THE CANADIAN BOTANICAL ASSOCIATION

BULLETIN

DE L'ASSOCIATION BOTANIQUE DU CANADA

May / mai 1999 32(2) Montréal

Patron / Président d'honneur
His Excellency the Right Honourable / Son excellence le très honorable
Roméo Leblanc, P.C., C.C., C.M.M., C.D.
Governor General of Canada / Gouverneur général du Canada

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This issue of the Bulletin is the last one before the CBA Annual General Meeting in St. Louis. Let me remind you of two important points that you should now put in your agenda:

1999 CBA Annual General Meeting (AGM)
Thursday August 5, 1999; 7 h 30 to 9 h 30 AM

BSA / CBA / SMB Social Event
Thursday August 5, 1999; 7 h 00 to 9 h 00 PM

I would also like to tell you that a fair number of our members responded to the ballot that was enclosed in the February issue of the Bulletin. There is still time for those of you who have not responded yet to sent in your ballot to Liette Vasseur. The issue of the Student Director will be discussed at the next AGM.

I also invite all members to participate in "The WEB Press (see page 24) or to send items that could be included in "The Plant Press" [see CBA Bulletin 31(1): 1].

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Ce numéro de mai du bulletin de l'ABC est le dernier avant le congrès annuel de St. Louis. J'aimerais vous rappeler deux dates importantes que vous devriez mettre à votre agenda dès aujourd'hui :

Assemblée générale annuelle de l'ABC 1999 (AGA)
Jeudi 5 août 1999; 7 h 30 à 9 h 30

Rencontre sociale BSA / CBA / SMB
Jeudi 5 août 1999; 19 h 00 to 21 h 00

Plusieurs d'entre vous ont déjà retourné le bulletin de vote inséré dans le bulletin de février qui concernait le directeur étudiant. Pour les autres, il est encore temps de faire parvenir ce bulletin de vote à Liette Vasseur car ce sujet sera à l'ordre du jour de la prochaine AGA.

Je vous invite finalement à participer à la nouvelle chronique « La presse Internet » (voir page 24) et à la chronique « La presse botanique » [voir Bulletin de l'ABC 31(1) : 1].

Denis Lauzer

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Information for submitting texts / Soumission des textes

Texts and illustrations for the Bulletin must be sent to the Editor preferably via the electronic mail (attached file) or on a diskette. Texts should be saved under "Word" and illustrations under the "TIFF" format.
If you have any question about text submission please contact the Editor.

Les textes et les illustrations pour le bulletin doivent de préférence être envoyés par courrier électronique (sous forme de fichier attaché) ou encore sur une disquette.
Les textes doivent être enregistrés sous « Word » et les illustrations sous le format « TIFF ».
N'hésitez pas à contacter le rédacteur pour toute information sur l'envoi de documents.

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CBA Bulletin / Bulletin de l'ABC

The CBA Bulletin is issued quarterly (February, May, August, November) and sent to all CBA members.
Le Bulletin de l'ABC paraît quatre fois par année (février, mai, août, novembre) et est envoyé à tous les membres de l'ABC.

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To ensure continuous delivery of the Bulletin please notify the Treasurer promptly of any change of address.
Veuillez communiquer tout changement d'adresse au trésorier afin de recevoir tous les numéros du bulletin.

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If you have any comments or suggetions about the Bulletin, please contact the Editor at the above address.
Si vous avez des commentaires ou suggestions concernant le bulletin, veuillez s'il vous plaît contacter le rédacteur à i'adresse mentionnée plus haut.

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Texts for the August issue must be received before July 1, 1999. Les textes pour le bulletin d'août doivent arriver au plus tard le 1er juillet 1999.

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Poorly Known Economic Plants of Canada - 21. Bilberry, *Vaccinium myrtillus* L.

E. Small and P.M. Catling, Eastern Cereal and Oilseed Research Centre, Research Branch, Agriculture and Agri-Food Canada, Saunders Bldg., Central Experimental Farm, Ottawa K1A 0C6

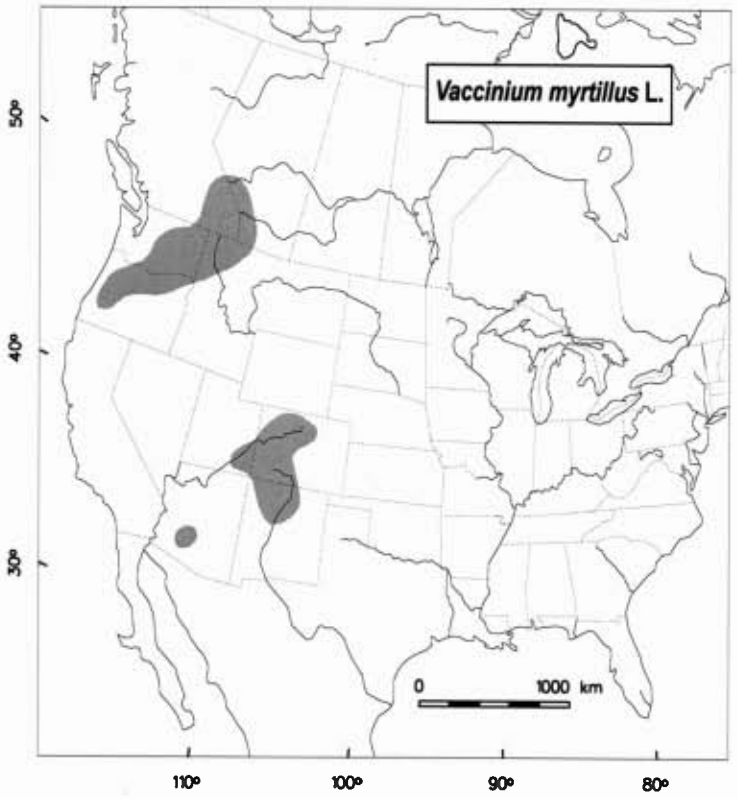
Common Names: Bilberry, dwarf bilberry, blaeberry (a Scottish name meaning blue berry), mountain bilberry, whortleberry, whortles, myrtle whortleberry, whinberry, tracleberry, huckleberry. Most of these common names have also been applied to other species of *Vaccinium*, and thus are frequently misinterpreted. The name bilberry is derived from the Danish *bollebar*, meaning dark berry. However, not all berries are dark, and a white-fruited ornamental form is known. French: Airelle, brimbelle, myrtille, myrtille commune, myrtillier commun. The above names are used in European French. The species is absent from Quebec, and a French-Canadian name is unavailable (although Boivin used the name myrtille in his Flora of the Prairie Provinces); the name "airelle" is generally used when bilberry extract is sold in stores in Canada.

Vaccinium myrtillus (Synonym: *V. oreophilum* Rydb.) should not be confused with *V. myrtilloides* Michx., the velvet-leaf or sour-top blueberry, which is Canada's most widespread wild species of blueberry, occurring from coast to coast.

V*accinium myrtillus* is classified in *Vaccinium* section *Myrtillus*, characterized by a 5-celled berry and stamens enclosed within the petals when the pollen is released. In Europe, hybrids (known as *V.* H *intermedium* Ruthe) with *V. vitis-idaea* L. have been reported. Bilberry has at least seven North American relatives in section *Myrtillus* centered in the Pacific Northwest. Of these, the Mountain Bilberry (*V. membranaceum* Dougl.) has the largest fruit, ranging to 20 mm in diameter, and thus could be employed to increase yield. The Cascade Bilberry (*V. deliciosum* Piper) is of potential interest in breeding and crop development because of its excellent fruit flavour, cold-hardiness and blossom frost resistance.

Bilberry is a small (5-30, rarely 60 cm tall), somewhat spreading, perennial, deciduous, shrub with slender angular branches arising from a creeping rhizome. Plants are usually shorter at higher elevations. The roots are slim (1.5-2 mm in diameter), much-branched, and often form an interconnected mat in the top 5 cm of substrate. The leaves are 10-30 mm long, and bright green. The flowers are globular and waxy, with pale-green or pinkish petals 5-6 mm long. The bluish-black (occasionally reddish, bluish, or blackish), globose, flat-topped berries are 5-10 mm in diameter, sometimes covered when ripe with a delicate grey bloom; they have a slightly acid, sweet flavor. The berries may contain up to 40 seeds, although generally only half this number are viable.

Bilberry is found in most of Europe, but only on moun-



tains in the south. There are some populations in southwestern Greenland that are thought to be ancient European introductions. The species also occurs in Asia. In North America it is found in two areas of the Rocky Mountains (one in southeastern British Columbia and southwestern Alberta through Washington to central Oregon, the other in central Colorado, adjacent Utah, north-central New Mexico, and southern Arizona).

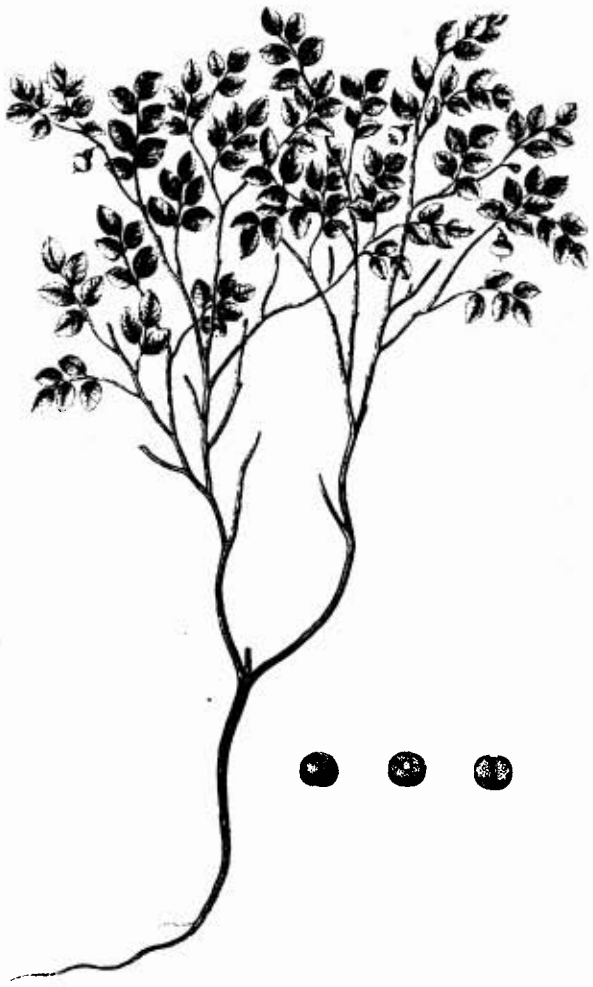
Bilberry occurs in various climates in damp woodlands, heaths, and moors. It prefers filtered shade and moist, fertile, acidic soil. In North America it is found in open, moist coniferous woods, hillsides, hummocky seepage slopes, and moraines above 1600 m. The plants are cold-tolerant at least to -20 ^{0} C, and much lower when protected by snow cover.

Because bilberry grows naturally in open and semi-open forests, clear-cutting of the trees may be harmful to the plants as a result of mechanical injury, as well as increased frost and drought injury. Although bilberry is relatively fire-tolerant and resprouts after fires, it is most frequent where burn intervals are relatively long (up to 100 years). Fire suppression may lead to dense conifer forests providing insufficient light for berry production. Similarly, areas replanted with conifers may not supply sufficient light for good growth.

Pollination is by bees. The berries are eaten by many birds and mammals, including bears, and the foliage and twigs are browsed by some mammals. As with many other species of *Vaccinium*, birds and mammals are known to disperse the seeds. Reproduction is both by seeds and by vegetative spread.

The berries were extensively eaten by Native Americans, including the Kootenay, Carrier, and Shuswap tribes. North American Indians preserved berries of *Vaccinium* species in various ways, most commonly by drying in the sunshine or by a fire. In the North, berries were placed in seal oil, or stored in leather bags deposited in the permafrost. As with other *Vaccinium* species, bilberry fruit has long been popular in both Europe and North America for jams, jellies, preserves, pie fillings, liqueurs, and wines.

This attractive, hardy, shade-tolerant, low-growing shrub makes an interesting edible landscape, which is very ornamental in the autumn when the leaves turn red. Root cuttings can be transplanted to disturbed sites to reduce erosion, at the same time providing a natural food and cover for wildlife. Bilberry is also of value as a nurse crop for Douglas fir seedlings. In some parts of the Rocky Mountains problems with black and grizzly bears could be reduced through effective management of natural stands of bilberry. A larger supply of the berries would reduce bear foraging in populated areas and campsites.



During the latter part of the First World War, England experienced a shortage of aniline dye, formerly imported from Germany, and the pigments from blue-black berries were substituted. So much of the bilberry crop was purchased by dye manufacturers that there was little available for making jam.

The bilberry has been used in folk medicine for centuries, perhaps even for millennia (although it is difficult to establish the precise identity of some *Vaccinium* species used in past times). Bilberry extracts are popular and are commonly marketed in Europe, as well as by numerous North American supermarkets, drug stores and health stores. Diverse medicinal claims are made for extracts of bilberry; the chief applications are noted below. Numerous pharmacological studies (more than 70) have been conducted that provide at least some support to the various claims.

Strengthening of cardiovascular system. Bilberry is believed to strengthen capillaries, allowing them to stretch without breaking or leaking, so that red blood cells can squeeze through tighter vessels, thereby benefitting blood flow. This is said to reduce bruising, and also varicose veins and "spider" veins which result from leakage of blood from capillaries. In past times in Europe, the herb was used prior to surgery to lessen bleeding, and even today some European doctors prescribe bilberry extracts before operations to reduce post-operative bleeding. Claims have been made that bilberry may lower blood pressure.

Vision. Bilberry has been shown to improve vision, especially night vision. During World War II, pilots and navigators of the English Royal Air Force consumed large quantities of bilberry preserves, particularly before night missions, in the belief that this improved vision. The proposed explanation is improved blood flow to the capillary-rich retina of the eye. The resulting improved eye function has been said to reduce eye fatigue and lessen the incidence of cataracts and common myopia (near-sightedness).

Diabetes. The berries and especially the leaves of bilberry have been used in folk-medicine treatment of diabetes. Bilberry leaf has a reputation as a "blood sugar-reducing" drug, useful in "antidiabetic" (against diabetes) teas. Although it is not widely used to treat diabetes today (insulin therapy has become standard treatment), it is interesting that very high levels of chromium are found in bilberry leaves, and that there has been suspicion that chromium may have a role to play in the treatment of diabetes. Also, myrtillin (methoxylated glucoside of gallic acid) in bilberry leaf has been shown to reduce hyperglycemia and normalize blood sugar level. An allied question that has not yet been sufficiently clarified is whether or not the improvements in blood circulation associated with the use of bilberry (discussed above) are useful for the treatment of circulatory disorders associated with diabetes. As noted below, because of toxicity the consumption of bilberry leaf is generally discouraged today. Insulin therapy can debilitate some people, and herbal treatments capable of safely reducing the need for insulin could be advantageous.

Digestive disorders and mucous membrane inflammation. Bilberry (both leaf and berry) tea has been used as a treatment for diarrhea and as a relief for nausea and indigestion. Bilberry has considerable tannin content, and the astringent action of the tannins is believed to be responsible for its effectiveness in treating digestive disorders, as well as for topical (surface) treatment of mild inflammation of the mucous membranes of the mouth and throat. Numerous herbs with tannins are also known to have the same useful properties, and bilberry is not especially useful for these purposes, although some over-the-counter herbal preparations with bilberry are available in Europe specifically for digestive disorders. As noted below, the leaf is toxic and prolonged consumption is hazardous. Fresh berries seem less effective than dried, older berries for treating digestive disorders, perhaps because the tannins are not in a suitable chemical form until after drying has taken place.

Urinary tract health. Bilberry has at least some of the beneficial properties of cranberry for maintaining urinary tract function and curing infections (see number 20 in this series).

Antioxidant. Flavonoids such as found in bilberry fruits are natural antioxidants, which are medicinally effective because they disarm damaging free radicals. Free radicals are highly reactive chemical fragments produced during the metabolism in the body, that can impair cell function.

Fresh berries may cause diarrhea in some individuals, but are not considered toxic. However, the leaves must not be consumed (for example in tea) over a long period of time, because they are poisonous. Although bilberry leaf tea is sometimes encountered in herbal therapy, its use is hazardous and not recommended.

Anthocyanidin flavonoids responsible for the deep bluish color (often in the form of colorless precursors, proanthocyanidins, in the fresh plant) are believed to be the key medicinal compounds of bilberry. The most significant bioflavonoid in bilberry appears to be myrtocyan. Dried berries of bilberry contain about 0.7% anthocyanins. The dried berries of several other wild species of *Vaccinium* have been shown to have much higher content of anthocyanins, so that it is possible that future research may show that these other species are even more desirable as medicinal plants than bilberry. Other medicinally significant constituents (tannins, myrtillin, chromium) are mentioned above.

Bilberry is harvested mostly from native stands in North America and Europe and has consequently received much less attention from plant breeders than the cultivated species of *Vaccinium*, including the cranberries and blueberries. Most cultivated blueberries are stimulated to produce many young flowering and fruiting branches by heavy pruning of the shrubs. However, this practice is unsuitable for bilberry, which produces most of its fruit at the base of older branches.

Bilberry has a well-deserved reputation as a useful herbal medicine and therefore promises a growing market. North American wild bilberry is not readily accessible (the plant grows in mountainous areas) and so cultivation is desirable. Although not extensively cultivated in North America, natural stands are known to produce up to 100 kg (fresh weight) of berries/ha; a much higher production is likely possible under cultivation. There is considerable information in the European (foreign language) literature on cultivation and management techniques. While there is a large available supply from Europe, the development of a Canadian supply is a worthwhile enterprise.

Membership Committee

To be or not to be... a CBA member

Yes, it is that time of the year when you should be renewing your affiliation with the Canadian Botanical Association. The CBA continues to be an important venue for following botanical issues both in Canada and abroad and for sharing information with colleagues from all areas of the plant sciences, all this culminating in the Annual CBA meeting. Membership is imperative to maintain a vibrant and diverse organization! If you have not renewed yet, please send your cheque to:

Mikisiw Computing Ltd.
CBA Membership
103 Kenosee Court
Saskatoon, SK, S7J 3S7

Please also consider asking a colleague to join the CBA ranks or sign up a student or a post-doctoral fellow (only $ 25.00!). If you have lost your Membership Form or need some more, please contact me.

Hugues Massicotte, hugues@unbc.ca, chair, Membership Committee

Être ou ne pas être... membre de l'ABC

Oui, c'est la période de l'année où l'on doit renouveler notre adhésion à l'Association botanique du Canada. L'ABC est un outil qui permet de suivre les débats de l'heure en botanique, au Canada et ailleurs, de partager de l'information avec nos collègues impliqués dans toutes les sphères d'activité de la biologie végétale, et finalement de se rencontrer une fois l'an durant le congrès annuel. Chacun des membres constitue une cellule essentielle pour maintenir le tissu vital de l'organisation. Si vous n'avez pas encore renouvelé votre adhésion, veuillez retourner votre chèque à :

Mikisiw Computing Ltd.
ABC Adhésion
103 Kenosee Court
Saskatoon, SK, S7J 3S7

De plus, demandez à un collègue s'il est intéressé à joindre l'ABC ou encore parrai-nez un étudiant ou un chercheur post-doctoral (c'est seulement 25,00 $!). Si vous avez égaré votre formulaire d'adhésion ou si vous en désirez d'autres, veuillez s.-v.-p. me contacter.

Hugues Massicotte, hugues@unbc.ca, responsable, comité des adhésions

Conservation Committee

Conservation Corner

There's good news on the conservation front. At the end of November, the City of Mississauga purchased the Creditview Wetland, citing its value as a provincially significant wetland as one of the main reasons for protecting it from development. In September, the Conservation Committee wrote a letter urging Mississauga Council to preserve this particular wetland for a number of reasons, including: it was designated as provincially significant (1989, 1996); the regionally significant Virginia chain is fern located there; the wetland was in existence since glaciation; and, it is used as a teaching tool by local schools and universities.

The conservation committee also sent a letter to the provincial government of Ontario regarding its "Lands for Life" initiative which would have resulted in only 6% of Ontario's land mass being protected within protected areas. We supported the World Wildlife Fund's efforts to increase the total amount of land to be protected, and to apply scientific criteria in selecting land to be set aside for conservation purposes. In response to public pressure, the Ontario government set up a consultation process with the "Partnership for Public Lands", which consisted of representatives from The Wildlands League, Federation of Ontario Naturalists, WWF-Canada and 38 supporting organizations.

The Ontario government announced on March 29, 1999 that, as a result of these consultations, they will now set aside a further 2.4 million hectares, bringing the total to 12% of the Province in protected areas. This includes 378 new protected areas that were presumably chosen by the Partnership for their conservation value. An important focus of the agreement is the expansion of tourism opportunities which should reduce dependence of Northern Ontario on resource extraction.

In other conservation news, the committee has written a letter to the Town of Oliver in the south Okanagan, British Columbia, urging the cessation of waste water dumping on endangered semi-desert habitat. We have also been considering actions regarding the desire and activity of horticultural cultivation of endangered native orchids in Manitoba. If you have any conservation concerns that would benefit from CBA/ABC attention, don't hesitate to contact me at pam.krannitz@ec.gc.ca!

Pam Krannitz, pam.krannitz@ec.gc.ca, Chair, Conservation Committee

Faculty Opening

University of Saskatchewan
Department of Biology
Plant Taxonomy / Biodiversity
(http://www.usask.ca/biology)

The University invites applications for a faculty position in plant taxonomy/biodiversity at the level of Assistant Professor, commencing January 1, 2000. This is a tenure-track position in the Department of Biology, with a joint appointment in the Department of Plant Sciences.

Requirements include a Ph.D., preferably with teaching experience. The successful applicant will be responsible for teaching courses such as introductory plant taxonomy and for curatorship of the W.P. Fraser Herbarium. The successful candidate is expected to develop a dynamic research program and to collaborate with other plant scientists on campus.

Applications are invited from qualified individuals regardless of their immigration status in Canada. The University of Saskatchewan is committed to Employment Equity. Members of Designated Groups (women, aboriginal people, people with disabilities and visible minorities) are encouraged to apply.

Send curriculum vitae, a statement of teaching and research interests, as well as the names, addresses and telephone/fax numbers and e-mail addresses of at least three referees to:

Chair, Selection Committee
Department of Biology
University of Saskatchewan
112 Science Place
Saskatoon, SK S7N 5E2
Canada
Telephone: (306) 966-4400
Fax: (306) 966-4461

Upcoming Congress

XVI International Congress on Sexual Plant Reproduction

The XVI International Congress on Sexual Plant Reproduction will be held at Banff, Alberta, from April 1-5, 2000. The conference is co-sponsored by the Universities of Saskatchewan and Alberta, and is held under the auspices of International Association of Sexual Plant Reproduction Research.

The scientific program will include all topics on sexual plant reproduction, from flowering to seed development. Sessions will be held in the mornings and evenings with the afternoons available for skiing, field trips, nature walks and discussions with colleagues.

For further details, please check the web site:
http://www.usask.ca/biology/spr/
Co-organizers are:
Dr. D.D. Cass, University of Alberta
d.cass@ualberta.ca
and **Dr. V.K. Sawhney**, University of Saskatchewan.
sawhney@admin.usask.ca "

Commemorative Stamps

I have a few first day envelopes of the XII International Botanic Congress, Leningrad, 1975 with the official stamp of the Congress. I have a have a few first day envelopes from the XIII International Botanical Congress in Sidney, Australia 1981. The envelopes have the official stamp of the Botanical Congress dated 24 August 1981. Two envelopes feature fungi and are officially dated 25 August 1981. I also have one folder of 6 stamps of Australian native animals. I have a Charles Darwin Centenary Day (of his death) first day envelope, 19 April 1982, with the picture of Darwin embossed on the envelope with a special issue 15.5 p stamp with his picture. I also have first day postcards from the XV International Botanical Congress, Yokohama, 1993. I also have a book by E. Bobrov, 1970, The Life of Linnaeus, 1707-1778. In Russian. Illustrated. 285 pages. If anyone is interested contact W.F. Grant, ef16@musica.mcgill.ca.

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http://agrenv.mcgill.ca/plant/grant.htm

Following in the footsteps of the chronicle "The Pant Press", this new chronicle, called "The WEB Press", is created in order to share WEB sites adresses to CBA members. Please send your WEB site suggestions and your appreciation of these sites to:

***Dr. Denis Charlebois**, charled@magellan.umontreal.ca*

Dans la tradition de la chronique « La presse botanique », la présente chronique, « La presse Internet », est créée dans le but de faire connaître aux membres de l'ABC des sites Internet reliés à la botanique. Veuillez faire parvenir vos suggestions de sites, et votre appréciation de ces sites, à :

***Dr Denis Charlebois**, charled@magellan.umontreal.ca*

There are still a few traces of snow left in some areas but some of us can't help but think about the warmer months to come. Along with summer come outdoor activities such as camping, cycling and swimming. But there is no reason to wait that long to sharpen your surfing skills, WEB surfing that is. As a starting point for The Web Press, I would like you to visit the following sites. I realize that these choices are arbitrary and that is why we are calling on our members' surfing knowledge to get this new column going.
Denis Charlebois

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Botanical Museum, University of Helsinki
[http://www.helsinki.fi/kmus/]

The home page of the Botanical Museum, University of Helsinki [http://www.helsinki.fi/kmus/] is a gold mine with links related to botany at large. Many links are directly available from their main page. Try the following two :

-List of all WWW Pages of the Botanical Museum, and

-Internet Directory for Botany - Subject Category List. . Among the topics covered : ARBORETA AND BOTANICAL GARDENS; BOTANICAL SOCIETIES, INTERNATIONAL BOTANICAL ORGANIZATIONS; BIOLOGISTS' ADDRESSES; BOTANICAL MUSEUMS, HERBARIA, NATURAL HISTORY MUSEUMS; CHECKLISTS AND FLORAS, TAXONOMICAL DATABASES; CONSERVATION AND THREATENED PLANTS; ECONOMIC BOTANY, ETHNOBOTANY; GARDENING; IMAGES; JOURNALS, BOOKS, LITERATURE DATABASES, PUBLISHERS; LINK COLLECTIONS, RESOURCE GUIDES; LISTSERVERS AND NEWSGROUPS; LOWER PLANTS AND FUNGI: Algae - Bryophytes – Fungi; OTHER RESOURCES: Plant Pathology - Plant Genetics - Standards - Tropics – Other; PALEOBOTANY, PALYNOLOGY, POLLEN; UNIVERSITY DEPARTMENTS, OTHER INSTITUTES; SOFTWARE; VASCULAR PLANTS FAMILIES. This site will keep you busy for at least a week.

Denis Charlebois, charled@magellan.umontreal.ca

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Antony Torkelson site
[http://walden.mvp.net/~tonytork/]

This site offers little information on botanical related topics but it contains links to numerous site related to botany. Each link is accompanied with a short description. Among those of interests, click on " Lots of General Botany Links " or on " Botanical Gardens of the World ". One comment, this site, like so many others, is also victim of the fast pace of the WWW. Therefore, don't be surprise if you end up with a " Server Error " message when trying to access on of the proposed links.

Denis Charlebois, charled@magellan.umontreal.ca

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Amazing Environmental Organization Web Directory
[http://www.webdirectory.com/]

Finally, pay a visit to the Amazing Environmental Organization Web Directory site http://www.webdirectory.com/. It is mainly a big search engine dedicated to environmental issues. You can either type keywords in the search window or clic on one of the proposed folders. Among those folders, you can find agriculture (regrouping topics such as horticulture and farming) and forestry. Each folder leads to numerous links with a short explaination. Overall a good starting point for " plant scientists " interested in the environment.

Denis Charlebois, charled@magellan.umontreal.ca

The following publications have not yet been spoken for. If you are willing to review one of these books please contact the editor at the address indicated at the beginning of the bulletin (page 17). On request, the book you wish to review will be sent to you.

Les publications suivantes n'ont pas encore été réclamées. Si vous voulez faire la critique d'un de ces ouvrages, veuillez contacter le rédacteur du bulletin à l'adresse indiquée à la page 17.

Symmetry in Plants
by R.V. Jean and D. Barabé (Editors)
World Scientific, 1998
(Series in Mathematical Biology and Medecine, Vol. 4)

The Shoot Apical Meristem
Its Growth and Development
by R.F. Lyndon
Cambridge University Press, 1998

Molecular Genetics of Plant Development
by S.H. Howell
Cambridge University Press, 1998

British Plant Communities
Edited by J.S. Rodwell
Volume 1: Woodlands and scrub
Volume 3: Grasslands and montane communities
Cambridge University Press, 1998

EUCLID
Eucalyptus of southeastern Australia

by M.I.H. Brooker, J.R. Connors and A.V. Slee
Centre for Plant Biodiversity Research
CSIRO, Collingwood
Australia, 1997
(US $ 128.00)

[This is the English translation of the review published in French in the February issue of the Bulletin, 32(1): 14-15]

Eucalyptus trees and shrubs, which had their origin in Australia, are now planted all over the world. However, their identification has always seemed difficult. Fortunately, there is now a fast and efficient way of solving this problem. It is called EUCLID (Brooker et al. 1997).

EUCLID (EUCaLyptus IDentification) is the first interactive system on CD-ROM for the identification of taxa in the genus Eucalyptus. It was developed at the Centre for Plant Biodiversity Research, at the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia, using the database of the National Herbarium of Australia. This database contains information on some 60,000 herbarium specimens of Eucalyptus as well as information derived from experimental morphological studies and from extensive field observations.

The EUCLID package provides information concerning 310 species and subspecies from southeastern Australia. The system contains comprehensive information on the morphology, nomenclature, distribution and economic uses (wood, fibre, oils, honey, horticulture). It also contains numerous illustrations and more than 2000 color photographs.

The advantage of EUCLID by comparison with more conventional identification methods is that you can simply ignore characters that are poorly understood or that are not visible on the sample that you want to identify. In this way, the system can be used on incomplete specimens such as would be the case if you had only a fruit or a leaf for reference.

Once a specimen has been identified, supplementary information can be retreived concerning the morphology, ecology, different diagnostic characters with similar taxa, and different uses of the species in question. A notebook can be activated in which the user can add notes for future reference.

The EUCLID keys have been developed for both specialists as well as more profane users with some basic botanical knowledge. It will be useful for botanists, dendrologists, forest managers, ecologists, teachers, students, horticulturalists, farmers, nurserymen and gardeners. I would also recommend it to anyone interested in the development of modern electronic systems of identification. The applications can be adapted to many situations involving problems of identification whether it be plants, animals, soils, minerals, etc.

Finally, two shortcomings of this CD-ROM should mentionned. This version of EUCLID will not run on Mac computers, and the price tag of $128.00 US is rather expensive and will discourage many people from buying it.

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Translation, **Stuart Hay**, IRBV, Université de Montréal

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Plant-Microbe Interactions. Vol. 3

by G. Stacey and N. T. Keen (Editors)
Chapman and Hall
New York, 1997
(US $ 69.95)

Plant-microbe interactions is a specialist volume and to some extent a misnomer; this volume could more appropriately be titled "Molecular genetics of plant pathogens". Except for the introductory chapter by M. J. Harrison on AM mycorrhizal symbiosis, this book overviews the biochemistry of phytopathology in agronomic plants. The interplay between phytopathogenic effects in plants, plant detection and responses to pathogens, and disease resistance is interesting and complex. This volume consists of a series of chapters which review microbial pathogenicity and characterize the resistance mechanisms of plants.

The first chapter by M. J. Harrison reviews the arbuscular mycorrhizal symbiosis with plants, including the development of AM mycorrhizas. Harrison also discusses evidence that plant mutants having defective interactions with mycorrhizal symbionts also have defective associations with rhizobial symbionts, suggesting that these two plant-microbe associations may require similar plant functions. The mechanisms of plant-mycorrhizal signalling are discussed in detail.

Chapters 2 and 3 review how plants respond to pathogen attack. P. S. Low and A. T. Schroeder (Chpt. 2) describe how oxidative bursts are induced in plants. This is the process where incompatible (non-host) plants
have a hypersensitive response to pathogenic fungal attacks, resulting in a zone of cell death. The oxidative burst results in the production of oxidants or secondary compounds within seconds to minutes after elicitation. This response can be triggered mechanically, for example during penetration by fungal appresoria. Much of this chapter is devoted to reviewing signal transduction of oxidative bursts. P. Ricci builds on this theme in Chpt. 3 by describing the production and function of a group of small extracellular fungal proteins (elictins). Elictins are produced by the pathogenetic fungi Phytophthora, and induce a hypersensitive response in plants. Most examples are from elictin effects on Tobacco (Nicotiana). Knowing how these proteins operate will increase our understanding of how plants recognize invading pathogens.

Chapters 4 and 5 also review the role of proteins produced by phytopathogenic fungi. In chapter 4, G. De Lorenzo and F. Cervone overview the function and role of fungal proteins (endopolygalacturonases) and toxins, and plant-produced proteins (polygalacturonase-inhibiting proteins (PGIPS)). Fungal endopolygalacturonases are one of the first enzymes to disrupt cell walls and enable wall degradation by other enzymes. They may also act indirectly as potential signal molecules eliciting defence responses in plants. PGIPs are widespread plant cell wall proteins that are involved in the recognition and rejection of pathogenetic fungi. This chapter is particularly well written and clear. Chapter 5 by J. Walton, R. Ransom and J. Pitkin develops a case study for Northern corn leaf spot on maize (Zea mays) caused by the fungus Cochlibolus (Helminthosporium) carbonum. This is a serious economic pathogen causing leaf and ear rot in maize. Plant resistance to the HC-toxin produced by this fungus is conferred by the Hm resistance gene. This gene encodes an HC-toxin reductase which inactivates the HC-toxin and is commonly found in the Poaceae. The chapter heavily focuses on the molecular genetics of this system. This is the first plant resistance gene cloned, and the authors argue that other pathogen-plant systems may operate in similar ways.

The final two chapters review pathogenic effects of a bacterial pathogen, Pseudomonas syringae. C. Bender (Chpt. 6) discusses the production, regulation and mode of action of phytotoxins produced by this bacterium. Much of this chapter reviews the biochemistry of coronatine, a hormone-like compound that produces chlorosis in plants by inducing the formation of protease inhibitors. Much attention is on the biosynthesis and mode of action of this toxin. In the final chapter, S. Hutcheson discusses the role of the hrp (hypersensitive response) encoded protein export system in the pathogenicity of P. syringae. The hrp genes are required both for induction of a hypersensitive response in plants and for pathogenicity.

Rather than being a coherent, broad, and stimulating overview of plant-microbe interactions, this volume is a collection of review chapters and case studies. The volume would benefit greatly from a synthesis chapter which ties together individual chapters and puts the material into a wider context. This book is concise, up to date and interesting, but is also extremely specialized and likely not worth the ca. $100 (CDN) price tag unless your research interests are specifically in this area.

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Induced Responses to Herbivory

by R. Karban and I.T. Baldwin
The University of Chicago Press
Chicago,1997
[US $ 44.00, US $ 17.95 (paperback)]

This is a comprehensive review integrating interspecific ecological interactions, chemical responses and physiological mechanisms. The authors provide an exhaustive critical review

of the literature (approximately 800 papers) on induced responses by plants to attacks by herbivores. The book begins with an introduction of induced responses and a historical background of the topic. The authors define the scope of the book and summarize the succeeding chapters. They discuss how they will integrate two disparate bodies of literature: 1) biochemical mechanisms of induced resistance, and 2) plant-herbivore population biology.

The second chapter reviews mechanisms of plant perception to herbivore and other damage. This is mostly a biochemical review that goes through various "signalling" compounds which are produced in response to damage and transported various distances throughout the plant. There is a useful summary table that non-chemists like me will find easier to digest than the technical text. There is an interesting section on the air-borne transmission of signalling substances facilitating "communication" between plants and "alerting" undamaged neighbours to nearby threats. However, I was hoping here that some mention would also be made of the ecophysiological work that has been done on below-ground connectivity between clones of perennial plants. Though I believe this work has mainly reported the translocation of nutrients between clones or between separate herbaceous and woody plants linked by mycorrhizae, the possibility remains that damage to one clone or tree could result in a "signal" being received in neighbouring plants.

The third long chapter (50 pages) is on mechanisms of induced responses, ie: how secondary metabolites change after damage. The authors outline 5 mechanistic models and some examples, but I must admit my eyes glazed over with the biochemical details. Luckily they provide a 4 page summary at the end on why ecologists need to know all this mechanistic detail. They rightfully point out that progress in understanding the plant-herbivore interaction is dependent on understanding the complexity of the interplay between consumer and the consumed. They stress that plants are not passive players in this game, and that the behaviour of herbivores will be affected by induced responses.

This sets up the next 62 page chapter on induced resistance against herbivores. This chapter reviews induced responses of plants to simulated or herbivore mediated removal of plant tissue, when the induced response resulted in resistance or susceptibility to more herbivory. Often the full chain of events could be only partially explained, but I found this chapter to be mush more interesting than the previous one because it places biochemical mechanisms more fully within the context of ecological processes.

The fifth chapter reviews the extent to which natural selection can act on induced responses. The authors report on the few species for which heritability estimates have been derived. Not surprisingly, the most common information revolves around genetic differences in induced responses, and fitness differences between plants that show induced responses to herbivory and those individuals that do not. They then elaborate on the whole discussion of whether induced responses are actually the result of natural selection or a by-product of some other activity. The authors bring forward the mechanistic hypotheses outlined in chapter 3 and discuss the unoriginal problems of distinguishing cause and effect, and proximate and ultimate causes. However, they continue the discussion to include a review of optimality models and theoretical models of herbivore-plant interactions.

The final short chapter discusses the relevance of induced responses to agriculture and integrated pest management. Overall, I believe "Induced Responses to Herbivory" succeeds in its attempt to bridge the gap between biochemical mechanisms of induced responses and ecological observations and theory. It is really quite a remarkable book - well organized, very thorough and comprehensive, and the authors integrate different sections throughout the book. At the same time they show areas that would benefit from more research, making it a useful background document for anyone wishing to research this topic further. The book even has a useful and complete index!

I actually found this book difficult to review: it is so full of information, a cursory glance was not enough. I highly recommend it to anyone interested in plant-herbivore interactions.

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Experiments in ecology: Their logical design and interpretation using analysis of variance

by A.J. Underwood
Cambridge University Press
New York,1997
[US $ 80.00, US $ 34.95 (paperback)]

It is necessary to read the sub-title of this book to truly understand what it is about. It is basically a statistics book; it has chapters on frequency distributions, testing of null hypotheses, statistical tests on samples, comparing means of two populations, analysis of variance, nested analyses of variance, etc.. But this book is different from other introductory statistics books, as Underwood states clearly in the opening sentences of the first chapter:

" 'Not another book attempting to explain statistics in a simple-minded way!' could well be the reaction of an ecologist coming in from a hard day's work in the field and finding this

book. It is a reasonable comment. There already exist numerous books on introductory statistics. There are, however, few books that focus on the nature of biological experiments from the perspective of biological hypotheses and the practical problems that biologists routinely encounter."

As you can see, the book is written in a very engaging style. Underwood has obviously seen too many poorly designed ecological experiments and would like to do what he/she can to reduce this in the future. I have been using the concepts from Chapter 2, 'A framework for investigating biological patterns and processes', in my second year introductory ecology class. Underwood presents very clearly the process of using explanatory models to make predictions that, in turn, allow for the generation of testable hypotheses. He also emphasizes the point that once an experiment generates data in support of a hypothesis, other hypotheses should be generated from the same model in order to continue testing it. This is a reminder that is especially important in ecology.

The chapters on basic statistical theory are clearly written and are refreshing compared to other statistics books. Underwood gives practical advice throughout the book about problems commonly encountered when using statistics in ecological experiments. This includes discussion of the power of different statistical tests, appropriate transformations for satisfying the assumptions of analysis of variance, and use of multiple comparison tests. Underwood is obviously partial to analysis of variance, but does discuss regression analysis in a final chapter.

The last several chapters of the book focus more closely on experimental design. There is a chapter specifically on factorial designs and one on designs such as split-plot designs, Latin squares, etc. One chapter is devoted to the construction of statistical analyses from general principles.

I highly recommend 'Experiments in ecology' for graduate students or for faculty who need a refresher on statistics and experimental design. Biologists in areas other than ecology would find this book useful.

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Plant Family Album, an interactive botanical review Vol. 1: The Rosidae (CD-ROM)

by M. J. Waterway and H. Cohen Rimmer
Plant Science Department
McGill University
(Cdn $ 49.95)

This CD is an outstanding, pioneering effort that combines a huge volume of botanical information with solid programming that is exercised to produce not only accounts of 40 individual families but also an introduction that includes an illustrated account of how seed plants grow and reproduce, an illustrated overview of 120 species of Rosidae from the North American Flora, an illustrated glossary (linked from a pop-up definition window that in turn is linked from highlighted terms in the main text), and three kinds of quizzes with which to review the CD's contents.

Individual family treatments comprise several screens of text and illustrations, with buttons linking to literature references on the family, and to an account (*not* illustrated) of past and present thinking about the phylogeny of the family. The index to families indicates that Rosaceae is one of the families for which more detailed coverage is available, and this turns out to consist of 35 screens that cover inflorescence, flower, and fruit construction; vegetative morphology; two to five screens of details about each of the four traditionally recognized subfamilies; economic importance; and a summary of family features. The discussion of Rosaceae phylogeny is pretty comprehensive, the latest references being from 1995 (phylogeny and references add a further nine screens of text). Thus, even though the authors feature four subfamilies, an interested student can be led to papers that suggest that "Spiraeoideae" are at best paraphyletic with the Maloideae, the latter being no longer definable by a single fruit type except in the strict sense of the x=17 genera. Taking Hippocastanaceae as an example of a shorter family treatment, there are seven screens of text and illustrations, plus a screen of text each for phylogeny and references. The discussion of phylogeny refers to the results obtained by Judd et al. (1994) suggesting that Sapindaceae be expanded to include both Aceraceae and Hippocastanaceae, but the text-only approach deprives a student of the cladogram upon which Judd et al. base their argument (compare Fig. 70 in Zomlefer 1994).

The screens of the North American Flora section are presented seemingly without identification, in an apparently arbitrary order that begins with poison ivy. The screens can also be accessed from indices of scientific and common names, or by number. Buttons are available with which to obtain the family, genus, and species of the plant shown, so that the section can be

used as a kind of recognition test, checking one's mental identification against the right answer. Icons link the user to food, drug, toxicity, or other noteworthy information that may be available. There is also a link to a glossary of the medical terms used. Regarding food and drug uses, the authors give the appropriate warnings against experimental ingestion and self-medication, and emphasize the importance of accurate identification. This section includes a few screens where the limitations of photographic illustration can be seen. For example, the two images of inconspicuous, mat-forming *Chrysosplenium americanum* are almost impossible to decipher, yet a line drawing would have made clear what the user might expect to encounter if they picked up a leaf or an inflorescence. There seems to be no indication of scale in any of the photographs apart from that provided by recognizable objects that happen to be included in an image. This is too bad, considering the trouble taken in some cases to provide close-up views of plant parts that a user might not otherwise encounter.

The quizzes provided by *PFA1* are probably one of its most valuable pedagogical features. There are three kinds: family recognition, multiple choice, and matching. The matching quiz is interesting because it involves having the user drag labels onto the correct part of the screen. In the case of a screen-filling image of a particular flower or fruit this can be an especially valuable exercise for a student. At any point the user can ask to be graded, or to be shown the correct answers. With the family recognition quiz, it seems that you cannot advance to the next question until the question you're on is correctly answered. Fortunately, there are a limited number of choices, and each one produces an explanation why it is right or wrong.

My reason for wanting to review *Plant Family Album Vol. 1* (*PFA1*) is that I teach a plant families course at the University of Toronto. I'm naturally curious to see if *PFA1* is an alternative to books like *Flowering Plant Families* (Zomlefer 1994) or *Botany for Gardeners* (Capon 1990) that I have used as textbooks in this course.
Also, I have set up a website for my course (http://www.botany.utoronto.ca/courses/BOT307/307homep.html), so that there's also the comparison with my own effort, and with web-based resources generally, to be made.

As far as whether *PFA1* (and subsequent volumes) can replace one or more textbooks is concerned, the answer is yes and no. The authors have put just about everything that one would expect in a resource like this, including recognition features, morphology, taxonomy, a glossary, and then more: interactive review tools, color illustrations, and clickable indices of families and genera by scientific ("Latin") and common (English only) names. At the same time, however, there's no index to the work as a whole as far as I can tell. The glossary itself is provided with an index, but there does not appear to be any means to reach the pages that describe just, say, the gynoecium in different families. Nor are individual pages within a family treatment tabbed so as to allow a user to quickly get to, say, the fruit page. Nor did the Asymmetrix software used to develop the CD apparently enable the authors to allow the users to place bookmarks, as an alternative to providing an index. These are features that authors can embed in Adobe Acrobat documents, and that users of WordPerfect, for example, can place in a document that they are reading. A user of *PFA1* thus cannot help but marvel at how much information is locked up in the CD (567,000 Kbytes, or around 1,000 or more screen shots, I estimate), accessible only by following the authors' prescribed routes through the screens.

By comparison, well-organized and well-indexed books are easier to use for information retrieval. Books can be read almost anywhere, by normally sighted persons, on the toilet, in the bath, on a mountaintop, or in a boat, train, or car. A techno-junkie, of course, takes her or his laptop to all those places, but even hardware can fail at least temporarily. It is ironic that this review was begun with pencil and paper, and several printouts of screen shots, because I'm still waiting for the friendly technician to install the correct memory module in the desktop machine at home. For some reason, the childrens' Windows 3.1 machine that works so well with their CD-based games can't get past the title screen, no matter how or where I click.

Web-based resources, of course, resemble *PFA1* and are even more limited in where they can be used. However, few sites that I'm aware of have such a plentitude of well-annotated dissections as does *PFA1*. The authors were able to employ three McGill students to prepare and photograph the flowers and fruits, in various views, and variously split open to reveal their structure. Most of these illustrations are very clear and easy to relate to one's own experience of the subject (but see above, re the reliance almost exclusively on photographic images). Botanical images on the web vary dramatically in their quality and in the extent to which they are accurately identified and annotated regarding the salient features they illustrate.

On the other hand, where internet access is available, web-based resources offer an instructor willing to learn hypertext markup language (html) the opportunity to continually upgrade a site to the extent her or his time allows. This of course means that students using the site are continually serving as involuntary beta testers for at least some of its components, but never mind that. Web pages lend themselves to presenting layers of searchable content in a manner that facilitates linking related topics. CGI or other programs can be developed to allow students to test themselves, witness Olle Pellmyr's Javascript pollination biology quiz and review tool (http://129.59.217.19/BIO/quiz.html and review.html) and its more generalized CGI imitation, PollyAnna (http://server.esc.cquest.utoronto.ca/botany/general/Showcase99/). Perhaps most important of all, web-based resources allow an instructor to connect her or his students to the huge number of botanical and other resources that are present on the web. For

example, not only the angiosperm families database (http://biodiversity.uno.edu/delta/angio/; Watson & Dallwitz 1992), but also the various sites where users can carry out interactive identifications using DELTA-formatted databases that illustrate not only the taxa concerned but also the characters available with which to make an identification (e.g. the resources listed at http://biodiversity.uno.edu/delta/www/programs.htm). The web also provides a kind of visual lingua franca in terms of how an interface behaves: mouse cursors change their appearance when positioned over a link, ALT text may appear on an image if the author has provided it, and keystrokes can substitute for mouse activity in many situations (e.g. PgUp, PgDn, Alt-arrow, etc.). As more and more people learn to use the web designers of multimedia authoring tools would do well to match the web standard even if intellectual property rights require a different mechanism for doing so. In the case of *PFA1*, matching the web standard would just make the product a little easier to use.

Finally, there are some issues that *PFA1* and web-based resources raise that I think don't have technological fixes. I delight in *PFA1*'s photographs of dissected flowers and fruits, above all because I think they will encourage students to make their own and, in P. B. Tomlinson's words, "ask the plant" by picking it apart and studying the pieces. Beyond that, however, how does an electronic study tool drive the student away from the computer to go out into the field to experience the excitement of looking at real plants through a hand-lens or under a microscope? When the skills needed to do this effectively are in short supply, disparaged by short-sighted partisans of exclusively molecular approaches, perhaps we need role models (like Dorothy Swales, Curator Emeritus of MTMG, to whom *PFA1* is dedicated) more than we need multimedia CD-ROMs or websites. At the very least, as teachers and administrators, we need to remember the importance of hands-on experiences with whole plants for preserving and spreading our knowledge about the living world.

PFA1 is advertised on the web and can be ordered using forms available at http://www.agrenv.mcgill.ca/plant/ pfa. Regardless of the perceived shortcomings described above, I will install it on the computer in the lab where I teach, and will encourage my students to use it. However, $49.95 for just the Rosidae makes the complete set of CDs that the authors promise to deliver too expensive to consider as a replacement for a textbook.

Timothy Dickinson, Vascular Plant Herbarium (TRT), Royal Ontario Museum

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The Nature of Disease in Plants

by Robert P. Scheffer
Cambridge University Press
Cambridge, 1997
(US $ 64.95)

(English translation will be published in the next issue of the Bulletin)

Le regretté Robert P. Scheffer nous a laissé avec «The nature of disease in plants» un livre stimulant et fascinant. C'est un survol des plus importantes maladies des plantes qui ont eu un impact sur la vie humaine présenté dans une forme et un langage facilement accessibles. Cet ouvrage déborde d'informations incluant l'historique de la découverte et du développement des maladies de plantes et le rôle de l'homme dans leurs propagations.

Le livre est présenté en deux parties. La première intitulée : «Biology and control of plant diseases» traite des sujets d'intérêt général et donne la base théorique pour comprendre le développement des maladies. C'est une introduction précise et critique avec deux chapitres sur les moyens qu'ont des pathogènes d'attaquer les plantes et les moyens qu'ont ceux-ci de se défendre. Dans ces deux chapitres sont présentées les toxines, les enzymes, les hormones, les phytoalexines et d'autres substances inhibitrices, les relations génétiques et le modèle de la tumeur du collet d'*Agrobacterium tumefaciens* comparé à quelques autres tumeurs. Le chapitre suivant «Ecological Considerations » discute l'origine et l'évolution des pathogènes à l'aide d' *Alternaria* et *Cochliobolus,* ce qui permet de comprendre, à l'intérieur du même genre, l'évolution d'un parasite spécifique à partir d'un saprobionte. Le chapitre « Disease Controls and their Limitations » nous donne un survol de la sélection par la manipulation de la résistance de l'hôte, des principes de la lutte chimique et biologique ainsi que des problèmes de quarantaine et de certification.

La deuxième partie, « Natural history of some destructive diseases » reprend quelques-uns des sujets de façon plus détaillée. Cette deuxième partie peut être appréciée sans la lecture de la première partie. Ici, plus de 30 maladies sont traitées en détail et la plupart suivies d'un résumé qui fait ressortir les faits les plus importants. Ces maladies sont groupées sous les chapitres : Plantes indigènes pathogènes introduites ; plantes introduites pathogènes indigènes ; l'élimination des barrières

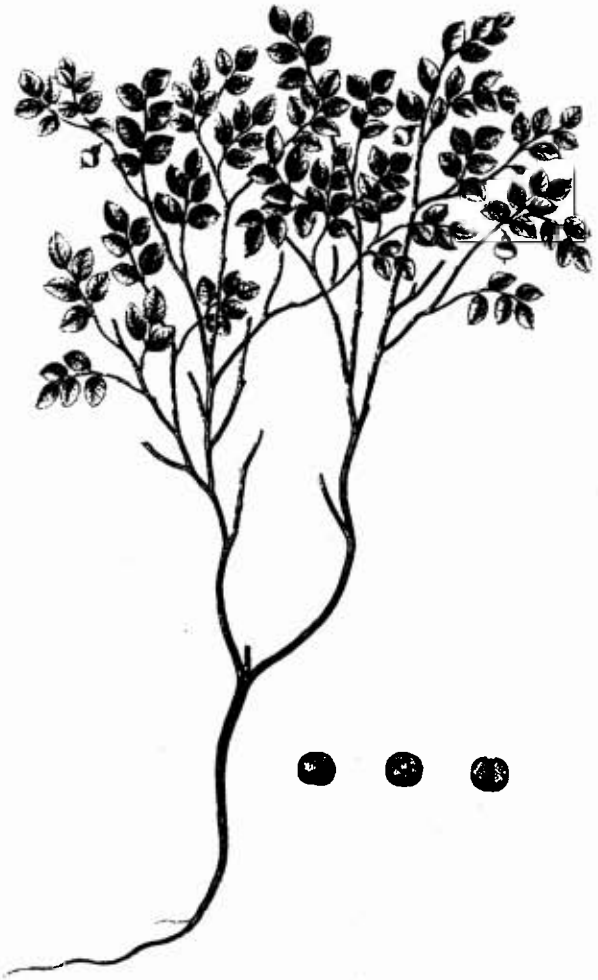
écologiques ; l'adaptation des pathogènes dans la monoculture ; les maladies dues aux toxines de *Cochliobolus* ; les maladies dues aux toxines d'*Alternaria* ; les maladies aggravées par des changements de l'agriculture ; les réintroductions annuelles. Une discussion sur les maladies abiotiques, spécialement sur le dépérissement des forêts en Europe, conclut le texte.

Les 700 références bibliographiques présentent une riche source d'accès à la littérature spécialisée et un glossaire définit de façon brève et concise quelques termes techniques utilisés dans le texte. Quelques schémas (surtout des formules chimiques des toxines) et graphiques ainsi que 24 photographies en noir et blanc illustrent le texte. Il est agréable de trouver parmi les illustrations 6 photos de pathologistes célèbres pour leur contribution scientifique. Cependant, j'aurais aimé voir ces photos datées. Deux cycles vitaux, du *Puccinia graminis* et du *Cronartium ribicola* sont présentés. Comme les cycles de Rouilles sont assez difficiles à mémoriser pour un novice – et ce livre s'adresse, en grande partie, à un public non initié – pourquoi ne pas l'avoir présenté de la même façon ? Pourquoi utilise-t-on dans un des cycles *Spermogonium* et dans l'autre *Pycnia* ; pourquoi une fois le singulier (*Aecium, Spermogonium) et dans l'autre, le pluriel (Aecia, Pycnia) en présentant seulement un* seul organe ? Pourquoi dans un des cycles, l'hôte urédial est présenté en haut et dans l'autre, en bas du cycle ? J'aurais préféré que l'expression *spermogonium* soit utilisée de façon exclusive. Il y a aussi des fautes d'orthographe. En principe, quelques fautes de frappe sont faciles à accepter mais trouver plus d'une vingtaine de noms scientifiques de plantes ou d'organismes pathogènes écrits incorrectement montre une certaine négligence de la part des correcteurs. Un autre exemple de cette négligence est l'utilisation des terminaisons dans la classification : un sous-embranchement (subphylum) est désigné par «mycotina » et non «mycota » (p.11).

Inévitablement, l'approche de l'auteur amène à un certain dédoublement, surtout par le fait que quelques maladies sont expliquées dans la première partie et sont retraitées en détail dans la deuxième. Le côté fort de ce livre est le fait qu'il s'agisse d'un ouvrage qui nous donne un message engagé. Robert Scheffer, célébrité mondiale pour ses travaux fondamentaux sur des toxines, parle avec passion des différents principes toxiques qui interviennent dans la pathogénèse. Il nous démontre que l'activité de l'homme est à l'origine de la plupart des maladies néfastes : la monoculture, la création d'une uniformité génétique, et différentes techniques agricoles comme le greffage ont fait émerger de la plupart des maladies des plantes. En même temps, il prévient le lecteur du danger que quelques maladies, jusqu'à maintenant restreintes géographiquement, deviennent pandémiques. Il indique également de nouvelles avenues de recherche en phytopathologie moléculaire qui pourraient avoir un impact sur la lutte. Plusieurs descriptions se lisent comme un roman policier. L'histoire de *Hevea brasiliensis* et de son principal pathogène, *Microcyclus ulei,* est une de ces descriptions mais je pourrais aussi bien nommer la Pomme de terre, le Caféier, le Châtaignier, l'Orme, la Vigne.

Nonobstant ma remarque négative sur l'orthographe des noms scientifiques, j'ai énormément apprécié ce livre. L'approche est très intéressante et la lecture stimulante. Il constitue non seulement un ouvrage qui informe sur les principes fondamentaux de la phytopathologie et les maladies les plus dévastatrices mais il est également une source inestimable de références, un livre que je recommande fortement à toutes les personnes intéressées à la phytopathologie et à l'écologie, à la biologie végétale ainsi qu'à l'agriculture et la foresterie.

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Meeting with BSA