flowering. Chrysanthemum is one of the world's leading floral crops, grown for cut flowers (for floral bouquets and flower arrangements) and as potted plants. It has been claimed that chrysanthemums are second only to roses in the world floral market (Teixeria da Silva et al. 2013). Certainly chrysanthemum is one of the top three best-selling cut flowers in almost all major flower-consuming countries. In Japan and China, it is the most popular flower. In addition to China and Japan, leading producers include the Netherlands, South Korea, Malaysia, Kenya, Columbia,

and Brazil. Production in India is growing rapidly. In Canada, chrysanthemum is the leading greenhouse potted plant, with over 10 million pots produced in some recent years (in the U.S., it is the 4th most important greenhouse potted plant). It is also one of the leading Canadian cut flowers, with production of over 25 million stems in some recent years, although more stems of tulip and gerbera are produced in Canada (in the U.S., chrysanthemum ranks 8th in cut flower importance). About 4 million outdoor potted plants are produced in Canada, although begonia, geranium, impatiens and petunia are more important (in the U.S., chrysanthemum is the 4th most important outdoor potted plant). [See Small 2011, 2012 for detailed production statistics for Canada and the U.S.]

### Cultivation

#### ADVICE REGARDING CUT CHRYSANTHEMUMS

On average, cut chrysanthemum flowering stems last 1 to 2 weeks. Purchased material should have two-thirds to three-quarters of the flowers open, and the foliage should not be yellowed. Florist shops may keep bulk material in near-freezing storage, and in the home cool locations are preferable (although troublesome, keeping a vase of stems in a refrigerator overnight will extend the life of the bouquet). The flowers should be located away from direct light and either hot or cold drafts. Stems should be recut diagonally after purchase (using a sharp knife or floral scissors intended for the purpose), discarding the bottom 1.3 cm (0.5 inch), and the portion placed in water should be free of leaves. Re-cut the stems daily and change the water. The foliage often deteriorates faster than the flowers, and leaves in poor shape should be removed. The cut flower industry employs rehydrating solutions, "flower foods" (including sugar), and germicides that inhibit bacteria to extend the life of cut flowers, and often flower shops provide packages of these along with purchased bouquets.

#### ADVICE REGARDING INDOOR POTTED CHRYSANTHEMUMS

Houseplant chrysanthemums are relatively easy to maintain. A cool room (e.g. 10–15°C or 50–59°F) prolongs flowering but the plants will tolerate warmer temperatures. Indirect but bright light is recommended, such as near a window. The soil should be kept moist at all times, but avoid waterlogging. Fertilization is unnecessary for the first few weeks, then add a light feeding (e.g. with a diluted tomato fertilizer) weekly. Deadhead old flowers and remove yellowed foliage. The plants may remain attractive



**Figure 12.** Chop suey green (*Glebionis coronaria*), an edible-leaved relative of chrysanthemum on sale in a Vietnamese market in Los Angeles in 2009. ©ChildofMidnight (CC BY 3.0 license).

for 6 to 8 weeks, and since they can be purchased cheaply, most people will discard them rather than attempting to rejuvenate the plants (best done by cuttings).

#### ADVICE REGARDING OUTDOOR CHRYSANTHEMUMS

**Purchasing:** Ornamental garden chrysanthemums are mostly grown from vegetative stem cuttings or suckers (not seeds), and sold as young plants in pots intended for transplanting both in the spring and autumn. Select plants that have unopened buds or are just beginning to flower. Avoid plants with fading flowers, damaged stems, or discoloured foliage. Plants available in the spring may have been forced into flower (after the initial bloom has faded, the plants can be pruned to one-third or one-half their height, and a second blooming period will result in the fall). Plants acquired in the autumn are less likely to harden off sufficiently to survive winter; alternatively to planting these, they might last through the winter in a cool, dry location that doesn't freeze.

**Planting:** Chrysanthemums are typically planted outdoors in massed landscape beds or at least in small groups. They are also suitable for borders, especially the cushion mum forms, which show best as edging plants or in the foreground of a border. Chrysanthemums can be planted in the spring (preferably), or in the fall. Plants purchased in the fall should be established in the garden at least 6 weeks before a killing frost. Garden chrysanthemums should be planted at least 0.5 m apart, and up to 1 m for vigorous cultivars.

Chrysanthemums are adapted to a temperate climate, with optimal temperatures in the range 18–21°C (64–70°F). They prefer fertile, neutral or slightly acidic, well-drained but moist soils (light, sandy soils are not suitable, addition of abundant organic matter in the form of peat, compost, or well-rotted manure is recommended), and full sun (at least for 6 continuous hours). In addition to outdoor plots, chrysanthemums are particularly suitable for container gardening on patios.

**Shaping:** As noted earlier, several trimming treatments of potted chrysanthemums are routinely carried out by commercial growers. Similarly, "pinching" is recommended for many cultivars grown in the home garden to prevent the plants from becoming tall and leggy, and producing a poor floral display. "Pinching" refers to removing about 1.5 cm or 0.5 inch of the growing tips to induce branching, reduce plant height,

and delay flowering. The result can be a compact bushy plant with more blooms. Cultivars have recently become available that naturally form low shrubs without pinching, but even these can benefit from some pruning. Home gardeners should pinch off the growing tips of small-flowered cultivars when they are about 18 cm (7 inches) high, or the plants could produce tall, weak stems with only a few flowers. (Young potted plants sold for transplanting are commonly already pinched to produce a well branched plant.) All shoots of early varieties should be pinched every 2 weeks until early summer, and until mid-summer for late-flowering varieties. Cultivars intended for the production of large, solitary flowers require removing most branches and flower buds, allowing only a few branches to survive, and only an uppermost flower on a given branch to mature.

**De-suckering:** New suckers are developed from the base of growing plants, and these can be removed to promote growth of the main plant.

**Overwintering:** Mulch in cold climates (alternate freeze-thawing is the chief overwintering challenge of chrysanthemums). Ten to 15 cm (4–6 inches) of pine needles or other material that won't pack solid when wet (avoid broad leaves) should be applied after the soil surface freezes. It has been recommended that old, dead, above-ground shoots be removed in the fall to avoid disease, but leaving this until the spring may promote overwintering.

**Rejuvenation:** Chrysanthemums can become crowded quickly, and should be divided or reproduced from cuttings or suckers (between 2 and 4 years is recommended). To divide, dig the entire clump up in the spring when new shoots appear; slice it into wedges (like a pie), discard the central (older) portion, and replant the outer portions. It is also possible to propagate the plants using cuttings about 10 cm (4 inches) long from the tops of young stems 15–30 cm (6–12 inches) long (dip the cut ends in rooting hormone, stick the cuttings in a container of sterile potting soil or a mix of sand and peat moss, maintain in bright but not direct light, and after roots form in 2–3 weeks, acclimate to brighter light and transplant).

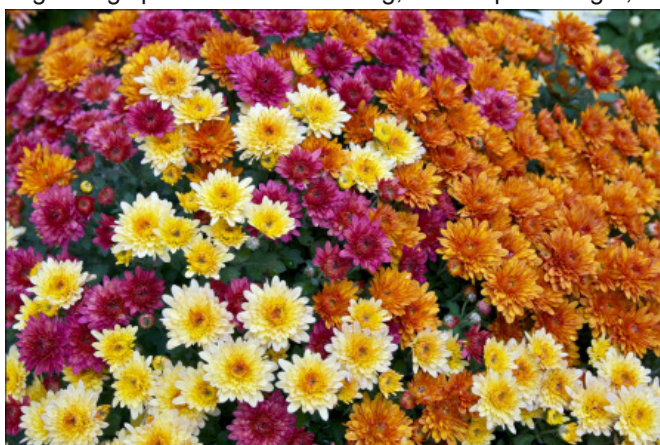
#### Cultural References

In Asia, chrysanthemum has long been associated with notions of long life, because it flowers in the autumn when most other flowers have faded. In times past, people would wipe chrysanthemum dew on their skin on Chrysanthemum Day, the 9th day of the 9th month of the year, in the hope of maintaining youthfulness.

Chrysanthemum has considerable symbolic value in Japan. It has been considered to be the national flower since 910 A.D., and is used as the crest and official seal of the emperor. A chrysanthemum with 16 "petals" is the traditional emblem of the Mikado (monarch), and the monarchy is called "the chrysanthemum throne." Japan's "Order of the Chrysanthemum" is the country's highest recognition of chivalry, and is awarded by the emperor.

The chrysanthemum is the official flower of Chicago (designated in 1961), Beijing (China; 1987), and many other cities.

In several European countries incurve-type chrysanthemums are emblematic of death, and are displayed in funerals and on graves. Similarly in China, Japan, and Korea, white chrysanthemums symbolize grief. Flower shops in Western nations sometimes advise that a gift of white-flowered chrysanthemums may be



**Figure 13.** Chrysanthemum flowers of various colours. Photo by Jebulon (released into the public domain).



## Why don't you get a haircut? You look like a chrysanthemum.

—P. G. Wodehouse (1881–1976, English humourist)

inappropriate because of this symbolism.

“The Chrysanthemums” is a poignant short story by American writer John Steinbeck (1902–1968, Nobel Prize for literature in 1962, best known for his novel “The Grapes of Wrath.”). It has been extensively analysed as a critique of a society that has no place for intelligent women, but this brief masterpiece is well worth reading simply as an example of great literature (<http://nbu.bg/webs/amb/american/4/steinbeck/chrysanthemums.htm>).

### Curiosities of Science and Technology

Words are often coined by analogy with familiar objects, and in Asia, where chrysanthemums have a very long history, a canine came to be called the “chrysanthemum dog.” The dog in question is the shih tzu, one of the most distinctive of the toy breeds. The name originated because its facial hair grows in all directions, resembling the “petals” of a chrysanthemum.

A “chrysanthemum cut” is an ornamental method of preparing a root vegetable, traditionally carried out by holding a portion of vegetable upright with chopsticks held parallel to each other, slicing vertically between the chopsticks, not quite to the base, while very slowly rotating the material through 180°, producing fine strands that radiate outwards from the centre, reminiscent of a daisy flower head.

In the cocktail world, a “chrysanthemum” is a combination of dry vermouth, Bénédictine and absinthe liqueurs, and a garnish of orange peel twist.

“Football chrysanthemums” are large (hence the analogy with a football), fluffy flowers of the incurve class, traditionally presented in the U.S. as a corsage by gentlemen to their dates, especially at football games (a custom that has become antiquated).

The “Chrysanthemum Revolution” (also known as the Aster Revolution) was a revolt in 1918 in Hungary against the Austro-Hungarian Empire. Socialist count Mihály Károlyi, soldiers from the Hungarian Army, and protestors wearing daisy-like flowers seized public buildings throughout Budapest. By the end of the year Károlyi became the Prime Minister of Hungary. However, in 1919, the revolution was overturned.

In 1989, scientists at NASA (U.S. National Aeronautics and Space Administration) published a study on the effects 19 popular houseplants had on common indoor air pollutants, towards finding ways of purifying the air in future space stations (Wolverton, B.C., Johnson, A., and Bounds, K. 1989. Interior landscape plants for indoor air pollution abatement. <http://maison-orion.com/media/1837156-NASA-Indoor-Plants.pdf>). Certain plants proved to be more efficient at removing specific pollutants than others. Chrysanthemum proved to be the best absorber of benzene, which is present in many household items, irritates skin and eyes, and is suspected of having a variety of toxic effects. Potted chrysanthemums have been especially recommended in homes with fresh paint or new plastics, which tend to release benzene.

### Key Information Sources

Note: several of the most authoritative books on chrysanthemums are cited below, as they contain considerable information. However, the cultivars mentioned are mostly dated (new selections are rapidly

being produced), and commercial growing techniques have also changed notably since these publications appeared.

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- National Chrysanthemum Society, USA - <http://www.mums.org>
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- Royal Horticultural Society [U.K.], Chrysanthemums - <http://apps.rhs.org.uk/advicesearch/Profile.aspx?pid=813>

## Acknowledgements

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**Figure 14.** Painting (public domain) of a chrysanthemum garden by American artist Daniel Ridgway Knight (1839–1924).

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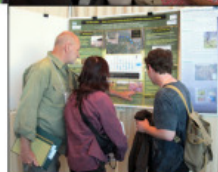


The CBA executive always welcomes new energy to be a vibrant part of our administrative team. We know great talents (possibly yet undiscovered!) abound out there and we hope to hear from you. The CBA is a wonderful venue to promote and to explore numerous areas within the botanical sciences with like-minded folks, and to discover new regions within Canada during the process. Please contact me ([hugues@unbc.ca](mailto:hugues@unbc.ca)) or Frédérique ([fguinel@wlu.ca](mailto:fguinel@wlu.ca)) if you are interested and willing to put your name forward, volunteer your time, or perhaps just want to know more about what is involved with some of the executive positions.

**At the 50<sup>th</sup> CBA annual meeting in Montréal (June , 2014), we will be looking for:**

- Nominations for a new **treasurer** (Dr. Jane Young will be finishing her mandate) and a new **secretary** (Dr. Santokh Singh will be finishing his mandate). *These 2 positions are key posts for the functioning of the Association.*
- Nomination for a **Vice-President** for the meeting to be held in Edmonton in 2015. *The V.-P., preferably residing in Alberta, is a key liaison between the CBA and the meeting organizers in 2015. It is a 1-year mandate.*
- Nominations for two **Eastern Directors** and two **Western Directors** (Ms. Marian Munro and Dr. Julian Starr are finishing their mandate for the eastern front and Dr. Melanie Jones and Dr. Bruce Ford are finishing theirs for the west). *A director is an important liaison role, ensuring that information about Botany is disseminated to Canadian universities of your region, and that students in botany are aware of opportunities available to them. It is a great way to get involved in the Association.*
- Nominations for two **student representatives** (Mr. James Jones, eastern region, and Ms. Kirsten Kilde, western region, are finishing their mandate). *A student representative helps with liaison with other students in the CBA, before and during the annual meeting.*
- Nominations for the position of **archivist**. *If you feel you can contribute in any aspect to help with the CBC/ABC archives in any capacity, we would love to hear from you. Your support to the association is always greatly appreciated!*

Hugues Massicotte, CBA/ABC Past President



50  
ans!



## Impliquez-vous... Et découvrez votre ABC!

