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The Canadian Botanical Association Bulletin

Bulletin de l'Association botanique du Canada

May / Mai 2002 • Volume 35 No. / N° 2

President's word / Message du président

Permit me first to welcome Martin Dubé as Editor of the CBA/ABC Bulletin. Having performed this task myself, I know the time commitments which have to be made in order to produce a suitable product. Martin will make changes in the "look" of the Bulletin, as previous Editors have, but I am sure that we will continue to have a well-produced, interesting and informative Bulletin. Thank you, Martin, for agreeing to become Editor of our Bulletin.

The **Annual Meeting (Botany 2002)** at Madison, Wisconsin, is rapidly approaching. Information and registration forms [in .pdf format] for the Meeting are available now on the Meeting website [www.botany2002.org], and all members will receive the registration booklet in the mail shortly. Note that Botany 2002 is actually two meetings, a **Forum on Botanical Education and Outreach** [Aug. 2-4] and the regular **Scientific Meeting with contributed papers and symposia** [Aug. 4-7]. You may register for either of these meetings separately, or for both at a bargain rate. **The deadline for early registration at a reduced rate is July 1**. For those attending the Education Forum there are several workshops from which to choose, all but two requiring payment of a small fee. For those only attending the regular Botanical Meeting several pre-conference field trips have been arranged, mostly one-day excursions on Saturday or Sunday [Aug. 3 and 4]. There are also two multi-day trips ending on Aug. 4. This year the Banquet is not included in the registration fees, so tickets must be purchased separately.

CBA/ABC has two other ticketed events, a Canadian students breakfast on Monday [Aug. 5th] and a Luncheon on Tuesday [Aug. 6th] at which some student awards will be announced. Students should note that they can apply to serve as projectionists at the meeting (this includes Canadian students). If they are hired and perform their duties (2-3 sessions; about 10 hours) they will receive a refund of their early

(continued on next page)

Canadian Botanical Association (CBA)

The Canadian Botanical Association is honored to have a patron such as Her Excellency the Right Honourable Adrienne Clarkson, C.C., C.M.M., C.D., Governor General of Canada.

Bulletin

The CBA Bulletin is issued quaterly (February, May, August, November) and sent to all CBA members. Comments or suggestions about the Bulletin should be directed to the Editor at the address below.

Information for submitting texts

Texts and illustrations for the Bulletin should preferably be sent to the Editor via internet as attached files, nevertheless any medium is acceptable. Any format for texts or illustrations are welcome. Please make sure that scanned illustrations are done with a very good resolution. If you have any question about text submission please contact the Editor.

Association botanique du Canada (ABC)

L'Association botanique du Canada jouit du bienveillant patronage de sa présidente d'honneur, Son excellence la très honorable Adrienne Clarkson, C.C., C.M.M., C.D., Gouverneure générale du Canada.

Bulletin

Le Bulletin de l'ABC paraît quatre fois par année, en février, mai, août et novembre. Il est envoyé à tous les membres de l'ABC. Tout commentaire concernant le bulletin est apprécié par le rédacteur.

Directives aux contributeurs

Les textes et les images sont de préférence envoyés sous forme électronique comme fichiers attachés, néanmoins, tous les supports de même que tous les formats imaginables sont acceptables. Les fichiers graphiques doivent être de très bonne définition. N'hésitez pas à contacter le rédacteur pour toute information.

registration fee [$75].
I will be handing over to Liette Vasseur in August the task of being President of CBA/ABC. I am sure she will perform the job splendidly. I offer my thanks to all who have ably assisted me during my term as President.

Finally, sometime during the next two years I hope to retire as webmaster of the Association's website. I invite anyone who would like to volunteer to take on this task to contact me. The job requires a commitment to learning webpage design to setting aside blocks of time to keep the website pages up to date.

Joe Gerrath, President, CBA/ABC

Editor's word / Un mot du rédacteur

Eh bien le voilà mon premier numéro. Bon, l'apparence est un peu différente de ce qu'elle était mais le contenu est identique. D'autres changements sont prévisibles, entre autres, j'aimerais bien augmenter le contenu. Je souhaite donc que non seulement les représentants de l'association mais aussi les membres ordinaires exploitent le potentiel d'information et d'échange qu'est le bulletin.

Je remercie chaleureusement Denis Lauzer de son temps et de son support durant la transition.

Martin Dubé, rédacteur

Here it is, the first issue of the Bulletin with my own grinding. Not so different in aspect but just the same in contents than previous issues. To add to the contents, I wish that Association officers and members will use the Bulletin for what it is, that is, a tool for disseminating information and for exchange.

Hearty thanks to Denis Lauzer who did not spare his time and effort to make the transition as smooth as possible.

Martin Dubé, Editor

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Next issue
Prochain numéro

In theory, texts for the August issue, 35(3), must be received before July 15, 2002. In practice, this issue will be produced as soon as sufficient material is available.

En principe, les textes pour le bulletin du mois d'août, le 35(3), doivent arriver au plus tard le 15 juillet 2002. Dans les circonstances, ce numéro sera publié dès que suffisamment de matière sera reçue.

Poorly Known Economic Plants of Canada - 33. American chestnut, *Castanea dentata* (Marsh.) Borkh.

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The devastating blight of the American chestnut was first reported in 1904. It was to develop into what has been called the greatest ecological disaster in the history of the world's forests. Half a century later, over 80% of North America's 4 billion American chestnuts were dead and practically all of the remainder were reduced to root sprouts. In southwestern Ontario, less than 500 of the original 1.5-2 million Canadian trees are left.

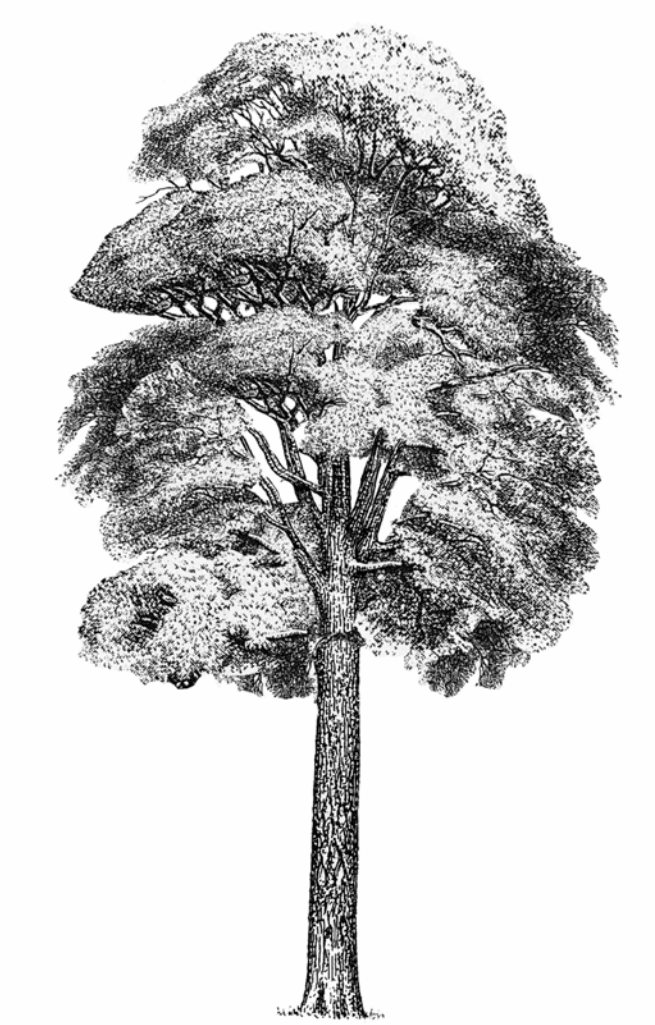
Latin Names
The genus name *Castanea* is from the Latin *castanea* and Greek *kastanea*, names for the chestnut tree. The name is commonly stated to be based on the city of Kastana in northern Greece, but has also been attributed to the city of Kastanis in Turkey. Although the name may have originated from one or both cities, it has also been suggested that the cities were named for the tree or its nuts.

English Names
The English word "chestnut" is from the 14th century Middle English *chasteine*, derived from the Old French *chastaigne*, which in turn is from the Latin *castanea*. The name "sweet chestnut" has been used to distinguish the edible chestnuts of *Castanea* from horse chestnuts of the genus *Aesculus*.

French Name
Châtaignier d'Amérique

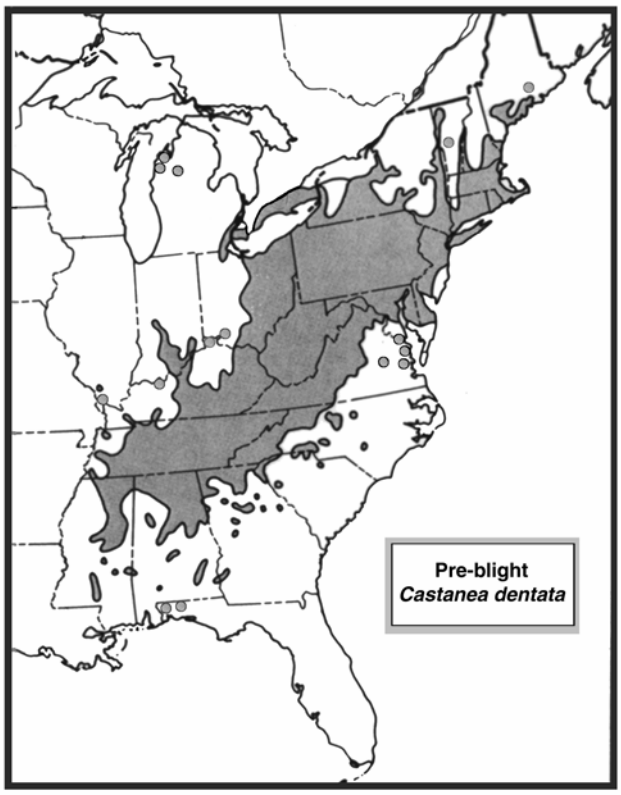
Morphology

The American chestnut, sometimes called "the redwood of the east," was once an incredibly magnificent and dominant tree. Some trees grew to monstrous size, often approaching 40 m in height, 3 m or more in diameter, and 600 years of age. However, a height of 30 m was typical for mature trees on the best sites, and 21 m on poor sites. Bisexual catkins develop at the ends of flowering branches, while male catkins occur at the bases. Before they were attacked by blight, American chestnut forests were very attractive when in flower: the trees developed such spectacular masses of white blooms that the floral display came to be called "summer snow." The odour was less attractive. Old-timers who remembered the smell of chestnuts compared it to Clorox and to "underarms without deodorant." The plants are self-incompatible, and are pollinated both by insects and wind. A protective spiny husk ("burr") encloses one to three nuts. The nuts are 5-8 cm wide, and are mostly dropped while the burr is still on the tree.



***Castanea dentata* (American chestnut)**

The chestnut blight is caused by a fungus of Asian origin [*Cryphonectria parasitica* (Murr.) Barr, formerly *Endothia parasitica* (Murr.) P.J. And. & H.W. And.], which develops a girdling sunken canker on the stem, killing the phloem and vascular cambium, and producing foliar blight. The blight fungus normally does not damage American chestnut root tissues, and since the plant reproduces extraordinarily well from its roots, it has managed to persist throughout most of its original range. In the past, reproduction was at the base of dead trunks, so the phrase “stump sprouts” accurately described the majority of plants. More recently most plants have been growing in the manner of clonal shrubs rather than originating from old stumps, and the phrases “root crown sprouts” or “root collar sprouts” are more accurate. It has been widely reported that plants remain healthy until they reach a certain size, but it appears that blight symptoms are first evidenced in both small and large trees. Nevertheless, the above-ground portions of the plants are regularly killed. Flowering trees are widespread but uncommon, and are generally killed by the blight before they can produce much seed. Occasional trees manage to set seeds, and seedlings are sometimes observed, although very rarely.



Key to wild and cultivated *Castanea* in Canada

1a. Mature leaves smooth beneath; winter buds smooth ***C. dentata***
1b. Mature leaves hairy beneath; winter buds hairy **2**

2a. Younger twigs remaining hairy; teeth of leaves triangular; leaves without lepidote glands beneath ***C. mollissima***
2b. Younger twigs soon becoming smooth; teeth of leaves with long points; leaves either with or without lepidote glands beneath **3**

3a. Leaves coarsely serrate, 10-23 cm long ***C. sativa***
3b. Leaves finely serrate, 7-12 cm long ***C. crenata***

Classification and Geography

Castanea is in the Fagaceae or beech family, sometimes called the Oak family. The genus includes about 14 species of trees and shrubs, five of which are native to North America. American chestnut is the only chestnut native to Canada. It was once an important member of the deciduous forest of the eastern US and the Carolinian Zone of southern Ontario, and persists over most of its original area. The species occurs from southern Ontario and adjacent southern Michigan to Maine and the southern states, and is indigenous to 24 American states. In Ontario American chestnut is found in 10 counties along Lake Erie from Windsor to Niagara Falls and north to London. The present Canadian distribution approximates the pre-blight distribution. The map presented here indicates the natural distribution, with the exception of localities in western Michigan, where chestnuts have established from introduced plants. Establishment from cultivation undoubtedly occurred in other places, but documentation is incomplete.

The Japanese chestnut (*C. crenata* Sieb. & Zucc.), Chinese chestnut (*C. mollissima* Blume) and European chestnut (*C. sativa* Mill.), as well as some hybrids, have been introduced into parts of southern Canada. Although these species can be readily identified using the key above, distinguishing American chestnut from hybrids involving Eurasian species is problematic and requires taxonomic

American chestnut stumps almost a century old can still be seen because their high tannin content has retarded decay. The stumps can be identified with the naked eye by the combination of pores at the inner border of each annual ring and absence of rays.

***Castanea dentata* (in flower)**

research. The species name *dentata* is a reference to the distinctive coarsely dentate leaves of the American Chestnut. The leaves are also characterized by lack of hair and large size (up to 30 cm long).

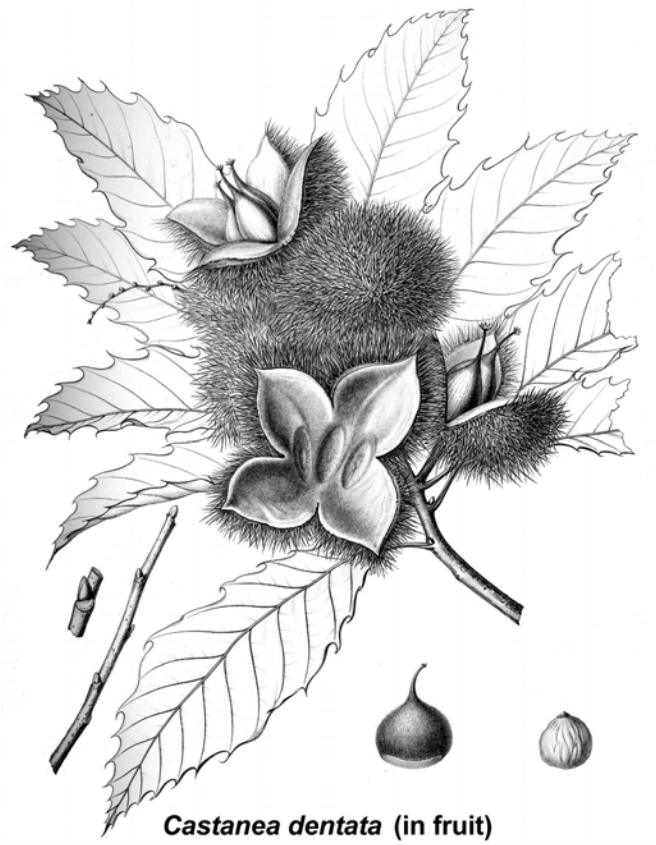
Ecology

The blight fungus was first discovered in 1904 in New York city, apparently imported from Asian nursery stock. It co-evolved with the Asian species of *Castanea*, which are fairly tolerant to the disease, while the American chestnut had virtually no resistance. At the time the need for quarantine was inadequately appreciated. The blight was much more destructive than Dutch elm disease. Blight reached Canada in the 1920s, and by the 1940s most trees were devastated. Before chestnut blight, American chestnut dominated much of the eastern deciduous forests, often comprising 25% of the trees, especially in the old-growth Appalachian forests. It has been said that an ambitious squirrel could have traveled from Maine to Georgia on the branches of chestnut trees. The species usually occurred in mixtures with other hardwoods, particularly oaks, occasionally hemlocks and pines. In southern Ontario, chestnut associated with oaks and white pine. Chestnuts tolerated light to moderate shade until they became part of the canopy and overtopped their associates. The tree was most common on moderate slopes, avoided limestone while occupying acidic soils, and was rare or absent on poorly drained sites, preferring sandy and gravelly somewhat dry conditions.

Unlike many other trees, the American chestnut showed relatively little fluctuation in fruit production from year to year, regularly producing well. Native wildlife, including birds, bears, squirrels and deer, depended on the trees' abundant nuts. Seed dispersal was mostly by squirrels, rodents and birds. The elimination of the American chestnut is believed to have been associated with the decline of many dependent species in the eastern US. Chestnuts were a staple food of the wild turkey, which accordingly became less common. Seven moth species have been reported to feed exclusively on American chestnut, and some of these may now be extinct. An impressive nut-eating beetle, *Curculio caryatrypes*, almost became extinct during the blight, but survived on resistant introduced chestnuts. The Allegheny woodrat, *Neotoma megister*, provides another example of decline correlated with that of the American chestnut.

Use as Food

The American chestnut produced a large harvest of nuts that were said to be far superior to any other chestnut. Indigenous Peoples of North America made good use of the nuts. The Iroquois from New York consumed them raw, or pounded and boiled, or cooked in corn bread. Chestnuts were an important cash crop in Appalachia, and boxcar loads were shipped by rail to the large cities to be sold by street vendors as roasted nuts. Those that couldn't be sold were often squirreled away in attics filled to the rafters. The hardships of the depression were made much worse in Appalachia when the supply of chestnuts was ended by the blight. In Europe, chestnuts are sometimes fed to animals, particularly to pigs, as the resulting pork is highly esteemed. With amazing similarity, before the Appalachian trees were destroyed by blight, hogs were regularly turned loose to fatten on American chestnuts. Chestnut-fed pork is soft, has a stronger flavour than corn-fed pork, and a taste that is less attractive to North Americans.



***Castanea dentata* (in fruit)**

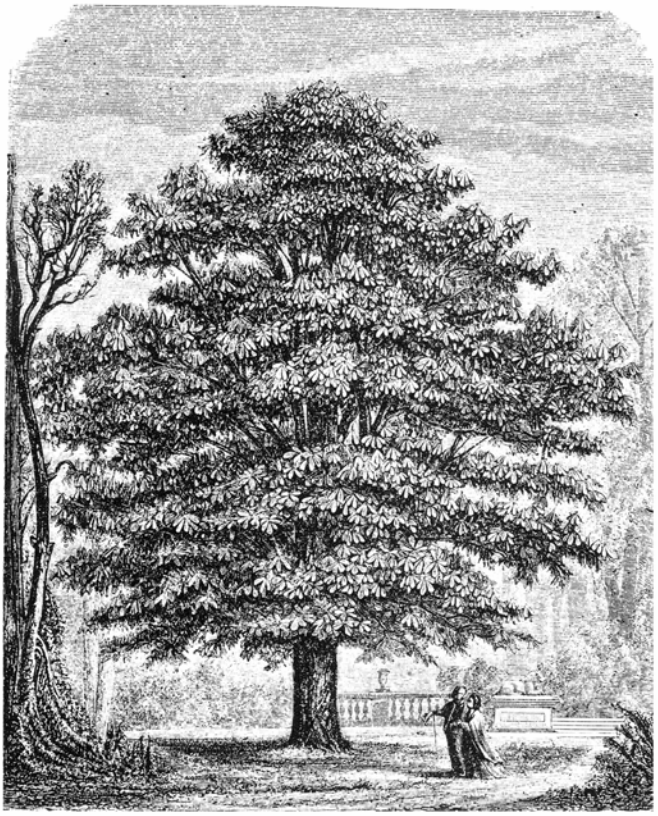
Toxicity

In 1913, while American chestnut trees were being destroyed in large numbers by blight, there were widespread reports of people and animals becoming sick or dying after eating chestnuts. No cause has ever been verified. There is no evidence that the blight itself produced poisonous substances, and the fungus has been fed to rats without harmful effects. Chestnuts are not considered harmful in any respect.

Chestnuts are sometimes confused with "horse chestnuts." The European horse chestnut, *Aesculus hippocastanum* L. is commonly planted as an ornamental in North America. It, as well as the native American species of *Aesculus*, are poisonous, and should not be consumed (although there has been medicinal use of horse chestnut). It seems that the name "horse chestnut" came about with the old English practice of using the plant medicinally to cure horse maladies. However, horses often refuse to eat horse chestnuts.

Non-Food Uses

Early American settlers called the American chestnut "the farmer's friend" because it not only furnished large amounts of nuts but also wood for various purposes. American chestnut wood was tough and heavy, water-resistant, and as rot-resistant as redwood. It was much easier to grow than oak, and the wood was more easily worked, and so was particularly valued for construction of furniture and similar products. Many of these objects are now collector's items. It was said that chestnut wood "carried man from cradle to grave, in crib and coffin." The trees were often cut for fuelwood, but usually regrew rapidly from stump sprouts. The trunks were often straight enough to be used as telephone poles as high as 20 m. Because of the high tannin content of the bark and heartwood (6-12% dry weight), more than half of the tannin produced in the US for tanning leather came from American chestnut. The tannin was responsible for resistance to decay, and so the trees were ideal for telephone and telegraph poles, props in mines, ship masts, fence posts, railroad ties, and shingles. The 30 m spread of the tree was valued for shade and, in the 18th and 19th centuries, American chestnuts were widely planted along city streets.



***Aesculus hippocastanum* (horse chestnut)**

Agricultural and Commercial Aspects

Chestnuts are probably the most important nut crop in the temperate zone, and only rank behind coconut and peanut in importance. At present, American chestnut has no economic significance. The species native to Europe and Asia have been cultivated as nut trees for many years, especially in China, Korea, Japan and the Mediterranean basin. In the Mediterranean region, chestnuts have been grown for at least 3,000 years. In Asia, the Japanese chestnut has been cultivated since at least the 11th century, and the Chinese chestnut possibly as long ago as 6,000 years. Most of the world's chestnuts are produced and consumed in Asia. China, which mainly grows the Chinese chestnut, is currently the world's largest producer and exporter of chestnuts. Because it is the only commercially important species of chestnut that is quite resistant to chestnut blight, the Chinese chestnut has become the most important chestnut species in the world. So commonly is this nut used as food in the Orient that is said to almost take the place of the potato. The Japanese chestnut is also somewhat resistant to chestnut blight, but does not produce as high quality nuts. In Europe, the chestnut industry has long been based on the European chestnut. Italy is the largest chestnut producer, followed by France and Spain. In North America, there is a small chestnut industry in the US, principally in California, Oregon and Washington, based on hybrids of European and Asian species. Also, Chinese chestnuts are produced in the southeastern states. Similarly in Ontario, a small industry is based on hybrid and Chinese chestnuts, and it has been noted that the latter produced fruit heavily after only 25 years.

Chinkapins, also spelled chinquapins and chinquepins and sometimes called dwarf or bush chestnuts, are species of shrubs and small trees of North America. The most important is *C. pumila* (L.) Mill., known as the Allegheny, American, common, and tree chinkapin. Often, all American chinkapins are placed in *C. pumila*. It is a prolific producer of sweet, nutty-flavored small chestnuts. There has been very limited success in establishing a commercial industry based on chestnuts from chinkapins.

Cultivars & Germplasm

The American chestnut was not subjected to modern breeding or selection before it was decimated by blight, so that modern cultivars are not available as they are for many other nut trees. Resistance to the blight has been the overwhelming concern for the last century, and attempts are underway to conserve germplasm for a recovery. The preferred approach to maintaining long-lived, large trees is of course in-situ conservation as living stands. The seeds are difficult to store in a viable state for more than a few years. While root sprouts of the American chestnut have been able to maintain considerable germplasm for almost a century, it is known that such vegetative propagation gradually becomes less vigorous, and will in time result in extinction. Establishment of trees beyond the area of blight infestation is desirable since it has proven effective at maintaining living material. American chestnut is grown in various arboreta and volunteer planting programs are also maintaining some trees outside of its indigenous range. Genetic studies have shown that relatively high levels of diversity occur in southern populations, which are presumed to represent refugia from which postglacial revegetation occurred. Relictual populations in Alabama, Mississippi and Tennessee are considered very vulnerable because of logging and reforestation with pines for pulp and paper. From a Canadian perspective, analysis of diversity and preservation of the most northerly populations is essential to maintain the prospect of using locally adapted material for a possible restoration of the American chestnut. Canadian germplasm is also important on a global scale, as Canada has the most cold-hardy trees in the genus, tolerating temperatures to -35 C. American chestnut is a *Threatened Species* in Canada, and is given similar status in several American states.

Recovery

Chestnut blight attacked the European chestnut in Italy in 1938 with almost the same devastation as on American chestnut, but in the 1950s it was observed that some trees were recovering. Cankers from the recovering trees were cultured and produced white growths, rather than the typical orange growth from dying trees. The white strains were found to have much lower ability to harm chestnuts, and in 1965 were termed "hypovirulent." More interesting, when a debilitated tree dying from infection by a virulent strain was inoculated with a hypovirulent strain, it began to recover. It was then discovered that through hyphal fusion, the hypovirulent strain was transmitting some cytoplasmic factor that weakened the virulent strain. In Italy, hypovirulence spread naturally, and led to the recovery of the chestnut industry in that country.

In France, hypovirulent strains were successfully applied to affected trees as biocontrol agents. More recent work established that an infective virus-like agent occurs in hypovirulent strains of the blight fungus. This is composed of double-stranded RNA, has been called HAV (hypovirulence associated virus), and is responsible for lowering lethality to the trees. Natural hypovirulent isolates of the fungus have also been found on American chestnut, and some stands appear to be recovering, but much more slowly than was the case in Europe. Nevertheless, there is hope that eventually natural recovery will occur. Poet Robert Frost (1874-1963) prophesied that one day the chestnut blight would be controlled by nature:

> Will the blight end the chestnut?
> The farmers rather guess not.
> It keeps smoldering at the roots
> And sending up new shoots
> Till another parasite
> Shall come to end the blight.

Several approaches have been taken to re-establish the American chestnut in its original range. Hybridization of the American chestnut with its blight-resistant Asian relatives, the Chinese and Asian chestnuts, has been attempted in order to introduce resistance genes. A second approach to overcoming the blight problem has been to exploit hypovirulent strains of the fungus. It might be possible to displace the virulent strain of the blight fungus with highly weakened strains, and indeed there has been some success using weakened strains of the fungus as a biological control agent, but much less than was the case with European chestnut. A third method has been the application of ionizing radiation in hopes of generating favourable mutations. Fourth has been the attempt to genetically engineer resistance into the trees, particularly antifungal proteins such as found in Chinese chestnut. A fifth technique is classical selective breeding for the most resistant genotypes. A sixth practice is simply to manage the plants in the light of the ecology of infection. For example, low-altitude populations in the Appalachians seem to escape the blight to a greater degree than high-altitude plants, suggesting that new plantations would best be established in low areas. While progress has been slow, there is a reasonable prospect that in time resistant strains of the tree will be available.

Blight is not the only threat to American chestnut in Canada. Recent reports have drawn attention to impacts of habitat loss, loss of genetic purity through hybridization, and the potential spread to Canada of the oriental chestnut gall wasp (*Dryocosmus kuriphilus*), which established in Georgia in 1974. A “Proposed National Recovery Plan for American chestnut” was published for Canada in 2000 (lead agency: Ontario Ministry of Natural Resources). The goal is to maintain and/or establish self-sustaining populations, and the objectives are: 1) to identify and protect populations within the native range and promote their maintenance; 2) to manage chestnut blight; 3) to identify and protect blight-free stands outside the native range.

Several groups are concerned with reviving the American chestnut, of which the following are especially notable. In 1983, the American Chestnut Foundation, a non-profit organization, was founded with the aim of restoring the American chestnut to eastern forests through a scientific breeding program and cooperative research (http://www.acf.org/About.htm). The Canadian Chestnut Council was founded in 1988 as a charitable organization with similar goals (http://www.uoguelph.ca/~chesnut/).

Prospects

Although much smaller than the Old World commercial chestnuts, American chestnut produces the best-tasting nuts. It also has the tastiest nuts of any of Canada’s native nut trees, and extremely valuable wood. Should blight-resistant trees become available the American chestnut would be a very attractive potential new crop for Canada. There is reason to believe that what was once described as both “the king of trees” and “the queen of trees” may regain at least some of its monarchic importance.

Myths, Legends, Tales, Folklore, and Interesting Facts

Xenophon, a Greek historian of the 4th century BC, wrote that the children of Persian nobility were fattened on chestnuts.

A strange religious practice has been recorded in northeastern Spain. On the eve of All Souls, on the first of November, Catalonians run about from house to house to eat chestnuts in the belief that for every chestnut swallowed they will deliver a soul

out of purgatory.

A 16th century custom in Britain was to roast chestnuts over a fire, making a slit or puncture in the skin of every nut except one. When that nut exploded, it indicated that the other chestnuts were ready. The practice is the basis of Petruchio's speech in Shakespeare's *Taming of the Shrew*, Act I, Scene 2:

> And do you tell me of a woman's tongue
> That gives not half so great a blow to the ear
> As will a Chestnut in a farmer's fire.

Enormous chestnut trees have been documented in Europe. The *castagno de cento cavalli* or "chestnut of the hundred horses" near Mount Etna (Europe's most active volcano, on the island of Sicily) was considered to be the largest tree in Europe about a century ago. Its trunk measured more than 61 m (200 feet) in circumference, while its age was estimated at almost a thousand years. Its popular name was based on a story that the Queen of Aragon was caught in the rain while on the road from Spain to Naples, and that she and her 100 knights still mounted on their horses were able to shelter under the branches of the tree. It was said to be still bearing nuts when it was destroyed by the Mount Etna volcanic eruption in 1850. Trunks of many of these large trees were not single, but may have been formed from several stems branching from the same base. Particularly in Sicily, peasants were in the habit of cutting down the trunks to encourage more shoots and branches, and, therefore, more nuts, and this sometimes resulted in branches developing into trunks very close together, and when several trunks fused together an enormous compound trunk could be formed. This is the likely explanation of the enormous thickness of some ancient trees dated as far back as Roman times in Britain and elsewhere. In other words, what appears to be a giant tree really is a group of trunks that have grown together.

Castanea sativa **("chestnut of the 100 horses")**

Settlers learned to avoid using American chestnut as firewood in the home, because of an annoying crackling sound made while the wood was being burned. Air spaces in the wood that became superheated and snapped were responsible for the sounds. Nevertheless, because it burned slowly and completely without producing much smoke that could attract the revenuers, American chestnut was the favourite fuel wood at moonshine stills in the Appalachians.

The prominence of chestnut in the Great Smoky Mountains of Tennessee is reflected by such geographical names as Chestnut Cove, Chestnut Branch, Chestnut Bald, Chestnut Ridge, Chestnut Flats, and Chestnut Top.

Charlatan "tree surgeons" took advantage of people during the early days of the blight by offering to cure their trees by injecting coloured solutions into the trees or pouring these over the soil.

A chestnut horse (or just a chestnut) is a reddish-brown horse. Chestnut also means "the callosity on the inner side of the leg of a horse," so the answer to the trick question "How many chestnuts does a chestnut (horse) have" is four.

> Under a spreading chestnut-tree
> The village smithy stands;
> The smith, a mighty man is he,
> With large and sinewy hands;
> And the muscles of his brawny arms
> Are strong as iron bands.

American poet Henry Wadsworth Longfellow (1809-1882) wrote this poem in 1839 about a tree that stood at the corner of Brattle and Story Streets in Cambridge, Massachusetts. The tree was chopped down in 1876 in order to widen Brattle Street. A chair made from the wood was given to the poet on his 72nd birthday. Subsequent analysis of that chair indicated the tree was not the American chestnut that was prevalent at the time, but the European horse chestnut, *Aesculus hippocastanum*.

Acknowledgments: W.J. Cody (review), B. Brookes (artwork).

Book Reviews
Revue des livres

Wetland Ecology. Principles and conservation.
by Paul A. Keddy, 2000.
Cambridge University Press, Cambridge, 628 pages.
ISBN 0521783674 (paperback), 0521780012 (hardback)
Price: $52.95 paperback, $140.00 hardback

This is an ambitious book. In just over 600 pages, Paul Keddy attempts to deal with the vast subject of wetland ecology and conservation, and for the most part, he succeeds. The subject matter is timely, indeed it is vitally important because wetlands are among the most valuable but abused ecosystems on the planet, encompassing a impressive range of habitats, organisms, and geographical locations.

The book is divided into three parts. Part I begins with an overview of wetlands and then discusses their properties in terms of zonation, succession and plant diversity. Part II deals with the factors controlling the properties of wetlands in a number of geographical areas with chapters on hydrology, fertility, disturbance, competition, herbivory and burial. Part III, the path forward, considers wetland restoration, conservation, management and research.

Wetlands are defined in Chapter 1 (page 3) as ecosystems that arise "when inundation by water produces soils dominated by anaerobic processes and forces the biota, particularly rooted plants, to exhibit adaptations to tolerate flooding." Keddy recognizes six basic types: swamp, marsh, bogs, fen, wet meadow and shallow water. Keddy successfully provides some unity and coherence for the study of wetland ecology by focusing upon general principles and drawing upon a range of wetland types and geographical regions to illustrate their common ecological features. He emphasizes the need for carefully-designed experiments to augment descriptive studies and advocates research that measures ecosystem properties and assesses the importance of factors responsible for these properties. For example, when dealing with the factors responsible for wetland zonation, he distinguishes between zonation and succession and emphasizes the competition factor in generating zonation.

Although the topic of conservation recurs throughout the book, the chapters on management are among the most valuable. The author discusses the inseparability of theory and management, acknowledging that, without sound science, there can be no effective management. Keddy's plan for effective management depends upon carefully formulating priorities for action and choosing indicators for these actions. Priorities for action are protection, management and restoration while indicators must be appropriate, have critical limits and monitoring must occur to ensure that management goals are achieved.

The scope of the book is broad and the material is well documented with 50 pages of references. The treatment of the majority of topics is as comprehensive as one can expect in a single volume. Vascular plants are the primary focus and although various animals are included, little attention is paid to other organisms such as bacteria and algae. Epiphytic and other algae deserve some consideration, if only because of their productivity and role in wetlands as food for invertebrates.

According to the author, the book is intended for senior undergraduates, resource managers and others working in wetlands. It could also serve as a basis for a graduate seminar.

Keddy has amassed an enormous amount of material which he presents, for the most part, in a readable style. The most disappointing parts of the book are the illustrations. They are uneven in quality and they vary considerably in type font and layout. Many of them (e.g. Figs 1.11, 2.9, 2.10) present a challenge to the reader because they lack adequate labeling of their axes or have no key to the symbols used.

There are a few typographical errors and mis-spelt names such as Rosenberg, *Salicornia europaea*, *Eleocharis obtusa* and the use of *Phragmites communis* in the text when the original author's called it *Phragmites australis*. The book is a welcome addition to the wetland literature and well worth the price.

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Membership

The Membership Committee wishes to report that the membership process has run quite smoothly this year (at least from my perspective, although I was on sabbatical leave!), and we are thankful once again for the dedicated work of Mel Fisher.

The CBA continues to be a vibrant community of botanists and I offer my annual encouragement to active members to sponsor their students (and to inspire colleagues!) to join the association, to participate and enjoy the fellowship of others.

Hugues Massicotte

Tibetan Medicinal Plants.
by C. Kletter and M. Kriechbaum (Eds.), 2001.
Medpharm Scientific Publishers & CRC Press, Stuttgart, 383 pages.
ISBN 0-8493-0031-2
Price: 269,90 DM / US $175.00.

The Tibetan system of medicine is amongst the most ancient, but also least known in the world. The flora of Tibet – a land notorious for its bleak, harsh climate and wind-swept landscape – has a richness that is little appreciated, except perhaps as the source of numerous rhododendrons, primulas, and the blue poppy. A competent medicinal flora for the region would therefore be ample contribution to fill this void. The editors of this volume, Christina Kletter and Monika Kriechbaum, along with the contributing authors, have produced far more than a competent flora. *Tibetan Medicinal Plants* is a comprehensive – and beautifully produced – treatment of this knowledge and the plants upon which it relies.

The preface, which describes the history of the production of this volume, is as fascinating as the rest of the book. In 1972, the Austrian pharmacist M. Eperjesi donated a collection of 134 Tibetan drugs to the Institute of Pharmacognosy, University of Vienna. He had made the collection as a student visiting the Tibetan Medical and Astrological Institute (Men-Tsee-Khang), established by H.H. the 14th Dalai Lama and the Tibetan government-in-exile at Dharamsala, India. An effort to identify and catalogue the collection led to the realization that very little scientific research on Tibetan medicinal plants had been published. Funding from the Austrian Ministry for Foreign Affairs, Department for Development Cooperation, supported a multi-disciplinary research project undertaken in collaboration between Austrian research institutions and Tibetan doctors in Dharamsala, India, and in Nepal. The result is a document that brings together ancient knowledge and practices with contemporary research.
The book begins with a concise discussion of Tibetan medicine that describes its history, the fundamental principles of diagnosis and treatment, the understood properties of the *material medica*, principles of collecting and storing plants for use as medicines, and traditional methods of processing plant-based medicines. This is followed by a brief description of the habitats of Tibetan medicinal plants that emphasizes the role of human impacts (grazing, deforestation) in creating habitat favourable to some species of medicinal plants, and eliminating habitat favourable to others.

The bulk of the text comprises a set of 60 monographs organized according to the Tibetan classification of plants used in Tibetan medicines. These cover approximately 100 species. Each monograph covers most of the following topics:

- Tibetan plant classification, including synonyms and important characters;
- botanical findings – a review of species associated by other authors with the Tibetan classification;
- plant material – the corresponding species determined by the authors of this volume;
- notes – largely from original field and laboratory work – on the corresponding genera and species, including botanical description, distribution and ecology, taxonomy and variability, conservation, material used to prepare the Tibetan drug, and macroscopic and microscopic characters;
- reviews of available literature on chemistry and pharmacology;
- additional notes on uses in Tibetan medicine; and
- an extensive reference list for each monograph.

I was particularly pleased to see the notes on conservation provided for most of the species covered in the monographs. Although there is little research available to back up the authors' general observations and predictions of vulnerability to over-exploitation and habitat loss, their efforts will help to identify priorities for further work on conservation and sustainable use.

A set of 77 colour plates includes figures associated with each monograph – photographs of herbarium specimens and of the plants in their natural environment, as well as photographs of key macroscopic and microscopic characters of the various species associated with each Tibetan plant.

The volume finishes with glossaries of botanical terms, food terms (since much of Tibetan medicine is preventative, good diet is considered good medicine), Tibetan medical terms, a list of plant species included in the monographs, an index of Tibetan terms, and a general index. The end papers of this hardcover edition have been printed with a map of the region indicating important collecting sites for Tibetan medicinal plants.

In undertaking this project and producing this book, the editors and authors hoped to contribute to the existing knowledge of Tibetan medicinal plants and the preservation of traditional Tibetan medicine. They have done a fine job of meeting this goal, and have, in the process, created a superb and concise medicinal flora and ethnobotany.

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