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The Canadian Botanical Association Bulletin

Bulletin de l'Association botanique du Canada

October / Octobre 2005 • Volume 38 No. / N° 3

President's message

Dear CBA/ABC member:

Hope you are all having an exciting and enjoyable summer. A year has gone by since I took over as the President and I feel that although we have moved forward on a few things, there is still a lot to be accomplished.

First of all, I would like to thank all of you for your support in the last year. In particular, I want to thank all members of the Board who truly have done an outstanding job in each of their respective responsibilities. We are grateful to the out-going executive members **Christine Maxwell**, the secretary, and **Roisin Mulligan**, the Vice-President, for their dedicated service and enormous help to the Association. We welcome **Marian Munro** as the new secretary and **Daya Dayanandan** as the Vice-President and I look forward to working with them. The complete list of new Board members is available on the website: www.cba-abc.ca and on page 44 of this issue.

By all accounts, the **Plant Canada 2005 meeting** at Edmonton in June was a big success. This was the first time six plant-related Canadian societies got together under the umbrella of Plant Canada and it was a rewarding experience to get to know colleagues from our sister societies. With over 500 registrants, the task of organizing this meeting was a mammoth one and the credit goes to **Mike Deyholos**, Chair of the local organizing committee and his organizing team, and a large number of student volunteers for doing an outstanding job. The CBA/ABC representatives on the organizing committee were **Roisin Mulligan** and **Randy Currah** and our heart-felt thanks to them for all their hard work and for looking after the various needs of our society and its members. The meeting had an excellent series of plenary sessions, several symposia, and a number of oral presentations and poster sessions on a wide variety of topics. The quality of speakers and presentations was excellent. With a large number of interesting sessions at a time, one often had a hard time making a choice. The social program included a number of excursions and field trips, a barbeque and a very enjoyable and entertaining banquet at the Fort Edmonton Park. Overall, it was a very stimulating and exciting meeting, and it was wonderful to meet many new colleagues and to visit with old friends.

I am very pleased to report that at the Plant Canada meeting CBA/ABC gave out a number of awards. The **Lawson medal** was awarded to **Denis Barabé** of the Jardin Botanique de Montréal and the University of Montréal for his life time contribution to botany for his research on flower development, phyllotaxy and

(continued on next page)

Canadian Botanical Association

Bulletin
The CBA Bulletin is issued quarterly (in theory in March, June, September, and December) and sent to all CBA members.

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 go to the Editor's web site: http://www.umce.ca/cours/martin/CBA_ABC_Editor/ or feel free to contact the Editor (see below). For general info on CBA, go to the web site: http://www.cba-abc.ca

Association botanique du Canada

Bulletin
Le Bulletin de l'ABC paraît quatre fois par année, normalement en mars, juin, 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 site web du rédacteur: http://www.umce.ca/cours/martin/CBA_ABC_Editor/ et n'hésitez pas à contacter 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, **38**(**4**), must be received before **November 15th**, 2005.

La date de tombée des textes du prochain numéro, le no **38**(**4**), est le **15 novembre** 2005.

Published in Edmundston, on September 27th, 2005.
Publié à Edmundston, le 27 septembre 2005.

ISSN 0008-3046

President's Message (*continued from preceding page*)

symmetry in plants. The **Mary E. Elliott award** went to **Paul Catling** of the Agriculture and Agri-Food Canada, Central Experimental Farm, Ottawa, for his service to CBA/ABC in various capacities over many years (citations for both these awards appear on page 27 in this issue of the Bulletin). There were several excellent student presentations, both oral and posters, at the meeting and the judges for the Lionel Cinq-Mars and Iain and Sylvia Taylor awards committees had a difficult time selecting the best presentations. Indeed, for the Cinq-Mars award there was a tie and there were also two Honorable mentions. The names of the winners for both these awards and titles of their presentations appear on page 28 in this issue.

This year CBA/ABC gave out four John Macoun Travel Bursaries to students from different parts of the country to attend the Plant Canada 2005 meeting. However, there were only four applications for travel bursary and I encourage students, and the supervisors to coax their students, to apply for these bursaries and to present their research at the annual meetings. I am also pleased to report that this year the following student paper awards were made: Stan Rowe award in ecology, Leulla K. Weresub award in mycology, and Taylor Steeves award in structure and development. The Porsild prize in systematics was not awarded this year and I must again ask students and their supervisors to submit the best student papers for each of these awards. The winners of the student paper prizes, along with the titles of their papers, and the recipients of the John Macoun Travel Bursary are listed on page 28 in this issue.

At the AGM in Edmonton a number of important decisions were made and a summary of those is provided by Martin Dubé, the editor of the Bulletin (see below). The complete minutes of the AGM are available at the CBA/ABC website.

My best wishes to you all for an exciting and rewarding autumn.

Cheers,
Vipen Sawhney, CBA/ABC President

Motions adopted at the AGM

According to the AGM minutes (I did not attend the meeting), the following motions were carried by a working majority: - **Brian Husband**, **Rodger Evans** and **Hugo Cota Sánchez** stay as directors for a scond term (2006-2008); - **Marian Munro** becomes the association's secretary (2006-2008); - **S. Daya Dayanadan** is nominated as Vice President (2005-2006); - The number of issues of the Bulletin is reduced from four to three per annum; - The third coming issue will be electronic. Those members willing to continue to receive paper copies will get it at extra cost (nominal) per annum (free for retired people). **M.D.**

Propositions adoptées à l'assemblée générale annuelle

Trois directeurs, **Brian Husband**, **Rodger Evans** et **Hugo Cota Sánchez**, entament un second mandat (2006-2008). Marian Munro prend la succession de Christine Maxwell au poste de secrétaire (2006-2008). **S. Daya Dayanadan** devient vice-président (2005-2006). Dorénavant, le Bulletin est publié trois fois par année (et non quatre). Le troisième futur numéro sera électronique. Les membres désirant recevoir une copie papier devront débourser un léger supplément annuel (sauf les retraités). **M.D.**

Editor's Message / Message du rédacteur

I heartly thanks those members who *spontaneously* sent their texts for publication and those other members who kindly accepted my requests for texts.

Je remercie vivement les membres qui m'ont soumis *spontanément* des textes et ceux qui ont répondu favorablement à mes *sollicitations* de textes.

Lawson Medal - 2005



Denis Barabé receiving his prize from President's hands. Photo by Róisín C. Mulligan.

Lawson medal is the most prestigious award of the Canadian Botanical Association and was established in 1969 in honor of Prof. George Lawson who is regarded as Canada's earliest distinguished botanist. Prof. Lawson was born in Scotland in 1827, he received his early education there, and a Ph.D. from Germany in 1857. He moved to Canada and accepted an appointment of Professor of Chemistry and Natural History at Queens College (now Queens University) in Kingston, Ontario. In 1860, he helped form the first Botanical Society of Canada but unfortunately that was short-lived. In 1861, he also helped establish the first official Botanical garden, and the following year moved to Dalhousie where he joined the Nova Scotia Institute of Science. He was a founding member of the Royal Society of Canada, and Secretary for agriculture for the Nova Scotia government. In 1891, he helped form the Botanical club of Canada and was its president at the time of his death in 1895.

This year's Lawson medal winner is recognized for his life-time contribution to botany in Canada and abroad for his research on flower development, phyllotaxy and symmetry in plants. In particular, he is regarded as an international authority for his research on the floral biology of Araceae and his research has involved a multi-faceted approach relating plant development and evolution. His published work is very thoughtful and thorough and according to one colleague, "We see in his research the work of an inquisitive and creative mind, unconfined by dogmas and bold in overcoming barriers between disciplines", another supporter comments, "By using mathematical approaches, he and his colleagues have successfully used laws of physics to demonstrate quantitatively how physical and biological constraints interact with each other". Our winner "stands for free-thinking, intellectual vitality and generosity in scientific endeavors". He is the author and co-author of over 110 refereed papers in top journals in plant morphology and development, several book chapters and three books including a co-edited volume on "Symmetry in plants".

In addition, our winner has served Canadian Botany in many other capacities including, Associate Editor of the Canadian Journal of Botany, Vice-President and then President of the Canadian Botanical Association, and has served on numerous committees of botanical interest, locally, nationally and internationally.

It gives me great pleasure to invite a dear colleague and a friend, Prof. **Denis Barabé** of Jardin Botanique de Montréal/ the Montreal Botanical Garden, and of the University of Montreal, to come forward and accept the 2005 Lawson Medal.

Vipen Sawhney, CBA/ABC President

Mary E. Elliott award - 2005



Paul Catling gets his award from Vipen Sawhney. Photo by Róisín C. Mulligan.

The Mary E. Elliott award was established in the memory of late Dr. Mary Elliott who died tragically in 1978. This award was established to recognize an individual for meritorious service to Canadian Botanical Association/Association Botanique du Canada Dr. Elliott was a plant pathologist and mycologist who worked for several years with Agriculture Canada at the Central Experimental Farm in Ottawa. She was widely known for her work on the Sclerotiniaceae and was the curator of the National Mycological Herbarium. She served the Canadian Botanical Association in various capacities as the Secretary, Vice president and then the President, and at the time of her death was its past –President.

This year's winner has served the Canadian Botanical Association in numerous ways. He has been on the CBA Board in various positions as one of its Directors, President-Elect, President and Vice-President, and Chair of the Systematics and Phytogeography section and Chair of the Conservation committee. He was instrumental in establishing the Alf Erling Porsild student paper award in Systematics and Phytogeography, and has been a strong proponent of teaching, Science Policy and Conservation of plants. He is a regular participant at the CBA annual meetings and has helped organize and co-organize several symposia, lead many field trips at the annual meetings and Served on Cinq-Mars student paper selection committees. His dedication and devotion to the service of the Association is noted in that "in the last 30 years Paul has missed only two CBA annual meetings".

It is very fitting that this year's award winner comes from the same institution where Dr. Elliott had worked for several years, and it is my great pleasure to ask **Dr. Paul Catling** of the Agriculture and Agri-Food Canada, Central Experimental Farm, Ottawa to come forward and accept the 2005 Mary E. Elliott Award.

Vipen Sawhney, CBA/ABC President

CBA Student awards and travel bursaries (2005)

Note: This year, there is no winner for the Alf Erling Porsild Award.

Lionel Cinq-Mars Award

Tie for Best Presentation

Marie-Pierre Gauthier, University of Montreal, for her paper, "Molecular phylogeny of the genus *Philodendron* (Araceae): Clarification of its taxonomic position and species level classification" co-authored with Anne Bruneau and Denis Barabé.

Jennifer Lusk, Acadia University, for her paper, "Dammed rare plants! An exploration of factors on dam reservoirs limiting survival and establishment of two Atlantic coastal plain flora species at risk" co-authored with Ed Reekie.



From left to right, Christian Lacroix, Marie-Pierre Gauthier, Jennifer Lusk, and Vipen Sawhney. Photo by Róisín C. Mulligan.

Honourable mentions: (two)

Jennifer Burke, University of Lethbridge, for her paper, "The evolutionary origins of *Erigeron trifidus*" co-authored with John Bain.



Photo by Róisín C. Mulligan.

Krystal Mathieson, University of New Brunswick, for her paper, "Tracking bryophyte community reassembly in the Acadian forest nine years after forest harvest" co-authored with Kate Frego.



Photo by Róisín C. Mulligan.

John Macoun Travel Bursaries



Photo by Róisín C. Mulligan.

This year there were four recipients of the Macoun Travel Bursary:

From left to right**, Marie-Pierre Gauthier**, Université de Montréal, **Jennifer Burke**, University of Lethbridge, **Mathieu Chouteau**, Université de Montréal, and **Athena Mckown** , University of Toronto. Far right, Vipen Sawhney.

Iain & Sylvia Taylor Poster Prize

Rachel Botting, University of Northern British Columbia, for her poster, "Patterns in terrestrial bryophyte and lichen species in young and old sub-boreal spruce forest." Co-authored with Arthur Fredeen.

Honourable mention: **Colin Nakata**,University of Manitoba, for his poster, "Plant responses to petroleum coke". Co-authored with S. Renault.



Photo by Róisín C. Mulligan.

Stan Rowe Award (Ecology)

Benjamin Gilbert, McGill University (see on left), for his paper, "Neutrality, niches, and dispersal in a temperate forest understory" published in the Proceedings of the National Academy of Sciences (U.S.) **101**: 7651-7656. Co-authored with Martin Lechowicz (2004).

Honourable mention: **Helen T. Murphy,** University of Windsor, for her paper, "Context and connectivity in plant metapopulations and landscape mosaic: does the matrix matter?" Oikos, **105**: 3-17. Co-authored with Jon Lovett-Doust (2004).

Taylor A. Steeves Award (Structure and Development)

Mark Belmonte, University of Manitoba, for his paper, "Alterations of the glutathione redox state improve apical meristem structure and somatic embryo quality in white spruce (*Picea glauca*)", with Gillian Donal, David Reid, Edward Yeung, and Claudio Stasolla. Journal of Experimental Botany (in press).

Luella K. Weresub Award (Mycology)

Travis A. Clark, University of Toronto, for his paper, "Dikaryons of the basidiomycetous fungus *Schizophyllum commune*: evolution in long-term culture''. Genetics **167**: 1663-1675. Co-authored with J.B. Anderson (2004).

Poorly Known Economic Plants of Canada - 46. Black chokeberry (*Photinia melanocarpa*).

E. Small and P.M. Catling

National Environmental Program, Biodiversity Section, Agriculture and Agri-Food Canada, Saunders Bldg Central Experimental Farm, Ottawa ON K1A 0C6

Although overlooked as a crop plant in North America, the black chokeberry has attained notable economic success elsewhere. For 75 years, Europeans have been selecting cultivars for production of food and nutraceutical products from the berries. However, the development of the crop in Europe has employed only a fraction of the genetic variability present in North America. This variation includes three closely related taxa, as outlined below. Only very recently have North American researchers become interested in adopting chokeberries as a new crop.

Latin Names

Different authors have placed one or more of red and black chokeberry, and their putative hybrid (purple chokeberry), in several related genera of the Rosaceae: *Aronia*, *Crataegus*, *Mespilus*, *Pyrus*, *Sorbus*, *Photinia*, and others. Most of the literature places the chokeberries in *Aronia*, but recent study has resulted in their transfer to *Photinia*. Because of the confusing array of synonyms, these are rather extensively presented below.

BLACK CHOKEBERRY
Photinia melanocarpa (Michx.) K.R. Robertson & J.B. Phipps
Aronia arbutifolia var. *nigra* (Willd.) Seymour, *Aronia melanocarpa* (Michx.) Ell., *Aronia nigra* (Willd.) Koehne, *Mespilus arbutifolia* var. *melanocarpa* Michx., *Pyrus arbutifolia* var. *nigra* Willd., *Pyrus melanocarpa* (Michx.) Willd., *Sorbus melanocarpa* (Michx.) Heynh.). The name *Photinia* is based on the Greek *photeinos*, shining, referring to the glossy leaves of some of the evergreen species. The epithet *melanocarpa* is based on *melas* for "dark" and *carpos* for fruit."

RED CHOKEBERRY
Photinia pyrifolia (Lam.) K.R. Robertson & J.B. Phipps
Aronia arbutifolia (L.) Pers. [not *Photinia arbutifolia* Lindl.], *Aronia arbutifolia* var. *glabra* Ell., *Crataegus pyrifolia* Lam., *Mespilus arbutifolia* L., *Pyrus arbutifolia* (L.) L. f., *Pyrus arbutifolia* var. *glabra* Cronq., *Sorbus arbutifolia* (L.) Heynh.). *Arbutifolia* means "with leaves of *Arbutus*," and *pyrifolia* means "with leaves of *Pyrus*."

PURPLE CHOKEBERRY
Photinia ×floribunda (Lindl.) K.R. Robertson & J.B. Phipps, *Photinia melanocarpa* ×*Photinia pyrifolia*
Aronia arbutifolia var. *atropurpurea* (Britt.) Seymour, *Aronia atropurpurea* Britt., *Aronia floribunda* (Lindl.) Spach, *Aronia prunifolia* (Marsh.) Rehd. [not *Photinia prunifolia* (Hook. & Arn.) Lindl.], *Crataegus prunifolia* (Marsh.) Baumg., *Heteromeles arbutifolia* (Ait.) M. Roem., *Mespilus prunifolia* Marsh., *Pyrus arbutifolia* var. *atropurpurea* (Britt.) B.L. Robins., *Pyrus floribunda* Lindl., *Sorbus arbutifolia* var. *atropurpurea* (Britt.) Schneid.). *Floribunda* means "full of flowers."

English Names

Photinia melanocarpa: black chokeberry (chokeberries are so named for their astringent fruit, due in part to a high content of tannins); less commonly: barrenberry, chokepear. For commercialization, the genus name *Aronia* is being widely used as a common name (i.e. aronia) for both the plant and the fruit, to replace the unpleasant image of the name "black chokeberry." The name *Aronia* is a modification of *Aria*, beam tree of Europe. Sometimes chokeberries (some *Photinia* spp.) and chokecherries (*Prunus virginiana*) are confused. Adding to the confusion, there is a cultivar of chokecherry called Melanocarpa.



Figure 1. Black chokeberry (Photinia melanocarpa) in flower, photographed at Fitchburg, Massachusetts, 22 May 2005 by P. M. Catling.

Photinia pyrifolia: red chokeberry

Photinia ×floribunda: purple chokeberry

French Names

Photinia melanocarpa: cerisier à grappes, gueules noires, amélanchier à fruits noirs, aronie à fruit noir, aronie à fruits noirs, aronie noire, aronie naine

Photinia pyrifolia: amélanchier à fruits rouges, aronie à fruits rouges, aronie rouge, aronie à feuilles d'arbousier

Photinia ×floribunda: amélanchier à fruits mauves, aronie à feuilles de prunier, aronie à fruits mauves, aronie florifère

Morphology

Black chokeberry is a deciduous, multistemmed, suckering shrub, typically only 0.5–1 m tall, occasionally up to 3 m (rarely 4 m) high, with lustrous, dark green, glabrous leaves and white flowers. The species reproduces both sexually and vegetatively. New shoots arise from the rhizomes, and the plant spreads, tending to form large colonies. The fruits are black (occasionally dark red), up to 1 cm in diameter, and occur in clusters. The berries (technically pomes) often fall off the plant at maturity, but are sometimes persistent in a withered condition into the early winter.



*Figure 2. Black chokeberry (*Photinia melanocarpa*) in fruit, by B. Flahey.*



*Figure 3. Red chokeberry (*Photinia pyrifolia*), flowering and fruiting branches. Source: Sargent, C.S. 1890. Plant note.* Pyrus arbutifolia. *In Sargent, C.S. (Editor). Garden and Forest 3: 416–417. Garden and Forest Publishing Co., New York, NY.*

Red chokeberry is similar to black chokeberry, but produces bright red fruits (not black or dark red like black chokeberry) that are notably more persistent into winter than the fruits of black chokeberry. It has dull green leaves that are densely gray-pubescent beneath. The leaves turn scarlet in the fall, making this species particularly attractive as an ornamental.

Purple chokeberry, the putative hybrid between the two above species, is somewhat intermediate between them. The fruits are purplish-black and somewhat persistent into the winter, and the leaves are pubescent when young but usually become glabrous at maturity.

Classification and Geography

Black chokeberry occurs in the northeast from southern Labrador and coastal Maine west through the Great Lakes to Wisconsin and south in the Appalachians to Alabama.

Red chokeberry is found on the eastern coastal plain from Newfoundland and Quebec south to Florida and eastern Texas. (The occurrence in Newfoundland has recently been challenged as material representing nursery stock: see http://www.nfmuseum.com/Appendix_1_nfinal.wpd)

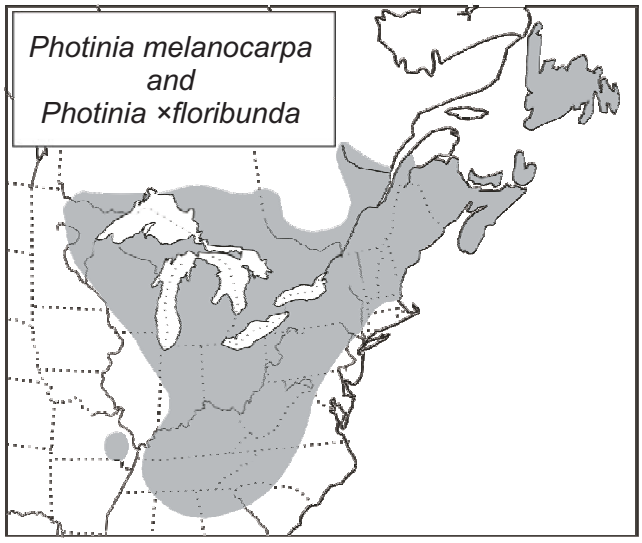


Figure 4. Collective distribution area of black chokeberry (Photinia melanocarpa) and purple chokeberry (Photinia ×floribunda).

The geographic distribution of purple chokeberry appears to correspond approximately to that of black chokeberry, but more study is required to establish the boundaries accurately. Some authorities have combined the purple chokeberry with the black into one species, commenting that The two are very difficult to discriminate. The purple Chokeberry remains a poorly understood grouping. As explained in the paragraph following the key, allopolyploidy combined with apomixis may be characteristic of many plants assigned to the purple chokeberry.

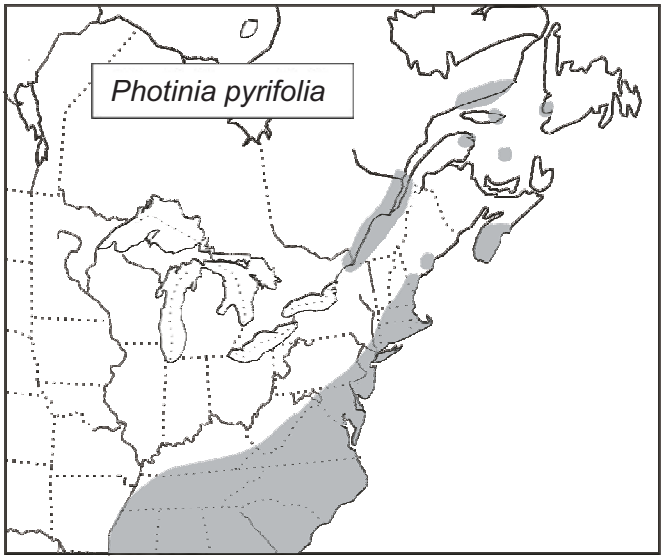


*Figure 5. Distribution of red chokeberry (*Photinia pyrifolia*).*

Key to Canadian taxa of *Photinia*

A. Ripe fruit red, persistent into winter; leaves mostly densely grey-hairy beneath (but glabrous in f. *glabra* (see Uttal 1984) which occurs in North Carolina, Georgia and possibly elsewhere); plants often with rhizomes and forming patches .....RED CHOKEBERRY, *Photinia pyrifolia*

A. Ripe fruit purplish black or black, not persistent or persistent into winter; leaves smooth or densely grey-hairy beneath when young; plants forming either tight clumps or patches.....B

B. Ripe fruit black; leaves smooth beneath .....BLACK CHOKEBERRY, *Photinia melanocarpa*

B. Ripe fruit purplish-black; leaves and branches hairy beneath when young .....PURPLE CHOKEBERRY, *Photinia* ×*floribunda* (*P. melanocarpa* ×*P. pyrifolia*)

THEORIES ON THE NATURE OF PURPLE CHOKEBERRY

Two kinds of plants of hybrid origin may make up what has been interpreted as the purple chokeberry. As explained respectively in the following paragraphs, these are a) allopolyploids (at the tetraploid level), and b) introgressants (at the diploid level).

One or more common allopolyploid biotypes (i.e. plants with multiple sets of chromosomes acquired through hybridization of different taxa), stabilized by apomixis, may constitute a large part of the purple chokeberry. There appears to be a relationship between ploidy level and apomixis (production of viable seeds without fertilization) among the chokeberries, and this is probably key to understanding variation of these plants. Tetraploids have been reported among the Russian-bred cultivars of black chokeberry (the first to be bred for fruit), and apomixis seems to be present in these selections. A similar association of tetraploidy and apomixis seems to exist among the wild chokeberries of North America. The most common chromosome count in the red and black chokeberries is 2*n* = 34 (i.e. the diploid complement). Counts of 2*n* = 68 (tetraploid complement) have been published for red chokeberry, but these were made long ago by botanists who may not have appreciated the taxonomic problems in the chokeberries (i.e., the reports may actually pertain to the purple chokeberry). Persson Hovmalm et al. (2004) demonstrated apomixis in tetraploid plants collected near the area of sympatry of the three chokeberries. Such tetraploid plants were presumed by Jeppsson et al. (2000) to be allotetraploids, and they may represent the (hybrid) purple chokeberry. Stabilized, morphologically distinct hybrids may exist in different regions.

Outcrossing occurs to a substantial extent in all three chokeberries (although inbreeding has also been demonstrated), and given that there are substantial areas of sympatry, introgression (gene transfer from backcrossing following hybridization) among the chokeberries is also plausible, and may well account for the existence of plants that are very difficult to identify.

Ecology

The chokeberries appear to differ in geographical distribution, and accordingly may be expected to also differ at least somewhat in adaptations. However, ecological differences have not been adequately studied. Chokeberries grow in a variety of habitats, including meadows, bogs, lake edges, borders of woods, barrens, and dunes. The species are notable for growing both in wet and dry areas, and occur on several substrates, preferring neutral to slightly acid soils, and tolerating infertile soils. The chokeberry taxa usually grow in sites exposed to full sunlight.

A wide variety of insects visit the flowers, and small bees are thought to be the primary pollinators. Many wild populations appear to be outbreeders dependent on insects, while some cultivars are self-fertile. Birds eat the berries, and are a significant risk for growers raising the plants in orchards. The leaves of numerous members of the Rosaceae, including those of the three chokeberries, are cyanogenic, i.e. capable of producing cyanide, and so are potentially toxic to livestock and wild browsers. However, the chokeberries are not considered to pose a significant risk of poisoning.

Use as Food

Wild food enthusiasts, following the traditional practice of some native inhabitants of North America, sometimes consume chokeberries raw, but they are very astringent, much like chokecherries. Black chokeberries are generally too puckery, sour, and strong in taste to consume directly, and are usually combined with other berries such as blueberries and black currants. Wild fruits can be collected and stewed or made into jelly. They are rich in pectin, and can be added to pectin-deficient fruits to produce mixtures that jell readily. Some cultivars selected for fruit (rather than ornamental) characteristics, like Nero and Viking, have

better flavour, and may even be eaten out of hand. Black chokeberries are primarily used in the food processing industry— to produce a very wide range of edible products, including alcoholic beverages (wine, spirits), non-alcoholic drinks (especially mixed juices), jam, sauce, soft spreads, syrup, fillings for confectionery and bakery products, and flavourings for yogurt, cream desserts, and teas.

Black chokeberry extracts are now widely employed as red colour for foods. Prominent in the extracts are anthocyanins, a subclass of flavonoids. These are water-soluble plant pigments, responsible for blue, purple, red, and black colouration. The chokeberries are exceptionally rich in anthocyanins, making up, according to one report, 1% of the dry weight of the berries. Flavonoids act as antioxidants, and have anti-inflammatory effects. Because of these health-promoting properties, black chokeberry anthocyanins have impressive economic potential as a food additive, supplementing the usefulness of the juice for flavour purposes.

Non-Food Uses

Recent publicity that highly coloured berries (as well as vegetables) contain bioactive pigments that can fight cancer, heart disease, and even the aging process has stimulated interest in the use of plants as sources of health-promoting dietary extracts ("nutraceuticals") that can be consumed directly or employed to fortify foods ("functional foods"). A note of caution has arisen in recent years: often plant extracts do not have nearly the health-promoting value as the same chemicals consumed while still a part of the fresh fruit or vegetable. In any event, anthocyanins from fruits have acquired an excellent reputation as disease-fighting antioxidants, and it is possible to preserve their health-promoting value in the form of extracted juice. Black chokeberry juice (under the more attractive name aronia) has already acquired a reputation as healthful, and its piquant taste makes it commercially attractive, at least when combined with other juices. It is not surprising that some Native Americans employed the berries of black chokeberry in traditional medicine to treat colds.



*Figure 6. Black chokeberry (*Photinia melanocarpa*) flowering and fruiting branches, by B. Brookes.*

All of the species of *Photinia* mentioned here are grown as ornamentals, especially red chokeberry. Among wild plants, only red chokeberry is claimed to produce brilliant autumn leaf colouration. However, 'Autumn Magic', released by the University of British Columbia in 1996, is said to be a cultivar of black chokeberry, and has been described as having brilliant wine red foliage that complements its black berries. The black chokeberry cultivar 'Viking' also has attractive, intense, crimson red fall leaves. Occasionally chokeberry plants have been used as a windbreak, and they are also considered useful for bank stabilization and erosion control.

Agricultural and Commercial Aspects

Black chokeberry was introduced to Europe more than 200 years ago, but serious development as a crop was not begun until the 1930s, in Russia. To date, Russia has more extensively cultivated the species than other countries. In recent decades, black chokeberry has also been commercially cultivated in Scandinavia and other parts of eastern Europe, and very recently in the United states, particularly in Oregon. The species has also been experimentally cultivated in Quebec (Rousseau 2001: http:/www.sbf.ulaval.ca/colloque-agf-2001/Resum_H.Rousseau.html).

Some cultivars have been selected that have larger fruit, and large size is certainly desirable in edible berry crops such as blueberry and raspberry intended for fresh consumption. However, chokeberry has primarily been an "industrial" crop, harvested for extracts, and so total yield of berries/unit area cultivated, not berry size, is most important. Commercial yields of black chokeberry fruit from Europe are generally in the range of 5 tons/ha. Newly established plantings require several years of development. Five-year-old plants can produce 10–15 tons/ha.

Cultivars and Germplasm

Genetic analysis of European cultivars has indicated that they are quite similar, which is consistent with a very small sampling of North American variation having been used as

foundational breeding material. The large natural distribution of black chokeberry, as well as the ranges of the other chokeberries, represent a considerable reservoir of germplasm potentially useful for breeding improved cultivars. European fruit cultivars of black chokeberry include 'Albigowa', 'Aron', 'Darbrowice', 'Egerta', 'Estland', 'Hugin', 'Kashamachi', 'Kutno', 'Mandschurica', 'Nero', 'Nowa Wies', 'Serina', and 'Viking'. Some of these cultivars are also employed as ornamentals. Hybrids of black chokeberry and *Sorbus* are also considered to have some promise as fruit varieties.



*Figure 7. Red chokeberry (*Photinia pyrifolia*). Source: Hooker, W.J. (Editor). Bot. Mag. 65, plate 3668.*

Prospects

Increasingly known for its healthful properties, aronia (black chokeberry juice) is being combined with other juices for effective marketing. Several berry-producing shrub species are currently competing for development as new crops based on the health-promoting value of their juice (notably elderberry and sea buckthorn). Black chokeberry, a native of Canada, is naturally adapted to much of the climate and terrain of the country, and so constitutes an excellent candidate. The species is easy to grow, cold hardy, and disease resistant. It is ironic that Europeans took the initiative to import and develop this crop that was foreign to them, and their success provides good reason for Canadians to expand on their accomplishments.

Myths, Legends, Tales, Folklore, and Interesting Facts

- Aronia is the second most popular ice cream flavor in Poland.
- Although birds will eat fresh chokeberries, they are not a preferred food and tend to be ignored during the summer. In the winter, however, when food is much less available, the shrivelled berries that persist on the plants (especially red chokeberries) become a significant source of nutrition for birds, as well as for other wildlife. Relatively few woody plants retain their fruit after they mature, and it appears that the phenomenon in the chokeberries represents an adaptation for distributing the seeds during the winter, that compensates for the lack of palatability compared to other species consumed during the summer. Other possible examples of retention of unpalatable berries include mountain ash, juniper, and European buckthorn.
- As noted above, anthocyanins derived from chokeberries are being widely used to colour food. However, food scientists must carefully control the acidity of foods in order to express a given colour. Anthocyanins tend to shift hues from pinks and reds at pH 3.0 to purple-violets at pH 5.0 and blues at pH 7.0.
- Many chokeberries develop spectacular red fall foliage. Red colouration in autumn leaves of most deciduous plants is primarily a result of the production of the anthocyanin cyanidin-3-glycoside, and leaf anthocyanins often increase in concentration during senescence. Several hypotheses have been advanced to explain the possible adaptive value of the development of such leaf pigments in the fall. Postulated explanations include: a protective function against high irradiance, particularly ultraviolet light; prevention against damage in sensitive tissues by photo-oxidation [although late-season leaves are unlikely to add much photosynthate, maintaining the biochemistry of the cells in good working order could contribute to resorption of nutrients from the leaves before they are discarded]; increasing stress tolerance, particularly to cold temperatures; discouraging herbivores (at least those that overwinter or lay eggs in the vicinity); and attracting seed dispersers. (For additional information, see Lee, D. W., J. O'Keefe, N. M. Holbrook, and T. S. Feild 2003. Pigment dynamics and autumn leaf senescence in a New England deciduous forest, eastern USA. Ecol. Res. **18**: 677–694.)

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Acknowledgments

W.J. Cody (review), B. Brookes (artwork), J. Cayouette (information).

.



*Figure 8. Black chokeberry (*Photinia melanocarpa*) fruiting branch, photograph by P.M. Catling, Annapolis Valley, NS, Aug. 2005.*

THE GLOBAL TAXONOMY INITIATIVE

by Mark Graham, Director, Research Services, Canadian Museum of Nature

To date, 175 countries have signed on to the United Nations Convention on Biological Diversity (CBD). Like any large-scale, global initiative, the CBD grinds at a slow pace: identifying issues, planning carefully and thoroughly and eventually implementing well-meaning actions, in six official languages. At its fourth meeting, the parties to the CBD agreed that there was a taxonomic impediment in their work to help countries conserve, sustainably use and equitably share the benefits of biological diversity. In other words, without proper taxonomic expertise the “sound management of biodiversity” was not possible (1). Based on recommendations that they received from a group of experts, the so called Darwin Declaration (2), the CBD decided that concentrated action would be needed in the form of the Global Taxonomy Initiative (GTI) (3). Following that decision there was much analysis and planning and eventually the approval of a program of work (4, 5). What is in the program of work, how that relates to the CBD and what that means for Canada is the subject of this essay.

It is generally recognized that there is a dwindling number of taxonomic experts world-wide. At the same time, there is also a persistent, high demand for taxonomic expertise to maintain and understand the value of the irreplaceable record of biological diversity that is kept in an orderly, hopefully accessible fashion in the world's museums, botanical gardens and zoos some 3 billion specimens (6, 7). Making sure that specimen collections are developed and cared for are two of the main “front end” curatorial tasks of taxonomic experts. Additionally, our thirst for digital information has created an ongoing need for authoritative collection information to be accessible via the Internet. The obvious role for taxonomists is to ensure that information is correct (8, 9, 10, 11).

The lack of taxonomic expertise creates the most serious problem in developing countries, regions of the world with the greatest biological diversity (12). Even though there are observations that great numbers of students are trained as taxonomists in some of those countries, there is little or no opportunity for employment of these young experts (13). The trend toward a lack of employment opportunities is not unique to developing countries. In Europe and North America there is a growing concentration of taxonomic expertise at museums and botanical gardens and a decrease at universities (14). The general shift to a smaller number of experts and away from academic institutions indicates a declining interest in the profession and a decreased capacity to generate new experts.

While taxonomic research is not always considered innovative by funding agencies, the results continue to be greatly needed, are fundamental to the life sciences and in many ways instruct how we conduct ourselves (15, 16, 17). These are the essential elements of the taxonomic shortfall facing the CBD.

The GTI program is intended to augment the many work initiatives of the Convention; for a complete list of thematic and cross-cutting issues go to the CBD website (18). In short, the Convention has a vast slate of activities that it attempts to plan and implement towards it major milestone in 2010, to significantly decrease the loss of biodiversity. Within this mission, the role of the GTI is to provide a forum that promotes the importance of taxonomy and taxonomic tools and to facilitate cooperation between Parties to the Convention for taxonomic research.

More specifically, the five operational objectives of the GTI are for each member country to conduct a taxonomic needs assessment, contribute to capacity building, provide support for the CBD's thematic areas (e.g. forest biodiversity) and cross-cutting issues (e.g. alien invasive species), and improve access to information. The enhanced awareness for taxonomy and a greater sense of cooperation will improve the chances for collaborative funding initiatives, including those through the Global Environmental Facility (19).

The Convention Secretariat, as much as possible, supports a GTI Coordinator who organizes a program of work, writes a guidebook on the utility of the GTI (currently in draft format) and acts as a reference for the Focal Points of each country. The Canadian Focal Point is the Canadian Museum of Nature (Dr. Mark Graham is the contact person - mgraham@mus-nature.ca).

In Canada, the capacity to benefit from and contribute to the GTI is impeded because there is no coordination mechanism to link Canadian taxonomists. Although some attempts have been made to list taxonomists (20, 21), the experts remain scattered among government, university, museum and private organizations. There have been regional meetings of the GTI in Europe, Asia and Africa to understand what the program of work might mean to those places and how to address needs. In Canada it is difficult to both conduct a needs assessment and to understand how the country might be contributing to the program of work of the GTI.

Even with the logistical challenge in Canada, there are a few key recommendations that I can make as the Canadian Focal Point for the GTI. You will recognize these as cogent points with or without a GTI. First, regarding expertise, because of decreasing numbers of taxonomists in Canada there can be a feeling of a being a taxonomic have-not country; there are still a great many in comparison to other countries. There needs to be a continued capacity to train new taxonomic experts within our academic institutions, a trend that does seem apparent at the moment. That capacity, however, will only be viable if those emerging experts have employment opportunities, a trend that does not seem apparent at the moment. Our taxonomic experts need to engage in programs of research that help to serve the needs of Canada as well as those of other countries. Research findings need to be published in the scientific literature, an obvious point of survival for most science faculty members, and information about their collections (specimens, tissue and DNA), as well as the actual vouchers and types, need to be readily available. Eventually our national granting agency will recognize that providing funding for the proper housing of specimens and availability of related data is a legitimate component of taxonomic

research and make this process easier through access to funds. The Natural Sciences and Engineering Research Council of Canada already provides an excellent guideline on natural history collections, should funding become available from somewhere (22). Finally, when new research tools become available that might assist the scientific process, such as the continually emerging DNA techniques, taxonomists need to work as openly and constructively as possible to explore the utility of those methods (23, 24, 25, 26).

In summary, The GTI provides a broad, collaborative, international forum to raise awareness for the importance of taxonomy and to focus efforts. In the most immediate sense, it does that for the needs of the United Nation convention to conserve biological diversity, and in the long-term for sustained and appropriate levels of expertise. Canadian taxonomists have a role to play, to be aware of the activities of the GTI and most importantly to apply our expertise in Canada and abroad in research and training efforts. Further, to apply all reasonable effort to make valuable natural history specimens and specimen-based research accessible to others.

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News from Teaching Section

prepared by Christine D. Maxwell, Chair of the Section

The Teaching Section held a successful afternoon session called “Teaching in the plant sciences” at the recent Plant Canada meeting in Edmonton. The contributed papers section of the program had been arranged jointly by the chair of the teaching section, **Christine Maxwell**, with considerable help from **Kate Frego**, and the chair of the CSPP Education section, **Anja Geitmann**.



Co-organizers of the contributed paper session, Christine Maxwell (left) and Anja Geitmann.



David Cass with one of his models.

The session included talks by two 3M teaching fellowship winners, **David Cass** and **John Hoddinott**. David Cass delighted the audience by producing a series of simple “models” from a large black bag. These ranged from coloured rubber tubing, used to illustrate vascular tissues to a more elaborate endodermal cell made from a box surrounded by a layer of insulating tape. He also gave some valuable advice for those involved in teaching botany to first year students. John Hoddinott presented a thought-provoking paper on the educational use of technology in a liberal arts and science curriculum and suggested that there may be different instructional strategies appropriate for arts and science, as well as for large research-intensive institutions compared to smaller liberal arts based institutions.



David Hoddinott giving his talk.



Frédérique Guinel giving her talk.

Frédérique Guinel from Wilfred Laurier University had been challenged by her department chair “to make plants interesting” to her students in an introductory botany course. She gave a lively description of her course, which involves field trips to Chinatown, the Royal Botanical Gardens and the handing out of chocolates. She also talked about the response of the students to the material.

Liz Straszynski, who teaches at the University of Toronto Schools presented two papers developed from her teaching experiences. In the first she described the lack of specificity in the curriculum documents supplied to teachers and emphasized how this gives flexibility to individual teachers to incorporate plant-based activities into their own programs. In the second she described an exercise she had devised to develop experimental design and scientific writing skills in high school level students. The project involves small teams of students working together in a collaborative manner. Information is shared between teams, the pooling of information benefiting all the participants. She also gave us some insights into the nature of the adolescent brain. The abstracts of the contributed papers appear on the Teaching website at **http://www.trentu.ca/biology/botany/cbaabstracts.html**.



Liz Straszynski giving her presentation.

The presentations were followed by a lively roundtable discussion, moderated by **Heather Addy** and **Randy Currah**. The topic was somewhat controversial. “Does the modern Biology Student need Botany?”



The panel in the roundtable discussion. (From left to right) Peta Bonan-Smith, Cindy Graham, Marie Davy, Hugues Massicotte and Frédérique Guinel.

Participants on the panel were **Peta Bonam-Smith**, **Cindy Graham**, **Marie Davey**, **Hugues Massicotte** and **Frédérique Guinel**. Each member of the panel presented his or her opinions and then the discussion was opened to the floor. No clear concensus was reached!

The session was well-attended and we are already planning a session for the 2006 meeting at Concordia.

Teaching Website. This has been updated with many broken links removed, and currently more material is being added. New pages on Careers and Graduate Student Information will be added shortly. If you have any suggestions or comments they would be welcomed. Please send them to Christine Maxwell (cmaxwell@trentu.ca).

Book Reviews
Revues de livres

The Herbaceous Layer in Forests of Eastern North America
Edited by F.S. Gilliam and M.R. Roberts, 2003
Oxford University Press, New York, 424 p., 65 halftones, line illus & maps.
ISBN 0-19-514088-5 (hardback)
Price: US$54.50, CDN$77.95



This major new compilation by Frank Gilliam and Mark Roberts synthesizes the current knowledge of an often-neglected component of forests, the herbaceous layer. The book relies on a scientific literature including classic studies by pioneers of vegetation ecology to the most current research to illustrate the dynamic nature of herbaceous vegetation in eastern North American forests. Several authors with various expertises contribute to this work, providing a wide breadth of information. A broader context is presented by organizing the chapters into four themes: the environment of the herb layer, population dynamics, community dynamics across spatial and temporal scales, and community dynamics and the role of disturbance.

The environment of the herb layer section focuses on nutrient and light availability in forest understory environments. Here, herb layer ecophysiology is examined, particularly the physiological responses to variability in nutrient and light environments. Nutrient concentrations and seasonal patterns of accumulation within the herbaceous layer are also discussed with an emphasis on spring ephemeral herb dynamics. The authors describe the differences between herbs and woody species, and the characteristics of herbs that contribute to ecosystem-level nutrient dynamics.

The population dynamics section explores the challenges of conserving rare herbs in eastern forests and the current knowledge of life history characteristics. The seminal review on population biology of herbs in temperate forests by Bierzychudek (1982) is used as a framework to assess the progress in knowledge of plant population dynamics of rare eastern flora. The author notes that population studies of eastern species continue to receive little attention; only 150 articles were found, and most focused on common species. Questions originally posed by Bierzychudek are still relevant today: what factors regulate herb population sizes? How stable are population sizes? How much variation occurs in herb population behaviour?

The majority of the book is devoted to community level processes, and focuses on dynamics occurring across spatial and temporal scales and the role of disturbance. Brian McCarthy discusses eastern old-growth forests, which are often used as "benchmarks" to which younger forests or managed forests are compared. He notes the difficulty in defining old growth forest and points out that inclusion of herbaceous species is lacking in most definitions. He reviews some key literature on the dynamics of herbaceous species in old growth and highlights differences between old growth and second growth herbaceous layers. Likewise, Christensen and Gilliam provide a succinct review of the theories of succession from classic works by Cowles, Clements, Egler, Gleason and others. In examining how the environment influences vegetation in various successional communities, the authors find that no single hypothesis explains these dynamics, rather, there is support for various hypotheses, depending on successional stage and the forest type examined.

Spatial dynamics of herbaceous layer communities are examined at varying scales, including microscale pit and mound topography, mesoscale interactions between forest layers, and the landscape scale of the boreal forest. Susan Beatty's work on microtopography represents some of the most extensive research on microscale habitat heterogeneity and its influence on species distributions. Spatial heterogeneity appears to allow many species to coexist and provides a buffer against environmental fluctuation. Beatty proposes two hypotheses to explain the influence of spatial heterogeneity on species distributions and recommends that these be further tested in other forest systems.

The creation of microtopography by fallen overstory trees represents one influence of the forest overstory on the herbaceous layer; conversely, Lisa George and Fakhri Bazzaz review the influence of herbaceous species on tree regeneration. The numerous literature investigating the competitive interference of herbaceous species on tree seedling dispersal, germination, survival and growth are synthesised. Gilliam and Roberts, who discuss a potential linkage among forest strata, further examine interactions within forests. This linkage may arise from similar responses to environmental gradients; however, these responses change with successional stage indicating that the mechanisms may be related to stand age.

Louis De Grandpré and others provide a larger scale perspective by describing the boreal forest of Quebec. This ecosystem consists of four forest domains which transition from Abies balsamea – Betula papyrifera in the south to forest tundra in the north. The authors focus on the two most southernmost domains and examine a second gradient occurring from east to west. This gradient is related to topography and forest fire frequency, with the latter being a primary control of herbaceous layer community dynamics.

The final theme of the book examines the influence of disturbance on herbaceous layer vegetation. The major natural and anthropogenic disturbance types in eastern North America are discussed. The severity of these disturbances is emphasised, which is argued to be an important factor in determining vegetation responses. The authors suggest that characterizing disturbance in this way focuses on the processes that control ecosystem responses, independent of the causal agent. Using this approach, the authors examine the effects of natural and anthropogenic disturbances on herbaceous vegetation and point out that the initial effects of disturbance on vegetation have received considerable attention, while long-term effects are lesser known, but fundamental in understanding the recovery of vegetation.

In the context of disturbance ecology, James Luken discusses the effects of invasive species on the function of eastern North American forests. A useful table classifies colonizers based on dispersal distance, uniqueness to the region, and its environmental impact. The term invader or invasion is then assigned to species that have large measured impacts on the ecosystem and can be either indigenous or nonindigenous to the country. Floristic surveys indicated that 144 nonindigenous species are potential invaders to eastern North American forests; however, the literature documents very few (~10) that have large impacts. The success of these species appears to be related to their ability to express different traits across a range of environments. Nevertheless, relatively low coverage of invasive species within eastern forests indicates that these forest environments may be resistant to invasions. Low light availability may be a key limitation

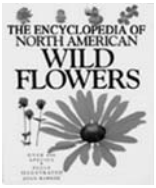
to forest invasion, but other factors also contribute such as disturbance regime, distance to human populations and diversity of the target population.

The concluding chapter provides several useful features. A synthesis of the main points of each chapter, based on the four themes, is presented. This section nicely summarizes the chapters but also integrates the ideas among chapters, providing some interesting generalizations for the reader. Each of the chapter authors presents a list of topics that are particularly essential for future research, which may be useful to a range of ecologists, from graduate students to senior level research scientists.

Overall, the book is well written, with considerable attention given to the integration of knowledge for many levels of biological organization. There are over 80 figures and tables in the book; however, some chapters have only a few graphics and would benefit from some additions. Generally, the figures and tables are presented clearly and are useful in illustrating the authors' main ideas. Some chapters also provide graphics that summarize the literature, which is particularly appealing. Although there are different authors for each chapter, their diverse writing styles do not disrupt the reader. The only drawback of the book is its limitation to eastern North American forests. As many of the ecological processes are broadly applicable, inclusion of other regions would have been fitting. Even so, this book fills a large gap in forest ecology textbooks, and the comprehensive review of a broad array of topics makes it well suited as an undergraduate or graduate student textbook in forest ecology or to use by any ecologist or botanist interested in the herbaceous layer.

Barbara V. Ramovs
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Encyclopedia of North American Wild Flowers
By Joan Barker, 2004
Parragon Publishing, Bath, UK., 384 pages.
ISBN 1405430354
Price: $19.99 (hardbound)



What a surprise to find, on a table of a general book display in a mall, an Encyclopedia of North American Wild flowers. Obviously, i could not resist. When the book was viewed again at home, it soon became obvious that a closer scrutiny was needed for its evaluation.

Already the title of the book is misleading. It is readily apparent that the author is an artist rather than a professional botanist: the described wild flowers include several plants usually classified as weeds, often with instructions for their elimination; i.e. *Agrostema githago*, *Plantago lanceolata* and others. In contrast, will known flowers, such as *Polygala* and *Convolvulus* are omitted.
The introduction looks very technical. It tries to define wild flowers as included in this book and reasons for their importance. It bemoans the fact that plants used to be destroyed or transplanted by will and warns of laws that now protect threaten species.

A sketch of basic nomenclature suggests to the reader how plants are classified and presents examples of the principle on which scientific names are based. A distinction between annuals, biennials and perennials, the plant structure, and different habitat should provide further aids to identification. It is a pity that the listed habitats are not presented here in the same sequence as in the following text. They are not included in the index. Reasons are given for wild flower conservation. The author considers colour of primary importance for identification. A printing error is obvious on page 9, line four of the second column, where it should read ''colour'' rather ''flower''.

The sections Glossary and Drawing that follow make me wonder why the two were not, for easier understanding, combined? Also, in a perfunctory overview of the text, the label under the drawing calls a leaf type *per*; while it is described correctly in the reference glossay as perfoliate.

The main part of the book consists of excellent plant photographs, each accompanied by both a common and scientific name, common family name, flower type, flowering period and colour; leaf type, height, habitat and range. The photographs by Oxford Scientific Film and Animals are acknowledged to individual authors at the end of the book. They follow each scientific plant name recorded in alphabetical order in tight sequence.

Different lontigudes of North are all inclusive under one habitat-heading of an individual section. Thus: Western North America, Eastern North America, and North East North America are all represented under Woodland and Forest on two facing pages. Sometimes there is a more definite description that lists United Stated or Canada, or a more defined distribution, i.e. Central United States. I suspect that the lack of uniformity is a result of diverse references used by the author. This is even more evident when we try to compare plant distributions as listed for instance on pp. 142 and 143: East United States, Northeast North America, Eastern central United States.

At least three plant photographs are mislabeled: on p. 34 what is labeled as Northern Bedstraw is instead a member of the Mustart family. The photograph on p. 344 is not *Silene acaulis*. That plant does not have succulent leaves and its fruit is not a berry. The mislabeling on page 98 brings up another problem: while the arrow points to the left, the described plant is on the facing page, identified properly directly under the photograph. The plant pictured on that page is not identified, it is possibly a Valerian. The Tachoca Daisy, described on the same page, is not pictured. Its only relation to the other two plants is supposedly its purple colour. It does not coincide in distribution.

Perhaps there is a need for a further warning concerning individual descriptions and definitions. A discrepancy was readily found on a perfunctory examination of the text on p. 276 where describing the nature and use of Indian Hemps, *Apocynum cannabinum*, it is stated: ''American Indians used the berries (?) of Indian Hemp to make tea''. The fruit of *Apocynum* is a follicle, not a berry. I was also concerned that although the poisonous properties of *Conium maculatum* (a wild flower?) were mentioned, its fleshy roots, principal cause of poisoning, were not.

The listing of plant descriptions without accompaning photographs is dispersed throughout the text. While sometimes it possibly includes a related plant similar to that pictured, i.e. Flowering Spurge and Snow-on-the-Mountain, at other time the plant, while of similar habitat and similar geographical distribution, have only colour is their common denominator. The many plant descriptions without accompanying pictures leave a feeling of loss.

It is regrettable that none of the excellent general habitat pictures, i.e. full page landscapes with profusion of flowers in bloom, are not identified in any way (location or plant material).

This well presented book on quality paper shows what can be done by assembling a superior representations produced by many individuals. The author, Joan Barker, ''trained as an artist, specializing in flower painting that led to study of plant forms'' was living in Dorset, England, then this book was published.

This is a coffee table volume with beautiful plant pictures and a challenging text to appeal to a flower enthusiast.

I would like to acknowledge assistance for plant identification from Gisèle Mitrow and Paul Catling at the Central Experimental Farm.

Erika E. Gaertner
Ottawa

The ROM Field Guide to Wildflowers of Ontario. by T. Dickinson, D. Metsger, J. Bull, and R. Dickinson, 2004 Royal Ontario Museum and McClelland and Stewart Ltd. With colour photos, 416 pp. ISBN 0-7710-7652-5 [sofcover]. Price: $29.99.



A team of botanists from the Royal Ontario Museum has produced a field guide to some 550 wildflowers of Ontario that is both classic and innovative. The guide is classic in that it includes all the features one is looking for in a guide: pocket size, oil-and-water-repellent cover, good binding (though I did not test it to its limit, not wishing to destroy a perfectly good, brand-new guide), readable font, identification tools, illustrated glossary, excellent, concise diagnoses, distribution maps, photographs and some drawings, a list of useful books and web sites on Ontario vascular plants, and an index to vernacular and scientific plant names. The guide covers flowering herbs, and thus excludes trees and shrubs, ferns, lycopods, and graminoids.

The illustrated glossary is efficient, even if illustrations are small. It takes the form of a text, rather than a series of definitions. A small problem may be found in the definition given to the terms simple vs compound ovary, and as a result, of achene and nut. A compound ovary is not one made of several chambers with several stigmatic lobes (a plurilocular ovary), but a structure comprised of several fused carpels, whatever teh number of chambers. Subsequently, achenes are described as developing from a simple ovary, but the fruit shown, a Compositae cypsela, is a compound, inferior, unilocular ovary, with 2 stigmatic branches. The application of these terms needs to be revisited.

Each page is devoted to a single species. Though the alphabetic order that is used to order species within families is based on the Latin name, it is the vernacular name that appears first on the page. Non-native species are indicated by an asterisk. The descriptions cover the habitat (a description of habitats is provided with the glossary), habit, leaves, inflorescences (called flower clusters), flowers and flowering time, and fruits. Diverse notes often accompany the diagnosis, notably remarks concerning related species. Each species is mapped according to its distribution in the 14 ecoregions of Ontario, defined at the begining of the book. Ecoregion polygons are shaded when a species is present. Though less precise than dot distritubion maps (but far easier to produce), such maps still clearly show the biogeographic patterns typically found in Ontario vascular plants. These maps are thus of interest to plant geographers, given the dearth of published distribution information for Ontario plants.

The photographs are well-disposed on the pages, and two to four accompany each described species. Photos are usually very good to excellent, though many are dark, probably owing to their small size. They illustrate the habitat, habit, or a detail of the plant, usually the flower or fruit. There is no fixed pattern to the features illustrated. The only photo that puzzled me was that of the Northern yellow-eyed grass (*Xyris montana*): a series of yellow dots in what one guesses might be a fen, with a prominent *Platanthera* in the center, does not help the user to grasp the habitat or habit of the plant. Fortunately, the related *X. difformis* is illustrated below.

The guide is innovative in several features. Firstly, and perhaps most strikingly, it is organized along taxonomic lines, not according to flower color or leaf or inflorescence shape, as is often the case in field guides. The plants are grouped by family, the authors' rationale being that plants of the same family are more similar to each other, a comparison among them thus making more sense when one is trying to identify a plant, a position with which I agree. The authors used the recent Angiosperm Phylogeny Group classification of Angiosperms, and not the traditional families that are found in Canadian floristic works of the past. This was a pleasant surprise to me. By using the modern system, the authors will contribute strongly to familiarize Canadians, and I hope generations of students, to the new classification and redefined families, and make it the system that everyone knows and is comfortable with. In the guide, families are first organized according to the major lineages of flowering plants: paleoherbs, monocots, magnoliids, and eudicots, and then ordered alphabetically. Colors on the book margin identify each of the major groups (e.g., gray for eudicots). One could argue that it might have been as well to push the use of the classification farther and group families in orders, since often (but not always) plants of the same order are more similar to each other than they are to those of different orders. But this is quibble. Another novel feature of the guide is that each family is briefly described, sometimes a full page when particular features require explanation (some nice botany can be learned here, given the fine drawings that accompany explanations).

Another innovative feature for a field-guide, but a system that has been utilised elsewhere, is the use of table keys as the identification tool. The key to families is presented at the beginning of the book, and that for species under each family, where needed. As far as I could test them, the keys appear to work. Admitedly, only their use by a large body of enthusiasts will tell us how friendly they are to the public.

I enjoyed reading and leafing through the guide. The descriptions are easily understandable, the level of vocabulary friendly to a wide range of users. The photos are not only very nice, but helpful in identifying the plants. The maps are instructive. The guide will prove useful well beyond the borders of Ontario, throughout central Canada and adjacent areas. Furthermore, it will become an excellent educational source about the new flowering plant families. Finally, the price is well within range for such books. Overall, a useful addition to the floristic literature of Canada and a great educational tool. I warmly recommend that all botanists, and nature lovers, acquire it.

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Mycorrhizas: Anatomy and Cell Biology.
by R. L. Peterson, H. B. Massicotte, and L. H. Melville, 2004
National Research Council Research Press, 176 pages.
ISBN 0-660-19087-7
Price: $69.95CAN, other countries: $69.95US (softcover)



This is a beautifully produced book from three authors who have made major contributions to mycorrhizal research over many years.

The preface states that plant-fungus associations: “are the most prevalent symbiotic systems on earth.” True, if one excepts the multiple symbiosis origin of the eukaryotic cell. But as mycologists know, there would be no forests, and many fewer land plants (possibly none at all) if mycorrhizal relationships had not evolved hundreds of millions of years ago. So mycorrhizas are essential components of the biosphere.

The preface provides a rationale for this book as an antidote to the current prevalence of ecological, physiological and molecular investigations of mycorrhizas, and the corresponding neglect of their morphology and anatomy. I agree with the authors, in that all understanding and investigation of mycological phenomena must surely spring from a preliminary visual analysis. How can we know what questions to ask until we have looked at the structures (and in this case the interfaces) involved? This book presents copious photographic visualizations, most in colour, derived from light microscopy (employing many staining techniques), scanning electron microscopy, transmission electron microscopy, and even X-rays (though the specific technique used in visualization is often, unfortunately, not identified), as well as many interpretive coloured diagrams. Of the over 300 illustrations, 271 are numbered, and another 34 un-numbered pictures are presented in 16 ‘boxes’ scattered throughout the text. There are also 8 whole-page colour photographic collages at the beginning of the chapters, mostly representing various ecosystems, each followed by a full-page interpretive black and white version.

This must surely be the most extensive and exhaustive collection of excellent mycorrhizal images ever to appear in a single publication - all packed into the first 153 of the book’s 173 pages, which also contain 7½ pages of references, an inadequate 1½ page glossary, a short methodological appendix, and a rather perfunctory index of less than 2½ pages.

The book has 8 chapters, each dealing with a more or less discrete set of mycorrhizal phenomena: Ectomycorrhizas, Endectomycorrhizas, Arbuscular mycorrhizas (note: not Vesicular-arbuscular mycorrhizas [VAM], a phrase that should not be used because some of the mycorrhizal fungi involved do not produce vesicles), Ericoid mycorrhizas, Arbutoid mycorrhizas, Monotropoid mycorrhizas, Orchid mycorrhizas, and Dark septate fungal endophytes. Within each chapter, a logical sequence is followed - definition, plants involved, fungi involved, then other topics such as specialized plant-fungal structures, interfaces, development and anatomy. The ‘boxes’ cover questions specific to each category.

Although an early section purports to deal with ‘Mycorrhizal categories’, there is neither a table comparing the features of the various kinds of mycorrhiza, nor any set of comparative side-by-side diagrams introducing the 7 kinds of mycorrhiza recognized. Nor is there a table of major plant families/genera involved in each kind of association. These are the kind of reader-friendly features that would have added significantly to the didactic value of the book.

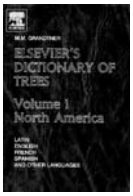
This leads me to the first of my two serious criticisms of the book - it costs $70 plus tax, which will put it beyond the reach of many of the (mostly young) people who could have found it most useful. The high price undoubtedly derives from the extensive use of high quality colour reproduction, and a short print run. Lower book prices can stem only from heavy subsidies or long print runs. This leads me to one inescapable conclusion – the project would have been better executed on CD-ROM. There would then have been effectively no limit to the number of illustrations that could be incorporated, and hot links and other search features would have allowed the user to find any kind of information in the twinkling of an eye. Best of all, the price could have been much lower, and shipping costs greatly reduced.

My second criticism is that none of the illustrations indicate a magnification. It is extremely important that the reader understand the relative magnifications of the illustrations in each plate, which often vary enormously. This deficiency reduces the scientific and didactic value of the book, and although the experienced eye quickly makes appropriate judgments, and teachers will be able to supply information about relative sizes to their students where necessary, the uninitiated solo reader will probably become confused.

Nevertheless, this is a valuable and instructive compilation, and the student who is willing to dig (pun initially unintended) can find many answers, and many unsolved mysteries, in its pages.

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June 2005

Elsevier’s Dictionary of Trees. Volume 1 - North America.
by Miroslav M. Grandtner, 2005
Elsevier, Amsterdam, 1529 pages.
ISBN: 0-444-51784-7
Price: USD 220 (hardbound)



The recent publication of Elsevier's Dictionary of Trees, Volume 1 (North America) is part of an ongoing project covering trees of all over the world, presented by geographical regions: North America, South America, Eurasia, Africa and Oceania. The publication of the next volumes of this series is foreseen for 2006 to 2012. Dr. Miroslav M. Grandtner, the initiator of the project, is also the editor of Vol. 1, which involves 1529 pages dealing with 8778 taxa. He edited this reference book with the assistance of scientific collaborators and of a team of more than 80 members. The rich professional experience of Dr. Grandtner in the edition of works in ecology and international forestry joined to the specialisation of the publisher (Elsevier) in the field of dictionaries, are favourable conditions to the quality of this book.
The preliminary pages explain how to use the book. They first give the definition of a tree and provide an appropriate map of North America: from Alaska to Panama,

including Caribbean Islands. They also indicate a list of abbreviations (including a short definition of them) and a fifteen-page bibliography dealing with essential works on the trees of North America. The taxa are presented in alphabetical order of their accepted Latin names, each of them being preceded by a reference number. Family is specified. Scientific synonyms are indicated when existing. Names are also indicated in English, French, Spanish, and other languages; trade names are also noted. Six different indices appear in the last part of the book. The first index refer to Latin synonyms. Each of the five following indices refers to English, French, Spanish, other languages and trade names.

The dictionary specifies the distribution by using geographic codes illustrated in the map, and often identifies the countries, states or provinces, specially for endemics. Some specific aspects (physical, ecological) are also signalled in relation to trees: height of the trees (giant, large, medium or small), preferences for soils (acidophilous, basiphilous or neutrophilous) and their chemical elements (magnesium, silica and calcium), light (heliophilous and sciaphilous), soil dampness (hygrophilous, mesophilous and xerophilous), foliage (evergreen, semi-evergreen or deciduous), economical uses of the trees (drug, toxic, firewood, fuel or charcoal, food, fodder, plantation, soil and environment amelioration, timber, pulp and paper, rarity (endemic, endangered, near extinction), cultural aspects, etc.

Because of the size of the project, the book does not deal with identification keys, morphological descriptions, nor illustrations. Nevertheless, the Dictionary reports many details in different fields often omitted in conventional floras giving the book an original and unique character. Indices and reference numbers allow the reader to find the required information easily. The international level of the book must be taken into account when considering the standardised names used in English and French outside of North America.

The dictionary is highly recommended to all persons interested in learning more about trees, particularly for foresters, botanists, environmentalists, students at all levels. It constitutes also a precious reference for researchers, linguists and translators. Persons who cannot afford the purchase of this dictionary should ask their library to acquire this reference book.

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The Nature of Plants: Habitats, Challenges, and Adaptations.
by John Dawson and Rob Lucas, 2005
Timber Press, Portland, Oregon, 205 colour photos, 5 colour drawings, 314 p.
ISBN 0-881 92-675-2 (hardcover)
Price: 39.95$ (US), 54.95$ (CAN)



Plants are remarkable for their diversity in form, function, and adaptability, and “The Nature of Plants” provides an excellent overview of this variability in a clear and accessible format. The book is devoted to demonstrating how plants deal and live with the challenges present in their environments. Although not aimed at a professional audience (the book contains several discussions of basic botany, such as seed plant reproduction and basic plant anatomy), those with botanical training should find much to enjoy in this well-written and informative work. Educated lay-persons should enjoy the revealing insight into the mysterious world of plants. The authors, John Dawson, a retired professor from Victoria University in New Zealand (and author of several other popular books on New Zealand plants), and Rob Lucas, a lecturer in the Natural Resources Center of the Open Polytechnic of New Zealand, both come from a southern hemisphere perspective, but the book takes a global approach and is balanced with discussion and examples of plant diversity from throughout the world. Some of the material is locally relevant and familiar, with examples from the Canadian flora, such as discussion of the parasitic genera *Orobanche* (broom-rapes) and *Castilleja* (Indian paintbrush) (both Orobanchaceae) and dodder (*Cuscuta*, Cuscutaceae), the explosive seed-pods of *Impatiens* (Balsaminaceae), the stinging hairs of nettles (*Urtica*, Uricaceae), and the arctic tundra. On the other hand, information on plants from the tropics and other far away parts of the world will be particularly interesting to temperate-trained botanists.

The book is divided into nine chapters, each discussing a unique way that plants have evolved to live among other plants or in challenging environments. It thus takes a functional approach to examining the plant kingdom, and includes many examples from the ferns, conifers, and flowering plants. Each chapter begins with information on the anatomical, physiological, and morphological adaptations of plants, and/ or an introduction to the challenging ecosystems that plants call home, followed by detailed discussion of the particular lifestyles. The text is easy to read, and does not rely heavily on ecological and botanical jargon, but where specialized terminology is necessary, a glossary is presented. Throughout the text, the authors consistently revisit several themes, such as the various evolutionary processes that have resulted in similar structures in unrelated lineages of plants, and floristic biogeographic patterns between geographically disparate regions, such as South Africa and Australia. Chapter one discusses plants that use other plants to survive, emphasizing climbers, epiphytes, parasites, and mycotrophs. Chapter two characterizes plants of dry places, including a detailed description of how deserts are formed, descriptions of the major deserts of the world, and the various ways that plants deal with drought. Chapter three discusses the intimate relationship between plants and fire. In chapter four, the authors discuss how plants deal with serpentine and salty soils. In the fifth chapter, plants of aquatic environments are discussed, including those that live entirely submerged in water, those that float, emergents, and tropical magroves. Plants of cold environments are characterized in chapter six, and chapter seven is about the relationships between plants and animals, including herbivore defense mechanisms, pollination biology, fruit dispersal, and the carnivorous lifestyle. Chapter eight discusses the hidden relationships that plants share with pathogenic, parasitic, and mycorrhizal fungi and bacteria, and the final chapter (which may have been more suited as an introductory chapter) provides a brief overview of plant evolution through time, from the origin of life up to the angiosperm-dominated present.

The story of plant diversity is best told with examples, and this book does not fall short on this mark. Not surprisingly, many of the familiar botanical ‘wonders-of-the-world’ find a spot in the text, such as the titan arum (*Amorphophallus titanum*, Araceae), the world’s largest inflorescence; *Parasitaxus usta* (Podocarpaceae), the world’s only parasitic conifer (debatably a parasite, but clearly a highly unsusual mycotroph); *Rafflesia arnoldii* (Rafflesiaceae), the world’s largest flower; *Welwitschia mirabilis* (Welwitschiaceae), the remarkable gnetalean plant of the Namib desert; and the coastal redwoods (*Sequoiadendron giganteum*, Taxodiaceae), the world’s tallest trees. But for every example that is well-known and familiar, the authors include several more that are equally remarkable, but poorly known. Notable examples include the African succulent climber *Adenia spinosa* (Passifloraceae) with stems that can weigh up to four tons, the nickel

accumulating tree *Sebertia acuminata* (Sapotaceae) from New Caledonia that exudes a bright blue milky latex when cut, the large alpine tree senecios (*Senecio killmanjari*, Asteraceae) from the tropical mountains of Africa, as well as descriptions of rare vegetation types, such as the fynbos of South Africa and the kwongan of Australia.

The authors do not hesitate to use scientific names at the family, genus, and species level throughout the text, including common names where appropriate. Although necessary, some of this information may not be particularly informative to an amateur naturalist with little basic training in taxonomy. Reciprocally, those with interests in taxonomy know that in today's molecular era, higher-level plant classification changes very rapidly. Accordingly, some of the information presented in the book does not reflect current taxonomic knowledge. For example, the genus *Cytinus*, long considered to be part of the holoparisitic family Rafflesiaceae, as indicated in the book, is now placed in its own family, Cytinaceae, following recent molecular phylogenetic study. Similarly, the authors indicate that pineapplegrass (*Astelia*, Asteliaceae) is part of the lily group of families (order Liliales), when molecular study has indicated that it is in fact part of the order Asparagales, a large group of monocots that includes the onions, orchids, and relatives. In other cases, however, the authors allude to recent studies that have clarified or changed taxonomic circumscriptions.

In any book, it is difficult for text alone to adequately explain the remarkable and sometimes bizarre adaptations that plants have evolved. As such, the photographs are arguably the strongest point of the book. The many photographs, most taken by the second author, are stunning and informative, and complement the text greatly. Photos range from closeup shots of flowers, habit shots of plants, to dramatic landscape shots. The captions are generally informative, usually with scientific names, geographic origins of the photos, and brief descriptions, but unfortunately for the taxonomically-oriented reader, many do not include family names, making it necessary to dip into the text to determine a plants proper classification. In some cases, plants in the photos are not mentioned in the text, and it is impossible from the book alone to determine their respective families. A few of the photos (e.g., some grasses), don't include the scientific name of the plant in the picture.

For the research-oriented reader, the authors identify several areas where more study is necessary, such as understanding the germination and establishment of seeds of *Parasitaxus usta*, and understanding the exact mechanism of closing of the leaves in the venus flytrap (*Dionaea muscipula*, Droseraceae). Throughout the text, the authors occasionally provide references to the primary and, more often, the secondary literature, although their use of references is not consistent. It might simply have been more informative to provide a bibliography for further reading. Regardless, the list of references, most of which have been published in the last 25 years, will provide adequate entry into the literature for the interested non-specialist.

Overall, the book is carefully written (I noted only two typos) and was enjoyable to read, and is suitable for anyone interested in knowing more about the life strategies of some of the remarkable plants with which we share the planet. Published by Timber Press, the book should reach a large audience of enthusiastic nature (and book) lovers. In an animal-oriented world, a book like this that showcases plants is definitely a welcome addition to the popular natural history literature, and hopefully it will open a few eyes to the wonders of the botanical world. For those for whom plants are already a passion, the book should remind them why that is so.

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Communiqué

Exposition virtuelle : Marie-Victorin. L'itinéraire d'un botaniste.

Depuis le 18 avril 2005, il est possible de visiter, sur le site de la Division des archives de l'Université de Montréal à www.archiv.umontreal.ca/mv/expov.htm, une exposition virtuelle relatant la vie et les réalisations d'un professeur les plus connus de l'Université de Montréal, fondateur du Jardin botanique de Montréal et pionnier de cette science au Québec, le frère Marie-Victorin.

Ayant comme mandat de conserver et de diffuser les documents de l'Université, la Division des archives de l'Université de Montréal, en collaboration avec l'Institut de recherche en biologie végétale, successeur de l'Institut botanique fondé par Marie-Victorin, le Jardin botanique de Montréal et la Fondation Muséums nature Montréal a élaboré et mis en ligne cette exposition qui présente près de 400 documents numérisés provenant de quatre fonds d'archives. Le site propose un parcours relatant, en cinq tableaux, la vie de Marie-Victorin. Une section pour les jeunes offrant un accès thématique et de multiples liens procurant des informations supplémentaires ainsi qu'un concours pour les moins de 12 ans compètent l'exposition.

Depuis la naissance de Conrad Kirouac en 1885, jusqu'à sa mort en 1944, le site raconte et met en contexte l'existence de Marie-Victorin. On y découvre aussi l'important héritage de celui qui, avec ses élèves et collaborateurs, a profondément transformé le paysage du Québec en développant l'enseignement des sciences et la recherche scientifique en plus de créer des institutions qui portent encore sa marque plus de soixante ans après sa mort. L'exposition fait aussi une place à ceux qui ont inspiré sa vision comme à ceux qui l'ont suivi et qui ont continué de faire vivre ses réalisations. Plus qu'une simple exposition, ce site constitue le survol de la vie d'un homme qui a marqué l'histoire du Québec et de son époque.

Ce projet n'aurait pu être réalisé sans le soutien financier du Ministère du Patrimoine canadien, du Conseil canadien des archives, de Bibliothèque et Archives Canada.

Pour plus d'informations, veuillez contacter la référence de la Division des archives de l'Université de Montréal au (514) 343-2251 ou par courriel à reference@archiv.umontreal.ca.

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SECTION CHAIRS / RESPONSABLES DES SECTIONS

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