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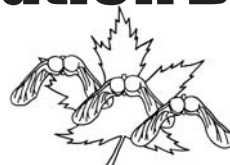
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The Canadian Botanical Association Bulletin



Bulletin de l'Association Botanique du Canada

December/Décembre 2008. Volume 41 No.3/N°3

CBA-ABC 2009



Plants on the Periphery



It's hard to believe, but **CBA-ABC 2009** is only a few months away. The Local Organizing committee at Acadia University has been working hard to design a conference package that will attract a diverse group of plant biologists from across Canada.

Our first goal was to keep registration fees low, while including as many activities as possible. We succeeded as regular registrants will pay **\$250**, and more importantly students will pay only **\$100**, with the opening mixer, contributed paper sessions, poster session, bbq, and banquet all included! We have also been able to secure excellent prices for campus accommodations.

Our second goal was to organize several field trips that would accommodate diverse interests. We succeeded and will offer an all day Botanical Hike to breathtaking Cape Split, a Wine and History tour of Grand Pre and the surrounding Gaspereau Valley, and self-guided walking tours of the historic South Shore town Lunenburg.

Finally, all conference information will be available on our website by the first week of January 2009 including the ability to register for the conference, book on-campus accommodations, and register for one of our exciting field trips. The website is currently under construction so check back often for updated information. Visit <http://cba-abc.acadiau.ca/> to track our progress toward registration in early 2009. (see page 75 for more details)

We look forward to welcoming you to Nova Scotia, and Acadia University next May!!

Sincerely,
Acadia's CBA-ABC 2009 LOC



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, **42(1)**, must be received **before February 20th 2009**

La date de tombée des textes du prochain numéro, le no **42(1)**, est le **20 février 2009**

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CBA-ABC 2009



Plants on the Periphery



C'est difficile d'y croire, mais la conférence du **CBA-ABC 2009** est dans seulement quelques mois. Le comité organisateur local au *Acadia University* a travaillé d'arrache-pied pour concevoir une trousse de conférence qui plaira aux divers groupes de botanistes dans l'ensemble du Canada.

Notre but premier était d'abaisser les frais d'inscription, tout en incluant le plus d'activités possible. Nous avons atteint notre objectif, car nos inscrits réguliers ne paieront que **250 \$** et nos étudiants ne paieront que **100 \$**. Le prix de l'événement englobe une soirée cocktail d'ouverture, des séances de communication offerte, des présentations par affiches, un barbecue ainsi qu'un banquet! Nous avons également réussi à offrir l'hébergement sur le campus à un prix très raisonnable.

Notre deuxième objectif était d'organiser plusieurs excursions pédagogiques qui pourraient susciter de l'intérêt chez plusieurs groupes de personnes. Nous sommes heureux d'annoncer que nous avons organisé une excursion d'une journée de randonnée pédestre botanique au site enchanteur Cape Split, une visite historique et viticole du Grand Pre et de la vallée Gaspereau environnante et des visites d'interprétation à pied du quartier historique South Shore de Lunenburg.

En dernier lieu, tous les renseignements au sujet de la conférence seront mis en ligne sur notre site Web à compter de la première semaine de janvier 2009, incluant la possibilité de s'inscrire à la conférence, de réserver un hébergement sur le campus et de vous inscrire à une de nos excursions excitantes. Le site Web est actuellement en chantier, alors venez nous visiter souvent pour des mises à jour. Visitez le cba-abc.acadiu.ca pour suivre nos progrès vers l'inscription à la conférence au début 2009.

Nous avons très hâte de vous accueillir en Nouvelle-Écosse et au *Acadia University* en mai prochain!!

Cordialement,

Comité organisateur local CBA-ABC 2009 du *Acadia University*



Sad News



Wilf Schofield

Members of Canada's botanical community will be saddened to learn that Wilf Schofield passed away on November 5th 2008 at the age of 81. He had been a professor at the University of British Columbia for many years and after retirement continued an active research program on bryophytes, traveling the world to New Zealand, Australia, Japan and Tasmania. His research on the moss flora of Alaska will be published posthumously. According to the obituary published in the Vancouver Sun, his greatest joy was in sharing his enthusiasm for bryophytes. A full obituary will appear in the next issue of the Bulletin. A celebration of Wilf's life will be held on Saturday, April 25th 2009, 5 - 9pm at the Unitarian Church of Vancouver.



Volunteers!



CBA needs YOU ! Consider serving on our Board

Nominations are invited for the following positions, each of them for a 2 year term:

Secretary

Director representing Eastern Canada

Director representing Western Canada

These terms will begin at the end of our next AGM in May 2009.

Please send your nominations (or expression of interest) to: Christian Lacroix, Dean of Science,
University of PEI, 550 Univ. Ave, Charlottetown, PE C1A 4P3

e-mail: lacroix@upei.ca

Keith Winterhalder is honored in India.

The Society for Ecological Restoration (SER) India recently reported that the first of five eco-Restoration Information centres has been established at Dimoria College, Assam (North East India). SER-India has named this Center in the memory of the great restoration ecologist, **Prof. Keith Winterhalder**.

SER reports that a major hurdle in promoting restoration ecology in India is lack of scientific information and poor access to networks. Scientific publications such as the journals Restoration Ecology, Ecological Restoration, books from the Science and Practice restoration book series from Island press, as well as books published by different publishers are in much need for restoration practitioners, students and researchers. This information center will serve this purpose for seven north eastern states of India. SER-India is planning to establish four more centers in the coming years. Your support and collaboration is needed and will be highly appreciated.

(Keith Winterhalder was president of the CBA from 1995 to 1997 and a regular and very enthusiastic participant in all the association's activities. He was well known for the "greening of Sudbury". Sadly, he passed away in 2005)

Thanks to Peter Nosko for this information.

Nouvelles de l'association

I'ABC a besoin de VOUS !

Devenez un membre de notre conseil d'administration

Un appel de candidatures est lancé pour les postes suivants, chacun d'une durée de deux ans:

Secrétaire

Directeur représentant l'est du Canada

Directeur représentant l'ouest du Canada

La période de service pour chaque poste debuttera à la fin de la réunion annuelle générale en mai 2009.

Veuillez faire parvenir vos nominations (ou nous communiquer votre intérêt à soumettre votre candidature) à: Christian Lacroix, Dean of Science, University of PEI, 550 Univ. Ave, Charlottetown, PE C1A 4P3, e-mail: lacroix@upei.ca

Keith Winterhalder est honoré en Inde.

La société Society for Ecological Restoration (SER) de l'Inde a récemment annoncé que le premier de cinq centres d'information sur la reconstitution en milieu naturel a été mis sur pied au Dimoria College, à Assam (dans le nord-est de l'Inde). SER-India a nommé ce centre à la mémoire du grand spécialiste en reconstitution du milieu naturel, **Professeur Keith Winterhalder**.

SER souligne qu'un obstacle majeur à la promotion de la reconstitution en milieu naturel en Inde est le manque d'informations scientifiques et la difficulté d'accès aux réseaux. Des publications scientifiques telles que les revues Restoration Ecology, Ecological Restoration, les livres de la série Science and Practice sur la reconstitution publiés par Island press, ainsi que les livres publiés par différents éditeurs ont grandement besoin de spécialistes, d'étudiants et de chercheurs dans le domaine de la reconstitution en milieu naturel. Cela sera la visée de ce centre d'informations pour sept états du nord-est de l'Inde. SER-India a prévu de mettre sur pied quatre autres centres dans les prochaines années. Votre soutien et collaboration sont nécessaires et sont grandement appréciés.

(Keith Winterhalder était le président du CBA-ABC de 1995 à 1997 et un participant régulier et très enthousiaste à toutes les activités de l'association. Il était reconnu pour avoir rendu « plus verte la ville de Sudbury ». Il est malheureusement décédé en 2005)

Merci à Peter Nosko pour ces renseignements.

News from the Sections



Photo: C. Maxwell

Mycology Section

The Mycology committee is delighted to announce that the Weresub lecturer for 2009 will be Dr. Faye Murrin, from Memorial University. Her research interests are on the cell biology of insect pathogenic fungi and the ecology of mycorrhizal mushrooms in the

boreal forest. The exact title for the Weresub talk is still to be determined but we are looking forward to her presentation in Acadia. Details will follow in the next Bulletin.

Plant development Section

We would love to have applications or nominations for the Taylor A. Steeves Award!! Students of structure and development need to submit applications or nominations for the Taylor A. Steeves Award before **April 1st, 2009***. It is greatly appreciated if professors could make their students aware of this wonderful award. It was established to honour Taylor Steeves for his numerous contributions to the CBA and to botany. For more information or to submit applications or nominations, please contact Dr. Usher Posluszny, College of Biological Science, University of Guelph, 50 Stone Rd. E., Guelph, Ont. N1G 2W1 or at uposlusz@uoguelph.ca.

***Note date change from that given in the last Bulletin.**

Teaching Section

The section is delighted to announce that Dr. Kate Frego, winner of a 3M Teaching Fellowship in 2008, has accepted an invitation to give a lecture at the annual meeting at Acadia. The title of the talk will be announced in the next Bulletin. We are also hoping to have a session of contributed papers on innovative ideas that you have used in your teaching, so please take the time to submit an abstract and share your ideas with others!

Position available

Plant genetics tenure-track position McGill University, Faculty of Agricultural and Environmental Sciences

The Faculty of Agricultural and Environmental Sciences (FAES), Department of Plant Science, invites applications for a tenure-track position in plant genetics at the level of Assistant Professor, effective September 2009.

The Department of Plant Science facilities include the Applied Biotechnology Laboratory, an extensive phytotron for controlled environment plant research, and fully equipped field stations for horticultural and agronomic research. As the FAES has identified bioproducts, including biofuels, as a strategic field of growth, and has now established a centre in this area, opportunities exist for those applicants wishing to collaborate with other McGill researchers in this field.

Candidates must have a Ph.D. and preferably post-doctoral experience in a relevant field. We seek applicants with

expertise in plant genetics and molecular biology to develop a well-funded, internationally-recognized research program and to teach at both the undergraduate and graduate levels in programs offered by the FAES. Applicants should submit a letter of intent, a *curriculum vitae*, up to four representative publications, a statement of research and teaching interests, and arrange to have three letters of reference mailed to: Dr. Alan Watson, Search Committee Chair (C/O Meline Chatoyan), Department of Plant Science, McGill University, Macdonald Campus, 21111 Lakeshore Rd., Ste-Anne-de-Bellevue, QC, Canada H9X 3V9. With the exception of reference letters, electronic applications (plant.science@mcgill.ca) are encouraged. The deadline for the receipt of applications is **January 2, 2009**. For more information on the Department of Plant Science, consult www.mcgill.ca/plant/.

In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada; however, all qualified applicants are encouraged to apply. McGill University is committed to equity in employment.

CBA/ABC Regional Undergraduate Awards.

This program offers annually one award of \$200.00 for one of the undergraduate conferences/meetings in Biology for each of the five (5) regions of Canada: Atlantic region, Québec, Ontario, Prairies and Territories, and British Columbia. The awards will be presented for the best presentation by an undergraduate student in the discipline of Botany at one of the major regional undergraduate conferences. The purpose of this recognition is to encourage undergraduate students to pursue graduate research in botany and to enhance the visibility of the Association. If no presentation in Botany is scheduled, the money returns to the Association. Students cannot apply directly to the CBA/ABC for these awards.

There are three major undergraduate conferences. The dates and locations are given below. We encourage members of the Association to participate in the judging for these awards.

AUUBC 2009 (Atlantic Universities Undergraduate Biology Conference) March 6-8, 2009, Nova Scotia Agricultural College Truro, NS <http://apics.dal.ca/index2.html>: <http://people.upei.ca/blatch/APICS/>

22nd ANNUAL ONTARIO BIOLOGY DAY 2009 University of Windsor March 21-22, 2009

Please bookmark this URL, which will be updated as the event draws near:

<http://www.uwindsor.ca/biologyday>

British Columbia: UBC Okanagan. April 3, 2009. Contact Dr. Louise Nelson Tel:250 807-8756 louise.nelson@ubc.ca

CBA/ABC Student Awards '08-'09

~Awards for Papers published by Students~

Alf Erling Porsild Memorial Prize

Award honoring the memory of the eminent Arctic botanist Alf Erling Porsild. Applications/nominations for students who published a paper in plant systematics and/or phytogeography (as senior author) during the previous year should be sent to the current Chair of the Systematics and Phytogeography Section of the CBA/ABC (Dr. Tim Dickinson, Dept. of Natural History, Royal Ontario Museum, 100 Queen's Park, Toronto ON M5S 2C6) *before April 1st 2009.*

J. Stan Rowe Award

Award established to celebrate the life and work of Stan Rowe, eminent Canadian Plant Ecologist. Applications/nominations for students who published a paper in plant ecology in 2007 should be sent to the current Chair of the *Ecology* Section of the CBA/ABC (Dr. Liette Vaseur, Associate Vice President – Research, Laurentian University, 935 Ramsey Lake Rd, Sudbury, ON P3E 2C6) *before April 1st, 2009.*

Taylor A. Steeves Award

Award established to honour Taylor Steeves' numerous contributions to the CBA/ABC and botany. Applications/nominations for students who published a paper in 2008 in plant development, structure or morphology should be sent to the current chair of the *Plant Development* Section of the CBA/ABC (Dr. Jane Young, Ecosystem Science and Management Program, University of Northern British Columbia, 3333 University Way, Prince George, BC V2N 4Z9) *before April 1st, 2009.*

Luella K. Weresub Memorial Award

Award established in memory of Dr. Luella Kayla Weresub, a well-known Canadian mycologist who worked at the Biosystematics Research Institute of Agriculture Canada. The award is open to all undergraduate or graduate students working on fungi. Applications/nominations for students who published a paper in fungal biology in 2007 should be sent to the current chair of the *Mycology* Section (Dr. Hugues Massicotte, Ecosystem Science and Management Program College of Science and Management, University of Northern British Columbia, Prince George, BC V2N 4Z9) *before April 1st, 2009.*

Please refer to CBA/ABC website (cba-abc.ca) for eligibility details

CBA/ABC '09

Conference Awards

John Macoun Graduate Student Travel Bursary & Keith Winterhalder Undergraduate Travel Award

Awards established to provide partial financial assistance for travel to the Annual Meeting to a student (or students) presenting a paper in the Lionel Cinq-Mars competition or a poster in the Taylor competition.

Eligibility:

3. Open to all student members of CBA/ABC.
4. Students must present a paper (Lionel Cinq-Mars competition) or a poster (Taylor competition) at the Annual CBA/ABC Meeting.
5. No student may receive more than one travel bursary while registered for the **same** degree.
6. Students must apply no later than the submission deadline for abstracts to the Annual Meeting.
7. The application must contain the following documents:
 - a. A copy of the abstract of the paper to be given at the Annual Meeting in the Cinq-Mars Competition;
 - b. A supporting letter from the student's Supervisor of research that also includes a statement that the student is engaged in a MSc. or Ph.D. program;
 - c. The student's curriculum vitae (one page);
 - d. A letter of recommendation from a member of the student's research committee (not the Supervisor)
8. Applications should be sent the President of CBA/ABC (Dr Rodger Evans, Biology Dept., Acadia University, Wolfville, NS B4P 2R6; e-mail rodger.evans@acadiau.ca)

Lionel Cinq-Mars Award

Award for the best oral presentation by a student of his or her own research, as a contributed paper at the Annual Meeting.

Eligibility:

Any bona fide (under-)graduate Canadian student enrolled at a Canadian institution of higher learning, as well as Canadian students at foreign institutions, are eligible. Every effort will be made to ensure that each student in the competition has a fair evaluation and an equal chance of winning the award.

Oral presentation will be evaluated by a panel of judges (at least one from each CBA/ABC section) chaired by the President-Elect. The merit of each paper will be judged on the basis of content (60%) and presentation (40%). All students who wish to compete for this award must indicate this by checking the appropriate box on the abstract form. Abstracts must be submitted for the Annual Meeting at which the student will compete for the Award.

Iain and Sylvia Taylor Award

Award for the best student research poster presented at the CBA Annual Meeting.

Eligibility:

Any bona fide (under-)graduate Canadian student enrolled at a Canadian institution of higher learning, as well as Canadian students at foreign institutions, are eligible. Every effort will be made to ensure that each student in the competition has a fair evaluation and an equal chance of winning the award.

Posters will be evaluated by a panel of judges chaired by the Vice-President of CBA/ABC. All students who wish to compete for this award must indicate this by checking the appropriate box on the abstract form. Abstracts must be submitted for the Annual Meeting at which the student will compete for the Award.

**Please refer to the CBA-ABC2009 website (cba-abc.acadiau.ca)
for abstract submission details and deadlines**

ABC/CBA Prix Étudiants '08-'09

~Prix pour les articles publiés par les étudiants~

Le Prix Commémoratif Alf Erling Porsild

Prix honorant la mémoire de l'éminent botaniste de l'arctique Alf Erling Porsild. La mise en candidature d'étudiants ayant publié un article en phytogéographie ou systématique végétale (comme auteur principal) durant l'année précédente devrait être envoyée au président de la section systématique et phytogéographie des plantes de l'ABC/CBA (Dr. Tim Dickinson, Dept. of Natural History, Royal Ontario Museum, 100 Queen's Park, Toronto ON M5S 2C6) *avant le 1 avril 2009.*

Le prix J. Stan Rowe

Prix établi pour célébrer la vie et le travail de Stan Rowe, éminent écologiste canadien des plantes. La mise en candidature d'étudiants ayant publié un article en écologie végétale durant l'année précédente devrait être envoyée au président de la section écologie de l'ABC/CBA (Dr. Dr. Liette Vaseur, Associate Vice President – Research, Laurentian University, 935 Ramsey Lake Rd, Sudbury, ON P3E 2C6) *avant le 1 avril 2009.*

Le prix Taylor A. Steeves

Prix établi pour honorer les nombreuses contributions de Taylor Steeves à la botanique et à l'ABC/CBA. La mise en candidature d'étudiants ayant publié un article en 2008 en développement, structure ou morphologie végétales devrait être envoyée au président de la section développement végétal de l'ABC/CBA (Dr. Jane Young, Ecosystem Science and Management Program, University of Northern British Columbia, 3333 University Way, Prince George, BC V2N 4Z9) *avant le 1 avril 2009.*

Le prix commémoratif Luella K. Weresub

Prix établi en mémoire du Dr. Luella Kayla Weresub, une mycologue canadienne reconnue qui travailla à l'Institut de recherche en biosystématique d'Agriculture Canada. Cette compétition est ouverte à tous les étudiants de premier cycle ou diplômés qui travaillent sur les champignons. La mise en candidature d'étudiants ayant publié un article en mycologie devrait être envoyée au président de la section mycologie (Dr. Hugues Massicotte, Ecosystem Science and Management Program College of Science and Management, University of Northern British Columbia, Prince George, BC V2N 4Z9) *avant le 1 avril 2009.*

S'il vous plaît visiter le site web de l'ABC/CBA (cba-abc.ca) pour les détails d'éligibilité

ABC/CBA '09

Prix de conférence

John Macoun Bourse de Voyage pour étudiant gradués & Keith Winterhalder Bourse de Voyage pour bachelier

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

Eligibilité:

3. Ouvert à tous les membres étudiants de l'ABC/CBA.
4. Les étudiants doivent présenter une communication orale (compétition Cinq-Mars) ou une affiche (compétition Taylor) à la réunion annuelle de l'ABC/CBA.
5. Aucun étudiant ne peut recevoir plus d'une bourse de voyage pendant qu'ils (elles) sont inscrit(es) au même programme d'étude.
6. Les étudiants doivent soumettre leur candidature avant la date limite de soumission des résumés à la réunion annuelle.
7. L'application doit contenir les documents suivants:
 - a. Une copie du résumé de la communication prévue à la réunion annuelle pour la compétition Cinq-Mars;
 - b. Une lettre de support du directeur de thèse de l'étudiant(e) qui inclue aussi une déclaration que l'étudiant est inscrit à un programme de maîtrise ou de doctorat;
 - c. Le curriculum vitae de l'étudiant (une page);
 - d. UNE lettre de support d'un membre du comité de direction de l'étudiant (autre que le directeur)
8. Les demandes devraient être envoyées au président de l'ABC/CBA (Dr Christian Lacroix, Dean of Science, University of PEI, Charlottetown PEI, C1A 4P3, E-mail : lacroix@upe.ca)

Le prix Lionel Cinq-Mars

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

Eligibilité:

Tout membre étudiant(e) de premier cycle ou diplômé inscrit(e) dans une institution canadienne d'études supérieures, ou membre étudiant(e) canadien(ne) d'une institutions étrangères, est éligible. Tous les moyens nécessaires seront employés afin d'assurer que chaque étudiant(e) participant à la compétition reçoive une évaluation juste et une chance égale de gagner la compétition.

La présentation orale sera évaluée par un comité de juges (au moins un représentant de chaque section de l'ABC/CBA) sous la direction du président élu. Le mérite de chaque communication sera jugé sur le contenu (60%) et la présentation (40%). Tous les étudiants qui souhaitent participer à cette compétition doivent indiquer leur intention en cochant la case appropriée sur le formulaire de soumission du résumé. Les résumés doivent être soumis pour la réunion annuelle à laquelle l'étudiant participera à la compétition.

Le prix Iain et Sylvia Taylor

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

Eligibilité:

Tout membre étudiant(e) canadien(ne) de premier cycle ou diplômé inscrit(e) dans une institution canadienne d'études supérieures, ou membre étudiant(e) canadien(ne) d'institutions étrangères, est éligible. Tous les moyens nécessaires seront employés afin d'assurer que chaque étudiant(e) participant à la compétition reçoive une évaluation juste et une chance égale de gagner la compétition.

Les affiches seront évaluées par un comité de juges sous la direction du vice-président de l'ABC/CBA. Tous les étudiants qui souhaitent participer à cette compétition doivent indiquer leur intention en cochant la case appropriée sur le formulaire de soumission du résumé. Les résumés doivent être soumis pour la réunion annuelle à laquelle l'étudiant participera à la compétition.

**S'il vous plaît visiter le site web CBA-ABC 2009 (cba-abc.acadiou.ca)
pour les détails de soumission de résumés et les dates limites**

What's New in Botany? Graduate Student Research

"Graduate Student Research" will profile a graduate student and his/her research. If you would like to submit a profile, please send a photo of yourself, the name of your supervisor, where you are studying, and a summary of your research. Please keep within 250 words. It will be wonderful to hear from students and their exciting research! Please forward your profile to Dr. Jane Young (Ecosystem Science and Management, University of Northern British Columbia, 3333 University Way, Prince George, BC, V2N 4Z9) at youngj@unbc.ca.

Tyson Kerr



I am a Masters of Science candidate in the Biology Department at Acadia University in Wolfville, Nova Scotia, working under the supervision of Dr. Rodger Evans. The focus of my research is centred around the determination of MADS-box gene expression patterns in reproductive floral organs of *Physocarpus opulifolius* (Ninebark: Rosaceae). These genes fall in the middle of a genetic hierarchy required for floral organ development, and are largely responsible for the number and position of these organs. The MADS-box domain is a highly conserved sequence found in many genes expressed in multiple tissues, of which the product is a transcriptional activator which binds DNA to both self-regulate and control downstream target gene expression. The floral organ identity genes are divided into various classes based on the floral organs they specify. Currently, I am using *in situ*-hybridization to determine the expression patterns of three B class genes responsible for petal and stamen specification, all of which share a common ancestral gene, and a C class gene responsible for stamen and carpel specification. Once the expression patterns of these genes in *Physocarpus opulifolius* have been determined, this information can be compared to other Rosaceae family members, and ultimately integrated into our understanding of angiosperm floral evolutionary development on the whole.



Tyson Kerr

Brittany Cranston



Brittany Cranston is a candidate for MSc at Memorial University of Newfoundland supervised by: Dr Luise Hermanutz. Her project is "The Stress Gradient Hypothesis: Impacts of Climate Change on Plant-Plant Interactions"

Competition involves the struggle between organisms to acquire resources such as light, heat, nutrients, and water. However, under severe abiotic conditions where one or all of these may be limiting, the presence of a neighbour (nurse) may favour growth and shift a relationship from competition to facilitation. This is known as the Stress Gradient Hypothesis.

The purpose of my research is to predict the potential migration of the treeline under the influence of changing climatic conditions. By studying the role of microclimate and community structure on conifer survival, I hope to determine how the Stress Gradient Hypothesis facilitates growth and survival of black spruce planted above the treeline in the Mealy Mountains of Labrador, potentially acting as a vector of treeline advance. This will be achieved through the use of warming chambers, shading structures and environmental manipulation.

Terrestrial ecosystems, particularly those in the Canadian north, may be heavily affected in the coming decades by changing climatic trends; treeline species bordering the southern reaches of the tundra, already at their climatic threshold, have been shown to be particularly susceptible to temperature increases of 2 to 3 degrees.

Understanding the impact climate change may have on interactions between plant species is a crucial first step in protecting the biodiversity in the Labradorian Tundra.



Brittany Cranston

Julia Wheeler



I am a graduate student at Memorial University, supervised by Luise Hermanutz and Paul Marino. As a member of the Labrador Highlands Research Group, I'm studying vegetation community dynamics in the boreal-alpine tundra transition zone in the Mealy Mountains, Labrador. Above the treeline, black spruce early life history is influenced by multiple community interactions; I'm studying how seedbed and predators impact early survival and establishment success for black spruce.

Seedbeds, being the understory moss and lichen groundcovers, may play a significant role in future treeline movement in the Mealy Mountains; changing climatic conditions may cause a shift in the dominant understory vegetation, which in turn may influence black spruce recruitment depending on the success of seed germination and early growth in the dominant groundcover vegetation type. In turn, invertebrate predators have been linked to particular groundcovers and can have a strong impact on early black spruce survival.

By determining how these factors facilitate or inhibit the establishment of black spruce seedlings above the current treeline, we can draw inferences about potential limitations for future treeline expansion in the Mealy Mountains under the influence of climate change.



Julia Wheeler

Ecology in Canada: What's New and Who is doing it?

5. Forest Resources Laboratory at Nipissing University



By Jeff Dech



Research in the newly established Forest Resources Laboratory (FRL) at Nipissing University focuses on aspects of plant ecology at the community, ecosystem and landscape levels of biological organization. In the forests of the Great Lakes - St. Lawrence and northeastern Boreal regions of Ontario, we explore patterns in the distribution, composition and productivity of plant communities, and the ecological drivers that produce these patterns. Ultimately, we strive to translate the knowledge we gain of ecological patterns on the landscape to application in the practice of forest resource management. From this perspective, a major theme of the research we undertake relates to providing the scientific knowledge required to support the sustainable development of new forest bioproducts in northern Ontario.

Recently, we have embarked on a five-year research program funded by Industry Canada (FedNor), Ontario Ministry of Northern Development and Mines (Northern Ontario Heritage Fund Corporation), Nipissing University and private sector partnerships. The objective of this program is to develop ecologically-based inventory and supply management tools for the bioresources of the Boreal forest of northeastern Ontario. These resources include both the forest trees (sources of fibre, biomass, biofuels) and the understorey plants (sources of pharmaceuticals, nutraceuticals, foods). Initial species of interest include Black Spruce (*Picea mariana*) an ecologically and economically important boreal forest tree, and Ground Hemlock (*Taxus canadensis*), an evergreen shrub that is a source of paclitaxel, which is used in the treatment of various types of cancer. This list of species is expanding as the project develops, towards the ultimate goal of including a significant number of plant species with potential interest from the perspectives of bioenergy, bioprospecting, conservation and restoration.

Studies currently underway in the FRL are aimed at developing predictive empirical models of abundance, productivity and quality attributes (e.g. black spruce wood density) for each species of interest across the range of ecological conditions they occur under in the boreal forest of northeastern Ontario. Towards this goal, we use dendrochronology, digital image analysis, ecological land classification, geographic information systems and predictive ecological mapping techniques. A particular emphasis is placed upon applying the results of our investigations of individuals, populations and communities of plants in research plots to the landscape level through relationships to remotely sensed data sets (e.g. LIDAR).



A stand of black spruce in the Romeo Malette Forest near Timmins, ON.



The Forest Resources Laboratory Team (left to right: Bill Shaver, Paul Courville, Jeff Dech, Thomas Quint)

The FRL team consists of Dr. Jeff Dech (Forest Bioproducts Research Chair), Paul Courville (full-time project technician), and several undergraduate students from programs in biology, environmental sciences and geography at Nipissing University. In the near future, we will be searching for a post-doctoral fellow to join the team through an Ontario Ministry of Research and Innovation funded program. As the project progresses it is anticipated that opportunities for graduate students will also arise.

For more information on the FRL or any of our projects please contact Dr. Jeff Dech or visit our website at www.nipissingu.ca/biology/FRL.asp



Thomas Quint and Paul Courville doing ecological land classification field work in the boreal forest of northeastern Ontario



Paul Courville in a large population of *Taxus canadensis* (Ground Hemlock) in the Romeo Malette Forest near Timmins, ON.

Editor's Note

Ecology in Canada is an ongoing series and we welcome articles from the various ecology labs across Canada. Please send your articles along with photos to one of the co-chairs of the Ecology section, Dr. Liette Vasseur, Associate Vice-President Research, Laurentian University, 935 Ramsey Lake Rd, Sudbury, ON P3E 2C6. Tel: (705) 675-1151 Ext. 3404, Fax: (705) 673-6522. E-mail: lvasseur@Laurentian.ca or Adrienne Sinclair, Environment Canada - Wildlife Service, CITES Scientific Authority, 4th Floor, 351 St. Joseph Blv Gatineau, QC, K1A 0H3; Tel: (613)-759-1373, fax (613) 759-1599 E-mail: adrienne.sinclair@ec.gc.ca, or to the editor directly.

NATIVE PLANT EMBLEMS OF CANADA

8. Manitoba

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



FLORAL EMBLEM: PRAIRIE CROCUS



Fig. 1. Prairie crocus (*Anemone patens*), in fruit at left, in flower at right. Source: a set of paintings of Canada's floral emblems by Lavonia R. Stockelbach (née Bonnie Hunter, 1874-1966), housed in the Saunders Building, Central Experimental Farm, Ottawa.

SYMBOLISM

The prairie crocus is one of the earliest common and showy spring flowers in cool areas of central northwestern North America. It is very hardy, and sometimes the emerging flowers are surrounded by snow. It is regarded as a beautiful but exceptionally tough harbinger of spring and a symbol of compatibility with cold, northern climates.

LATIN NAMES

Anemone patens L. var. *multifida* Pritzel

The genus name *Anemone* has been interpreted as being based on the Greek *anemone* (or *amona*), a combination of the Greek roots *mon*, to be red and *damu*, blood. The name is possibly from *Naaman*, a Semitic name for Adonis, whose blood, according to myth, produced red anemones (*A. coronaria*; see Myths, below). An alternative explanation is that the name is from the Greek *anemos*, meaning wind, possibly a references to the wind-dispersed seeds (equipped with long, feathery styles) or, less likely, to the early blooming of anemones during a windy season. According to the old saying, "March winds and April showers bring forth May flowers", but prairie crocuses often appear during the windy and rainy months of March and April.

The epithet *patens* in the scientific name is Latin for "spreading" or "outspreading". It has been speculated that this refers to the plant's habit of spreading over large areas and/or to the widely spreading petals or seed head.

The name *A. patens* var. *wolfgangiana* is used by some authors but *A. patens* var. *multifida* has priority. The epithet *multifida*, meaning many times divided, refers to the segments of the leaf. The illegitimate synonyms *Pulsatilla hirsutissima* and *P. ludoviciana* are often encountered, and the species is frequently lists as *P. patens* and *P. vulgaris*, and sometimes as *A. pulsatilla*.

ENGLISH NAMES

Prairie crocus (prairie-crocus). Also: American pasqueflower, pasque flower (pasqueflower), prairie smoke (prairie-smoke), wind flower. Occasional local names include April fool, bleeding nose plant, crocus anemone, prairie anemone, ears of the earth, blue tulip, gosling, gosling plant, gosling weed, hartshorn plant. The name pasque flower reflects blooming during the Easter (Paschal) season, and pioneers used the mauve sepals ("petals") to dye Easter eggs. "Pasque" is from the Hebrew *paschal*, "relating to Passover", and in the Old World some anemones begin blooming as soon as the mountain snow melts, about the time of the Jewish holiday Passover. It has also been speculated that the word pasque is derived from the French *passer* + *fleur*, but this seems much less likely. "Crocus" is a misnomer applied by European immigrants to a plant that reminded them of the European crocuses (*Crocus* spp., of the Iridaceae or iris family), some of which bloom early in the spring and have flowers of similar size and colour. The name "wind flower" used for anemone species is probably based on the above explanation that the name *Anemone* is from the Greek *anemos*, wind. "Prairie smoke" is based on the plumed styles of the raised fruiting heads scattering light, creating a hazy, smoke-like appearance. The names "gosling", "gosling plant", and "goslin weed" are based on the furry appearance of the sepals, reminiscent of the downy appearance of goslings. "April fool" is based on the early appearance of the plant, which is sometime so "foolish" as to appear before the snow has melted.

FRENCH NAMES

Pulsatille. Also: anémone, anémone des prairies, anémone pulsatille, crocus des prairies, fleur de Pâques.

HISTORY

a. Canada

The prairie crocus was adopted as the floral emblem of Manitoba in 1906. Interest in the plant had been aroused by the Manitoba Horticultural Society, and by a vote among schoolchildren that put the prairie crocus in first place, the prairie lily second, and the wild rose third.

b. Foreign

The prairie crocus was adopted as the state flower of South Dakota in 1903. In Häme, a historical province of southern Finland, *A. patens* is considered to be the provincial flower. *Anemone vernalis* is the provincial flower of South Karelia, Finland.

APPEARANCE

Prairie crocus is a long-lived perennial herbaceous plant with a thick woody taproot and a woody base. The shoots are 5-40 cm (2-16 inches), sometimes as tall as 60 cm (2 feet), and are hairy. Individual plants may live for more than 50 years, occasional specimens becoming 30 cm (1 foot) across and producing more than 40 blossoms at a time. The basal leaves usually have slightly hairy blades 5-8 cm (2-3 inches) long, with petioles 5-10 cm (2-4 inches) long. The leaves are typically trifoliate, with each leaflet dichotomously dissected. Flowering occurs in the spring and early summer. The flowers first appear near the ground at the bases of the newly expanding leaves. Usually there are three bracts under the singly-borne flowers, the bracts 2.5-4 cm (1-1.6 inches) long, hairy, and with dissected margins. The flowers are 2.5-10 cm (1-4 inches) across, with 5-8 sepals that are blue, light lavender, blue-purple, purple, or rarely white, 2-4 cm (0.8-1.6 inches) long, and quite woolly-hairy on the outer side. *Anemone patens* is unusual for the genus in having true petals; however, these are inconspicuous, gland-like bodies, resembling stamens, but smaller. The flowers have a central mass of 60-200 yellow stamens, as well as numerous pistils in a head. The flowers transform into heads of small, dry fertilized fruits (achenes or so-called seeds), each of which has a body 3-4(6) mm (about 1/8th inch) long and a curved extension ("beak", actually a persistent feathery style) 2-4 cm (0.8-1.6 inches) long. The peduncle (flower stalk) elongates during fruit development so that, at maturity, the tuft of silky-haired achenes is elevated for effective wind dispersal.

Fig. 2. Painting of the official flower of Manitoba, prairie crocus (*Anemone patens*), from the Walter Coucill Canadian Centennial official flowers of Canada series (see Coucill 1966 cited in #1 of this series). Reproduced with the permission of the copyright holders, the Coucill family.



CLASSIFICATION

Family: Ranunculaceae (buttercup family).

The genus *Anemone* has about 150 species of perennial herbs, found nearly world-wide but primarily in cooler and arctic regions. Twenty-five species occur in North America north of Mexico, of which 16 are native to Canada. North American populations of *A. patens* have been assigned to var. *multifida*. At least three additional varieties are found in Eurasia.

GEOGRAPHY

In Canada, *A. patens* has been recorded in the Yukon, Northwest Territories, British Columbia, Alberta, Saskatchewan, Manitoba, and Ontario. The United States distribution includes Alaska, Colorado, Idaho, Illinois, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, Utah, Wisconsin, and Wyoming. The species also occurs in Europe and northern Eurasia.

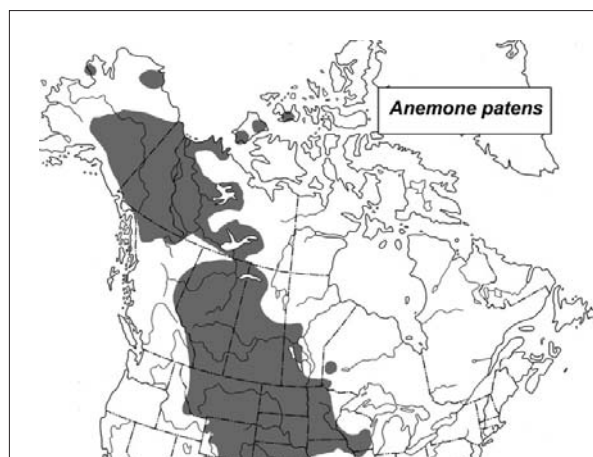


Fig. 3. Canadian and adjacent United States distribution of prairie crocus (*Anemone patens*)

ECOLOGY

Habitat

Prairie crocus occurs in prairies, on open slopes, glacial moraines, burned-over ground, along railway rights of ways, in overgrazed pastures, and sometimes in open woods and on granite outcrops. The plants prefer well-drained conditions. The species is characteristic of the open, tall grass and mixed grass regions of North American western prairies, often thriving on exposed slopes and in dry, wooded areas. *Anemone patens* is known to grow well in areas that are regularly grazed, burned, or mowed.

Inter-species Relationships

Prairie crocus appears to thrive in overgrazed pasture lands, possibly because its toxic qualities discourage most herbivores. Moreover, the ground-level positioning of the crown of the plant with its vegetative and floral buds, and the frequent low position of the leaves, are considered to be adaptations making it difficult for grazers to damage the plants significantly. Nevertheless the species is consumed by some wildlife, including turkeys, rabbits, squirrels, deer, and elk, often because little else is available early in the season. For the same reason, floral-visiting insects often depend on the prairie crocus. Trampling by natural prairie grazers, such as the once-common buffalo, stimulates the development of deep-seated adventitious buds causing the production of small rosettes near the parent plant, and so encourages vegetative propagation.

Pollination & Dispersal

The prairie crocus is one of the earliest plants to bloom, this often occurring before the last winter snow has melted. Such early blooming is an adaptation to take advantage of available pollinators, bees (mostly smaller bees of the genus *Andrena*) and other insects. While the plants are self-fertile to some degree, they are primarily outcrossing. With early pollination the seeds may ripen by early summer, and if moisture is available they can germinate immediately. If the habitat becomes too dry, the seeds will become dormant, germinating during the following spring. Most other plants avoid such early flowering because occasional severe frosts (-10 to -5°C or 14 to 23°F) may destroy the season's seed crop.

Prairie crocus achenes ("seeds") are wind-distributed, the elongation of the flower stem after pollination being a mechanism to raise the achenes above the level of other plants in grazed grasslands, to expose them to the wind. However, distribution by wind is frequently not effective, as the achenes in a head often become entangled and some of the achenes are deposited close to the parental plants. It has been claimed that the achenes are self-planting, although this is disputed. Some have suggested that the long plume is "differentially hydrophilic", composed of strands that imbibe water at different rates, so that when the tail gets wet or dries out, it twists, like a drill. The seeds are shaped like spears and are covered with backward pointing hairs, so that when twisted they drill into the earth. In addition to wind distribution, animals may also disperse the seeds through adhesion to wet fur, but this has not been well documented.



Fig. 4. Prairie crocus (*Anemone patens*). Source: Canadian Heritage. 2002 (revised edition). Symbols of Canada. Canadian Heritage, Ottawa, ON. Reproduced with permission.

USES

The chief modern use of prairie crocus is as a garden ornamental, as detailed below. In the past, North American Indians used leaf poultices of the plant to treat rheumatism

Solar Heating in Flowers

Saucer-shaped flowers often occur in plants of cool or cold regions, or plants that develop at the coldest time of the year. Such flowers can function as solar heat collectors, much like parabolic dishes. In the case of the prairie crocus, highly-reflective petals concentrate the heat in the centre of the flowers, where stamens and pistils are warmed, promoting fertilization and seed development. On a sunny day the temperature inside a prairie crocus flower can be as much as 10°C (18°F) warmer than the temperature of the surrounding air. In addition to the flowers concentrating the sun's warmth, they typically move to face the sun as it travels across the sky (a phenomenon called heliotropism or phototropism), such solar tracking maximizing the daily exposure to heat. Moreover, the flowers tend to close up at night. The warmth at the central part of the flower not only aids the development of pollen and seeds, but may also help insects survive and reproduce in cold climates, by providing warming stations on cool days. In arctic regions, such heat-accumulating flowers are adapted to a very short season; in cold-temperate regions, heat-accumulating flowers are an adaptation to reproducing sexually in the early spring, before other plants can attract available pollinators, and indeed before taller-growing, surrounding plants compete for light.

and neuralgia (but see Toxicity, below; although producing serious blisters, the resulting irritation may have functioned medicinally as a counter-irritant). The smell of crushed leaves was thought to cure headaches, and decoctions of the roots were employed for lung problems. Prairie crocus was listed in the US Pharmacopoeia from 1882 to 1905 as a diuretic, expectorant, and uterine stimulant.

TOXICITY

Handling the fresh plants can produce skin rash (contact dermatitis). A particularly severe reaction occurred when a 77-year old woman treated her osteoarthritis of the knees with a compress of prairie crocus, resulting in an extreme dermatitis. About 1 hour after applying the compresses to her knees she developed a strong burning sensation, reddening and swelling, and the entire area of the knees became covered with large blisters. Open wounds were treated with saline compresses and steroid antibiotic ointment. Healing was gradual and required 14 days.

The vapours from the fresh juice of the plant can cause inflammation of eyes. Eating fresh material can produce irritation of the mouth, vomiting, and diarrhea. The toxicity is due to an acrid oil called protoanemonin, the result of an enzymatic breakdown product of the glycoside ranunculin, found in many species of *Anemone*. The oil in fresh leaves can cause severe topical (external) and gastrointestinal irritation (including acute inflammation of the gastric tract and kidneys, cramps, unconsciousness, and even death through respiratory failure), but is unstable and changes into harmless anemonin when plants are dried. In the USSR, extracts were used to poison arrow tips. There have been reports that the plant can cause mechanical blockages in the digestive tracts of sheep.

CULTIVATION

The prairie crocus is an excellent plant for sunny, perennial borders and rock gardens. Since the plants are toxic (see above), it is inadvisable to plant them in areas frequented by small children. The species should not be dug up from the wild, as it does not transplant well, and is an important component of biodiversity which supports other species. Garden-grown plants can be moved in late summer, preferably with a large clump of surrounding earth. Large clumps can be divided in late summer or early fall. Seeds can be collected from wild plants in late spring or early summer, but only small amounts should be taken to avoid reducing the natural capacity for propagation. Both plants and seeds can be purchased from various sources. Fresh

seeds can be planted outdoors, or they can be stored in a cool place for planting in the following spring. If the seeds are allowed to dry out for a week or two they will become dormant, requiring stratification (several weeks of exposure to cool moist conditions) before they can germinate. Seedlings can be established in a protected location, by sowing them in a mixture of sand and peat moss as soon as they are ripe, and then transplanting them. Prairie crocuses grow best in sandy, well-drained soils in sunny locations. Seeds should be covered with about 1 cm (0.4 inch) of soil, and the soil packed down firmly, and watered regularly during dry spells. Established plants should not be watered during the summer unless the soil becomes very dry. The seeds are slow to germinate and the plants are slow growing. Flowering may occur at the start of the third growth season, but usually 4-5 years are required for a good floral display.

CONSERVATION STATUS

Both in North America and in Eurasia, there has been widespread reduction in populations of prairie crocus due to urbanization, agricultural activities, and decline of natural ecological processes, such as fire and grazing, that maintain the required habitat. In Manitoba and elsewhere in the prairie provinces, the plant has become significantly less common. A recent study has documented a gradual decline of prairie crocus due to invasion of alien grasses, particularly smooth brome (*Bromus inermis*). This may be an increasingly important threat to prairie crocus in North America. In much of Europe, the species is protected.

MYTHS, LEGENDS, TALES, FOLKLORE, AND INTERESTING FACTS

- An all-steel, 1-ton monument to the prairie crocus fabricated by a local welder in 2000, is a chief attraction of Arden, in southern Manitoba (population ca. 150). The plants are 2.7 m (9 feet) tall and each of the three flowers is about 1.5 m (5 feet) wide. The monument stands on a municipally designated heritage area where there are numerous prairie crocuses. The village calls itself "the Crocus Capital of Manitoba" and holds an annual Crocus Festival (see <http://www.ardenmb.ca/gallery.htm>).
- According to Greek mythology, the handsome, young Adonis, while hunting, was stabbed by the tusks of a fierce boar. The goddess Aphrodite heard the cries of her lover and arrived to see him bleeding to death. Anemones sprang from the earth where the drops of his blood fell (or, alternatively, from Aphrodite's tears). One version of the story holds that anemones were white

A Survivor of Glaciation

Prairie crocus occurs on the relicts of tundra and grassland that dominated much of the unglaciated area called Beringia, which included parts of Yukon, Northwest Territories, and Alaska. This region was dominated by steppe-tundra and prairie and had mammoths, horses, buffalo, antelope and two kinds of lions during a time more than 12,000 years ago when the rest of Canada was under mile-deep ice of the continental Wisconsin and Cordilleran glaciers. Prairie crocus probably survived glaciation in regions south of the ice front as well as in Beringia and colonized the prairie region of central Canada as the glaciers receded about 10,000 years ago.



Fig. 5. Prairie crocus (*Anemone patens*), on a relict grassland at Pelly Crossing in central Yukon. Photo by P.M. Catling .

before the death of Adonis, whose blood turned them red. Christians later adopted red-flowered anemones as symbolic of the blood shed by Jesus Christ on the cross, and anemones sometimes appear in paintings of the Crucifixion.

- The Bible passage Matthew 6: 28-30 states "And why take ye thought for raiment? Consider the lilies of the field, how they grow; they toil not, neither do they spin: And yet I say unto you, That even Solomon in all his glory was not arrayed like one of these." Most authorities now regard the "lily of the fields" as the Palestine anemone, *A. coronaria*. (For more information, see: Moldenke, H.N., and Moldenke, A.L. 1952. Plants of the bible. The Ronald Press, New York, NY.)
- The Lakota Indian name for the prairie crocus is *hosi' cekpa*, translating as "child's navel", rather descriptive of the plump flowers buds that look like a newborn's navel before it heals.
- The "Victorian language of flowers" was a secret coded language in Victorian times in England, with flowers and plants symbolic of certain messages, so when the flower or plant was mentioned in a letter those who knew the code could understand the hidden information. "Anemone" had the meanings sincerity, expectation, forsaken, and daintiness.



Fig. 6. Prairie crocus monument in Arden, Manitoba, photographed Oct. 22, 2007 by John Dietz, and reproduced with his permission.

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TREE: WHITE SPRUCE



Fig. 7. Silhouette of white spruce (*Picea glauca*). Source: Farrar, J.L. 1995. Trees in Canada. Canadian Forest Service and Fitzhenry and Whiteside, Markham, ON, Canada. Reproduced with permission.

SYMBOLISM

The white spruce is an appropriate choice as the arboreal emblem of Manitoba because of its extensive use by both early and modern cultures of the province, by its aesthetically pleasing, distinctive appearance, its high economic value, and its occurrence throughout most of Manitoba. The tree is indeed symbolic of the valuable natural resources and cultural diversity of the province. The white spruce is also one of the hardiest of trees, capable of growing north to the limit of trees.

LATIN NAMES

Picea glauca (Moench) Voss

The genus name *Picea* is based on the Latin word *pix* used for some species of pine, spruce, and fir, and also for the “pitch” (resin). *Glauca* in the scientific name is a Latin word for glaucous (based on the Greek *glaukos*, meaning bright, sparkling, gleaming, grayish, bluish-green) and is a reference to the glaucous foliage, i.e. the bluish-green tint of the needles due to a whitish, waxy, covering layer.

ENGLISH NAMES

White spruce. Also: Canada spruce, Canadian spruce, cat spruce, pasture spruce, skunk spruce, single spruce. For information on the derivation of the word “spruce”, see #2 in this series (dealing with the floral emblems of Newfoundland and Labrador). The names “cat spruce” and “skunk spruce” are based on the disagreeable odour produced by the needles when they are crushed. The name “pasture spruce” reflects recent establishment in pastures in eastern Canada. The obsolete name “single spruce” contrasts this species with the “double spruce”, *P. mariana* (but why either species once had these names is obscure). See **Classification**, below, for information on the names Black Hills spruce, Porsild spruce, western white spruce, Alberta spruce, and Alberta white spruce. [For additional but obsolete or rare English and French names, see *Plantes Vasculaires du Nouveau-Brunswick* Vascular Plants of New Brunswick <http://www.cuslm.ca/foresterie/plantenb/pterigymnosyn.pdf>]

FRENCH NAMES

Épinette blanche. Also épicéa glauque, épinette du Canada, épinette glauque, épinette grise, prusse blanche, sapinette blanche

HISTORY

a. Canada

The white spruce was designated the provincial tree of Manitoba in 1991. The red spruce (*P. rubens*) was declared to be the provincial tree of Nova Scotia in 1988, and the black spruce (*P. mariana*) was declared to be the provincial tree of Newfoundland and Labrador in 1991.

b. Foreign

Since 1947, the state tree of South Dakota has been the Black Hills variety of white spruce (the Black Hills are in South Dakota). The blue spruce (*P. pungens*) was made the state tree of Utah in 1933. Under the name Colorado blue spruce, it was proclaimed the state tree of Colorado in 1939.

Alaska declared its state tree to be the Sitka spruce (*P. sitchensis*) in 1962. The Serbian spruce (*P. omorika*) is one of the national trees of Serbia (the “oak” is the other national tree).



Fig. 8. White spruce (*Picea glauca*). Photo courtesy of Travel Manitoba.

APPEARANCE

Spruce species are evergreen, coniferous (cone-bearing) shrubs and trees with short (generally less than 2.5 cm or 1 inch), stiff, needle-like leaves with pointed but not dangerously sharp tips. White spruce usually grows up to 25 m (82 feet), sometimes to 50 m (164 feet) in height, and the trunk diameter at breast height may be as large as 1 m (39 inches). It produces a crown that is broadly conic to spire-like, although near the treeline the plants may be reduced to shrubs (often called “krummholz”). Open-grown trees develop a pyramidal crown that extends nearly to the ground, making the tree attractive as an ornamental. The bark is thin, light grayish-brown, and produced in irregular, thin, scaly plates. The branches droop slightly. The needles occur singly on all sides of the twig, but are often crowded on the upper side; they are (0.8)1.5-2(2.5) cm (about 0.5-1 inch) long, blue-green, 4-angled, often inwardly curved, and sharp-pointed. Trees produce both male and female cones. The seed cones are light brown at maturity, 2.5-6(8) cm (1-3 inches) long, ellipsoid-cylindrical, and pendent, with scales that are thin, flexible, and rounded.

White spruce commonly grows from 100 to 250 years of age if protected from fire (white spruce stands older than 200 years are rare because of fire in the mostly drier habitats where they occur). As with other conifers, trees in stressful sites (at the extreme north of their range, or at elevational treelines) can become quite old, and specimens 500-1000 years old have been reported.

CLASSIFICATION

Family: Pinaceae (pine family).

There are about 35 species of *Picea*, including seven that are native to North America north of Mexico, five of which are native to Canada.

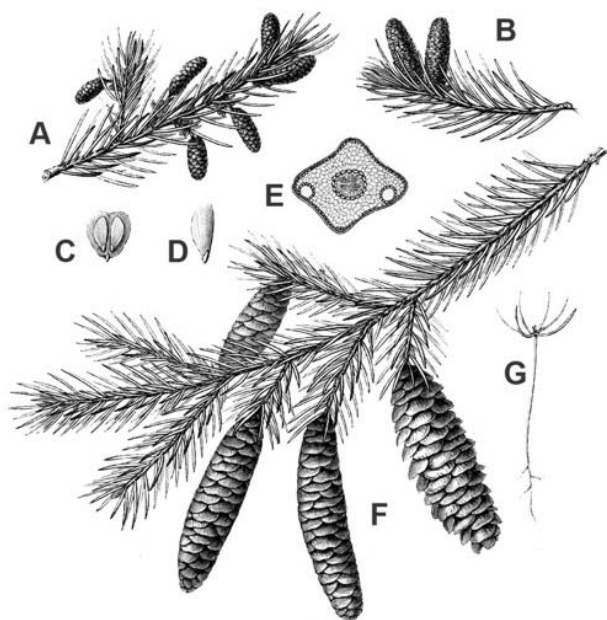


Fig. 9. White spruce (*Picea glauca*). A, Branch with male flowers. B, Branch with female flowers. C, Upper side of a cone scale with seeds. D, Seed with attached wing. E, Cross section of a leaf. F, Fruiting branch. G, Seedling. Source: Sargent, C.S. 1898. The silva of North America. Houghton, Mifflin and Company, Boston, MA. Vol. 12, plate 598.

CLASSIFICATION (continued)

White spruce is notably variable throughout its range, and several varieties have been recognized taxonomically, including the following. Western white spruce (also sometimes called Alberta spruce and Alberta white spruce) refers to var. *albertiana* (S. Brown) Sargent of the Canadian Rocky Mountains. Porsild spruce refers to var. *porsildii* Raup of Alaska. Black Hills spruce refers to var. *densata* Bailey of the Black Hills of South Dakota and adjacent Wyoming. These variations are not clearly separated, and may be the result of environmental modification or hybridization with other species. Many taxonomists today do not recognize these varieties.

White spruce and Engelmann spruce (*P. engelmannii* Parry ex Engelmann) hybridize and intergrade where they occur together (such hybrids are often called var. *albertiana*). Hybrids occur from central British Columbia south to Washington and Yellowstone National Park. In this area, white spruce is common at low elevations, Engelmann spruce at high elevations, and the hybrids at intermediate locations. White spruce also hybridizes with Sitka spruce and black spruce. Hybrids with sitka spruce occur where the two species are sympatric in northeastern British Columbia and southwestern Alaska. Hybrids between white spruce and black spruce are relatively rare.

In eastern Canada, white spruce is easily separated from the other two native eastern spruce species, the black and red, by its elongated cones and flexible cone scales; also,

white spruce twigs lack hairs whereas the twigs of red and black spruce are covered with hairs. In western Canada, white spruce is found with sitka spruce, which has longer cones, more elongate and pointed cone scales, and much flatter needles. The non-native Norway spruce (*P. abies*) is commonly planted in Canada, and sometimes escapes from cultivation to natural areas; it has cones that are much larger and longer than those of white spruce.

GEOGRAPHY

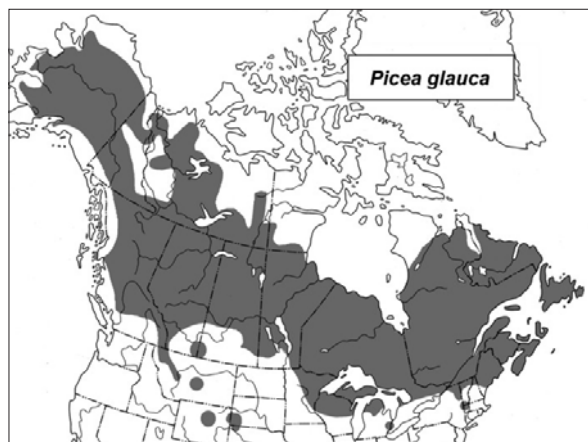


Fig. 10. North American distribution of white spruce (*Picea glauca*).

Picea glauca has a transcontinental distribution in North America, occurring from Alaska, Yukon, and British Columbia continuously eastward to Newfoundland and the northeastern United States, and sporadically in northern tier states (Montana, Wyoming, South Dakota, Minnesota, Wisconsin, and Michigan). The northern limit approximates the isotherm line of average 10°C in July, and may form the limit of trees. (For more on treeline, see no. 2 of this series.) The southern limit corresponds to the average 18°C July line, but there are many other factors. For example, the southern limit swings north of the 18°C line in the prairie region due to the limitation of severe, periodic drought.

ECOLOGY

White spruce is a dominant tree of interior boreal forests of Canada and Alaska, often occurring as an early colonizer. In British Columbia and Alberta, the species is often found on foothills and mountains ranging up to 1,500 m (5,000 feet) in altitude. In northeastern Alberta, there are open, parklike white spruce forests. In the west, white spruce is most common along rivers and lake shores. In eastern Canada and the northeastern United States, the species often occurs in coniferous and mixed coniferous-hardwood forests. In parts of eastern Canada, particularly Quebec (e.g. coastal portions of James Bay and Hudson Bay, and the Gulf of St. Lawrence), white spruce occurs in regions near treeline where fog occurs frequently (but may be replaced further inland by black spruce).

Habitat

White spruce is usually found in drier sites, including well-drained upland, river terraces, and montane slopes, but it

may also be found on floodplains, river banks, and in muskegs and bogs. The trees grow well on a wide variety of somewhat acidic or basic substrates, including gravel, sand, loam, silt, and clay. White spruce grows less well on sites with high water tables and/or permafrost. A permafrost lens often develops beneath a spruce tree in the north as a result of both the insulating effect of the thickened moss layer beneath trees in summer, and soil cooling in the winter due to a thinner insulating layer of snow beneath trees. Disturbance to the moss layer may result in melting of this lens, resulting in a space under the tree, which can lead to tipping over. The species is considered intermediate in shade tolerance. The seedlings are capable of germinating and growing well in the shade of spruce forests, but growth is best at full light intensity. The white spruce is quite susceptible to fire, but may rapidly colonize burned sites from seeds from unburned patches, partially burned trees, and edges of burned landscape.

Inter-species Relationships

Animals: White spruce is a significant but generally not a preferred food source for most wildlife. The spruce grouse feeds entirely on spruce needles in the winter. The seeds are consumed by chickadees, nuthatches, white-winged crossbills, pine siskins, and many other birds, as well as small mammals such as deer mice, red-backed and meadow voles, and chipmunks. Red squirrels feed on the buds in the spring, and also consume the seeds. Snowshoe hares eat the needles, bark, twigs, and seedlings. Porcupines frequently eat the bark of young trees. Black

bears are said to strip the bark to consume the sweet sapwood. The tree is also useful for wildlife as cover, especially as winter shelter for caribou.

Defoliation by the spruce budworm and the western spruce budworm may kill the trees if infestations continue for 2 or more years. Many other insects including gall flies, moths, and beetles feed particularly on white spruce. Spruce spider mites (*Oligonychus* spp.) may build up in large numbers during early spring and summer and are sometimes pests of young spruce trees in greenhouses.

Fungi: A number of fungi affect white spruce. One of these, *Ionotus tomentosus*, is a major cause of death of patches of white spruce over areas of up to an acre in parts of Saskatchewan. It is called "stand-opening disease" and is less common on alkaline soils.

Other plants: Black and white spruce co-occur over a wide range, and are natural competitors. White spruce outcompetes black spruce on well-drained mineral soils with deep or no permafrost, while black spruce is more tolerant of sites with permafrost, flooding, and high soil acidity. The dwarf mistletoe (*Arceuthobium pusillum*) is more often parasitic on black spruce and often does not kill trees, but it has been reported to kill white spruce in the Canadian Maritime Provinces. (For more on mistletoe, see no. 2 of this series.) White spruce is known to be allelopathic, i.e., chemicals leach from the tree and suppress the growth of some understory species.

The Beetles are Coming

Increasing pests due to accidental introduction or to other factors such as climate warming are a major developing problem. In the western Yukon, the spruce beetle (*Dendroctonus rufipennis*) has developed into a major, continuous infestation as a result of climate warming and the affected area of over 350,000 ha (865,000 acres) of grey and dying forest is now the most intensive spruce beetle outbreak ever recorded in Canada. On the other side of Canada there is concern that the introduced brown spruce longhorn beetle (*Tetropium fuscum*) will advance into a stage of exponential expansion and affect spruce across the country within the next decade or two. It is believed to have arrived in Point Pleasant Park in Halifax in the 1990s in wood packing material. Substantial effort to eradicate it failed, and since it has recently spread to central Nova Scotia, the primary goal has shifted from eradication to control and containment.

Most of the insects that feed on the economically important white spruce are considered to be pests, but not all of them are common enough to do serious damage. The boreal spruce beetle (*Dendroctonus punctatus*) is very similar to the spruce beetle but is much less common and less well known.

Garbutt, R., Hawkes, B., and Allen, E. 2006. Spruce beetle and the forests of southwest Yukon. Canadian Forest Service, Pacific Forestry Centre, Victoria, BC. 68 pp. http://dsp-psd.pwgsc.gc.ca/collection_2007/nrcan-rncan/Fo143-2-406E.pdf

Smith, G., and Hurley, J.E. 2000. First North American record of the Palearctic species *Tetropium fuscum* (Fabricius) (Coleoptera: Cerambycidae). *Coleopterists' Bull.* 54: 540. For additional information on *T. fuscum* see www.inspection.gc.ca/english/plaveg/pestrava/tetfus/bslbqueste.shtml.



Fig. 11. The boreal spruce beetle (*Dendroctonus punctatus*). This specimen, in the E.H. Strickland Entomological Museum, University of Alberta, was collected at Aklavik on the MacKenzie River, Northwest Territories on 5 Sept. 1930. Photograph by D. Jensen, used with permission of the E.H. Strickland Museum.

Competition between White Spruce and Red Squirrels

Red squirrels (*Tamiasciurus hudsonicus*) in the southwest Yukon feed almost exclusively on the seeds of white spruce. Many tree species, including the white spruce, produce an extremely abundant crop of seeds once (during a "mast year") every few years, with limited crops in the intervening years. Good production years in white spruce may be 2-12 years apart. This is an advantage to the trees since herbivores are reduced in number during times of limited seed production, and thus unable to consume as many seeds during times of abundant seed production. Very curiously, red squirrels are somehow able to predict years when a bountiful crop is about to occur and the rodents produce a second litter to take advantage of the abundance of food about to arrive. [For additional information see: Boutin, S., Wauters, L.A., McAdam, A.G., Humphries, M.M., Tosi, G., and Dhondt, A.A. 2006. Anticipatory reproduction and population growth in seed predators. *Science* 314(5807): 1928-1930. Also see <http://www.expressnews.ualberta.ca/article.cfm?id=8109>

Fig. 12. Red squirrels consuming white spruce seeds. The squirrels carry ear tags and an aerial (visible near the tails) for tracking purposes. Photos courtesy of Sebastien Descamps.



Pollination & Dispersal

Pollen is shed and distributed by wind in the spring and early summer (May to July, depending on location). Although seed can be produced by trees as early as 4 years of age, most seed production is by trees 30 or more years old. The cones ripen in August or September, and open to release the winged seeds, which are mostly dispersed by wind (some by animals, especially squirrels). The seeds remain viable for only 1 or 2 years. Most seeds fall close to the parent plant, rarely reaching more than 100 m (328 feet) away. Seeds sometimes travel much longer distances over crusted snow. Following seed dispersal, the old cones may fall off, or remain on the trees for 1 or 2 years. At the northern treeline, viable seeds are usually not produced, and reproduction is almost exclusively by layering (branches contacting the soil and growing into new shoots).

USES

The principal economic value of spruce is in its use as a softwood for construction lumber, plywood, and paper pulp. White spruce constitutes a quarter of Canada's softwood stock. The wood is also used for furniture, cabinets, boxes, crates, pallets, musical instruments (especially for pianos, guitars, and violins, and as organ pipes, because of its superb resonance and capacity to transmit vibrations), food containers (the wood has no distinctive odour or taste and does not contaminate food with resin), and paddles. Historically, the tree was important to Native Peoples, who used it for food, shelter, medicine, and fuel. Boughs were used for bedding, the wood for canoe frames and paddles, bark as roofing material, and leaf extracts as medicines. The tough, pliable roots were employed as rope, lace for birchbark canoes, and to make woven baskets. Spruce trees are often used as Christmas trees, and the white spruce is suited for this, with excellent foliage colour, short, stiff needles that are retained well (but not as well as some other trees), and a good natural shape. (For more on Christmas

trees, see no. 3 of this series.) The tree also is useful for stabilizing soil, establishing shelterbelts, revegetating mine spoils, and promoting recreation.

Spruce trees are used as ornamental and shade trees, sometimes as hedges, and there are more than 30 cultivars. The cultivar Conica (called dwarf Alberta spruce or dwarf white spruce) is thought to be the best known and most widely sold dwarf conifer sold in the United States.



Fig. 13. Open-grown, young spruce tree, showing attractive, ornamental appearance. Source: Harter, J. (Editor). 1988. *The plant kingdom compendium*. Bonanza Books, New York, NY. 374 pp.

TOXICITY

White spruce is not considered to be a toxic species. In times of famine, native peoples sometimes ate the young sapwood and young cones, or prepared beverages using the foliage; it is not clear whether such consumption is risky, and in any event the limited palatability of white spruce reduces the likelihood of significant human consumption.

CULTIVATION

White spruce is frequently planted for forestry purposes, and extensive information is available in this regard. For horticultural purposes, most propagation is by seed, although layering and grafting have also been employed, especially with rarer cultivars. For ornamental purposes, the tree is best planted in a moist, well-drained soil in full sun, but it will withstand poorer soils and light shade. The tree transplants well from containers or when ball-and-burlapped, but digging up and moving field-grown or wild trees is much less successful. Cultivars differ in their susceptibility to insects, disease, heat, drought, and winter desiccation.

CONSERVATION STATUS

In Canada, white spruce is a widespread and locally abundant tree that seems unlikely to be in danger of population decline that would threaten its future survival. However, as a result of expanding insect pests in some parts of Canada, vast white spruce forests are being destroyed and more widespread loss of mature forests is a possibility in the near future. Because white spruce is a critical forestry species, there are collections of seeds preserved for breeding purposes, and recommendations that some stands should be protected as potential genetic resources.

MYTHS, LEGENDS, TALES, FOLKLORE, AND INTERESTING FACTS

- Canada is the world's largest exporter of forest products, amounting to \$41.9 billion in 2005. The United States is Canada's major customer. In 2005, the forest sector directly employed 340,000 people, and more than 300 communities depended on the industry. The forest sector contributed \$37.6 billion (3%) of the Gross Domestic Product. Relative provincial contributions are: British Columbia (69% of the national revenue in 2004), followed by Ontario (10%), Alberta (9%), Quebec (7%), New Brunswick (3%), and Saskatchewan (1%).
- Girls of the Koyukon Indians of North America placed branches of black spruce and white spruce on the tracks of animals before crossing them. Like crossing the path of a black cat, without this ceremony hunters of the tribe who were pursuing the animals would have had bad luck. The Koyukon also believed that sleeping beneath white spruce trees provided protection from evil spirits, the branches could be used as good luck charms, especially if they had golden needles. To cure the sick, Koyukon shamans brushed them with the tops of black spruce trees and ceremoniously burned the pitch of white spruce.
- An old wives' tale that has survived down to modern times in Nova Scotia holds that carrying a small chunk of wood from a white spruce tree will prevent rheumatism, arthritis, and leg cramps.
- On December 17, 1903, at Kitty Hawk, North Carolina, the 1903 Wright brothers "Flyer" became the first powered, heavier-than-air machine to achieve controlled, sustained flight with a pilot aboard. The airplane was constructed of spruce and ash covered with muslin. The spruce has been identified as "giant spruce", a name for sitka spruce, a west-coast species, and presumably lumber was transported to North Carolina.

Burls

"Burls" are rounded, often tumour-like growths on the sides of branches or trees, and may be caused in a variety of ways. They are valued by woodworkers for making bowls. Burls sometimes occur in specific circumstances. An example of this is white spruce on the seashore cliffs of Mount Desert Island, Maine, where the trees in a narrow coastal belt have numerous burls unlike the trees inland. A similar, remarkably high incidence of burls within and among white spruce trees occurs in parts of coastal New Brunswick and Cape Breton. This has been attributed to a number of factors, including seashore salt spray. One of the largest burls in the world was cut from the base of a 351-year-old sitka spruce in 1976 at Port McNeill on northern Vancouver Island, British Columbia. This burl was 6 m (20 feet) in diameter and was estimated to weigh 30 tons. It is currently on display at the town's waterfront park.

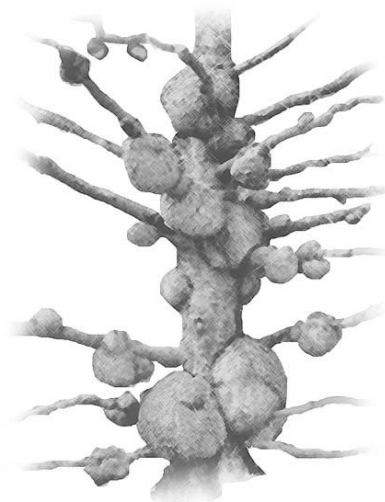


Fig.14. Numerous burls on a white spruce tree on a small island beside Mount Desert Island, Maine. Based on a photo in: White, P.R. and Millington, W.F. 1954. The distribution and possible importance of a woody tumor on trees of the white spruce, *Picea glauca*. Cancer Research 14: 128-134.

Fig. 15. Coat of arms of Manitoba. The beaver at the top holds the provincial floral emblem, the prairie crocus. At the centre, seven prairie crocuses are symbolic of the diverse origins of the people of the province. At bottom right is a forest composed of the provincial tree, the white spruce.



- The "Spruce Goose" was not made of spruce. Billionaire Howard Hughes (1905-1976) holds the record for flying what to this day is the largest aircraft, in terms of wingspan, ever to take flight. His plane has a wing span of 97 m (320 feet), a tail fin height of 24 m (80 feet), and a gross weight of 181 tonnes (200 tons), and was intended to carry up to 750 fully equipped troops, or two Sherman class tanks (a total maximum payload of 59 tonnes or 65 tons). The plane was three times larger than any other aircraft built to that time. The "flying boat" as it was known made only one flight, on Nov. 2, 1947, lifting 10 m (33 feet) off the surface of Los Angeles Harbor, and flying about a mile in about a minute. The project was intended to save metal by building a wood plane during the second world war, but the war ended so that the original purpose was no longer relevant. When it was completed in 1947, the US government had spent \$22 million (huge by the standards of the day), and Hughes had spent \$18 million of his own money. A disgruntled US Senator dubbed the plane the "flying lumberyard," which led to the nickname "The Spruce Goose." However, the giant airplane was constructed of birch, not spruce. The plane is now at the Evergreen Aviation Educational Center in McMinnville, Oregon.
- In 2008 it was reported that "the world's oldest tree" is a Norway spruce (*P. abies* (L.) Karst), discovered in 2004 growing at 900 m (3,000 feet) in Dalarna Province, Sweden. However, the trunk of this tree was found to have a lifespan of only about 600 years, a new trunk emerging from the root stock whenever the old trunk dies. Ancient remnants of the roots of the tree were radiocarbon dated at 9,550 years, which indicates that the plant started growing not long after ice sheets retreated from Sweden after the last glaciation, 11,000 years ago. However, it has been pointed out that it is not quite fair to compare plants that reproduce clonally from basal portions, as is the case above, with individual, whole plants, with persistent above-ground parts. The "oldest tree" in the latter sense is a bristlecone pine dated at about 5,000 years. For a comparison of the world's oldest trees (separately treating individual plants and clonally reproducing plants), see http://en.wikipedia.org/wiki/List_of_oldest_trees. The oldest authoritatively dated spruce was an Engelmann

spruce from Colorado that was felled about 1994, and was found to be 852 years old.

SOURCES OF ADDITIONAL INFORMATION

(Also see the literature cited for black spruce in #2 of this series; and for red spruce in #3 of this series.)

- Daubenmire, R. 1974. Taxonomic and ecologic relationships between *Picea glauca* and *Picea engelmannii*. *Can. J. Bot.* 52: 1545-1560.
- LaRoi, G.H., and Dugle, J.R. 1968. A systematic and genealogical study of *Picea glauca* and *P. engelmannii*, using paper chromatography of needle extracts. *Can. J. Bot.* 46: 649-687.
- Little, E.L., Jr., and Pauley, S.S. 1958. A natural hybrid between black and white spruce in Minnesota. *Am. Midl. Nat.* 60: 202-211.
- Nienstaedt, H., and Zasada, J.C. 1990. *Picea glauca*. pp. 204-226 in *Silvics of North America*. Vol. 1. Conifers. Edited by R.M. Burns and B.H. Honkala. USDA Forest Service, Agric. Handbook 654. Washington, D.C.
- Taylor, R.J. 1993. *Picea*. pp. 369-373 in *Flora of North America North of Mexico*. Edited by Flora of North America Editorial Committee. Oxford University press, Oxford, U.K. Vol. 2.

Website: The U.S. Silvics Manual website provides a great deal of useful and authoritative information on this species. http://www.na.fs.fed.us/spfo/pubs/silvics_manual/Volume_1/picea/glauca.htm

ACKNOWLEDGMENTS

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Plants on the Periphery. CBA-ABC 2009

Conference highlights.

The CBA/ABC will be meeting alone this year, so for undergraduate, graduate and new members, this is a really good opportunity to meet with Canadian botanists from across the country. In addition all the contributed papers will be given in a single session in the KC Irving Environmental Science Centre Auditorium. This gives you an opportunity to hear what is happening in research areas other than your own. Here are some of the highlights of the conference. The website, <http://cba-abc.acadiau.ca/> is constantly being updated.

Speakers

Keynote speaker, Dr Chris Eckert, Queen's University, Kingston



Special presentation by 3M teaching fellowship award winner Dr Kate Frego, University of New Brunswick, St. John



Weresub Lecture by Dr Faye Murrin, Memorial University Newfoundland



The topics for all the above will appear on the website.

Field trips. All field trips will take place on Monday May 18th 2009

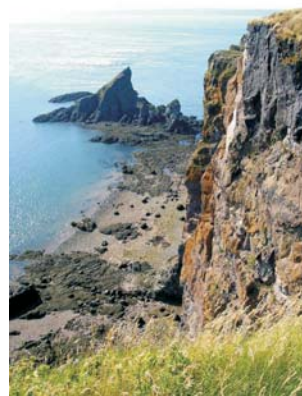
1. Vines, Wines and history

Spend a leisurely day exploring the history of the Acadians at beautiful Grand Pré National Historic Site, have lunch and stroll the grounds of Blomidon Inn, a restored 19th Century Sea Captain's Mansion, and taste wines and tour the vineyards and boutique shops at three of Nova Scotia's award winning wineries. Cost \$75.00



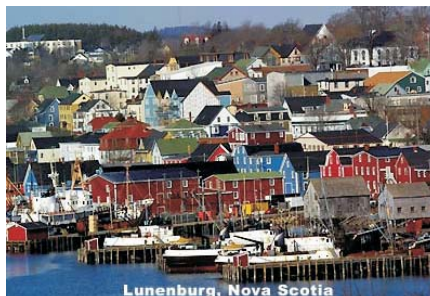
2. Cape Split Botanical Hike

Jutting out into the Bay of Fundy, Cape Split is a narrow peninsula underlain with volcanic rock. It is replete with one of Nova Scotia's most popular walking trails which meanders through lush mature deciduous forest and offers dramatic, breathtaking scenic views from cliff edges high above the beaches below. Cost \$30.00



3. Walking tour of Lunenburg

This trip includes an informative and entertaining guided walking tour of the historic town of Lunenburg which was founded in 1753. Lunenburg is located a little more than an hours drive from Wolfville on Nova Scotia's scenic south shore. Cost \$60.00



Details of the above trips appear on the conference website.

INSTRUCTIONS FOR ORAL PRESENTATIONS AND POSTERS appear on the website

Abstract deadline: April 1st, 2009

You will be able to register online in January 2009

Registration for student participants will be **\$100**. Registration for all other participants will be **\$250**.

Registration prices will increase to **\$125** (students) and **\$300** (regular) **after April 1, 2009**

Registration includes the following:

- Unbleached cotton conference "shopping" bag, programme and conference t-shirt
- Access to all contributed scientific paper sessions and inter-session coffee breaks
- Access to the opening mixer Monday May 18, 2009 and two beverage tickets for the cash bar
- Access to the poster session Tuesday May 19, 2009
- Access to the BBQ and Annual General Meeting May 21, 2009
- Access to the closing banquet and auction May 21, 2009

Be sure not to miss the great Botanical Auction which will take place after the banquet on May 21st!



The auctioneer will be in action at Acadia!

Bring your botanical items, knick-knacks, and other paraphernalia to the conference next May! Watch the skillful auctioneering techniques of Hugues Massicotte, and raise money to bring more students to the conferences through the Macoun Travel Bursary!

