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# The Canadian Botanical Association Bulletin



## Bulletin de l'Association Botanique du Canada

September/Septembre 2011. Volume 44 No.2/N°2

### Message du Président: "Guérir la planète tandis que les plantes s'adaptent aux changements environnementaux!"

Ma participation récente au congrès de la "Botanical Society of America" (BSA) à St. Louis, Missouri (9-13 juillet) s'est enchaînée par celui du "Plant Canada 2011" à Halifax NS (Juillet 17-21). Ces deux rencontres scientifiques ont renforcé ma conviction que, plus que jamais dans nos sociétés humaines urbanisées, les gens de tout âge ont un besoin urgent d'alphabétisation botanique. Il est important pour nous tous de continuer à articuler les contributions essentielles de la botanique à notre bien-être et au maintien des fonctions critiques planétaires. Investir dans les sciences vertes à tous les niveaux est toujours notre meilleure assurance pour comprendre et accepter notre avenir commun sur la planète Terre!

Comme toujours, les faits saillants pour Plant Canada à l'Université Ste-Marie furent nombreux et, vous en conviendrez, le congrès a très bien débuté avec deux présentations pleine d'énergie. D'abord, David Phillips a fourni un récit convaincant de la myriade de changements météorologiques notés dans notre paysage canadien, que cela soit par exemple floraison des plantes ou temps de récolte de sirop d'érable plus hâtifs, ou encore fonte des glaciers et des glaces de l'Arctique. Plus tard, Paul Bullock a décoriqué les complexités inhérentes des scénarios qui essaient de prévoir quels seront les impacts des changements climatiques sur la production agricole mondiale future. Il n'est certes pas nécessaire cet été de convaincre les agriculteurs de l'impact de la variabilité climatique sur leurs récoltes et comptes bancaires!

Plant Canada a accueilli plus de 500 participants (un record peut-être?) et nous a fourni de nombreuses sessions intéressantes (et simultanées). La conférence commémorative Weresub, magistralement donnée par Félix Bärlocher, s'est concentrée sur le monde merveilleux des champignons "Ingoldien", les hyphomycètes aquatiques si importants pour ces écosystèmes.

Nous sommes extrêmement reconnaissants à Yousef Papadopoulos et David Percival, les co-présidents de Plant Canada 2011, et à au moins 16 autres membres du comité d'organisation (représentant toutes les sociétés) qui ont consacré des centaines d'heures, ces deux dernières années, pour faire en sorte que l'événement soit un succès retentissant. En particulier, au nom de l'ABC, je suis particulièrement reconnaissant à notre vice-présidente, Marian Munro, qui, avec son enthousiasme légendaire et son attitude positive, a généreusement consacré temps et énergie pour organiser plusieurs facettes du congrès et a assuré la liaison essentielle entre notre Association et le comité d'organisation. Le travail de Marian a grandement facilité le mien en tant que président et je la remercie bien sincèrement.



Hugues Massicotte

## Canadian Botanical Association Bulletin

The CBA Bulletin is issued three times a year (in theory in 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>

## Association botanique du Canada Bulletin

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.

### Soumission 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, **44(3)**, must be received **before November 7th 2011**

La date de tombée des textes du prochain numéro, le no **44(3)**, est le **7 novembre 2011**

Published in Peterborough, September 1st 2011  
Publié à Peterborough, le 1 septembre 2011

SSN 0008-3046 (paper/version papier)  
ISSN 1718-8164 (electronic format/version électronique.)

Les plus grands honneurs de notre Association, la médaille Lawson et le Prix Mary Elliott pour service, ont été décernés lors du lunch d'affaires jumelé à notre réunion annuelle générale. Ils ont été mentionnés à nouveau au cours du banquet. Les médailles Lawson ont été décernées aux co-auteurs Larry Peterson, Carol Peterson et Lewis Melville, pour souligner leur contribution exceptionnelle sous la forme de leur livre intitulé: "Enseigner l'anatomie végétale en utilisant des exercices de laboratoire créatifs", publié en 2008 par la presse CRN. Nous étions également honorés de présenter le Prix Mary Elliott à Martin Dubé, qui a édité le Bulletin inlassablement pendant quatre ans, a créé une reproduction digitale de tous les bulletins disponibles alors, et qui, en outre, est applaudi pour ses efforts internationaux remarquables avec des botanistes haïtiens. Nous avons tous ressenti une grande fierté et joie pour nos collègues qui ont mérité de telles reconnaissances. Encore bravo!

Il nous faut donc maintenant porter notre attention sur Columbus, en Ohio, où nous nous réunirons avec la BSA en 2012. Les préparations vont bon train et déjà un appel pour symposia est en cours. Je suis extrêmement reconnaissant à Michele Piercey-Normore qui a accepté d'agir à titre de vice-présidente pour l'année qui vient. C'est avec grand plaisir que je planifie de travailler avec elle et la BSA pour l'élaboration d'un programme avec un thème apparenté à «La botanique, la prochaine génération». J'espère que vous serez en mesure de participer et partager vos idées pour le programme scientifique, et n'oubliez pas de marquer vos calendriers pour Columbus, Ohio, le 7-11 juillet, 2012!

Au cours de cette dernière année, j'ai été émerveillé par la force de l'ABC, en partie grâce au travail bénévole dévoué de tant d'individus. Je vous remercie tous. Nous continuons d'avoir une direction dynamique, et je vous invite à nous contacter si vous souhaitez devenir plus impliqué dans l'association. L'avenir de la botanique dépend de nous tous. C'est notre ABC!

Très sincèrement,  
Hugues Massicotte

### President's Message:

#### Healing the planet while plants adapt to environmental change!

My recent participation in the Botanical Society of America meeting in St. Louis, Missouri (July 9-13), was quickly followed by our Plant Canada meeting in Halifax NS (July 17-21), and both reinforced my conviction that, more than ever, as our human societies become increasingly urbanized, people have a need for greater botanical literacy. It emphasizes the importance of continuing to articulate the essential contributions of botany to our well-being and to sustaining critical planetary functions. Investing in botanical sciences at all levels is still our best assurance towards understanding and embracing our common future on Planet Earth! As always, highlights for Plant Canada 2011 at St. Mary's were numerous and, hopefully you will agree, the gathering was wonderfully energized from the beginning by both keynote speakers. David Phillips provided a convincing narrative of the myriad of changes that have been noted in our weather-challenged Canadian landscape, from earlier blooming time and earlier maple syrup harvest to melting glaciers and arctic ice. Paul Bullock further explained the complexities behind attempting to answer questions on how climate change will impact global crop production. With this in mind, again there is no need this summer to convince any farmer that weather variability is impacting their production and bottom line! The Plant Canada meeting hosted over 500 participants (a record perhaps?) and provided many informative concurrent sessions. The Weresub memorial lecture, masterfully given by Felix Bärlocher, disclosed the wonderful world of studying the "Ingoldian" aquatic hyphomycetes, a critical component of these ecosystems. We are extremely grateful to Yousef Papadopoulos and David Percival, the co-chairs of the conference, and to at least 16 other members of the Steering committee (representing all societies) who devoted an enormous amount of time these past 2 years to make this event a resounding success. In particular, on behalf of the CBA, I am especially grateful to our Vice-President, Marian Munro, who, with her trademark enthusiasm and positive attitude, generously shared her energy and time to organize many facets of the meeting and provided critical liaison between our association and the steering committee. All this greatly facilitated my job as president.

The highest honors from our Association, the Lawson Medal and Mary Elliott Service Award, were awarded during the AGM business lunch, and mentioned again during the banquet. Lawson medals were awarded to co-authors Larry Peterson,

Carol Peterson and Lewis Melville in recognition of their outstanding contribution in the form of their book entitled: "Teaching Plant Anatomy Through Creative Laboratory Exercises", published in 2008 by NRC Press. We were equally delighted to present the Elliott Award for Service to Martin Dubé who tirelessly edited the Bulletin for four years, produced a digital record of all bulletins available then, and who, in addition, is applauded for his noteworthy international efforts working with Haitian botanists. We all felt great joy and pride for our colleagues who deserved such recognitions.

We are now shifting our attention to Columbus, Ohio, where we will meet with BSA in 2012. Plans are underway and already a call for symposia suggestions has been made. I am extremely grateful to Michele Piercey-Normore who has agreed to act as Vice-President for this coming year. I am looking forward to working with her and with the BSA to participate in developing a program with a theme akin to "Botany, the next generation". Please consider participating to and sharing ideas for the scientific agenda, and don't forget to mark your calendars for Columbus, Ohio, July 7-11<sup>th</sup>, 2012!

I have marveled at the CBA's strength this last year, in part because of the dedicated volunteer work by so many individuals. We continue to have a vibrant executive, and I urge you to contact us if you wish to become more involved with the association. The future of botany depends on all of us. This is your CBA!

Most sincerely,

Hugues Massicotte



Hugues Massicotte, President, and Marian Munro, the Vice President, responsible for organizing the CBA/ABC participation in Plant Canada 2011

## 2011 CBA/ABC Plant Canada 'Auction' News

This year's 'dual' auction was wonderfully successful and we thank most heartedly all who generously contributed their irresistible items to the auction, as well as those who bid (and bid again!) to secure said items. The BBQ auction grossed \$200 (plus a \$5 surplus - ?!); the AGM silent auction added another \$185, for a grand total of \$390 to the Macoun student travel fund. We hope that all who were successful bidders are currently enjoying their fine new acquisitions! In addition, several members also donated an additional \$120 during the event to the fund. Our thanks to you all very much. Next auction? Likely 2013!

Photo: The auctioneer in action!



*Members of the CBA/ABC are sorry to hear that our secretary, Laurie Consaul, was taken ill after the Plant Canada conference, however, we are glad to hear that she is at home following surgery, and recovering with the help of her husband, Mark Armstrong.*

## Association News/ Nouvelles de L'association.

### The good news!

#### Nancy Turner receives further honours

Renowned ethnobotanist Dr. Nancy Turner received an honorary degree from the University of British Columbia on May 30th 2011 and on June 18th 2011 the District of Saanich bestowed upon her the municipality's highest formal honour, the title of "freeman" in recognition of her accomplishments and contributions.

The citation read at Convocation follows (in part):

"Prof. Turner is recognized worldwide for her pioneering work in documenting the traditional use of plants among Aboriginal peoples, and for her tireless efforts in ensuring the continuity of that knowledge in these communities.

Through her work, Prof. Turner has provided extraordinarily rich accounts of the lives, loves, fears, and joys of different cultures that may have otherwise been lost forever.

Known for her enormous energy and subtle charm, she's been called an anthropological magician, with an ability to incite curiosity and excitement from those around her. But perhaps she can be most aptly described as a citizen-scientist, the rarest among us who embodies a commitment to scientific rigour, respectful collaboration, and community betterment.

Prof. Turner was elected to the Royal Society of Canada and appointed to the Order of British Columbia in 1999. She was voted one of the Top Ten Thinkers in British Columbia in 2000, and she was appointed to the Order of Canada in 2009. Her long and intimate involvement with scholarship here at UBC, starting with her doctoral studies here in the 1970s, has benefitted students and colleagues alike."

#### Dr. Santokh Singh (UBC) Receives a Killam Teaching Award.

Dr. Santokh Singh, received a Killam Teaching award at the Spring Convocation at the University of British Columbia in May 2011. The citation is shown below.



"Dr. Singh is a dedicated plant physiology teacher, with research interests in cell biology especially plant hormones. Students enrolled in his laboratory courses have the opportunity to design experiments, carry out tests and work together in teams. As one student remarked, "He has so

much passion for teaching and plants that it promotes a learning environment that is positive and exciting". Students who carry out independent research projects under Dr. Singh's supervision take ownership of their projects and as a result become more confident and capable researchers in their own right. Students appreciate Dr. Singh's friendly demeanour, his fairness in the assessment of their work, and his supportive nature. That Dr. Singh is a caring and inspirational teacher is made clear by one awestruck student who observed, "He actually made plants interesting!"

#### Plant Canada - Certificates of Appreciation Awarded

Two members of the CBA/ABC, who have made a significant contribution to Plant Canada, were recognized and their efforts were acknowledged with the presentation of Certificates of Appreciation during the Plant Canada 2011 Banquet.

**Iain Taylor**, University of British Columbia, a member of both the CBA and CSPP, chaired the committee that set up Plant Canada and drafted our constitution and by-laws.

**Paul Cavers**, University of Western Ontario, a member of CBA and CSWS, was an enthusiastic member of the committee that set up Plant Canada and served as the first secretary.

### The sad news.....

#### From Vipen Sawhney, Iain and Sylvia Taylor

It is with great sadness we inform you that Prof. Emeritus Richard (Dick) Irving Greyson passed away on July 23, 2011 at the age of 79 after brief illness. Dick was born in Nelson, BC in 1932. He studied at UBC and the University of Oregon. Dick was on the faculty of the Department of Plant Sciences, University of Western Ontario, London, from 1964 to 1992.

After his retirement he moved to Vancouver where he was at the time of his death. Dick was a developmental botanist who had inspired and trained many students at the undergraduate and graduate levels. His research interests were mainly in the area of flower development and he had used a variety of approaches to understand the genetic and hormonal basis of flowers. Indeed he was a pioneer in using mutants in his research in different plant systems. The CBA/ABC awarded him the Lawson Medal in 1994 for his various contributions, specifically for the publication of his book, "The Development of Flowers", published by the Oxford University Press. We will miss Dick's warm friendly nature, his wisdom and analytical thinking, his humour, and story telling. Dick was predeceased by his wife Dorothy, and is survived by 5 children (Maureen, Peter, John, Philip, and Cecilia), and 8 grandchildren, as well as other family members. It is requested that donations be sent to the following organization in his name- Nature Vancouver, PO Box 3021, Vancouver, BC V6B 3X5

## Report of the Editors of *Botany* at the 2011 Annual Business Meeting of the CBA

### Partnership between Canadian Science Publishing and the Canadian Botanical Association

CSP and the CBA have formally partnered by signing a 3-year Memorandum of Understanding covering areas in co-marketing and promotion, discounts to CSP publications (including *Botany*), sponsorship opportunities, and encouraging CBA members to publish in *Botany*. The CBA logo would be placed on both the *Botany* cover and home page. This partnership is an important step in the continued success of *Botany*.

### New *Botany* Editorial Office

CSP has centralized the role of Editorial Assistant for its 15 NRC Research Press journals. The Editorial Assistants (EAs) that successfully competed for 9 positions are now CSP employees under the supervision of the Peer Review and Submission Support Supervisor Louis Lafleur. The new EAs came to Ottawa in March to receive ScholarOne training and for CSP "new employee" orientation. Lori Cayer is the EA looking after *Botany*, as well as the *Canadian Journal of Earth Sciences*, in regard to submissions via ScholarOne.

### % Manuscript Submission by Country. The top ten are shown.

#### January to December 2010      January to March 2011

|               |      |               |      |
|---------------|------|---------------|------|
| Canada        | 29.3 | Canada        | 24.2 |
| China         | 12.9 | China         | 13.3 |
| United States | 10.7 | United States | 11.7 |
| India         | 7.8  | Japan         | 6.7  |
| Japan         | 4.1  | Egypt         | 5.0  |
| France        | 3.7  | Pakistan      | 5.0  |
| Brazil        | 3.4  | India         | 4.2  |
| Iran          | 2.2  | Brazil        | 3.3  |
| Pakistan      | 2.2  | Tunisia       | 3.3  |
| Argentina     | 2.2  | Spain         | 3.3  |

### Accepted, Rejected, and Withdrawn Manuscripts

| No. of manuscripts accepted and sent to RP |      |      | No. of rejected/withdrawn manuscripts |    |      |    |      |    | Rejection rate (%) |      |      | Total REJ/WD rate (%) |      |      |
|--------------------------------------------|------|------|---------------------------------------|----|------|----|------|----|--------------------|------|------|-----------------------|------|------|
|                                            |      |      | 2008                                  |    | 2009 |    | 2010 |    |                    |      |      |                       |      |      |
| 2008                                       | 2009 | 2010 | REJ                                   | WD | REJ  | WD | REJ  | WD | 2008               | 2009 | 2010 | 2008                  | 2009 | 2010 |
| 146                                        | 113  | 86   | 257                                   | 5  | 207  | 12 | 207  | 2  | 63.0               | 62.3 | 70.2 | 64.2                  | 66.0 | 70.8 |

### 2010-2011 Special Issues

2010: None

Upcoming: Pollination

### Online Access

Online access to *Botany* continues to grow. Here are the Counter statistics (full-text downloads) for the past 4 years:

| 2007   | 2008   | 2009   | 2010    |
|--------|--------|--------|---------|
| 77,662 | 88,635 | 84,164 | 103,296 |

### Subscription Trends

Institutions continue to switch over from print to online subscriptions because of the 20% price savings, increased functionality, availability of back files, and archiving in Portico to ensure perpetual access. Overall institutional subscriptions to *Botany* decreased by 5% (556 to 525). Institutional print subscriptions fell by 30% (293 to 204) and electronic subscriptions increased by 27% (223 to 283). This trend is expected to continue in the coming years.

(Continued)

All consortia have renewed for 2011, which is quite an accomplishment in this economic setting. Countries include Australia, Canada, China, Denmark, France, India, Korea, and state-wide licenses in the U.S. Free access of our content is provided to developing countries through Research4Life and TEEAL. These organizations ensure worldwide access to our journals.

### Open Access in Canada

*Botany* access in Canada has been expanded to include the back files, so *Botany* will be freely available from 1951 to 2010. This should attract more journal traffic, citations, and visibility.

Access from 2011 onward will be subscription based. The 2 major consortia in Canada have purchased multi-year e-access to the full bundle of NRC Research Press journals:

- Canadian Research Knowledge Network (CRKN), 44 Canadian universities
- Federal Science eLibrary (FSeL): 6 largest Federal science departments

The other smaller Canadian university libraries, government departments, and societies are purchasing specific journals rather than the full bundle. This will ensure that most Canadians continue to have access to the NRC Research Press journals.

### Journal Citation Report Data 2010

|               | Category       | Ranking by 2-year impact factor | 2-year impact factor | 5-year impact factor | Cited half-life | Eigenfactor |
|---------------|----------------|---------------------------------|----------------------|----------------------|-----------------|-------------|
| <i>Botany</i> | Plant sciences | 95/187                          | 1.098                | 1.113                | 2.4             | 0.00179     |

### Canadian Science Publishing (CSP) Incorporation

Through the spring and summer of 2010, CSP engaged financial, legal, and human resource support to put into place the needed policies, systems, and legal agreements to transfer the NRC Research Press publishing operations to CSP. On 1 September 2010, all operations and 52 former NRC employees moved over to the new not-for-profit corporation. During this time, generous financial assistance was provided by the National Research Council of Canada.

Some of the key milestones that CSP had achieved by 1 April 2011 follow:

- CSP board in place: David F. Strong, Ph.D., D.Sc., LL.D., F.R.S.C. (Chair); Ken Davey, Ph.D. (Cantab.), O.C., F.R.S.C. (Vice-Chair); Samuel Gubins, Ph.D.; John P. Smol, Ph.D., Ph.D. (hc), LL.D. (hc), F.R.S.C.; John Teskey; Bruce Dancik, Ph.D.;
- the transfer of all copyright associated with NRC Research Press activities back to 1929;
- a license for the trademark "NRC Research Press" on the 15 NRC journals transferred to CSP;
- a new visual identity program for all of our services featuring a new NRC Research Press logo plus a CSP logo;
- a new very competitive NRC Research Press Web site hosted by an external third party specializing in scholarly journals;
- a new world-class submission and peer review system hosted by ScholarOne (part of the Thomson Reuters Group); and
- an agreement with Canadian Research Knowledge Network (the Canadian universities purchasing consortia) to ensure that all universities with science programs have access to NRC Research Press journals.



### Future CBA/ABC Meetings

**2012 Columbus Ohio. Joint meeting with the BSA (see poster page 69)**

**2013 Thompson Rivers University, Kamloops BC**

**2014 50th Anniversary of the founding of the CBA/ABC. Venue to be decided.**

## News from the Sections



### Mycology Section (August 2011)

Our note taker volunteer was once again Linda Tackaberry. We had a small gathering of persons for the mycology section on

Sunday July 17, at the Halifax Plant Canada meeting, possibly due to the early scheduling following the opening reception on the first day.

Several announcements were made. This year's symposium organized by Michele Piercey-Normore on "Effects of environmental change on fungal diversity" was on Wednesday and looked very promising with 5 excellent speakers. We also had a Weresub award winner this year, and we are very grateful to Jim Traquair and Shannon Berch who adjudicated the submissions for best paper in Mycology. The 2011 Weresub Memorial lecturer was Felix Baerlocher, whose title was "Research on aquatic hyphomycetes in a changing world".

We also discussed the CBA meeting to be held jointly with BSA and the American Bryological and Lichenological Societies next year (July 7, 2012) in Columbus, Ohio, and suggestions for a mycology symposium, organized jointly or not, were requested. Hugues Massicotte indicated that a joint proposal had already been tentatively sketched out by himself, Darlene Southworth and Ann Hirsch, on the topic of rhizosphere interactions: the root microbiome. At this stage the suggestion is to target 6 invited speakers, and perhaps encourage a half-day session with submitted papers on that topic. Any other suggestions for possible speakers or ideas are most welcome.

Possible speakers for the Weresub lecturer in 2012 were discussed and several suggestions made. Hugues will consult further with Shannon Berch this coming fall. Judges for the 2012 Cinq-Mars are Michele Piercey-Normore and Hugues, as the alternate.

We continued with discussions related to difficulties in retaining mycology and mycologists on the Canadian scene as well as who advocates on behalf of mycologists and mycology in Canada - representative or contact persons to serve as links to other international organizers (IMC, ICOM, etc) - a topic also brought forward by Keith Seifert last year. We pondered why there appears to be a loss of interest in mycology in Canadian Universities - despite general interest in fungi, citing perhaps a lack of courses and a lack of visibility to attract students. Topics to generate interest might include cooking with mushrooms, poisonous and beneficial mushrooms, food and medicinal properties, the challenges of taxonomy etc, as well as emphases on fungal associations and linkages (mycorrhiza, lichen, etc). One suggestion included more effort to link the general public with CBA mycologists, and possibly create a list of amateur mycology clubs across Canada, in order to facilitate an information exchange.

As always, we happily welcome anyone interested in joining the myco-section, as well as all myco-comments/thoughts!

Hugues Massicotte (Shannon Berch in absentia)

## Plant Development Section

This year we had a successful Plant Development meeting in Halifax. Fifteen members participated in the section meeting including new students. The Plant Development section would like to thank Dr. Rodger Evans for judging students oral presentations for the "Lionel Cinq-Mars Award" and Dr. Frédérique Guinel for organizing the Lionel Cinq-Mars judges in Halifax. Dr. Christian Lacroix will be the judge for the Lionel Cinq-Mars Award and Dr. Cindy Ross Friedman as alternate for next year joint meeting with BSA in Columbus, USA. Christina Lord won the Taylor A. Steeves Award for the best paper in Plant development, Structure or Morphology. The plant development section would like to thank Dr. Moira Galway for the task of judging this award. During the meeting it was discussed that awards should be promoted and Dr. Christian Lacroix will advertise the CBA/ABC award notices in "Botany". Students are encouraged to submit applications for the Taylor A. Steeves Award to the chair of the development section (Dr. Arunika Gunawardena, Biology Department, Dalhousie University) [arunika.gunawardena@dal.ca](mailto:arunika.gunawardena@dal.ca) before March 31st 2012. This award was established to honour Taylor Steeves for his numerous contributions to the CBA and to botany. We discussed having a joint symposium title: "From Model to Non-Model: The Future of Plant Development." at the Columbus meeting. Dr. Rodger Evans has already contacted Dr. Bruce Kirchoff, new chair developmental section/BSA and they are happy to consider co-sponsoring this symposium. We will need to submit a formal application sometime in September. More suggestions are welcome!

Arunika Gunawardena

## Ecology and Conservation Section

Une autre année de passée et la section écologie et conservation de l'ABC continue à être occupée. À Plantes Canada 2011, le symposium "Les changements climatiques : Les plantes à la course au Canada" a été un franc succès. Il y a eu beaucoup de discussion autour des enjeux de conservation, de réhabilitation, de distribution et utilisation traditionnelle des plantes natives de la côte ouest, au nord et à la côte est du Canada. Nous voudrions remercier les présentateurs et l'audience pour leur participation. La section a aussi organisé informellement une petite discussion sur la communication et la situation de la botanique au Canada. Des activités ont été suggérées et sont présentées dans la note Situation de la botanique au Canada. (p.51) À la réunion de la section, plusieurs suggestions ont été faites quant aux activités à venir dans les deux prochaines années. Premièrement, nous avons proposé pour la conférence de 2012 qui se tiendra à Columbus, Ohio, conjointement avec la BSA, un symposium sur les leçons apprises des transplantations ou relocalisation d'espèces en péril. Le but de ce symposium est d'entamer la mise à jour de notre document de position que nous avons depuis longtemps sur les transplantations des espèces en péril. Au cours de l'année qui suivra, un sous comité sera en charge de revisiter les enjeux face à ce sujet. Les participants de la table ronde à Ottawa en 2010 ont trouvé important de revisiter cet enjeu. Nous invitons les membres qui seraient intéressés à nous contacter dans les prochains mois afin que nous aillions une équipe sur pieds bientôt. Dans la même veine, nous voulons aussi inviter les membres qui seraient prêts à se porter volontaires pour juger les

conférence de 2012 pour les prix Lionel Cinq-Mars et Iain et Sylvia Taylor. Ces prix sont très importants pour l'association et votre aide sera des plus appréciées. Pour l'instant Marian Munro s'est portée volontaire pour les deux!

Un autre prix important cette fois-ci pour la section est le Stan Rowe qui est donné à chaque année à un étudiant (souvent récemment gradué) qui a publié un excellent article dans un journal arbitré. Dans les dernières années, le nombre de nominations a diminué. Afin de contrer à cet enjeu, nous voudrions encourager les membres à nommer des candidats (soit de leur propre labo or d'un collègue) ou d'identifier des articles publiés récemment qui proviendraient d'étudiants. Les critères se trouvent sur le site web à ... Finalement, un autre sujet qui a été abordé à la table ronde à Ottawa en 2010 et que nous voulons commencer à organiser est celui de l'acquisition de terres et d'autres initiatives semblables pour la conservation de milieu naturel et d'espèces en péril. Une fois de plus nous invitons les membres intéressés à nous contacter afin de former un sous-comité sur ce sujet. La plupart des activités auront lieu plutôt en 2012-2013.

Nous continuons à vous encourager à soumettre vos idées et à participer aux activités que nous initions. La vitalité de la section et de l'association se base sur les activités et les interactions que nous avons et le besoin d'aller de l'avant sur des enjeux se reliant à l'écologie et la conservation. Et ce ne sont pas les enjeux qui manquent!

Another year has passed and the Ecology and Conservation section of the CBA remains busy. The symposium "Climate change: Canada's plants on the run!" was a great success. Issues of species conservation, restoration, distribution and traditional uses of plants were explored through examples from the west coast, the north and the east coast. We would like to thank all presenters and the audience for their participation. The section also held an informal discussion on the communication and the situation of Botany in Canada. Some actions have been proposed (see note: Current state of the plant sciences in the United States... are we in the same boat in Canada? (page 51).

At the section meeting, ideas were suggested for the next couple of years. First of all, we have proposed for the 2012 joint meeting with the BSA in Columbus, Ohio, a symposium on lessons learned from transplantations and relocation of species at risk. This symposium will be the first step towards revisiting the position paper that has been written quite a while ago for the association on transplantation. It was felt important during the round table discussion of 2010 in Ottawa to revisit this issue. We would like to invite members interested in this topic to contact us as a subcommittee will be formed to work on this in the next few months.

Through this note, we would also like to invite volunteers for judging oral or poster presentation of our students at next year's meeting for the Lionel Cinq-Mars and Iain and Sylvia Taylor Awards. These awards are very important for our association and your help will be greatly appreciated. At the moment, only Marian Munro has volunteered for both!

Another award that is important this time for our section is the Stan Rowe Award which is given to a student who has published an excellent manuscript in a peer review journal (see criteria on the web...). In the past couple of years the number of nominations has declined. We encourage all members to nominate student's papers (whether from their own lab or from a colleagues) or to identify papers that have been published by a student and could be considered for the award.

Finally, another subject that was proposed at the 2010

Ottawa meeting and which we would like to initiate some action is the question of the acquisition of lands and other similar initiatives for species at risk or natural habitat conservation. Again we would like to invite people interested in this topic to contact us. Another subcommittee will be formed to work on this with most of the work being in 2012-2013.

Please continue submitting ideas to the section. Its vitality reflects the enthusiasm that we all have for the association and the issues related to ecology and conservation in Canada. And we certainly are not lacking of issues to deal with!

Thanks,

Merci,

Liette Vasseur & Art Fredeen (co-chairs of Ecology and Conservation Section)

## Teaching Section

The teaching section held a very successful and well attended symposium titled "Evaluating student learning- how can we tell if our assignments are making a difference?", which was co-organized with the CSPP teaching section in Halifax. Many thanks to Lyn Baldwin for her wonderful opening keynote presentation, as well as to Frédérique Guinel and John Markham for their presentations, in addition to organizing the sessions - excellent information! Thanks to esteemed panelists, Lyn Baldwin, Janice Eddington, Norm Hüner, and Christian Lacroix for their participation, and to Hugues Massicotte, Marian Munro, and Anja Geitmann for scheduling, sponsorship, and excellent support!

Thanks to Christine Maxwell for organizing The Iain and Sylvia Taylor poster judging this year, as well as for judging alongside Moira Galway, John Markham, and Cindy Ross Friedman.

The section meeting was also very well attended, possibly because a lunch was provided!

There was discussion and suggestions for symposia for the joint conference with the BSA in Columbus Ohio in 2012 "The Next Generation"

1. The decline in taxonomists and botanists in general – how do we ensure enough botanists are trained and will be hired to replace the retiring taxonomists and botanists in the future? Is the trend seen in Canada the same as that seen in the US? Hugues M. reminded the group that the theme for the 2012 conference is "The Future in Plant Science/The Next Generation" and this suggestion would fit within the theme. (For more on this subject see the article by Liette Vasseur on page 51 of this issue.)

2. The importance of undergraduate research .

3. 3MT (= three minute thesis) – how to tell a story in three minutes. Iain T. noted a problem identified by the UBC graduate program, i.e. that many doctoral students are not employed because they cannot be concise. A 3MT demonstration could help teach graduate students to be more concise. One suggestion was to invite professors to teach for three minutes.

Frédérique Guinel agreed to contact Iain Taylor and the chair of the Botanical Society of America (BSA) Teaching Section, Stokes Baker, to take these ideas forward for consideration for 2012.

Marian Munro, Teaching Section Webmaster is looking for articles in French or English for the website. Articles are also needed for the Bulletin. A suggestion was made to post articles or supplementary information cited in the presentations this year. Speakers can also share

Powerpoint presentations. The website is:

<http://www.teachingbotany.org>

Judges for Iain and Sylvia Taylor poster competition in 2012: Christine M. (chief judge) along with Hugo Cota-Sanchez, Marian Munro, and Santokh S. (alternate: Christina L., a Ph.D. student)

Cindy Ross Friedman has stepped down as Chair of the section, and Santokh Singh has agreed to take the position. A round of applause was given to Cindy for her chairmanship for the past few years.

Cindy Ross Friedman.



Panel discussion in the teaching section symposium.

From left to right, John Markham, Chair, Lyn Baldwin, Christian Lacroix, Janice Eddington and Norm Hüner.



Lyn Baldwin answers questions after her presentation at the Teaching Section symposium.



John Markham giving his presentation at the Teaching Section symposium.

# Association Awards

## MAJOR ASSOCIATION AWARDS

Special Acknowledgment: Once more, we owe Iain Taylor and David Sweet a great debt of gratitude for taking on the task on making the medals and awards for this years presentations.

### The Lawson Medal

First awarded at the 1969 Annual Meeting, the Lawson Medal, the most prestigious award of the CBA/ABC, was established to provide a collective, formal expression of the admiration and respect of botanists in Canada for excellence in the contribution of individuals to Canadian botany. It is named in honour of Dr. George Lawson, who is generally regarded as Canada's first professional botanist. Lawson Medals may be awarded each year in two categories of eligibility:

(A) Recognition of a single outstanding contribution to botanical knowledge

(B) Recognition of cumulative, lifetime contributions to Canadian botany

This year, the CBA/ABC is pleased to award the Lawson medal to co-authors Larry Peterson, Carol Peterson and Lewis Melville in recognition of their outstanding contribution in the form of their book entitled: "Teaching Plant Anatomy Through Creative Laboratory Exercises", published in 2008 by NRC Press. Over the past two and a half years, "Teaching Plant Anatomy" has received many favourable reviews from members of prestigious scientific societies around the world.

The authors are well known by many of us. Dr. Larry Peterson is internationally renowned for his research on symbiotic associations between fungi and roots and has taught many courses in botany, including plant anatomy. He has received numerous awards for teaching and research, and is a Fellow of the Royal Society of Canada. He is professor emeritus at U of Guelph. Dr. Carol A. Peterson has developed and taught courses in botany - plant anatomy. She is internationally renowned for her research on the structure and function of plant roots, and recently won the Gleb Krotkov Award for her contributions to the Canadian Society of Plant Physiologists. She is professor emerita at the U of Waterloo. Lewis Melville was a Research Associate in Larry Peterson's lab until 2009 and has contributed to research and teaching for over 20 years. He is the co-author of numerous research publications. Following early retirement from U of Guelph, Lewis is now pursuing musical ventures full time, including writing songs and performing in several bands. The following are a few excerpts from the glowing letters of support received regarding their recently published book:



Lawson Medal winners: (left to right). Carol Peterson, Larry Peterson, and far right, Lewis Melville, with President Hugues Massicotte.

*"Although a number of new plant anatomy texts have been published in recent years, none is as innovative, exciting and user-friendly as "Teaching Plant Anatomy Through Creative Laboratory Exercises" by Peterson, Peterson and Melville. What makes this book so usable from high school biology courses on through to upper level university plant structure labs is the wealth of experience that the authors have incorporated into this comprehensive clearly illustrated text. Using mostly photomicrographs of hand sections and wonderfully clear colour illustrations, they cover all aspects of plant structure from organelles to organs. The book also outlines some easy to use techniques, such as hand sections and clearings and macerations, which will certainly be very useful for any plant related lab. This book really does bring plant anatomy to life"*

*"This book has been one of our best sellers ever since we published it, which is testimony to its usefulness"*

*"When it was released, we did have several very attractive monographs on display but "Teaching Plant Anatomy" was the prime focus. Very quickly, we sold all of the 50 books that we had brought with us, including about 20 that were badly damaged after the shipping company managed to drop them in a large puddle just before they reached us!" (They were indeed flying off the shelf...)*

*"I want to thank you for publishing "Teaching Plant Anatomy Through Creative Laboratory Exercises". I have been using it as a reference/resource in teaching Plant Morphology and Anatomy and have found it to be extremely useful. I'm having my students do much more of their own sectioning and slide preparation rather than using so many prepared slides. The result has been dramatic; students are much more engaged in what they're learning and more inquisitive about what they're seeing. They are also more interested in branching out and pursuing questions of their own, because they know they can and they have the skills to do so."*

*"As a first year faculty member here at my University, I am the lecturer and laboratory instructor for the courses: Developmental Plant Anatomy and Plant Diversity. I taught Developmental Plant Anatomy during my first semester of*

teaching and selected "Teaching Plant Anatomy" as the required laboratory textbook for the students. The textbook is an excellent guide for teaching practical plant anatomy since it is easy to follow, has colored illustrations, and most importantly, a set-by-step photo guide of "how to". This last point is what students found the textbook to be the most useful."

"The general importance of the book should not be underestimated. Fewer plant anatomists are being trained, but this book will ensure that there is a high quality resource available to researchers in plant biology. In an age when the organism appears less and less important for biologists this book is heartening to see."

"This really is one of the most notable publication in the area of plant anatomy since the publication of Katherine Esau's 2<sup>nd</sup> edition of "Anatomy of seed plants"

"I knew immediately that this would become a best seller because it was done so very well in an area where very few excel. It teaches how to understand the complexities of plants through serious, but doable laboratory work at all levels. So often even in our Universities the study of plant anatomy is by-passed (it's just too difficult to understand), but now that reason has been completely nullified thanks to this outstanding contribution to the natural sciences."

"Of the nearly one-hundred monographs published by the Press, this has been in the top five in sales, and probably the most positively and enthusiastically received by scholars."

At a personal level, I have witnessed much of the hard work that went into the production of this book by three people that I have admired all these many years, and so I am delighted that their efforts should be recognized here by the CBA/ABC, today! Please join me in congratulating Larry, Carol and Lewis.

## Mary E. Elliott Service Award

The Mary Elliott Service Award is given to an individual for meritorious service to CBA/ABC. It was first awarded in 1978 in memory of Mary E. Elliott. Before her untimely death in 1976, she had just completed four consecutive years of service on the Board of Directors (as Secretary, Vice President and President), and was just beginning her term as Past President. 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.

The Canadian Botanical Association is pleased, this year, to present the Mary Elliott award for long term service to the Association to Martin Dubé (Université de Moncton, campus d'Edmundston). Il est donc mon privilège de vous annoncer que le lauréat 2011 du prix Mary Elliott est Martin Dubé, de l'Université de Moncton, campus d'Edmundston.

Martin Dubé truly embodies the spirit of the award. He was a tireless worker for the association, and successfully edited the Bulletin from 2002 (Vol 35 no1) until 2006 (Vol 39 no 1), making significant changes to the format and also establishing it as an online newsletter. He was a pioneer of the electronic era, comme on dit. This was an enormous amount of work, especially when he was carrying a full teaching load! He was able to convince members of the CBA to start thinking about having our Bulletin in an electronic format. This was effectively accomplished in 2007. It saved money and also paper! He was green before his time!

Another of Martin's major contributions to the Association was the digitization of all of the Bulletins up until his last volume, Vol 39. It was (and still is) the most significant archival contribution to the Association to date. His efforts to digitize each Bulletin of the Association since the first issue (1968) has ensured that the history of our organization, as documented in our newsletters, is easily accessible and entirely searchable in a user-friendly CD. The digital repository that he singlehandedly designed and produced was significant and will be of great benefit to the Association for years to come. These CDs, I understand, are still available for a cost of \$5.00.

*(Un exploit grandiose a été celui de numériser tous les numéros du Bulletin de l'ABC publiés depuis le tout début, soit 1968 jusqu'en 2006. Cette tâche monumentale a été complétée durant son terme et est toujours disponible au coût de \$5.00! En même temps, il a su convaincre les membres qu'il serait temps de penser à la publication électronique (qui a effectivement été initiée en 2007) en partie pour sauver des sous mais aussi du papier.)*

Martin is a generous soul, who assists others when critically needed and in a timely fashion, and our current Bulletin editor, Christine will attest to this.

Martin is a plant taxonomist who understands the importance and need to continue to preserve specimens in herbaria across the world. He has been instrumental in helping with the reconstruction of the Erik Leonard Ekman National Herbarium, the only herbarium in Haiti, located in the capital of Port-au-Prince. When he started this work in 1997, the Herbarium was in very bad shape. Martin now continues his efforts to help with this reconstruction after the earthquake of 2010, furthering botanical interests abroad!



Martin Dubé receiving his award from Hugues Massicotte. Photo: Édith Bourget

(continued)

In conclusion, by editing the Bulletin for four years and by producing a historical record of the newsletters which will be valuable for years to come, and for his tireless international effort, we are delighted to present The Mary Elliott Award to Martin Dubé. Please accept our most heartfelt congratulations.

## AWARDS FOR PAPERS PUBLISHED BY STUDENTS

### J. Stan Rowe Award (\$500)

This award was established to celebrate the life and work of outstanding Canadian Plant Ecologist Stan Rowe (born in 1918 and left us in April 2004). We would like to thank Liette Vasseur and Art Fredeen for their adjudication.

This year, the winner of the Rowe award was Cameron Carlyle for his paper "Using three pairs of competitive indices to test for changes in plant competition under different resource and disturbance levels" in the Journal of Vegetation Science 21: 1025 - 1034. (co-authored by L.H. Fraser and R. Turkington)

The paper was described by the committee as a "Well written, very interesting analysis of competition indices, with clear and strong experimental design".



Cameron Carlyle

### Taylor Steeves Award (\$500)

This award was established to honour renowned botanist Taylor Steeves who has made numerous contributions to the CBA/ABC and to botanical sciences. It is awarded in recognition of the best paper published in the field of plant development by a graduate student. We are grateful to Moira Galway (chief judge), Art Davis (U of Saskatchewan) and Usher Posluszny (U of Guelph) for the adjudication.

This year, the award went to Christina Lord for her paper entitled: "Isolation of leaf protoplasts from the submerged aquatic monocot *Aponogeton madagascariensis*" published in 2010 in The American Journal of Plant Science and Biotechnology and co-authored with Arunika Gunawardena. It is a paper involving the use of novel material (lace plant), reflects a very rigorous and well laid out research problem and is well-presented, well written and documented.



Christina Lord

### Luella K. Weresub Award (\$1000)

This award was established in the memory of Dr. Luella Kayla Weresub (1919-1979), a well-known Canadian mycologist who had worked at the Biosystematics Research Institute of Agriculture Canada since 1957. Dr. Weresub was a very active member of CBA/ABC, serving as a Director from 1971 to 1973.

We are grateful to Jim Traquair and Shannon Berch who were the adjudicators for the submissions this year.

The award this year goes to Troy McMullin, for "Relationships between the structural complexity and lichen community in coniferous forests of southwestern Nova Scotia" co-authored by Richard Troy McMullin, Peter N. Duinker, David H.S. Richardson, Robert P. Cameron, David C. Hamilton, Steven G. Newmaster, and published in Forest Ecology and Management. The judges felt that "This is an excellent paper describing comprehensive and sophisticated ecological research on the lichens of old-growth forests in Nova Scotia. The need for the research is clearly stated along with a hypothesis based on the literature and author's observations and research. The methodology and the results are clear and succinct. The complex environmental factors and their interactions governing the establishment and maintenance of lichen diversity in coniferous forests of southwestern Nova Scotia are clearly documented.

Appropriate conclusions in line with current models lead into practical recommendations for the preservation of lichen diversity through maintenance of "unharvested forest" stands rather than "individual old trees or clumps". This well-written paper will no doubt serve as a source of sustainable management recommendations for other Acadian forest regions in North America.



Troy McMullin receiving his award from Hugues Massicotte

## Plant Canada Special Award

We did not have an Alf Erling Porsild Award. However, we had a special PC award given as certificates of recognition to Art Fredeen (for best T-shirt design) and Christian Lacroix (for honorable mention in the T-shirt design competition).

Art Fredeen (left) and Christian Lacroix receive their awards from Marian Munro (centre)



## Lionel Cinq-Mars Award (presented at the extended AGM special ceremony on July 21st)

This award was established in 1976 for the best oral presentation by a student of his or her own research, as a contributed paper at the Annual General Meeting. In 1978, the award was named in memory of Lionel Cinq-Mars, a charter member of CBA/ABC and a member of the first CBA Executive (1965-66). Cinq-Mars (1919-1973) was an expert field botanist, amassing a considerable personal herbarium and was considered an expert on the genera *Viola* and *Amelanchier*.

Oral presentations were evaluated by a panel of judges chaired by Frédérique Guinel, President-Elect, and consisted of:

- For the Systematics and Phytogeography Section: Hugo Cota-Sanchez
- For the Plant Development Section: Rodger Evans and Frédérique Guinel
- For the Ecology and Conservation Section: David Garbary and Art Fredeen
- For the Mycology Section: Michele Piercey-Normore and Hugues Massicotte.

There were 12 participants in the competition who were all excellent. It was thus difficult to choose the best one among them. We decided to give an honorable mention and one award.

The Honorable mention goes to Hazel Cameron-Inglis from Lynn Baldwin's lab at Thompson Rivers University. Hazel's presentation was given with great confidence; it contained great graphics which were logically explained. All judges were impressed by Hazel's performance, especially since she is a 4<sup>th</sup>-year student. Congratulations!

The Lionel Cinq-Mars Award this year goes to Lauren Rimmmler, a student from Anne-Gaëlle Rolland-Lagan at the University of Ottawa. The research presented by Lauren was innovative and interesting. Lauren used mathematical models to study the development and growth of leaves. In her presentation, she demonstrated her communication skills by explaining a difficult concept well. She used nice graphics with data based on a large sample size. All judges congratulate Lauren.



Lauren Rimmmler (centre) receiving her award from Frédérique Guinel and Hugues Massicotte.



Hazel Cameron-Inglis (honorable mention), receiving her award from Frédérique Guinel and Hugues Massicotte.

## Iain and Sylvia Taylor Poster Award

The CBA/ABC gives an award for the best student poster presented at the Annual Meeting. The award is made in honor of Iain and Sylvia Taylor, two outstanding members who have for many years actively contributed to the development of the CBA, and continue to be involved to this day. Our panel of judges was spearheaded by Christine Maxwell (our Bulletin Editor), with other judges being Cindy Ross-Friedman (Thompson Rivers University), Moira Galway (St Francis-Xavier U) and John Markham, University of Manitoba.

The 2011 award was presented by Christine Maxwell, and Iain and Sylvia Taylor. The committee felt that selection for Best Poster was a challenging task and awarded 2 co-winners, and 2 honorable mentions.

The two co-winners (\$250 each) were:

Md. Shafiullah - CBA-S2 Comparative Gene Expression Patterns in Aerial and Aquatic forms of *Myriophyllum aquaticum*.  
Md. Shafiullah and Christian Lacroix, Dept. of Biology, University of Prince Edward Island.

Kate Crosby - CBA-S18 Phylogeography and colonization history of the invasive Mediterranean annual grass *Avena barbata* in California. Kate Crosby and Robert G. Latta, Department of Biology Dalhousie University, Halifax, NS.

Two honorable mentions went to:

J. P. Ross - CBA-S16 Determination of diurnal rhythms in stem and leaf elongation rate in barley, oats, and corn, using rotary motion sensors. J. P. Ross, J. Kusakina and D. N. Kristie Department of Biology, Acadia University, Wolfville, N.S. and <sup>2</sup>Department of Biology, University of York, York, UK.

C. Huynh - CBA-S5 E107 shoot-controlled low nodulating pea mutant: a tool to study the regulation of symbioses. C. Huynh F. C. Guinel Department of Biology, Faculty of Science, Wilfrid Laurier University, Waterloo, Ontario.



The Iain and Sylvia Taylor Poster awards  
From left to right. Iain and Sylvia Taylor, Christian Huynh, M.D. Shafiullah, Kate Crosby, Christine Maxwell, and Hugues Massicotte.

Missing from photo: James Ross shown below.



## STUDENT TRAVEL AWARDS

The President thanked the excellent Award Committee members: John Markham (U of Manitoba), Arunika Gunawardena (Dalhousie U.), and Lynn Gillespie (Can Museum of Nature and U of Ottawa). They were thoughtful and diligent with respect to the Winterhalder, Macoun, Elliott and Lawson Awards, and we owe them a great debt of gratitude.

### Keith Winterhalder Undergraduate Travel Award

This award was established in 2006 and is in honor of the late Keith Winterhalder, a long time member and former president of the CBA/ABC, for his outstanding contributions to the Association and for his never-failing interest and encouragement of the student members of the CBA/ABC. It is intended to provide partial financial assistance for travel to the Annual Meeting to an undergraduate student (or students).

This year, we are pleased to give the award to: Hazel Cameron-Inglis, an outstanding Honour student in Biological Sciences at Thompson Rivers University.

Hazel Cameron-Inglis receiving her award.



### John Macoun Travel Bursary

This award, named to honor John Macoun, was established in 1988 to provide partial financial assistance for travel to the Annual Meeting to students presenting a paper in the Lionel Cinq-Mars competition or a poster in the Taylor competition. The Macoun fund continues to be replenished by funds raised during the many botanical auctions we have had over the years, plus additional donations.

John Macoun (born in Ireland, 1831-1920) was official botanist on five major Canadian expeditions and, in 1881, was appointed Botanist to the Geological and Natural History Survey of Canada. He was also a member of the Botanical Society

of Canada (1860-62) and was a founding fellow of the Royal Society of Canada in 1882. He had an outstanding career as a traveling scientist.

This year, travel awards were presented to 6 deserving students.

Andrew Trant, a PhD student from Memorial University, Troy McMullin, a PhD student from the University of Guelph, Claire Gilmour, a MSc student at the University of Ottawa, Sarangi Athukorala, a Ph.D student at the University of Manitoba, Christian Huynh, a MSc student at Wilfrid Laurier University, Stephanie Riviere, a MSc student, also at Wilfrid Laurier University.



Macoun Travel Award winners receive their awards from Hugues Massicotte. From left to right: Troy McMullin, Stephanie Riviere, Christian Huynh, and Claire Gilmour.

## Regional Undergraduate Awards

Conference: 2011 BC Interior "Inter-University (formerly University College) Science Poster Day" held in conjunction with the "Undergraduate Innovation and Research Conference at Thompson Rivers University" took place on Friday April 1st, 2011 in Kamloops, British Columbia.

The winner of the CBA/ABC Regional Undergraduate Award was Siobhan Crawford for her poster titled "Biofuel crop growth on amended mine tailings: are 'green mines possible?'" Her supervisor was Dr. Wendy Gardner, co-supervisors: Dr. John Karakatsoulis and Dr. John Church (Natural Resource Sciences, Thompson Rivers University.)



Siobhan Crawford receiving her award from Dr. Lyn Baldwin, Thompson Rivers University.

## University of British Columbia's Botany Graduate Students' Symposium

by Heather McFarlane

The annual University of British Columbia's Botany Graduate Students' Symposium was held on April 8th 2011. The student-run symposium provides a venue for graduate students to present and share their work within the university in a semi-formal setting. This year's symposium was a venue for over 25 student talks and posters, representing roughly 50% of the students in our department. Graduate students from the department of Botany, Zoology, and Forestry participated in the symposium, including students from the Beaty Biodiversity Centre, the Michael Smith Laboratories, and the Bamfield Marine Sciences Centre. Post doctoral researchers, research associates, teaching faculty, and research faculty were all an active part of the symposium. Congratulations to our Canadian Botanical Association prize winner for best student talk: Teagen Quilichini "A perplexing biopolymer: how autofluorescence is uncovering clues to sporopollenin composition and assembly" and for best student poster: Sandra Keerthisinghe "MUSTACHES regulates bilateral symmetry generation in stomata". Both winners received \$100 and a one-year membership to the association. Special thanks are extended to our sponsors: Bioline, Bio-Rad, The Canadian Botanical Association, Mount Baker Bio, and the UBC Department of Botany, and to all of the volunteers who made this exciting day of research possible.

*Editor's note: Letters of thanks were received from the students, who have also contributed profiles. See page 48.*



Winners of the CBA/ABC awards. Teagen Quilichini on left and Sandra Keerthisinghe on right.

## Graduate Student Profiles

We are interested in hearing about the research that Canadian graduate students are involved in! Please send your profiles to the Editor of this newsletter at [cba.abc.bulletin@gmail.com](mailto:cba.abc.bulletin@gmail.com). Profiles should be no longer than 250 words, and you should include a photo.

### Michael Wright. Wilfrid Laurier University.

I have always had an interest in the natural world, wanting to know what everything was and how things worked. My undergraduate studies drew me towards developing a deeper understanding of biological phenomena, particularly the origins of biodiversity and associated evolutionary processes. A course in systematic botany with Dr. Mihai Costea at Wilfrid Laurier University sealed the deal – I found plant diversity and evolution fascinating and beautiful, and was amazed by parasitic plants that have traded autonomy for a much more precarious lifestyle! Needless to say, I was hooked.

For the past three years I have studied the parasitic plant genus *Cuscuta* in the lab of Dr. Mihai Costea. For my honours thesis, I worked on a revision of the taxonomy of a group of dodders from western North America. I explored the evolution of reproductive biology within *Cuscuta* for my Master's thesis, with particular focus on floral morphology, anatomy, and pollen production. This year, I am excited to begin my PhD with Dr. Saša Stefanović at the University of Toronto, where I will continue to study the biodiversity and evolution of *Cuscuta* with microsatellite markers and molecular cytogenetics. My long-term goal is to develop deeper understanding of the evolution of parasitism in plants, with a focus on evolutionary transitions between host specialization and generalism, and the ecology of parasite virulence. In particular, I am interested in the roles of polyploidy, aneuploidy, supernumerary chromosomes and chromosomal rearrangements in ecotypification and speciation within parasites.



Michael, (bottom left) with a heavy *Cuscuta* infestation in Mexico

### Sandra Keerthisinghe, Department of Botany, University of British Columbia

While in the final year of my B.Sc. program at UBC, I volunteered in Dr. Fred Sack's lab, during the course of which I became increasingly engaged in conducting research in the field of plant cell biology and genetics, which I found to be very interesting. As a result, I joined the lab as a M.Sc. student. The Sack lab investigates how cells co-ordinate the regulation of their development, differentiation and morphogenesis, utilizing stomata, which are specialized cellular structures found on the shoot epidermis, as a model system. My Master's project focused on further characterization of the receptor-like kinase MUSTACHES (MUS), a novel signalling protein identified by Dr. Jeannette Nadeau, a former member of the Sack lab. MUS appears to be involved in the generation of proper stomatal morphogenesis, a highly co-ordinated event which imparts bilateral symmetry to the two guard cells of the stomata, which is essential for proper stomatal functioning. My work demonstrated that MUS may be required to maintain the polarity of microtubule dynamics. As well, I extensively characterized MUS localization patterns, and the point of origin of MUS action. Currently, I am continuing my work in the Sack Lab as a PhD candidate, with the objective of further characterizing microtubule regulation by MUS, and further defining the MUS signalling pathway by identifying cellular components involved.

I thank the Canadian Botanical Association, for granting the opportunity to share my work, as well as for the generous support offered to the Botany Graduate Students' Association of UBC.



Sandra Keerthisinghe

### Teagen Quilichini, Department of Botany, University of British Columbia

My research is focused on understanding the composition and formation of sporopollenin. Sporopollenin is a highly resistant biopolymer in spore and pollen walls, which protects these structures from environmental stresses. I am interested in understanding how the components of the outer pollen wall are exported from their site of synthesis in the tapetum to the anther locule for polymerization on the surface of developing pollen grains. In particular, I am studying an ABC transport protein thought to function in sporopollenin export from tapetum cells. I plan to use the *abcg26* mutant as a tool to investigate the nature of sporopollenin precursors *in planta*.

I am currently at UBC under the joint supervision of Dr. Carl Douglas and Dr. Lacey Samuels, as part of the "Working on Walls" network funded by NSERC. Before starting graduate school in 2008, I studied with Dr. Douglas Muench at the University of Calgary.



Teagen Quilichini

## Obituary

### **Dr. Leslie Laking, CM, LLD, BSA, FAIC, Kew Cert.\* Director Emeritus of Royal Botanical Gardens (1916-2011)**

*Contributed by Dr. David A. Galbraith, Ph.D.*

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Few Canadians have brought plants and the public together with as much style, enthusiasm and credibility as Dr. Leslie ("Les") Laking. Throughout his career as Director of Royal Botanical Gardens (RBG; in Hamilton and Burlington, Ontario) from 1954 to 1981, Laking developed a wide variety of programs that celebrated plants both in cultivation and in nature. He was also a consummate scholar, teaching undergraduate and graduate courses in botany, soils science and landscape architecture at University of Toronto and McMaster University. For those who knew him personally, "real gentleman" and "diplomat" were commonly used to describe Laking, qualities essential to his success in developing and managing as complex an institution as RBG. Born on 22 September 1916 in Freelon, Ontario, Laking was fascinated with everything alive and wild. He attended the Ontario Agricultural College (OAC), graduating in 1939 with a Bachelor of Science in Agriculture. He then went to Royal Botanic Gardens, Kew, in England as an exchange student until near the end of the war. On returning to Canada he enrolled as a botany graduate student at University of Toronto. However, a desire to serve during the war prompted Laking to cut short his graduate studies and join the Canadian Meteorological Service as a weather forecaster and instructor for the Commonwealth Air Training Scheme. After the war Laking worked as a soils specialist on a Thames River Valley conservation survey. In 1946 he met Thomas Baker McQuesten, a Hamilton civic leader considered one of RBG's founders, and was hired on July 1<sup>st</sup> as RBG's Assistant Director and Horticulturist. Dr. Norman Radforth, who had recently completed graduate studies in botany, was appointed Director. They were among the first staff hired by RBG.

In 1946 Laking married Barbara Tarver, a fellow Kew horticulture student. Barbara was an artist who developed many RBG programs in the floral arts. They worked as a team until her death in 1986. In 1961 she organized the volunteers at RBG into the vibrant group now known as the RBG Auxiliary, celebrating its 50<sup>th</sup> Anniversary in 2011. In retirement, Laking was named Honorary President of the Auxiliary. In 1981, when Laking retired they were together honoured as "The Lakings" by the renaming of RBG's Spring Garden as The Laking Garden.

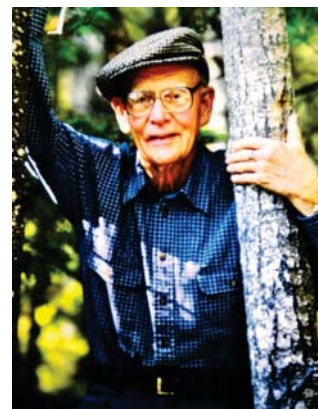
In his 2006 book *Love, Sweat and Soil: A History of Royal Botanical Gardens from 1930 to 1981*, Laking recalled that he was aware of the complex landscape of the area and the developments leading to RBG, even before attending OAC. While still in England, Laking received a press clipping about the Legislature of Ontario passing an "Act Respecting the Royal Botanical Gardens," bringing RBG into existence as a legal entity on the 100<sup>th</sup> Anniversary of Royal Botanic Gardens, Kew becoming a public institution.

The concept of RBG as a mix of protected natural areas, public parks and gardens arose in the 1920s. Under

Hamilton's Parks Board a proposed botanical garden associated with McMaster University grew into a major civic beautification project. A competition was held to design this, the "Northwest

Entrance" to Hamilton, in the late 1920s. The name "Royal Botanical Gardens" was approved by King George V in 1930, more than a decade before the 1941 Act. The Rock Garden, the first of the new Hamilton gardens, opened in 1932. Built in an abandoned gravel quarry with stone moved from the Niagara Escarpment, it has been a fixture on the Hamilton landscape ever since. Several large properties were incorporated into RBG in its early years, including most of Cootes Paradise Marsh (already protected as a fish and bird sanctuary), the former Hendrie family farm (donated to the City of Hamilton as a park), the Rock Garden and others, bringing the total to nearly 1,000 ha. The period during which Laking served as RBG's Director was one of post-war optimism, economic growth and rapid scientific and cultural change. The living collections at RBG grew dramatically in number and composition too. Always with an eye to horticultural trials in Southern Ontario, RBG's collections of lilacs, rhododendrons, crab apples and others became known internationally as living gene banks. The Katie Osborne Lilac Collection is particularly important. It encompasses the largest number of lilac cultivars held in any living collection world-wide, many of which are extremely rare.

Innovative public education programs were developed at the same time as gardens, hiking trails and collections. Shortly after joining the RBG staff in 1946, Laking travelled with Barbara and Dr. Radforth to Brooklyn Botanic Garden to study its public programs, considered some of the most innovative and effective in bringing people together with plants in urban areas. Inspired by this visit and subsequent contacts with other botanical gardens, RBG developed a Children's Garden, a Junior Gardeners' Club that has introduced generations of kids to growing plants themselves and a Junior Naturalists Club that has enjoyed decades of success as well. The construction of RBG's first purpose-built administrative centre, the launch of the Centre for Canadian Historic Horticultural Studies (CCHHS; in partnership with the Dunnington-Grubb Foundation) and the Hendrie Park gardens were all products of Laking's quiet, confident and capable administration and leadership. Horticultural science was a major theme for Laking. In addition to promoting ties with industry and many horticultural societies, he developed RBG into a centre of excellence in woody plant ornamental horticulture, with world-respected specialists in the taxonomy, cultivation and breeding of lilacs. Horticultural therapy also emerged as a



*Dr. Leslie Laking relaxing near the family cottage at Bancroft, Ontario in 2000. Photograph courtesy of the Laking family.*

discipline during Laking's time. Ray Halward, RBG's first plant propagator, developed strong ties to the Ontario industry and to horticultural therapy, creating Ontario's first training program in horticulture as a form of recreational therapy. The plant breeding program resulted in introductions of *Aster*, *Buxus*, *Spiraea* and *Syringa* cultivars. Involving many horticultural societies and the horticultural industry in the development of RBG contributed to its development. Dr. Jim Pringle, RBG's Plant Taxonomist, noted "Les's down-to-earth demeanour and obvious knowledge of the practical aspects of horticulture greatly contributed to rapport with and support from the horticultural societies, which was also important to RBG getting off to a good start. A newly founded institution is fragile, and these ties were important. This is an area in which multiple solitudes often develop -- a lack of rapport among the trades, the academics, the executives, and others, to the detriment of some botanical gardens. I feel that Les's (and Ray's) strong ties with the trades, developed and fostered in Les's case in part by his having attended the OAC and probably by also his early experiences, were of great importance to a major sector of early support for RBG." (pers. comm.) Laking was directly involved in forming several societies, including the Canadian Iris Society, the Rhododendron Society of Canada and the Ontario Regional Lily Society. He was a member of the International Society for Horticultural Science and its Commission on Nomenclature and Cultivar Registration, eventually passing RBG's participation along to RBG's Curator, Freek Vrugtman. Royal Botanical Gardens was named the International Cultivar Registration Authority for *Syringa* in 1974, with Mr. Vrugtman serving as Registrar. A library is a necessity for the work of a botanical garden. The first books and journals owned by RBG arrived in 1947 for staff use. In the 1950s and 1960s Laking promoted the establishment of the botanical, horticultural and ecological library at RBG. In the late 1970s the library was moved into a purpose-built section of an expansion to RBG Centre. Programs were expanded to include a focus on the history of horticulture. The "Nursery and Seed Trade Catalogue Collection", the first of its kind in Canada, as well as other historic horticultural archival materials, were developed managed by Ina Vrugtman, RBG's librarian and Curator of CCHHS.

Although RBG became strongly associated with formal gardens and horticultural programs, the nature sanctuaries became a real system of parks and protected areas under Laking, who saw great value in both kinds of landscapes. An early priority for RBG was a joint program with McMaster University for a residential degree in parks management. Although this program was cancelled before it produced graduates, it brought many of the early staff to RBG, including Laking.

Shortly after becoming RBG's Director, Laking initiated a project to document the spontaneous flora of the nature sanctuaries so that educational programs could be designed around the trails and a nature interpretation centre could be planned. From 1955 to 1959 the Estonian botanist Aleksander Tamsalu worked tirelessly to collect plants in the sanctuaries and develop his own successional theories, eventually collected over 9,800 herbarium specimens. Under Laking's leadership, the RBG Herbarium (HAM) was established, incorporating the original McMaster Botany Department Herbarium, a horticultural herbarium from University of Guelph, and original collections such as Tamsalu's.

Laking was very involved in public education and outreach.

For 13 years he made a weekly radio broadcast on CFRB in Toronto, "Growing Things," that reached out across Ontario. He also was a frequent contributor to magazines featuring garden writing, and won awards for his communications efforts on behalf of horticulture. Laking was also passionate about higher education and was appointed to McMaster University's Botany Department. There he taught plant taxonomy and soils sciences. Barbara McKean, RBG's present Head of Education, recalled fondly his soils sciences courses and his particular knack for introducing students to the practical realities of relationships among soils, plants and nature. Laking taught plant materials in the landscape architecture program at University of Toronto and served on the Senate of the University of Guelph for three years in the 1970s.

In his later years on staff and in those that followed his 1981 retirement, Laking accumulated many awards and accolades. In 1971 he was awarded the Doctor of Laws, *honoris causa*, by both University of Guelph and McMaster University. In 1979 he was named to the Order of Canada, invested in the Order in 1980. Having served as the President of the American Association of Botanical Gardens and Arboreta, he was presented with the AABGA Award of Merit in 1978. It was especially fitting that Dr. Laking received the George Lawson Medal from the Canadian Botanical Association in 1982 for his lifetime achievements. Lawson, professor of Chemistry and Natural History at Queen's College in Kingston (later Queen's University) is considered the "father of botany" in Canada. He founded the Botanical Society of Canada about the same time that he established Canada's first, albeit short-lived, botanical garden, around 1860.

Laking retired in 1981 but remained active in the life of RBG for the next three decades. Laking was named RBG's Director Emeritus in 1996. Mark Runciman, RBG's present CEO, recalled at a public celebration of Laking's life that he had made a point of being quietly available to all of his successors. To everyone who had the privilege of knowing Laking, he was a confidential sounding board, valued colleague and elegant gentleman with a quiet, gentle sense of humour.



Barbara and Leslie Laking receiving special citizen's citations from the City of Burlington in 1975. Photograph courtesy of the Laking family.

(continued)

Dr. Leslie Laking passed away on April 16<sup>th</sup>, 2011 in his 95<sup>th</sup> year. His daughter June died a few weeks later, following a decade and a half of battling cancer. Laking is survived by his son Ron, a landscape architect living in Truro, Nova Scotia, son-in-law Brian Walker, and grandchildren Kelsey, Danica, Yolande, Nicole and Lauren.

\*Member of the Order of Canada, Doctorate of Laws *Honoris Causa*, Bachelor of Science in Agriculture, Fellow of the Agricultural Institute of Canada, RBG Kew Certificate in Horticulture

#### Acknowledgements

Thanks to Jim Pringle, Freek and Ina Vrugtman, Barbara McKean, Elizabeth Avery and Dolf DeJong for their contributions and comments.

#### Recommended Sources

Laking, L. 2006. Love, Sweat and Soil: A History of Royal Botanical Gardens from 1930 to 1981. Royal Botanical Gardens Auxiliary. 179 pp.



## **Current state of the plant sciences in the United States... are we in the same boat in Canada?**

*By Liette Vasseur*

We are all conscious of our roles as plant scientists/botanists and thus, the value of our profession and its importance to the world. Plants are at the bottom of our food webs and pyramid of life and therefore essential for humans, but society generally takes plants and their fundamental importance to all other life for granted. Our economy, well being, and even our survival are based on the roles, functions and services provided by plants as well as their interactions with other biotic and abiotic components of ecosystems. Sustainable use of plants is essential for continued food production, mitigation and adaptation of climate change impacts, control of invasive species, health and well-being, etc.

Given the importance of the plant sciences to society, do we have the botanical capacity to deliver on all these issues and maintain scientific excellence needed to find solutions or sustain society into the future? In the United States, this question has led the Chicago Botanical Garden (with the financial support of the National Fish and Wildlife Foundation) to analyse the situation and prepare a report that was recently released on the status of botanical capacity in the United States. This note summarizes the report (108 pages) and present key points and statistics. The process used in the preparation of this report included a literature review, surveys and workshops in order to capture the viewpoints of different stakeholders from academia to governmental and private sectors.

According to the report, the status of botanical capacity in the United States is in decline. Here are some facts that are spread across the report:

- While the number of undergraduate students graduating with a BSc in biology has steadily increased between 1991 and 2008, the number of graduates in botany increased until 2000 but has since decreased.
- Similarly the number of graduate students (both MSc and PhD) in botany has decreased from 1991 until 2008.
- The number of botany advanced degree programs offered by universities (which was in 1988, 72% of the top 50 universities) are down by 41% with half of these universities having eliminated their botany programs.
- 40% of universities have eliminated plant anatomy/botany courses in the past 5-10 years leaving students dissatisfied with plant course selection.
- Articles published in peer-reviewed journals in conservation and population genetics showed that 72% were on animals with only 26% on plants.
- There is some discrimination in workload and salaries of

botanists versus other professions such as wildlife biologists and microbiologists at the USA federal agencies. Salaries, for example, were \$25,000 lower for botanists than microbiologists.

- In science centres, wildlife staff outnumbered the botanists by 20 to 1.
- 45% of academic and 40% of governmental staff with expertise in botany expect to retire in the next decade with most thinking that their position may be replaced but unfortunately not in the same discipline.

Many more statistics are presented in the report demonstrating the challenges ahead. It is important to note that such a decline in the plant sciences is not only found in the USA. The report also mentions similar declines in China and Australia.

The report goes on to make strong recommendations. Among them (14 in total), better integration of plant science material at the undergraduate level, better linkages between organizations, improvement of the number of staff at the federal level in botany, and improvements in facilitating partnerships to ensure that plant science expertise remains where it is needed.

### **What is the situation in Canada?**

During the Halifax meeting, there was some discussion within the CBA related to the report and the status of botany in the USA and Canada. One question came relatively rapidly, what can we say about Canada? It has been reported that almost all (if not all) Botany departments or programs have been closed and merged with general biology in Canada over the past few decades. But many questions remain regarding the need, the current offerings, the expectations in terms of employment, etc. in the plant sciences. The discussion group that was organized on the second last day of the meeting concluded that it would be important to get a few people interested in this issue and prepare a similar report to that of the United States. Despite funding issues (to be looked at), it would be possible to replicate the study using similar questionnaires. We would like to invite anyone interested in helping in this study to contact Art Fredeen, Liette Vasseur or Hugues Massicotte of the CBA. Over the next few months, a group will be established and examine the possibility to move forward.

# MAJOR INVASIVE ALIEN PLANTS OF NATURAL HABITATS IN CANADA

Paul M. Catling and Gisèle Mitrow

## 1. European Common Reed (often just called Phragmites)

*Phragmites australis* (Cav.) Trin. ex Steud.  
subsp. *australis*



Figure 1. European Common Reed in December.  
Photo taken on Hwy 7 near Perth in southern Ontario by  
P.M. Catling.

## Identification

Common Reed (*Phragmites australis*) looks different from other grasses with plume-like inflorescences (Figures 2-4) and is encountered much more often because the others only very rarely escape from garden plantings in Canada, usually as dumped garden waste. Therefore it is not too difficult to be reasonably sure of its identification.

The other important aspect of identification is that the “plumes” are always present, those of the previous year being present into the spring and early summer before the new plumes are fully developed in the fall. Therefore the “plumes” allow identification throughout the year. The identification difficulty is in distinguishing the native American Common Reed (*Phragmites australis* (Cav.) Trin. ex Steud. subsp. *americanus* Saltonstall, P.M. Peterson and Soreng) from the alien invasive subsp. *australis* (see the key). However, there are a number of considerations if identification to species is to be certain.

Although European Common Reed retains its plume-like inflorescence overwinter, it does eventually shatter unlike the somewhat similar ornamentals, Eulalia (*Miscanthus sinensis* Andersson) and Amur Silvergrass (*Miscanthus sacchariflorus* (Maxim.) Benth.) which are naturally better for indoor flower arrangements. These species of *Miscanthus* also differ in their unbranched inflorescence compared to the extensively branched inflorescences of *Phragmites*. The elongate silky hairs on the species of *Miscanthus* are on and at the base of the glumes, whereas

in the species of *Phragmites* they are on stem sections (rachillas) between the florets. The single –flowered spikelets are paired along the elongated rachis in *Miscanthus* but the 2 – 8 flowered spikelets of *Phragmites* are dispersed throughout the branched inflorescence.



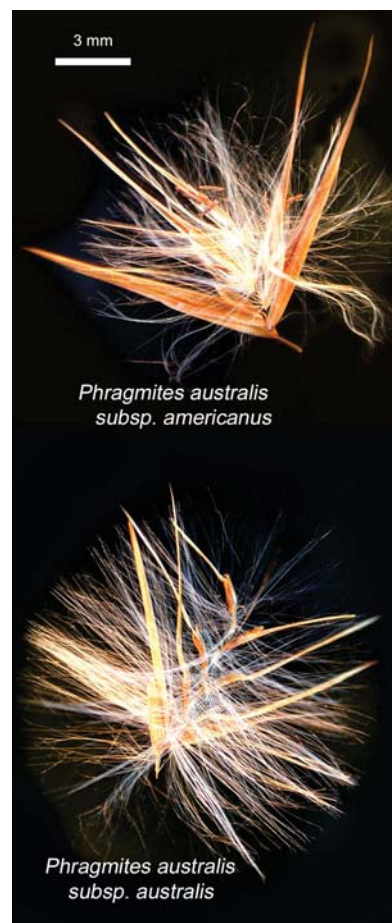
Figure 2. Inflorescences of (from left to right) *Arundo donax* (top left, DAO 212409), *Miscanthus sacchariflorus* (top right, 241916), *Miscanthus sinensis* (middle right, 242100), *Phragmites australis* subsp. *australis* (lower right, 792221), *Phragmites australis* subsp. *americanus* (lower left, 792217). Photos by G. Mitrow and P.M. Catling.

Another Canadian ornamental grass, the Giant Reed (*Arundo donax*), differs in having the silky hair on the back of the lemmas and generally less prominent. In Giant Reed there is a wedge-shaped light to dark brown area at the base of the blade. Giant Reed also differs in frequently having a more leafy stem and the inflorescence is more upright. *Arundo* and *Phragmites* can also be distinguished by their rhizome anatomy.



Figure 3.(left) Spikelets of *Arundo donax* (DAO 212409) above with floret on the right, and paired single-flowered spikelets of *Miscanthus sacchariflorus* (241916) on the lower left and of *Miscanthus sinensis* (242100) on the lower right.

Figure 4. (right) Spikelets of *Phragmites australis* subsp. *americanus* (DAO 792217) above and *Phragmites australis* subsp. *australis* (792221) below. Photo by P.M. Catling.



The best characters for distinguishing the invasive subsp. *australis* from the native subsp. *americanus* involve the colour of basal internodes and the length of lower glumes. These characters have been supported through analysis of thousands of specimens. Other characters sometimes applied, such as ligule length, inflorescence shape, and surface texture of the stem, have not been supported by extensive study. Although molecular methods exist for distinguishing the subsp., these are not essential to make an identification. The following key will help to identify all of the plants mentioned above. Although hybrids between the two subsp. of *P. australis* have been reported, they are not common and most plants can be identified without difficulty using the two simple key characters.

1a. Inflorescence with silky hairs not prominent due to enclosure in glumes and length not exceeding the lemma; silky hairs only on the lemmas ..... *Arundo donax*  
 1b. Inflorescence with silky hairs prominent since not enclosed in glumes and longer than lemmas; silky hairs on glumes or stem sections below lemmas ..... 2

2a. Primary inflorescence branches themselves branched; silky hairs on stem sections between the florets ..... 3  
 2b. Primary inflorescence branches not further branched; silky hairs at the base of and on the backs of the glumes ..... 4

3a. Culms of lower internodes red (or reddish-purple); larger lower glumes (3.0) 4.1 - 7.6 mm long .....  
 ..... *Phragmites australis* subsp. *americanus*

3b. Culms of lower internodes yellow (or yellowish-brown); larger lower glumes (1.9) 2.8 - 4.4 (5.1) mm long .....  
 ..... *Phragmites australis* subsp. *australis*

4a. Silky hairs at least twice as long as the florets; awns on florets lacking or shorter than the florets .....  
 ..... *Miscanthus sacchariflorus*  
 4b. Silky hairs less than twice as long as the florets; awns on florets twice as long as the floret..... *Miscanthus sinensis*

## Description

Plants are 1-5 m tall with leafy stems and yellow to brown basal internodes. They are topped by spreading, branched and oval inflorescences 10-50 cm long. Leaves are 20 - 70 cm long and 1 - 5 cm broad, and they are retained longer and into the winter compared to those of the native subsp. *americanus* which fall much earlier. The rhizomes are 0.5 - 3 cm thick and long stolons of similar thickness, creeping over the ground surface to establish new plants, may reach 10 (- 15) m long in one season. The branched inflorescence is composed of spikelets with two basal bracts (glumes) and 2 - 7 florets. Each floret is comprised of two bracts (the lemma which is lowermost and the palea which is uppermost). These enclose three stamens and the pistil, including stigma, style and ovary, the latter sometimes developing into the grain ("seed"). The stem sections below the florets, called rachillas have long silky hairs 5 - 11 mm long. The florets break off (disarticulate) at the base of the rachillas so that the dispersal so that the dispersal unit is a floret with a rachilla and numerous long silky hairs serving as a parachute.

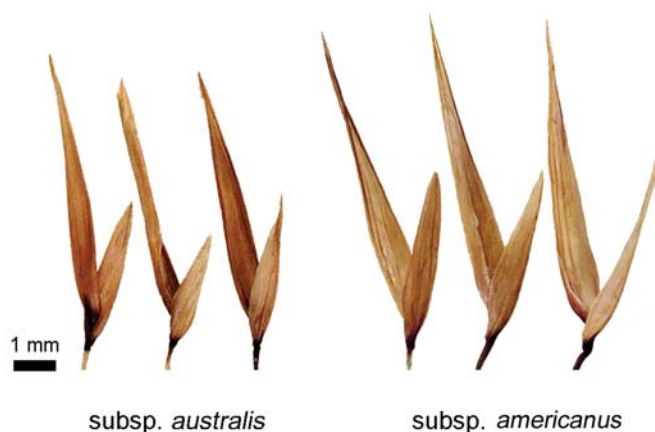


Figure 5. Basal bracts (glumes) of the flower cluster of invasive alien European Common Reed (subsp. *australis*) on the left, those of the native American Common Reed (subsp. *americanus*) on the right. Photo by P.M. Catling.

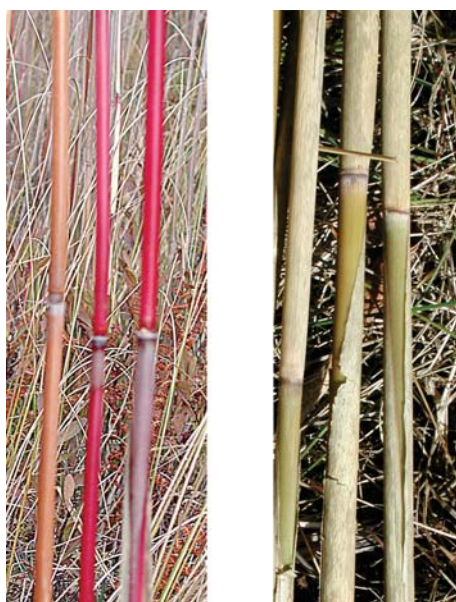


Figure 6. Reddish stems of American Common Reed (subsp. *americanus*) on the left and greenish-yellow stems of the invasive alien European Common Reed (subsp. *australis*) on the right. Photo from near Perth, Ontario, November 2003, by P.M. Catling.

### Identification constraints for *P. australis*

A recent study of Canadian plants suggested that lower stem internode colour will identify plants correctly 99 % of the time. Lower glumes are less reliable but valuable when internode colour is not available. If specimens with larger lower glume lengths of 4.1 – 4.4 mm (inclusive) are treated as unknowns, those lower than 4.1 are treated as subsp. *australis*, and those with higher than 4.4 are treated as subsp. *americanus*, then 6.5 % of plants will be unidentifiable and 2.2 % will be incorrect. An expansion of the unknown range results in lower likelihood of misclassification. A range of 3.8 – 4.8 mm results in a misclassification rate of 0.7 %.

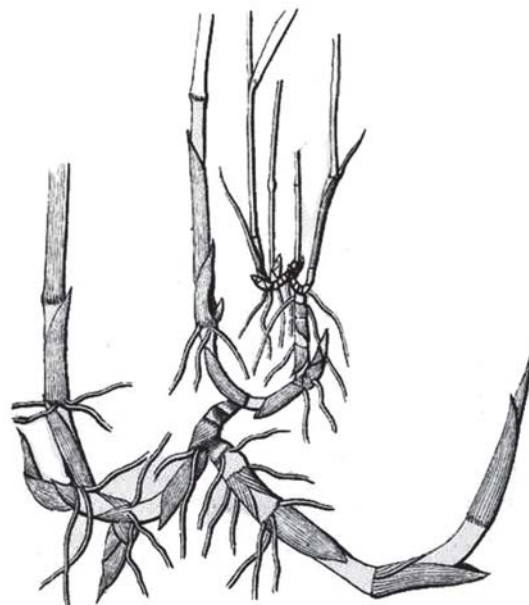


Figure 7. Rhizomes and lower stems of *Phragmites australis* subsp. *australis*. From: Warming, E. 1884 *Om Skudbygning, Overvintring og Foryngelse* [translated title: On shoot architecture, perennation and rejuvenation]. Naturhistorisk Forenings Festschrift: 1-105.

### Classification and Distribution

The native range of *Phragmites australis* subsp. *australis* has been reported to include many temperate and tropical regions of the world. It is the most widespread of 3-4 similar species that have been recognized. Studies of the taxonomy and genetic diversity of the entire group are incomplete. Intra-specific varieties have been noted, but have been considered “merely local variants.” The discovery of three distinctive genotypes in North America has suggested that more taxa may deserve recognition.

Common Reed was first found in Canada in 1910 in southern Nova Scotia. In the 1920s it was collected from places near Quebec City and in Montreal. The first southwestern Ontario record was in 1948. By 1970 it had spread locally but was still found only around southwestern Nova Scotia, in the St. Lawrence valley and in southwestern Ontario.

By 1990 European Common Reed had become much more frequent in the St. Lawrence valley and in southwestern Ontario and had extended west into eastern Ontario. It was not until 2001, at least 90 years after its arrival, that it was discovered as a wolf in sheep's clothing, a European invader that had been masquerading as a native species. By 2010 it had spread throughout much of southern Ontario and southern Quebec, and had a more extensive distribution in the maritimes, but the biggest change was its spread into central and western Canada. It appeared in northern Ontario (2002), northwestern Ontario (2004), southern Manitoba (2009), Alberta (2010), and interior southern British Columbia (2000). The rate of spread is increasing and within a decade or two it is expected to become abundant in the prairie provinces.

(continued)



Figure 8. European Common Reed, showing stems, flowering inflorescence and flowers. From Otto Wilhelm Thomé: 1885. *Flora von Deutschland, Österreich und der Schweiz*, pl. 63

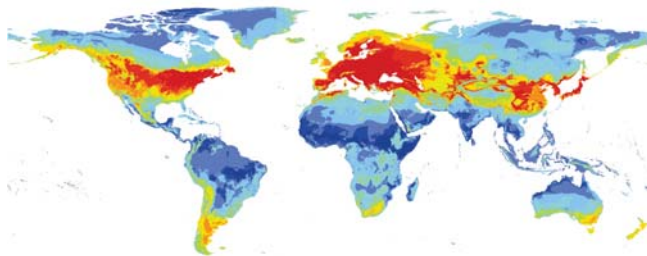


Figure 9. The red and orange colour on this map represents the potential worldwide distribution of European Common Reed based on its climatic tolerance within its recently established Canadian range. (For more information see Catling and Mitrow. 2009b.). The interactive map is from the Global Biodiversity Information Facility website and is derived from the cooperative Canadian database developed by AAFC researchers.

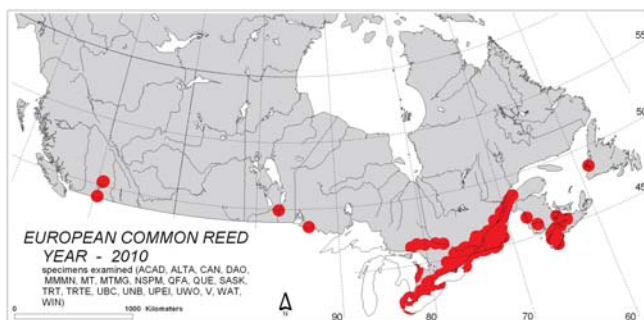


Figure 10. The red areas on the map above represent the present range of the alien invasive European Common Reed in Canada.



Figure 11. The red areas on the map above represent the predicted range of European Common Reed in Canada within two decades. Note extensive anticipated occurrence in the prairie provinces. Since the rate spread is increasing and the climate over much of Canada is getting warmer it may extend to the north of the red areas over the shorter period of a single decade. The 2030 projection is a minimal area projection.

Twenty-two plant collections in museums, universities, and government departments across Canada co-operated to make a database of over 2000 records of Canadian *Phragmites* available online. The database received 71,512 questions in 2009. It allows modeling using climate change data.

By comparing the climate and substrates of regions where a newly arrived plant already occurs, it is possible to map the extent of those landscapes to get an idea of how far it will spread. For example, a plant species that occurs in Windsor in southern Ontario and also in Sudbury can be expected to occur over a broad area of Canada within the climatic range of those two locations. Based on information on correctly identified plants, the present distribution of European Common Reed is primarily eastern but it can be expected to colonize a large area of central and western Canada. Based on further analysis of the times of collections and habitats, we can develop an idea of the approximate rate of spread. We anticipate that it will be common in the prairie provinces within one or two decades. Its spread can be predicted to be along transportation rights of way. It will likely become a serious agricultural problem in the irrigation districts of Alberta by impeding water flow in irrigation canals. It may have a huge impact through reduction of native biodiversity in prairie wetlands with significant implications for waterfowl. The advantage of knowing this early is that there is some time to prepare for it with biocontrol agents and methods of reducing rate of spread.

## Ecology

As with most grasses, the pollen of European Common Reed is carried by the wind. Seeds are also wind-dispersed and in some situations in Canada it has been suggested that this dispersal is important. Seeds may also be carried by wetness adhesion by waterfowl. They are apparently able to colonize fluctuating or disturbed shorelines of both rivers and large or small lakes. A single inflorescence may produce more than 2000 seeds but often it is much fewer and many seeds are inhabited by the seed-eating wasp larvae. In some, if not many cases, seed does not develop or it is weakly competitive and the principal means of dispersal is by rhizome fragments spread by road vehicles, especially maintenance equipment. The tendency for the stolons and

rhizomes to extend from ditches onto roadside gravel and asphalt allows them to be broken and transported by ploughs, graders and other equipment. Rhizome fragments are also transported by water. It has been wrongly assumed that clonal reproduction is restricted to the area immediately adjacent to a clone but transport by vehicles along roads and over water by wind and wave action can be very effective and can occur over long distances. Muskrats, herons and other aquatic animals also disperse rhizome fragments when transporting nesting material.

### The “Sleeper Weed” Phenomenon

European Common Reed provides a good example of a “Sleeper Weed”. This is one that arrives in a region, naturalizes and remains localized over an extended period. Then suddenly, after this period of dormancy, it bursts over the landscape. The burst may be due to new resources (the fluctuating resource hypothesis). In this case new roadside habitats may have played a key role. The “sleepers phenomenon” is also often referred to as the “lag and exponential phase of spread.”

For more on “sleeping weeds” see Groves (2006).

European Common Reed has exceptional ecological amplitude. It grows in water to 2 m deep and on relatively dry banks. Soil pH can range from very alkaline values above 8 in fens and brackish marshes to the low values below 5 in sphagnum bogs. The growth on acidic mine tailings of pH 2.9 in Vermont is remarkable. It can also grow in a variety of soil types ranging from gravel or sand to clay or pure organic substrate.



Figure 12. The *Phragmites* rhizomes in the soil from this ditch expansion operation will be dumped in a new location, but in addition the rhizomes attached to the track runner of this 360 excavator (inset – upper right) may be dislodged at the next work site, or along the way, giving rise to new stands. Photo by P.M. Catling in southwestern Quebec in 2005.

### Damage

European Common Reed is an aggressive plant that thoroughly dominates many places where it grows, and thus eliminates native biodiversity and it can also be a serious pest of agriculture. In Canada its impact as an



Figure 13. European Common Reed growing luxuriantly from a wet ditch to the top of a slope indicating the remarkable ecological amplitude of this subsp. in Canada. Photo by P.M. Catling in eastern Ontario in 2006.

environmental weed has been felt only over the past few decades and its impact on agriculture is largely anticipated. It is a very strong competitor that overgrows native plants, but this is only one mechanism of dominance. Production and retention of litter may also be an important factor and the extensive rhizome system facilitates root competition. The plant engineers the habitats that it invades modifying the environment in all respects. Studies have shown that it can displace native dominant grasses, rushes and other plants in only two years. Horizontal stolons that creep over the ground surface grow at a rate of 12 cm per day and may be over 10 m in length by the end of one growing season. New plants can develop from the tip of these stolons and along their length so that patches can expand very rapidly.

### In Canada

**St. Lawrence River wetlands:** Of the invasive alien plants of wetlands of the St. Lawrence River in Quebec, *Phragmites australis* was found to be highly competitive and to have a greater impact on native plant biodiversity than any of the other invasives present including Purple Loosestrife (*Lythrum salicaria*).

**Long Point Biosphere Reserve on Lake Erie:** This area contains some of the most important habitats for staging waterfowl in the Great Lakes. Naturally the loss of native wetland vegetation here is a great concern. In 2003 *P. australis* subsp. *australis* was expanding in this area at a rate of 50% per year (Meyer 2003). Based on a study of aerial photographs taken from 1945 to 1999, Wilcox et al. (2003) found that four kinds of vegetation had been extensively reduced by *Phragmites australis* subsp. *australis* (*Typha* marsh, marsh meadow, sedge/grass hummock, and mixed emergents). In a detailed study of impact on animals, Meyer (2003) found that the development of dense stands of *P. australis* subsp. *australis* reduced numbers of Swamp Sparrows, rails, waterfowl, Northern Leopard Frogs, and Fowler's Toads but benefited Least Bitterns, Red-winged Blackbirds, warblers, meadow voles and shrews.

**Lake St. Clair marsh and wet prairie:** Here *P. australis* subsp. *australis* is threatening the habitat of the endangered Eastern Prairie Fringed Orchid, *Platanthera leucophaea* Nutt.) Lindl., and other rare native prairie plants. It appeared here in early 1990's. Following decline of the orchid, an invaded area was sprayed with glyphosate and later burnt resulting in effective control and dramatic growth of the rare native orchid. Without this decisive action, this population of an already threatened species would have probably been

eliminated. There has been substantial loss of native marsh vegetation and particularly Cattails to *Phragmites australis* subsp. *australis* over the last few decades and some useful methods of demonstrating decline using satellite data have been developed on the basis of studies in the Lake St. Clair region.

**Farmland in eastern Ontario and southwestern Quebec:** *Phragmites australis* subsp. *australis* is invading cereal crops in parts of eastern Ontario and southern Quebec, in some cases reducing yield by up to 50% on parts of the cultivated land.

**St. Lawrence River estuary: Between 2003 and 2005:** European Common Reed was observed expanding in the tidal marshes at Rivière du Loup and La Pocatière. It expanded through the upper marsh to the edge of the *Spartina alterniflora* zone. Species displaced by the advancing stand comprised of *P. australis* subsp. *australis* alone included *Agropyron* spp., *Carex* spp., *Chenopodium* spp., *Convolvulus sepium*, *Eleocharis* spp., *Festuca rubra*, *Hierchloe odorata*, *Juncus balticus*, *Potentilla anserina*, *Scirpus* spp., *Solidago sempervirens*, *Spartina patens*, and *S. pectinata*.

**Lake Huron shoreline:** In a recent survey of *Phragmites australis* subsp. *australis* in this area, the plant was found to be in the early stages of invasion along a full 60 km of coastline. It was not present in this area during a survey of coastal vegetation in 1975 and is believed to have established beginning in 2002 based on discussions with residents. Alarming, in this area it is growing on sandy beaches and dunes, even with Dune Grass (*Ammophila breviligulata*). Replacement of many kinds of native vegetation was reported (*Artemisia campestris*, *Elymus canadensis*, *Eupatorium* spp., *Scirpus* spp. *Typha* spp.). Wasaga Beach Provincial Park has recently developed an action plan to deal with alien *Phragmites* which is considered a threat to the endangered Piping Plover, since the bird requires open sand, which is being replaced by dense stands of the plant.

**Walpole Island:** On this island in Lake St. Clair the loss of Cattail (*Typha latifolia*) to European Common Reed has been over 1000 ha over recent 5 year periods.

**Turtle breeding habitat:** Six freshwater turtle species in the Lake Erie region of southern Canada rely upon open unshaded areas to provide adequate solar heat so that their eggs can hatch. European Common Reed has extended onto sandy beaches shading the open nesting habitat and filling the sand with rhizomes so that it cannot be excavated and leading to water depletion. So rapid is the spread of the plant on some beaches that it engulfs nests of the Spiny Softshell Turtle (*Apalone spinifera*) within the incubation period of a single season.

**Canadian Costs:** The costs of environmental management are not the only costs. The dried stems and litter are a major source of fuel for fires and are a fire hazard where they are close to buildings. Invasion of channels has restricted water-based recreation. *Phragmites* has clogged drains. On the shore of Lake Huron it is eliminating famous sand beaches used for recreation. Some of these problems are already proving very costly. Based on its ability to respond well to fluctuating water levels and spread in water by floating rhizome fragments, and grow below as well as above water, the cost of control in western irrigation systems may be in the many millions of dollars.

## Why is hybridization important?

Hybridization between the native subsp. *americanus* and the introduced subsp. *australis* may be a problem for the former for a number of reasons.

- (1) Production of plants that are more aggressive than either parent leading to increasing rarity of the native subsp..
- (2) Genetic pollution of native subsp. because increasing numbers of offspring may be hybrids.
- (3) Decline of native seedlings due to reduced viability since most seeds of native subsp. may be hybrids



Figure 14. Stems of *Phragmites* have broken through a layer of asphalt (lower middle) and a stolon (right middle) has extended to the gravel shoulder (upper left and lower left inset). Photo by P.M. Catling in eastern Ontario in 2006.

## "Phragmites replaces native vegetation , ..." thereby degrading overall

plant species richness and diversity. The loss of native plant diversity further results in the decline of wildlife habitat, including that needed to support migratory bird assemblages and native, resident animal species." From: "Environmental Assessment for control of *Phragmites australis* in western Lake Erie coastal marshes"

## Outside Canada

**Worldwide:** This plant found a place in the compendium of "The world's worst weeds" (which includes 76 species) largely as a result of blockage of canals and drainage ditches where it restricts water flow and leads to flooding. These observations suggest that it could become a serious pest of the irrigation districts of western Canada. Although it is not a serious weed of Canadian cropland, it has reduced

yield of cereals in Quebec and Ontario. In other parts of the world it is a weed of several crops including particularly the cereals.

**Rhode Island:** On the middle and northeastern Atlantic coast of the US, a great effort has been devoted to control European Common Reed. In Rhode Island a majority of the wetlands require at least some restoration work to control it and millions are spent on this annually.

**Lake Erie:** The Nature Conservancy was granted half a million dollars by the U.S. Fish and Wildlife Service to co-operatively manage European Common Reed on 2,000 acres of western Lake Erie marshlands which are some of the most productive and biologically diverse systems in the Midwest.

**New Jersey:** Studies in certain low salinity marshes in New Jersey suggest that the invasion of *Phragmites* may be having deleterious effects on Mummichog (*Fundulus heteroclitus*). This is the principal fish inhabiting the marshes dominated by *Spartina* and other native species.

**Connecticut:** Dense monocultures of European Common Reed have been expanding in Connecticut's tidal wetlands at the expense of Cordgrass and Cattail. Recent studies have confirmed that various threatened bird species requiring shorter vegetation are declining due to the invasion. Continued restoration involving the removal of *Phragmites* is recommended.

**Fens:** A number of fens in New York State have been taken over by *Phragmites australis* subsp. *australis* with the loss of all native vegetation (pers. obs.). It has taken over almost 50% of the open area of Bergen Swamp, one of the most biodiversity-rich wetlands in the state. Not surprisingly it is regarded as a threat to a large, attractive silk moth (*Hemileuca* sp.) that is very rare and confined to a few fens in New York State and Ontario. Fens are unusual on the landscape and contain many rare and restricted species. The loss of Ontario fens (Minesing, White Lake, Hayes Bay, Stoco, etc) to *P. australis* subsp. *australis* seems inevitable without intervention based on the situation in New York, and it would likely lead to the extirpation or serious endangerment of many restricted species of plants and animals.

**Policy at risk:** The U.S. national policy of "no net loss of wetland acreage and function" is seriously threatened by European Common Reed. The problem is that resource managers attempting to offset the loss of wetland functions often have to construct new wetlands which are easily and quickly dominated by European Common Reed since the disturbed conditions are ideal for spread and colonization. The invader does not have anything near the functional equivalency of native wetland species, especially from a biodiversity perspective. Implementation of the policy is at risk and already a number of constructed wetlands are almost entirely composed of invasive *Phragmites*.

**Noxious Reed:** Currently European Common Reed is classified as a noxious weed in six U.S. states (Alabama, Connecticut, Massachusetts, South Carolina, Vermont and Washington) and several other states are considering assigning this status. Although there is no comprehensive list of the number of native North American species negatively impacted by *Phragmites australis* subsp. *australis*, it would undoubtedly be in the thousands.

## Beneficial Aspects

Although *P. australis* subsp. *australis* may have an extremely detrimental effect on biodiversity overall, it is to be expected that in some situations, it will benefit certain native species. This has been demonstrated with some birds on Long Point and with a variety of nesting wading birds in Delaware. Some native insects have adopted European Common Reed as a foodplant (see below).

This plant has an impressive list of values to people and there is potential for these values to be expanded. Some of the more important: (1) treatment of polluted water and mine waste due to capability for accumulation of nutrients and pollutants; (2) a biofuel crop; and (3) pulp for making paper.



Figure 15. A 5.2 m tall stand of European Common Reed. Photo by J. M. Gilbert, courtesy of the Ontario Ministry of Natural Resources.

### Subsp. – Does it Matter?

The introduced subsp. *australis* dominates and displaces native vegetation but the native subsp. *americanus* does not. The latter grows only 1-2 m tall and is often part of a rich community of native species. The introduced subsp. *australis* grows to 5 m tall in dense leafy stands and frequently nothing else can grow with it. The native subsp. *americanus* is one of many plants that are threatened by the invader.

## Management

The most frequently mentioned means of management is through the use of chemicals, but mechanical and biological methods have proven useful under some circumstances and the most successful management has involved a variety of methods. Mowing, flooding and burning have provided very

temporary control but only repeated use of herbicides has proven effective in short-term eradication. However, use of herbicides in most situations to control this plant in Canada requires certification. Since management is difficult, early detection and control of small infestations (less than a few acres) are important actions. The best that we can hope for is to slow spread and impact until more effective control methods are developed (perhaps through biocontrol – see below) and/or natural enemies catch up to make the plant less aggressive.

### Certification needed to use chemicals

The ministries of environment in each province are responsible for issuing pesticide applicator, operator and vendor licences. The ministries monitor compliance and enforce the regulations. Mainly through education and training, the ministries provide direction on the responsible use of pesticides and encourage and promote reduced reliance on pesticides through integrated pest management practices.

Provincial natural resources departments are able to supply information and some even have very useful best management practices documents for Phragmites on the web. The Ontario Ministry of Natural Resources (2011) document is particularly useful. Another especially useful management document is available from the Michigan Department of Environmental Quality (2010). The journal with the most articles on the effects of control measures on this species is *Hydrobiologia*.

### Chemical Methods

A nature Conservancy steward's document on the web indicates that Glyphosate is used by many of those managing fens. Rodeo (Glyphosate without the surfactant) is applied to flowering heads in late September. This is followed by burning of the duff the following spring. In some cases Glyphosate can be effectively injected into cut stems. Where overspray is a problem, the glyphosate, can be dropped into the hollow cut stems to limit damage to other plants..

### Mechanical Methods

Cutting and subsequent flooding has proven effective in ponds on Cape Cod National Seashore. In a number of places mowing in spring and late fall effectively preserves native vegetation but this has to be maintained to ensure continued success.

### Biological Methods

It is believed that approximately 26 species of insects feed on European Common Reed in North America, but only five are potentially native. The others have been accidentally introduced, likely in situations where dead stems were used as packing material. A European noctuid moth (*Apamea unanimitis*), that feeds on the leaves was first collected in North America in Ottawa in 1991. The larvae of another European noctuid moth (*Rhizedra lutosa*) feeds on the rhizomes. This species is currently spreading in the northeast. Among the native species that feed on the leaves is the Broad-winged Skipper butterfly (*Poanes viator*), but so far it has not been found in Canadian populations of European Common Reed. In Canada, and perhaps elsewhere in North America, these native and accidentally introduced species have had little impact on the plant. In Europe at least 140 herbivorous species have been

reported on European Common Reed. Some of the accidentally introduced insects that are associated with it have only been found on that (the introduced) subsp. in North America. This suggests that control agents may be found that will not attack the native subsp. *americanus*. Some have suggested that implementation of biocontrol is overdue and that time to save millions is running out. Biocontrol may not only reduce impact and cost of management, but it may only reduce impact and cost of management, but it may also reduce the rate of spread.

Other biological methods are available. One of the more interesting is the use of grazing to control Phragmites in the habitat of the endangered Bog Turtle in North Carolina

### Using volunteers

In Kampoosa Bog (a lake basin fen in Massachusetts), six years of cutting to chest height by volunteers including local citizens, high school groups, and naturalist organizations brought 3 acres of Phragmites under control. Cutting was done in late summer when the plants flower and when much of their energy is above ground. The herbicide Glyphosate was applied to the hollow cut stumps by certified herbicide applicators with squirt bottles. This specific application protected other plants in the vicinity. The habitat of over 21 rare species has been protected and the rare species have expanded into areas that would otherwise have been overwhelmed.

### Believe it or not

Floating islands of Phragmites in the Danube delta (Romania) are called "Plaur." Here the beds extend over an area of 2700 km<sup>2</sup> and may be the largest continuous beds of *P. australis* subsp. *australis* in the world.

Cultivars of European Common Reed are available. One planted in parts of the U.S. to stabilize shores is called "Shoreline." Please do not ask why this is unbelievable! Not having any idea what would happen next, and finding the plumes attractive, a family with a pond on the lawn in front of their newly painted house transplanted a few vigorous stems of European Common Reed from a nearby ditch to the pond edge. They were shocked at the rate of growth the first summer. Having returned from a period of absence at the end of the second summer they found the whole front yard was European Common Reed. The attractive pond had completely disappeared and their house was no longer visible from the road ... and they could no longer see the ocean.

What important plant do homeless people, kids, young adults, and criminals have in common? They all find seclusion in dense beds of European Common Reed where it grows in populated areas. It can be a safe and inconspicuous place for the homeless with good protection from the wind. Kids can create a maze of trails and cardboard forts. "Young adults" develop more advanced accommodations with mattresses. Seeds on a woollen hat have associated a criminal with a Phragmites crime scene.

A replica of an Acadian home in Annapolis Royal, Nova Scotia is very true to Acadian culture but the roof is thatched with subsp. *australis* which grows all around, instead of the native subsp. *americanus*. On the other hand the Acadians may have brought their thatch, finding the native subsp. inferior.

## A wolf in sheep's clothing



.... on the move

A hungry wolf finds a sheep's fleece and realizes that it can disguise itself to get into the flock and steal a lamb. Just as the disguised wolf is about to pounce, a shepherd appears looking for a sheep to slaughter for supper and he quickly grabs and kills the disguised wolf. Frauds, liars and look-alikes are always discovered, but not always right away. So it was with the European Common Reed, established in Canada in 1910, locally abundant by 1970, but avoiding detection until 2001 as a result of it being mistaken for the native subsp..

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Ecology section meeting at the pub. From left to right: David Garbary, Christine Maxwell, Paul Cavers, Marian Munro, Sean Haughian and Liette Vasseur.

## TOP CANADIAN ORNAMENTAL PLANTS. 1. OVERVIEW (PART 1)

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Fig. 1. Spring floral display in Keukenhof Gardens, The Netherlands. Photo<sup>1</sup> by P. Kratochvil, publicdomainpictures.net.

Plants are used for many indispensable purposes, notably for food, fuel, construction materials, and clothing. It may come as a surprise, therefore, that more plant species are employed for an apparently dispensable purpose – ornament – than for any other goal. Possibly as many as 100,000 species have been grown simply for display. Hundreds of ornamental species and thousands of cultivars are regularly sold to the Canadian public. However, the ornamental plant industry is dominated by only a few dozen species. This series is dedicated to the giants of the commercial ornamental plant industry of Canada, the plants that Canadians most often purchase as their household and workplace living companions, as gifts, and even to wear as personal adornment.

### A BRIEF HISTORY OF ORNAMENTAL PLANTS



Fig. 2. Nineteenth-century hand-coloured engraving interpreting the Hanging Gardens of Babylon (source Wikipedia).

The earliest cultivation of plants was certainly for food, medicine, and other survival purposes, but nevertheless plants were grown just for ornament in very early times. For millennia, attractive plants, many with symbolic significance, have been used for embellishing homes and places of worship. About 1570 B.C., Queen Hatshepsut of Egypt sponsored plant-hunting expeditions to beautify her royal gardens. The Hanging Gardens of Babylon (in modern day Iraq), one of the Seven Wonders of the Ancient World, are thought to have been built by King Nebuchadnezzar II about 600 BC, and were destroyed by earthquakes after the 2<sup>nd</sup> century B.C. While some aspects of these gardens appear to be legendary, certainly the technology of growing plants in stone vessels and on terraces was well known at the time. In any event, the rich and politically powerful have long flouted their status with extravagant, even garish displays of living plants, both outdoors and in their homes. Perhaps the most flagrant example was set by King Louis XIV (1638–1715) of France who, while keeping most of his subjects in abject poverty, built a fabulous 800 ha garden beside his opulent Palace of Versailles (together, a UNESCO world heritage site). Common people too, especially since the times of Louis XIV, have added flowering plants to their homes, albeit on a much more modest scale. However, reflecting the rise of a large Middle Class, gardens dedicated to flowers just for ornament did not become common in Western nations until the 19th century. The first settlers to North America brought planting stock of species that were popular in western Europe, much of which originated from Eurasia, often from exotic regions of the world, but infrequently from North America. Just as almost all major food crops grown in Canada today are of foreign origin, the same is true for the major ornamental plants grown here. Nevertheless there is now a movement to increase utilization of native plants for landscape purposes, because they are naturally adapted to

<sup>1</sup> Unless otherwise specified in square brackets, all photographs taken from online sources are public domain (usage stated to be unrestricted). Photos by E. Small and B. Brookes are by regulation copyrighted by the Crown of Canada.

local Canadian conditions, and usually require less care, water, fertilizer, and pest control agents. Until the 20<sup>th</sup> century, transportation from overseas ports was so slow that living plants suffered greatly when shipped. This resulted in the establishment of nurseries and greenhouses in North America to supply most of the needs of the continent. As discussed below, however, air freight has resulted in globalization of much of the ornamental plant trade, with some negative consequences for Canada economically and environmentally.



Fig. 3. The Orangerie beside the Versailles Palace, France. In the winter, the Versailles Orangerie shelters indoors more than 1,000 trees in boxes, mostly orange trees, which are kept outdoors from May to October. By pruning and limiting water and nutrients, sweet citrus trees were made to produce fruit year-round. Orangeries were initially established in Europe to provide oranges to the nobility and rich merchants, but by the 16<sup>th</sup> century the fruit was commonly available, and orangeries served mainly to impress visitors. Note the exceptionally formalized layout, typical of large classical French gardens. [Photo by Urban, authorized for reproduction under the terms of the GNU Free Documentation License, online at Wikimedia.]

## GREENHOUSE CULTIVATION

As a northern country, cold temperature is a principal limitation of plant growth in Canada. As noted below, Canada has a huge acreage of greenhouses (over 2,000 ha), most of which is dedicated to production of ornamental plants. Growing plants in the cold season traces to classical Roman times, when crude greenhouses were constructed with translucent mica-like sheets or oiled cloth. Roman emperor Tiberius (42 BC–37 AD) had a regular supply of cucumbers in the winter, requiring gardeners to grow the plants in wheeled carts, taken outdoors on sunny days and protected in glazed cucumber houses at night. In 1851, J.C. Paxton, gardener for the Duke of Devonshire, designed and built the Crystal Palace in London, England, a magnificent glass and iron structure that has since inspired the construction of numerous other large public greenhouses and botanical conservatories.

## ORNAMENTAL PLANT BREEDING

Breeding of ornamental plants is a major activity in many countries, including Canada. As with plant breeding generally, cross-pollination, back-crossing, selection, and

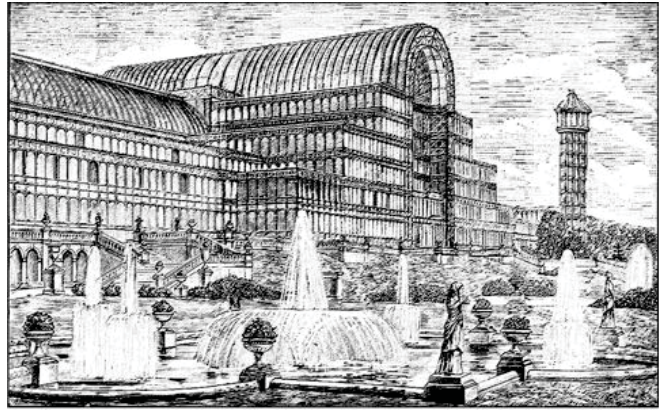


Fig. 4. The Crystal Palace in London. The building was 564 m (1851 feet) long, 39 m (128 feet high), and had 92,000 m<sup>2</sup> (100,000 square feet) of exhibition space. Source: engraving from Brown, C. 1886. True stories of the reign of Queen Victoria. Griffith, Farran, Okeden & Welsh, London, U.K. (Online at Wikipedia.)



Fig. 5. Toronto's first (1858) Crystal Palace (designed by Sandford Fleming, the inventor of standard time), one of the many palatial public greenhouses constructed following the example of London's Crystal Palace. Among the prize-winning exhibitors on opening day was author and naturalist Catherine Parr Traill (1802–1899), who was honoured for "the best collection of native plants dried and named". The building was dismantled in 1878 and the materials used that year to construct a second, larger Crystal Palace, which burned down in 1906. Source of illustration: Canadian National Exhibition Archives (online at Wikipedia).



Fig. 6. A modern commercial greenhouse specializing in ornamental plant production. Photo by J. O'Neil, publicdomainpictures.net.

evaluation are major steps in the creation of new cultivars. However, for many ornamentals, hybridization is not employed. For centuries, gardeners have been selecting attractive mutations of plants, many of which can only be reproduced vegetatively. Some selections are the result of hybridization associated with loss of sexual capacity, once again requiring vegetative propagation. A large proportion of ornamentals are now reproduced by cuttings and tissue culture. Over the centuries, numerous ornamental selections have been made, some of them so attractive that they are still available as heirloom varieties. Unfortunately many old ornamental selections are disappearing. Indeed, today even new cultivars have a very short market existence, and companies breeding ornamental plants are now in a very competitive marketplace. Traditionally, cultivars have been selected with large or numerous flowers, doubled flowers (with extra petals), new flower colours, and for an extended flowering period. More recently, stress has been on selecting for vigour, disease resistance, and resistance to other kinds of stress. To increase production efficiency, plant breeders are developing cultivars with a shorter flowering response time, and also compact plants so that more can be grown in a given area. Traditional selection techniques remain the main strategy for breeding ornamentals, but modern technologies, notably tissue culture, marker-gene-assisted plant breeding, and genetic engineering are now being widely employed for the major species.

## COLOUR, THE CHIEF ATTRACTION OF ORNAMENTAL PLANTS

The flowers of most ornamental plants are their chief attraction to most people, so much so that the word "flower" is widely used in the vernacular to refer not just to flowers but to herbaceous plants with attractive flowers (a usage occasionally employed in this article). The feature of flowers of dominant interest to most people is simply their colour. In nature, flowers have characteristics that are attractive to pollinators, and of these colour is particularly important because some animals prefer certain flower colours. For example, hummingbird flowers are frequently red; some butterflies prefer yellow or white while others prefer blue (but most do not seem to have a strong colour preference); and many flies prefer white or dull colours while many social insects and birds prefer bright colours. For humans, however, flower colour does not reflect a natural, symbiotic relationship. As noted below, ornamental plants serve several functions, but their main value is usually just the attractiveness of their floral colour or colours to humans. Ornamental cultivars have been selected for displays that are spectacularly more flamboyant than existed in the relatively small and evanescent flowers of their wild ancestors. Today, the ornamental plant industry is most concerned with "selling colour", and so some understanding of the psychology of colour attractiveness is desirable. Colour preferences of humans appear to be a) innate, selected as survival responses during evolution because they are particularly associated with either pleasant or unpleasant objects, or b) learned. Early researchers on colour preferences in humans suggested that in general people prefer, in decreasing order, blue, red, green, violet, orange, and yellow (a sequence that leaves out white flowers, which are widely admired). Blue has been shown to be the most pleasant colour to the majority of people (perhaps explaining why baby boys are traditionally honoured with blue), possibly because a blue sky indicates calm weather. By contrast, dark yellow and orange are the colours of urine, feces, vomit, and

rotting food, and there is a general lack of preference for these hues in all human cultures. We are all born with an innate attraction to reddish nipples to obtain nourishment from breasts, perhaps accounting for why red is such an attention getter, and explaining the advertising slogan "red sells". There have been claims that women prefer red slightly more than men do (supposedly why little girls are dressed in pink), speculatively explained as useful in our ancestors who relied on women gatherers to spot red berries against green foliage, while the men hunted. The psychological effects of red have been extensively studied, but remain controversial; certainly red is an extraordinarily attracting stimulus, and is the most popular of colours insofar as ornamental plants is concerned. Saudi Arabia has banned the selling of red flowers in the week preceding Valentine's Day on the theory that they encourage immoral relations between unmarried men and women.

Of all possible colours, black is the most unnatural for flowers. The phrase "black flowers" is used loosely to refer to very dark flowers of some ornamental species. Usually such flowers are a deep purple, and almost always a close look reveals that the flowers are not truly black. Orchids, tulips, carnations, calla lilies, roses, and pansies are among the species for which black-flowered variants have been selected. Black is associated with evil and death, which limits the use of black flowers in many situations. Nevertheless, the rarity and novelty of black as a floral colour has stimulated breeders to select very dark-flowered varieties, and they add considerable interest to a garden or bouquet.

On the whole, colour preferences for flowers seem to be determined mostly by individual taste (although green flowers are obviously not desired because plants are already overwhelmingly green). Moreover, a variety of colours is usually considered attractive, both in bouquets and in gardens (although as a rule it is recommended that bedding plants of a particular colour should be planted close together to accentuate the display). In foliage plants, variegated leaves have been selected in numerous cultivars, which also demonstrates a pattern preference for variation in colour. As most people realize, a given colour of apparel may be appropriate for one occasion or setting and not others; similarly, flower colour is traditionally determined in part by the circumstance: white and pastel hues for a funeral, bright flowers for winter. Learning plays a very large role in colour preferences, and it is important to be aware of ethnic, religious, and social traditions with respect to colour. Hinduism, Buddhism, and Confucianism have special respect for yellow and orange, Muslims have considered green to be a sacred colour, and Christianity has suggested special salvation-related meaning to red, white, and black. (In addition, regardless of colour, some particular species of ornamental plants often have special significance for given religions.) In modern times, social constraints limit men from displaying pink and purple, and this has extended to recommendations for giving flowers to men (although the reverse gifting is still predominant). New flower colours are continually appearing for the leading ornamental plants, but there is a tendency for traditionally available colours to remain especially popular. In the case of roses, for example, the most popular colours are red, pink, white, yellow, lavender, and purple; and for carnations the leading colours are red, pink, and white. Today, numerous ornamental plant species are available in a wide range of flower colours, and often the chief concern of many is simply to coordinate flower colour with dress or decor.

## FRAGRANCE OF ORNAMENTAL PLANTS

In nature, flowers often attract pollinators not just by vision but also by odour, and frequently the smell is also attractive to people. (On the other hand, some flower odours are repulsive to humans, such as the carrion (or corpse) flower *Stapelia*, which attracts flies with a stench like rotting flesh.) In some cases, the chemicals responsible for pleasant smells are extracted and used in perfumes and in preparations employed in aromatherapy, most notably for rose, jasmine, lily, and violet. The floral odour chemicals may vary from five or so to about 100, and are most frequently terpenes (not surprising, since this is the largest and most variable class of naturally occurring organic compounds). The aromatic compounds are most often synthesized in the petals in specialized cells (osmophores). Plants that release odour during the day are usually bee-pollinated. Conversely, those that open in the evening and release odours at night are typically pollinated by night-flyers such as bats and hawk moths. Flowers that attract night-flying pollinators are often white (to reflect as much light as possible), and are also frequently quite odorous (to reinforce the weak visual display). The night-blooming tuberose (*Polianthes tuberosa* L.) is exceptionally aromatic, and is used not just as a cut flower but also in perfumery. Other ornamental plants esteemed for their pleasant odour include daffodil, hyacinth, cyclamen, and primula. The species within genera, and indeed cultivars of a particular species often differ greatly in intensity and pleasantness of odour. For example, "scented geraniums" refers to species of *Pelargonium* that are especially fragrant; and the 'Stargazer' and 'Casa Blanca' cultivars of lily are renowned for their "heavenly odour" (which can be overpowering in a confined room). The wild ancestors of some ornamental plants are often much more fragrant, because modern cultivars have been selected for their visual appearance at the cost of decreasing their pleasant scent (some modern roses, lilacs, and carnations are notably lacking in odour). Pleasant-smelling flowers are not always welcome: worried about allergies, some health authorities have requested florists to exclude highly-scented flowers like lilac and hyacinth in bouquets delivered to hospitals and residential facilities. Females have been conclusively demonstrated to generally have slightly greater olfactory prowess compared to men: they have more threshold sensitivity to odours, as well as greater discrimination ability, and in some experiments have been shown to have greater preference for some odours (like rose). Blind and visually impaired people can enjoy ornamental plants that are especially fragrant, although the texture of some ornamentals may also be pleasant.

## MORPHOLOGY OF ORNAMENTAL PLANTS

Variation of appearance of species in the natural world is stunning, and many wild plants are so interesting that they make good ornamentals without selection. However, humans do have preferences, and virtually all popular ornamentals have been altered by domestication. Some animals have been selected (at least in part) for their appearance, notably dogs, cage birds, and goldfish. The breeds of these animals illustrate that people like novelty, beauty (in human terms), and bizarre characteristics (which unfortunately are often inadaptable or painful for the animals). In the same way that people differ in their tastes for dog breeds, styles of architecture, and manner of dress, particular ornamental plants attract different people. In the "Plants Galore" website, cited below, one can find numerous societies dedicated to

selected ornamental plants (irises, roses, bromeliads, hostas, daffodils, etc.). The range of such plant "fan clubs" shows that there is considerable variation in preferences.

The characteristics of houseplants are often related to the demanding ecological conditions found in houses. Diminutive African violets, primroses, and kalanchoes are ideal for small rooms. The limited light and humidity in many homes during the winter makes shade-tolerant, thick-skinned foliage plants like *Sansevieria* (mother-in-law's tongue) species and rubber plants appropriate. The Cactaceae appear to provide more houseplants than any other plant family, probably because most are small and easy to care for (i.e. they withstand neglect well).

Size is also a critical characteristic of outdoor ornamental plants. In a garden, a well known design principle is that taller plants are placed at the back, shorter ones in front, so that all can be viewed. Among woody plants, dwarf forms have been extensively selected, to meet the need for foundation perennials that complement, not overwhelm the houses that they border.

Plant species differ greatly in vegetative characteristics. Some species have fern-like highly-dissected leaves, others have gigantic, elephant-ear leaves, and plants with all manner of leaves are cultivated. Not content with nature's offerings of foliage, horticulturists have selected many leaf mutations. Cut-leaf cultivars of some woody plants (silver maple and several birch species, for example) are popular. Numerous cultivars have been selected that have the normal foliage pigments altered, so leaves are yellowish (frequently described as copper, bronze, or gold), or have anthocyanin pigments emphasized so the leaves are purplish or reddish. Plants with variegated leaves (i.e. with sectors devoid of chlorophyll) are extremely common. Stems or trunks have also been altered in many ornamentals. Several tree species (white mulberry and some beech species, for example) have forms selected for drooping branches, like weeping willow. Corkscrew (spiraling) stems have also been selected. Spiny stems protect many plants in the wild, but people do not like to be stabbed by spines, and many spineless forms have been bred. Habit of plants has frequently been altered, producing pyramidal, spreading, or other shapes. Some of the variations that have been selected by horticulturists are due to infection by viruses, so that sick, diseased plants that nature would normally eliminate are being maintained by humans. Indeed, virtually all characteristics selected in ornamentals would be deleterious in their wild ancestors, but nevertheless are viewed by humans as attractive. Probably the chief conclusion that can be drawn from examination of how ornamental plants have been changed by people is that humans are greatly entertained by variation, which is fortunate, because there is an enormous variety of plants to admire and protect.

## AESTHETIC AND EMOTIONAL VALUES OF ORNAMENTAL PLANTS

Aesthetics is a branch of philosophy that deals with the nature of beauty and taste. It has been mostly applied to the artistic and cultural world, but is also applicable to nature. There have been numerous attempts to scientifically examine the biological or psychological (sensory, emotional) roots of aesthetic judgments, i.e. why we like some things, not others. Our aesthetic evaluations of ornamental plants is the dominant reason for their existence, as noted below, but precisely why we find them so attractive is far from clear. Ornamental plants are employed to decorate our homes, businesses, public and recreational spaces, and even

“When you have only two pennies left in the world, buy a loaf of bread with one, and a lily with the other.”

—Chinese proverb

“Flowers are a proud assertion that a ray of beauty out-values all the utilities of the world.”

—Ralph Waldo Emerson (1803–1882, American poet and essayist)

“Flowers always make people better, happier and more helpful; they are sunshine, food and medicine to the soul.”

—Luther Burbank (1849–1926, American horticulturist)

ourselves. They are not only a regular companion of day-to-day life, but also are especially on display during holidays (most notably Mother's Day, Saint Valentine's Day, and Christmas Day), personal celebrations (like birthdays and anniversaries), professional and award ceremonies, and key life events (like graduations and funerals). Ornamental plants are prominent subjects of gardening books, articles in magazines and newspapers, shows on radio and television, lectures, and tours. Ornamental plants satisfy essential aesthetic and emotional needs of humans, much as do music, theatre, art, and literature. People once lived predominantly outdoors, but as civilization increasingly dictated that we spend most of our lives inside buildings, it seems that a primitive need for the colour, texture, fragrance, and indeed the essential life of plants has stimulated us to bring them inside as beloved companions. Today, about half of the world's population lives in urban settings (even more in technologically advanced countries like Canada), and ornamental plants are the chief reminders for most people that there is a natural world that is vital for human survival. Curiously, even images and imitations of

ornamental plants evoke pleasant feelings, as witnessed by the popularity of paintings and photographs of ornamental plants, silk flowers, plastic plants, wallpaper with floral motifs, and floral prints on dresses, lingerie, and bed sheets. Perhaps more so than any other category of plant, ornamental plants reflect basic human aspirations, sentiments, and values – the subjects of poetry, gifts between friends, expressions of sympathy for victims of illness and tragedy, and symbolic backgrounds for religious and secular ceremonies ranging from birth to death. Flowers are the essential organs of sexual reproduction of higher plants, designed to combine male and female elements. How appropriate, therefore, that humans have adopted flowers as the chief symbols of their own reproduction. They are a regular expression of affection during courtship (flowers say the sweetest things!). Weddings are a florist's best sales opportunity. Most marriage ceremonies feature a bridal bouquet, bridesmaid bouquets, boutonnieres, corsages, flower girl flowers, large floral arrangements for the altar and reception halls, bouquets for the dining tables, and flowers for the cake.

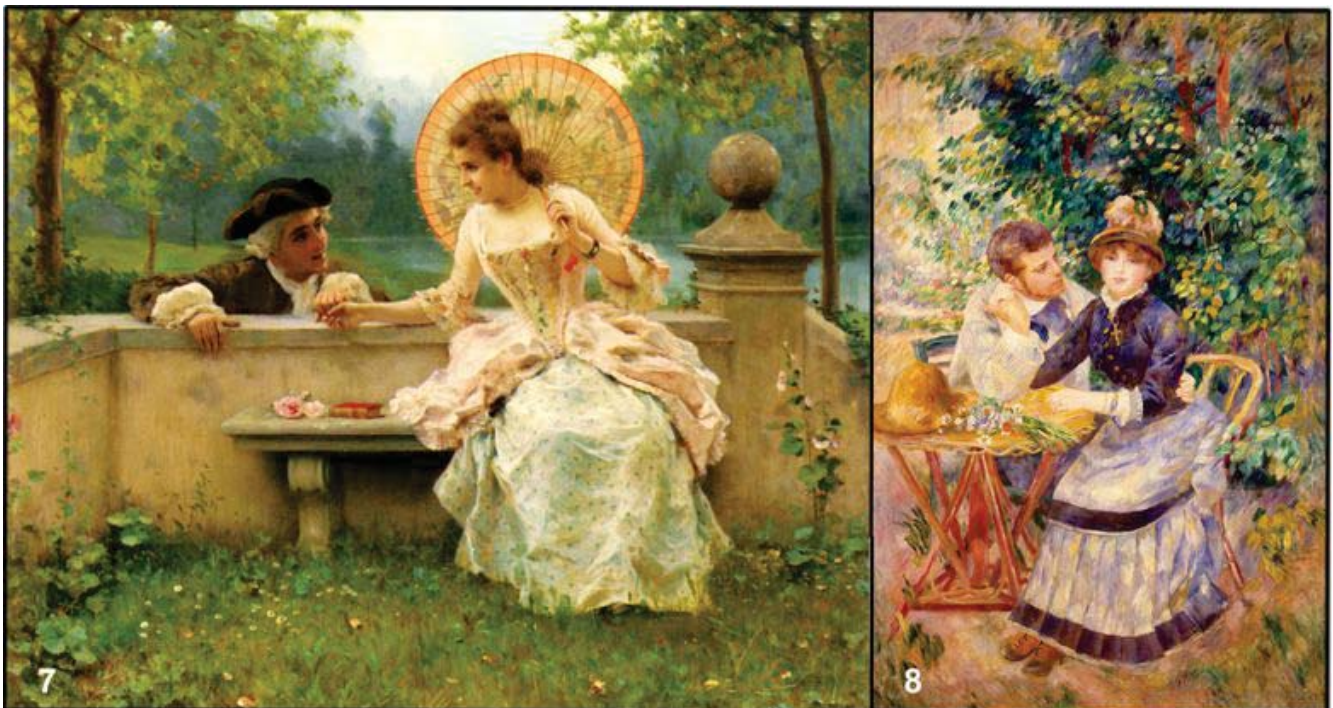


Plate 1. Great painters have regularly depicted courtship amidst flowers in gardens. Fig. 7. “A tender moment in the garden” by Federico Andreotti (1847–1930). Fig. 8. “In the garden” by Pierre-Auguste Renoir (1841–1919). (Both available online at Wikipedia.)



### A White Rose

The red rose whispers of passion,  
And the white rose breathes of love;  
O the red rose is a falcon,  
And the white rose is a dove.

But I send you a cream-white  
rosebud

With a flush on its petal tips;  
For the love that is purest and  
sweetest

Has a kiss of desire on the lips.

—John Boyle O'Reilly (1844–1890),  
U.S.-Irish poet and writer

Plate 2. Marriages are regularly a celebration of the beauty of flowers. Fig. 9. Wedding bouquet. Photo by A. Cervova, publicdomainpictures.net. Fig. 10. Bridesmaids carrying bouquets. Photo by Perin, online at Wikimedia. Fig. 11. A classical bridal bouquet of white roses. Photo by Rosendahl, publicdomainpictures.net.

## PRACTICAL VALUES OF ORNAMENTAL PLANTS

A narrow-minded, indeed snobbish perspective of ornamental plants is that they are of a much lower order of economic importance than plants grown for harvestable products, like food for humans and livestock, fibre, medicine, and lumber. This perspective is flawed in several respects:

(1) The ornamental plant industry is gigantic, employing millions and generating trillions of dollars annually on a world basis. The industry is capital-intensive, with excellent potential to become progressively profitable. (2) Ornamental plant research today is astonishingly multidisciplinary, incorporating all of the fields of biology, and addressing issues which are as intellectually and scientifically challenging as those examined by other sciences; the results are theories and technologies of immense value to society. The ornamental plant industry is “high-tech”, requiring specialists who are as competent as those in any other field of biology. (3) Ornamental plant producers utilize resources and space more efficiently than any other area of agriculture; the industry is a model of intensive, high-yield, sustainable production. (4) Ornamental plants are so widely grown that they pose important ecological problems, which need to be addressed; the responsible cultivation of ornamentals can enhance rather than degrade the ecosystems of the planet. (5) Ornamental plants provide key opportunities to develop favourable public relations between the general public and professional botanists. Most people are more interested in ornamental plants than any other kind of plant, and most professional botanists receive more inquiries about ornamentals than any other kind of plant. This provides a critical opportunity for botanists to educate the public about botanical issues, and to enlist support for botanical research. Ornamental plants are prominent in daily life. They are grown outdoors in private and public gardens, parks, and conservatories, indoors usually as relatively small house plants, and often in very large planters in commercial and public buildings and shopping malls. The nursery trade specializes in potted plants. The florist trade may include potted plants, but today deals primarily in cut flowers for

bouquets, corsages, and boutonnieres. Several horticultural fields are also included in the ornamentals industry, and so are specialty areas such as turf (sod) and Christmas trees. Ornamental plants are often the subject of craftsmanship, including landscaping, flower arrangement, topiary (the shaping of shrubs and trees into figures, especially resembling animals) and bonsai (production of interestingly shaped dwarfed trees).

Frequently, ornamental plants are functional. Groundcovers, especially on sloping lands can serve to prevent erosion. Trees provide shade, which not only increases human comfort, but when strategically planted near or even on top of buildings can result in considerable energy savings. Hedges can act as privacy screens, traffic barriers, and for noise reduction. Trees and shrubs can act as wind and snow barriers, making streets safer. Ornamental plants attract birds, squirrels, and butterflies, providing entertainment and education (and sometimes deer and rabbits, providing snacks for other of God's creatures). “Horticultural therapy” is the cultivation of plants by people to relieve stress, furnish psychological comfort, improve memory and concentration, encourage social interaction, and provide exercise.

Ornamental plants, especially the urban forest, are so widely cultivated today that they serve as an important carbon sink, binding (sequestering) carbon so that the concentration of the atmospheric gas carbon dioxide is controlled, thereby moderating the climate change problem. Ornamental plants can also be used for phytoremediation—to reclaim land polluted by industrial wastes, or to remove pollutants from sewage water. “Living walls” of plants are now used to purify water in buildings as well as to provide an attractive appearance.

(continued)

## KEY ORNAMENTAL PLANT TERMINOLOGY

**Bedding plants:** Plants that are naturally annual or treated as annuals, grown outdoors for one season. Bedding plants can be grown as individual display plants, as potted plants, and in hanging pots, but a frequent recommendation is to grow them as massed plantings (or in borders) that feature a particular colour. Examples: begonia, geranium, impatiens, marigold, pansy, petunia.

**Cultivar:** A genetically distinctive, named (in part with a nonscientific, i.e. non-Latin word or phrase) assemblage of plants, usually selected by plant breeders or horticulturists, and maintained in cultivation for its usefulness to people. Names are of the nature of: *Rosa canina* L. 'Magnificent Red', or *Rosa* 'Magnificent Red', or rose 'Magnificent Red'. Naming of cultivars is governed by the *International Code of Nomenclature for Cultivated Plants* (Brickell et al. 2009).

**Cut flowers:** Cut inflorescences (flowering stems) sold individually as "stems" (especially roses) or in bunches, arrangements, or corsages.

**Floral design (floral arts):** The art and trade of creating flower arrangements in vases, bowls, baskets, and other containers, and making bouquets, wreaths, corsages, and more complicated arrangements of ornamental plant materials. (Sometimes floral design is considered synonymous with floristry.) Ikebana (Japanese flower arrangement) is a particularly disciplined art form.

**Floriculture crop:** Any crop used for ornamental display; includes cut flowers, bedding plants, potted flowering and foliage plants, material grown for greens, and vegetative material harvested for propagation. Woody plants (shrubs and trees grown in nurseries) are usually excluded. Floricultural crops (e.g. ferns) do not always have flowers.

**Floristry:** The cultivation of ornamental plants, their arrangement, and their sales. (Not to be confused with floristics: the geographical study of distribution and evolutionary spatial relationships of plant species.)

**Foliage plants:** Ornamental plants with relatively inconspicuous flowers and fruits, grown for their attractive

stems and leaves. In Canada the phrase normally refers to potted plants grown indoors, or sometimes as patio plants. The phrase also includes potted ferns and fern allies (which lack flowers and fruits).

**Greens ("cut foliage"):** Ornamental stems, branches or leaves used as filler or background in cut flower arrangements and bouquets. Greens include both cultivated and wildcrafted (wild-collected) material.

**Nursery:** An area where young plants are grown to establish stock for transplanting. In hot climates nurseries can grow all classes of plants outdoors, but in Canada the nursery trade and the greenhouse trade are different to a considerable degree. Canadian nurseries are the major source of planting stock of ornamental woody plants (bushes and trees) that are established outdoors. Also, Canadian nurseries are a major source of hardy herbaceous perennials that can be grown outdoors. Although many Canadian nurseries also grow annual ornamentals, and are associated with greenhouses, the production of all indoor potted plants, most annual ornamental planting stock, and some herbaceous perennial planting stock is the focus of the Canadian greenhouse floricultural industry.

**Ornamental Plant:** Any plant employed primarily to beautify, decorate, or enhance the appearance or functionality of the human-made environment. This includes floricultural crops (as defined above), but also turf grass and many shrubs and trees, whether grown for their attractive flowers or for shade, hedges, or landscaping. Vines grown for foliage are also usually included here. Christmas trees are frequently excluded, but are best considered as ornamental plants because in principle they are like cut flowers, but on a grander scale. Plants grown for food are excluded, although there is considerable interest today in "edible landscaping" (discussed below).

*Editors note: This article will be continued in the following issues of the Bulletin. A reference list will appear at the end of the Overview.*

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## 2011 BEN Scholars Program

The National Science Digital Library (NSDL) Biological Sciences Pathway, BiosciEdNet (BEN), invites undergraduate faculty in the biological sciences to apply to become BEN Scholars. The BEN Scholars Program is one of the grassroots outreach activities of the BEN Collaborative of more than 20 life sciences professional societies. The goal of the BEN Scholars Program is to promote the use of digital library resources and student-centered teaching and learning methods in higher education, specifically in biological sciences lecture and laboratory courses, and in research training programs. The BEN Scholars program works both directly with faculty who are BEN Scholars and indirectly, through outreach activities led by BEN Scholars. Outreach activities are aimed at biological sciences faculty, postdoctoral fellows, and middle and high school teachers. Activities are carried out on campus with departments, locally throughout the region, and nationally through professional societies. Using digital libraries, BEN Scholars learn how to transform lectures and laboratories to be more student-centered and to integrate career exploration and up-to-date science content across fields into existing curricula. BEN Scholars receive professional development in: 1) Using and submitting resources to digital libraries; 2) Implementing best practices in teaching and learning; 3) Integrating digital resources into courses and measuring their impact on student learning; 4) Leading digital library outreach activities with colleagues through presentations, workshops, and one-on-one mentoring; 5) Networking with other BEN Scholars for a minimum 18 month period. BEN Scholars will receive recognition from the participating organizations, travel support, and a small stipend for completion of all fellowship activities (\$1,000 total). Half of the stipend (\$500) is paid for completion of all Institute and online professional development activities. The other half (\$500) is paid for classroom testing, including developing a report and responding to comments for a month. BEN Scholars must be available to participate in the NSDL BEN National Leadership Training Institute which is scheduled for January 25-28, 2012 in Washington, D.C. The Institute will start at 1:00pm on Wednesday, January 25 and end by noon on Saturday, January 28. **Applications are due by Thursday, September 22, 2011, midnight EST.** Applications will only be accepted via submission through the American Physiological Society (APS) online application center ([www.the-aps.org/awardapps](http://www.the-aps.org/awardapps)). APS is one of the BEN Collaborative partners. Questions about applications can be sent to Gerard Boulin ([gboulin@aaas.org](mailto:gboulin@aaas.org)). Sincerely, Yolanda S. George, AAAS Deputy Director, Education and Human Resources



# Botany 2012



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## Scenes from Plant Canada 2011 in Halifax

### The reception.



Sylvia and Iain Taylor



Roger Evans, Arunika Gunawardena and Hugues Massicotte

### The field trips- Coastal barrens, led by Jeremy Lundholm

#### The musicians



Jeremy Lundholm leads a crowd of botanists over the foggy coastal barrens.



Lyn Baldwin finds a quiet place to sketch at Peggy's Cove



Cindy Ross- Friedman and Tom Friedman at Peggy's Cove

## Algal Biodiesel field trip, led by David Garbary



David Garbary (tour leader) beside the algal culture vessel named "Jack" after the late Canadian phycologist Jack McLachlan.

Stephen O'Leary, NRC's Lead Project Director for Canada's National Bioproducts Program Algal Biofuels Initiative, explains some of the program details to tour members



Paul Cavers and Mirwais Qaderi concentrate on their lobsters

## The Lobster BBQ



Left to right: Art Fredeen, Frédérique Guinel, Guinel and Linda Tackaberry

## Banquet



The group enjoys wine and appetizers  
Thank you to all who contributed photos. Hugues Massicotte and Linda Tackaberry, Moira Galway and Cindy Ross Friedman and Tom Friedman. Editor.



Felix Baerlocher and Hugues Massicotte after the Weresub lecture

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