



Native Plant to Know

Butternut

(*Juglans cinerea*)

by Keri Pidgen

The butternut tree or white walnut (*Juglans cinerea*) was listed as endangered in Canada in 2003 by COSEWIC (Committee on the Status of Endangered Wildlife in Canada). This means that the extinction or extirpation (extinction in a given geographic area) of this species is considered imminent.

Butternut is a mid-sized tree, rarely exceeding heights of 30 metres (100 feet), with a relatively short lifespan of up to 75 years. This eastern tree species grows rapidly in its preferred habitats: well-drained slopes and riparian areas. Butternut can also be found as a component of hardwood forests, fencerows and in rocky areas (particularly of limestone origin).

Butternut is a hard mast tree meaning that it produces edible nuts, in this case a quantity of sweet, nutritious, oil-rich nuts every two to three years. The nuts, which are high in omega-3 fatty acids, are prized by humans, squirrels and chipmunks, nuthatches, chickadees and other birds.

The soft coarse-grained wood works, stains, and finishes well. This wood is highly prized for carving. It is used less often for cabinetwork and furniture. The husk also provides a tan-coloured dye that was used in the American Civil War for dyeing Confederate uniforms.

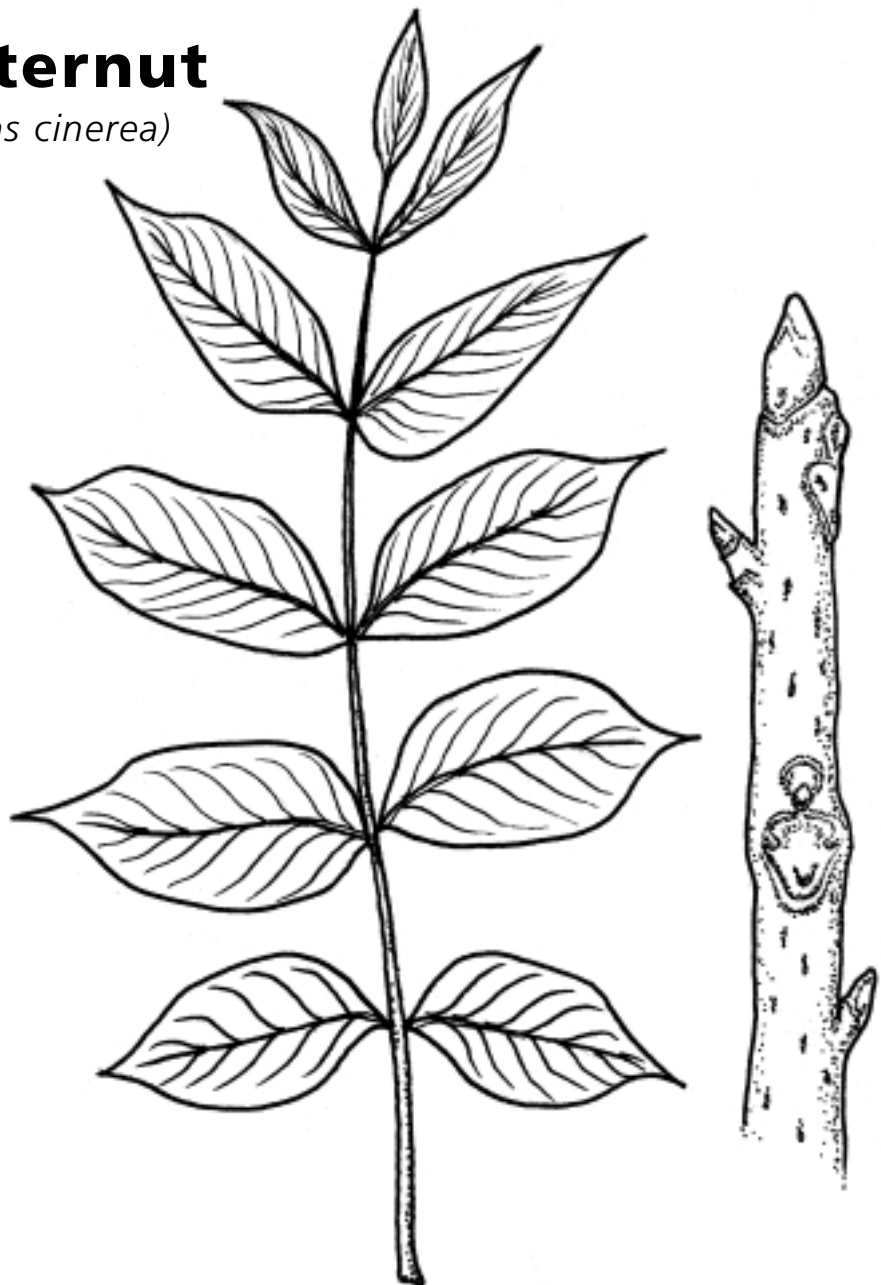


ILLUSTRATION BY BRIGITTE GRANTON

The *Blazing Star* is . . .

The *Blazing Star* is published quarterly (April, August, November, February) by the North American Native Plant Society (NANPS). Contact editor@nanps.org for editorial deadlines and for advertising rates. The views expressed herein are those of the authors and not necessarily those of NANPS.

The North American Native Plant Society is dedicated to the study, conservation, cultivation and restoration of North America's native flora.

Spring 2005
Volume 6, Issue 2

Editor: Irene Fedun
Production: Bea Paterson

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North American Native Plant Society, formerly Canadian Wildflower Society, is a registered charitable society, no. 130720824. Donations to the society are tax-creditable in Canada.

NANPS Membership: CAN\$15/YEAR WITHIN CANADA, US\$15 YEAR OUTSIDE CANADA

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NANPS Native Plant Sale

Saturday May 14, 2005, 10 a.m. - 4 p.m.
Parc Downsview Park
Carl Hall Road, Toronto, ON

Did you know that NANPS members can **advance-order – up to April 30th**? Visit www.nanps.org for a list of available species, place your order on-line and mail in a cheque. Your selection will be boxed and waiting for you on the day of the sale (Saturday, May 14th). You should still plan to arrive early and browse the aisles for species that arrived unexpectedly or in quantities too limited to offer ahead of time.

Please consider donating your excess native plants to the sale. Note: native species

only, please. You can bring them by the evening before or early on the sale day. Please make sure your pots are accurately labeled with the species/common name. And please let us know that they're coming by leaving a voicemail message at 416-631-4438 or send an e-mail to plantsale@nanps.org. Thank you!

If you're able to volunteer at the sale or during setup the evening before, please send a note to plantsale@nanps.org or leave a message on NANPS voicemail: 416-631-4438. **Please remember to confirm your attendance as a volunteer.**

Crieff Bog Tour

Members Only

Saturday, July 9, 2005
NANPS, in conjunction with the Waterloo/Wellington Wildflower Society, invites you to join us on a trip to Crieff bog on Saturday, July 9th. If you've been on our other trips you will find this a new and different habitat to explore. This guided tour to a cedar bog features many fascinating plants such as star flower, pitcher plant, Labrador tea, huckleberry, rose-twisted stalk, cranberry, and 13

rare orchid species. We will also visit the nearby spring-fed sedge meadow and quarry. As an added bonus we may spot a number of rare birds that have been seen in the area!

This trip is exclusively for NANPS and WWWS members. **Seating will be limited.**

Tickets are on sale now. Write excursions@nanps.org to get ticket information (please put **Crieff Bog Tour** in the subject line) and watch our website www.nanps.org for agenda details. Voicemail: 416-631-4438

New Board Member

NANPS welcomes Vijay Chander to our board of directors. Vijay has a degree in Forestry and a work history involving plantings to encourage the Karner Blue Butterfly at the

Metro Toronto Zoo. Vijay is young and energetic, and has ideas about revamping NANPS website and fundraising strategies. He is very welcome indeed!

Booth Volunteers Needed

NANPS members who live north of Highway #7 are needed to help staff a booth at the Newmarket Windfall Ecology Festival 2005 on

June 11th and 12th. It's a free outdoor event at Fairy Lake Park. Please contact Darcie McKelvey at treasurer@nanps.org.

A Letter from your President

As I write this I have been home less than 24 hours after a two-week trip with my spouse through Arizona and Nevada. We visited the Grand Canyon and travelled across a big chunk of Arizona. What was most interesting from NANPS perspective was the native vegetation that prevailed - outside all the towns and cities - in the untouched, uncultivated, uninhabited landscapes we travelled across. Most of Arizona is empty of significant human settlement, uninhabitable. Nature prevails. The composition of nature depends on rainfall, elevation, geology and botanical history. Much of Arizona is near desert or desert, or small and medium moun-

tains and volcanoes, and very high plateaus. Trees are not common, and members of the cactus family are, of course, present, but not dominant.

Carnegiea gigantea, the giant saguaro cactus, up to 12 metres (40 feet) tall, is featured in movies and travel books. To see them in their native habitat is a wonderful experience. And they are native plants - though not in my own northern neighbourhood. But it does snow on them a few times in a century!

Next time you go to Las Vegas, rent a car and take off - any way will do - and see a wonderful landscape of native plants.

Grif Cunningham

Doubles in the Wild

by Anna Leggatt

Where would our gardens be without double flowers? Imagine a garden without lush *Clematis*, blousy *Paeonia*, rainbow-coloured *Dahlia* and purple, pink, blue and white fall-blooming *Aster*. Some of you may shudder, preferring the simplicity and grace of single blooms. After all, these are as Nature intended and what we find in the wild, aren't they?

Double flowers are rare in the wild. However, they do occur and many of our wildflowers have developed extra petals, producing showy plants. These appear to be spontaneous mutations. Some, or all, of the stamens have become petaloid meaning they have a structure that looks like petals. In many double flowers, the stamens have developed

into petals. Often the carpels (the female parts of the flower consisting of stigma, style and ovary) turn into petals as well.

Sanguinaria canadensis forma multiplex, the double bloodroot, is one of my favourite flowers. The almost grey-white petals appear from inside a furled crenulated leaf. The flowers last for a week or more, unlike the delicate single that is only there for a couple of days. The double lasts because it has not been pollinated. Pollination is impossible because there are no carpels. In a single plant the petals drop after pollination. Their work is done - they have attracted an insect so there is no need to waste resources maintaining petals.

The original *S. canadensis* forma multiplex was found in the wild near Dayton, Ohio in 1916. Most of the bloodroots in cultivation are

direct clonal descendants of a plant sent to Montreal Botanic Garden. (See *Cuttings from a Rock Garden* by H. Lincoln and Laura Louise Foster, Atlantic Monthly Press, 1990.) Others have appeared and are listed in Europe. There are also pink forms, both double and single, in North America.

The plants often die inexplicably every few years. Perhaps the soil is exhausted. It's possible that this happens in the wild too and we do not notice since there are so many plants. Dividing and replanting prevents it from happening in the garden.

I keep looking for *Trillium grandiflorum* 'Flore Pleno' as I walk in the spring woods. I once found an unripe berry with six fading

tepals, instead of three. However, I suspect they were infected with mycoplasma organisms as I had seen green streaked flowers in that area. (Mycoplasma organisms are microscopic in size; they are the smallest known free-living life forms. They can cause bizarre flower patterns with green streaks and distortion in trilliums. They are spread by leafhoppers. Affected plants should be removed and leafhoppers controlled with a non-toxic insecticide.)

I have heard of several types of this trillium just north of Stouffville, Ontario, and I have seen pictures of some in a woodlot near Owen Sound. There are at least 12 separate plants there. Doubles found in the wild fall into two main types: one looks very like a miniature peony, the other still shows the three-fold arrangement of petals with rows one on top of the other, becoming progressively smaller. I once had a plant of the latter: it was never strong and it dwindled, eventually dying.

Double trilliums are reported frequently in the wild, while double bloodroots are very, very rare. The reverse is true in cultivation due to the ease of bloodroot propagation.

Anemonella thalictroides, the rue anemone, is a delicate small plant, often overlooked in our woodlands. It can be white to dirty white through to pink. Apparently some pinks are quite bright. The single pink plant in my garden is a pale shade. Several doubles, either with different colour or different petal sizes, have been found in the wild. Again, as there are no stamens, these flowers persist for a long time. However, sometimes an occasional petal or carpel persists so seeds are possible.

'Betty Blake' is a delicate green rue anemone, a little smaller than some of the normal wild forms. I visited Betty (for whom the mutation is named) at her home in Michigan several years ago. She had found several different forms in her woods. 'Betty Blake' was the best. There were semi-doubles as well. These are fertile and may have multi-petaloid offspring. Several double pink forms have been discovered. 'Oscar Schoaff' ('Schoaff's Double Pink') is one of the best. It was originally found in Minnesota. Oscar Schoaff had a pink border of these plants, all of which were offspring of the original collection and are more vigorous than the common form. They make an excellent garden plant as individual blooms will last several weeks.

Continued on page 4



Double bloodroot

PHOTOGRAPH COURTESY ANNA LEGGATT

Liverworts

by Joan Crowe

Liverworts are the poor relations of mosses. Their common name arose because the lobed thallus* in a few larger species was considered to mimic the shape of the human liver, and "wort" is an old English word for plant. In mediaeval times a belief was formulated known as the Doctrine of Signatures. For some centuries it was believed that a plant reminiscent of the shape of a body organ would contain a cure for diseases associated with it. Thus taking an extract of liverwort would cure your hepatitis. It probably worked as well as most things! However, thalloid liverworts only make up about one-tenth of the liverwort flora; the remainder are "leafy", more moss-like and generally much smaller.

Liverworts (*Hepaticae*) are Bryophytes along with the mosses, as they have the same life cycle and a similar means of reproduction. However, they differ in a number of ways. The leafy liverworts tend to be flatter, with two ranks of leaves. If there is a third rank it is hidden beneath the stem and usually those underleaves are much smaller. All liverworts are prostrate, like pleurocarpous mosses, but they are generally much more translucent than mosses, because the cells are bigger and isodiametric so more light passes through

them. The leaves never have midribs. The capsules are ephemeral and much simpler than moss capsules, opening into four valves and discharging their spores quickly.

The only mosses that might be mistaken for liverworts are the *Fissidens*. These are prostrate and do have two-ranked leaves but, even under low magnification, it can be seen that the leaves have midribs and the cells are narrow and dense. Some of the *Mniums* have large cells that give them the translucent look of liverworts but the leaves have midribs and the plants are larger and more erect.

Generally speaking, liverworts are not so resistant to desiccation as mosses, but there are some exceptions. The tiny, dark *Frullanias* grow in patches on tree trunks, often at eye level, where there is a very intermittent supply of water, but they have developed lobes on the underside of the leaves that are like little jugs that catch and retain minute quantities of water. Lower down the trunk, bright green patches of *Radula complanata* are common, also with a simpler water-catching leaf underlobe.

Liverwort leaves may be two, three or four-lobed. Occasionally the leaves may have minute teeth, or more commonly, they may be fringed. In the latter category, the fuzziest one of all is the whitish-green *Trichocolea tomentella*. It may be found growing with *Sphagnum* in swampy cedar forests. Another extremely common fringed species is *Ptilidium pulcherrimum* found on tree trunks and rotting logs. Less common is its reddish, more robust cousin *Ptilidium ciliare*.

Of the bilobed species, probably the pale whitish-green *Lophocolea heterophylla* is the most ubiquitous, especially on rotting logs. In southern Ontario, the robust three-lobed species *Bazzania trilobata* makes large patches on the forest floor. It always reminds me of a mass of brownish-green caterpillars because, when dry, the leaves and shoots curl under. When moistened and viewed with a hand lens, it can be seen that the leaves have three teeth and the underleaves are quite large.

In the north, moist decorticated rotting logs are a good place to find a variety of liverworts. More commonly, in southern Ontario you will come across such a log that appears to be covered in red velvet. This is *Nowellia curvifolia* with a strangely cupped bilobed leaf.

The only species of liverwort to which most people are exposed in high school or first-year

* Thallus – a life-like structure without distinct roots or stems

Continued from page 3

I have found several *Hepatica triloba* plants with multiple petals as well as stamens and carpels. These were pleasant but not spectacular.

Caltha palustris (marsh marigold) has double forms as does *Aster novae-angliae* (New England aster). I have seen asters with extra petals in meadows. However, many doubles in cultivation are, I believe, from careful selection in the garden.



PHOTOGRAPH COURTESY ANNA LEGGATT

Trillium grandiflorum (double)

I encourage you to keep your eyes open for unusual forms when looking at flowers in the wild. Rescue any that are threatened by development, making sure you obtain all the proper approvals first. Never dig plants from the wild unless they are under threat. (When collecting seeds of wild plants, take no more than 10%.) That said, the *Sanguinaria canadensis* forma *multiplex* grew far better in a garden and would probably have been lost if not dug from the wild.

Anna Leggatt writes and lectures on horticulture, conservation and natural history. She has a B.Sc. in Botany. Anna is a Nature Interpreter at the Kortright Centre for Conservation in Woodbridge, Ontario.



ILLUSTRATION BY JOAN CROWE

Leafy liverwort

university biology is *Marchantia polymorpha*. It is actually not very common, although it crops up occasionally in damp spots in gardens and often in recently burned-over forest areas. This is a comparatively large thallose species (7-15 millimetres wide, 4-6 centimetres long) with broad leaf-like lobes.

Of the thallose species, the cone-headed liverwort (*Conocephalum conicum*) is by far the most common. It may be found on moist rocks or soils that are basic, never on acid substrates. It has lobes more than one centimetre (about a half inch) wide and forms large patches. It can be seen with a hand lens that the surface is covered with distinct pores.

What they do for the plant is not clear. They may slow dehydration and they may act as a deterrent to insects. You will often find tiny mites and beetles sheltering in liverworts but you never see one chewed by insects or snails, unlike higher plants.

Although liverworts have the same power of rehydration as mosses, in most cases they are less resistant to prolonged dehydration. However, a few of the thallose liverworts such as *Mannia* species, are adapted to very arid conditions and they may be found growing in crevices in the alvars on the Bruce Peninsula or on rocky mesas in Thunder Bay, Ontario. They are even found in the Australian desert!

tify without a microscope (with magnification at least up to x40). Like mosses, our species are mostly circumpolar or circumboreal, so it is possible to use European books for identification purposes.

Both mosses and liverworts have a lot in common biochemically with the green algae and undoubtedly share a common ancestry. The bryophytes must have been among the first plants to move out of the water and establish themselves on land, but how or when remains a mystery. Unlike ferns, they do not fossilize well. Although there are traces at least as far back as the Devonian era, they undoubtedly evolved long before that. Like mosses, they do their bit to retain atmospheric moisture, slow erosion, store carbon dioxide and re-oxygenate the atmosphere and should be valued accordingly.

Joan Crowe is co-author with Linda M. Ley of The Liverworts and Hornworts of Ontario, available from the Claude Garton Herbarium at Lakehead University in Thunder Bay, Ontario.



Cone-headed liverwort growing with mosses

Marchantia also has this feature, but the pores are not so prominent.

The cone-headed liverwort is generally yellowish-green but in the dolostone-dominated areas of the Niagara Peninsula it may be bluish-green. The sporangia (the receptacles in which spores are formed) are borne in a cone-shaped structure like a small mushroom, most likely to be found in early spring. The most interesting feature of *Conocephalum* is that it has an attractive scent when you crush a piece. That will always distinguish it from *Marchantia*.

Many liverworts produce aromatic oils and tiny clumps of oil droplets can be seen in the cells of fresh specimens under the microscope.

At the other end of the scale most liverworts tend not to be found in very wet places, although the tiny thallose *Riccias* prefer moist habitats such as lake edges and *Ricciocarpous natans*, also thallose, is actually aquatic.

Liverworts, like mosses, have few common names and they are hard to iden-

Magnolias at Plant Sale

This year NANPS plant sale will have a few cucumber magnolia (*Magnolia acuminata*) trees grown from seed taken from NANPS own Shining Tree Woods preserve. Although Toronto is a bit north of its natural range, we couldn't resist offering a few of these magnificent seedlings. Most will be planted back in the preserve to help expand the number of these rare trees in the wild. You can help by choosing to donate \$20 to plant a Cucumber Magnolia in Shining Tree Woods. Donors will receive a Canadian tax donation receipt, a pewter NANPS logo lapel pin, and they will be thanked (unless anonymity is requested) in a future issue of the *Blazing Star*.



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A Tale of Three Orchids

by Hal Horwitz

Orchids are one of the largest plant families. The most recent estimates vary from 18,000 to 20,000 species worldwide. Although popularly thought of as tropical, they are found growing on every continent except Antarctica. The *Flora of North America* (2002) recognizes 208 species on this continent.

This is the tale of three Virginia orchids – three species recently found in our state for the first time. Virginia now boasts 58 orchid species among its flora. The manner in which each of these "new" orchids was found is instructive for us wildflower enthusiasts as we educate ourselves and, if we're lucky, make our modest contribution to the complex field of botany.

Some years ago, I was sitting in a classroom at the College of William and Mary listening to a Master's student report on his study of the flora of a section of Rappahannock River drainage in Lancaster County. The county, which is in an area of Virginia known as the Northern Neck, is on the coastal plain and borders both the Rappahannock River and Chesapeake Bay. The student's thesis had taken two years and involved choosing a well-defined area and going back season after season, recording every species found. Most of the species noted were routine, known to grow in the study area. However, I nearly came out of my seat when slides of *Cypripedium kentuckiense* flashed on the screen. This largest and most wonderful of the lady's slippers in North America had never been found east of Kentucky before this discovery. An incredible colony of more than 400 plants had been located over 500 miles (800 kilometres) from its closest neighbour. It is the only known population of the southern lady's slipper (a.k.a. ivory lady's slipper) on the coastal plain. The plant grows up to 38 inches (97 centimetres) and the flower lip can measure 2 1/2 inches (6.5 centimetres). The lip colour varies from nearly white to ivory to pale lemon yellow as contrasted with the golden yellow of similar species. The lip opening is formed by margins that neither fold inward nor outward. The lip is not slipper-shaped either, but more like a rounded oval. *Cypripedium kentuckiense* became the 56th orchid for the state of Virginia.

A year later while I was visiting the VA Division of Natural Heritage, the state agency responsible for maintaining an inventory of

rare native plants, animals and natural communities, their chief botanist showed me some satellite images of Virginia. They were colour infrared photographs taken from space in winter, when the trees are bare; this specialized view gave scientists new ways to evaluate land cover. Infrared images show soil as red, ponds as black and exposed rock as blue. Since the underlying rock formations in this part of the state are limestone, the blue splotches among the predominant red on the

private land and it took some time to gain the approval of landowners to search their property. Another limiting factor was the location; the sites were all about 400 miles (over 600 kilometres) from the Natural Heritage offices and not close to any large town. Nearly a year later, after multiple visits in different seasons, an orchid new to Virginia, *Spiranthes magnicamporum*, (great plains ladies' tresses), a Midwestern species, was found growing on three of those "splotches on



Cypripedium kentuckiense

map looked promising and begged further investigation. Perhaps these represented limestone barrens and harboured botanical communities unusual to Virginia.

All the promising-looking areas were on

the map." This find was quite a shock, since the nearest known population was over 300 miles (500 kilometres) away.

The infrared images allowed a trained observer to discover limestone barrens

PHOTOGRAPH COURTESY HAL HORWITZ

eventually found to contain multiple elements of Midwestern prairie plant life. High-tech science had located Virginia's 57th native orchid.

Now let me tell you about Stan Bentley, an amateur plant hunter from the western part of Virginia who loves native orchids. He has used up every spare minute of the past quarter century walking the byways and trails of western Virginia and the adjacent state of West Virginia. A few years ago, he ran across a little plant unknown to him in West Virginia, not a mile from the Virginia state line. What he saw was a stand of plants that looked for all the world like young, stout stems of *Corallorhiza maculata* var. *maculata*, (spotted coral-root), an orchid flowering in the mountains of Virginia and West Virginia from mid to late July.

The two observations that eventually led him to examine the plants in much greater detail were: the flowers never seemed to open and the stems were thicker than those of spotted coral-root. It was obvious that this was a species he had neither seen before nor read about. He called Dr. John Freudenstein, the recognized authority of the genus *Corallorhiza*, who visited the site and confirmed the uniqueness of this orchid. According to Dr. Freudenstein, this orchid is similar to a Mexican species of coral-root, but quite unlike anything north of the Mexico-United States border. In December 1999, the plant was officially described in a botanical journal as one new to science, *Corallorhiza bentleyi*.

In the intervening years, Bentley's coral-root has been located in several places in mountainous southwestern Virginia, adjacent to the original West Virginia site. In some locations the flowers never open fully and the lip is dark red, while in others the lip is yellow and open. All discoveries of Bentley's coral-root to date have been in deciduous Appalachian forest on somewhat disturbed sites. Stan Bentley "contributed" orchid species #58 for Virginia.

I find these three stories interesting because of the lessons they teach: there are still lots of botanical discoveries to make if you are persistent, if you use all the tools at your disposal, and if you stay inquisitive. Just because something looks familiar from a distance, does not guarantee that it is. Investigate anyway; it just might be something different. You may have been down that road previously, but you



Corallorhiza bentleyi

might have overlooked a rare plant or perhaps it did not bloom the year you searched. In addition, do not assume that all botanical exploration is complete. There is still much to discover. Imagine the thrill of finding a plant never described before!

When I was first getting involved in photographing wildflowers, one of my early mentors, an elderly man, would literally jump up and exclaim to the searched-for plant, "Wow, you're the most beautiful flower I've ever seen." At the time I thought it a little silly, but as time progressed I came to appreciate his

outbursts. His reaction was a wonderful expression of joy and a blessing that someone could maintain such enthusiasm and freshness of outlook throughout their life.

I invite you to join the hunt, maintain your persistence and enthusiasm. Delights await.

Hal Horwitz began photographing people, places and things -- above and below water -- over 40 years ago. Two decades ago he became fascinated with wildflowers and has photographed little else since. Hal has developed a special interest in the orchids native to North America.

PHOTOGRAPH COURTESY HAL HORWITZ

New & Noted

Farming with the Wild: Enhancing Biodiversity on Farms and Ranches

By Daniel Imhoff

San Francisco: Sierra Club Books, 2003

\$29.95 US, paperback

182 pages

ISBN 1-57805-092-8

As advocates for wilderness protection, we're used to dichotomies: natural areas versus cities, natural areas versus agricultural areas, the wild versus the tame. Such oppositional thinking, though, quickly runs up against some basic realities: we need to live somewhere and we need to eat.

Farming With the Wild ditches the dichotomous paradigm, shifting from opposition to partnership, asking how farming practices can make peace with the land. It is based on the premise that "Our relationship with food was once, and arguably should always remain, one of our deepest connections with the biotic community..." Some of the main questions at the heart of this visionary book are: what is the role of wildness in productive farming and how can farming practices actually help restore interconnected healthy ecosystems?

Based on years of research and travel that took him through 21 states and two countries, author Daniel Imhoff chronicles dozens of inspirational stories of farmers and ranchers who are restoring wild habitats on the lands they cultivate. For example, the reader is introduced to farmers in the Santa Cruz River region who are creating habitat to encourage pollinators, insects that are crucial to fruit production. Many other stories detail the

ecological services of benefit to farmers when farmers view and manage their land as functioning pieces of a natural system. Along with pollination, benefits include biological pest control (through efforts to create habitat for beneficial insects), weed suppression (through the reintroduction of fire, for example), and flood prevention (through the restoration of healthy riparian areas). All of these efforts and more provide payback not only for the farmer, but for the broader ecosystem as well. While the book doesn't put a pricetag on such benefits, its economic message is clear: the current, dominant agricultural model of production is not sustainable (not economically, not environmentally), and the farmers profiled here are offering a sustainable alternative that improves the land's capacity to renew itself (an excellent definition of ecosystem health).

While agricultural lands are traditionally thought of as places where the wild is tamed, this book makes a resoundingly sensible and hopeful argument that farms can be places where the wild actually enhances harvest, in the broadest possible sense of that word—not just as crop but as reward.

Review by Lorraine Johnson

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The Herbaceous Layer in Forests of Eastern North America

Edited by Frank S. Gilliam and Mark R. Roberts

New York: Oxford University Press, 2003

408 pages

ISBN 0-19-514088-5

In the world of forests, herbaceous plants are often neglected in favour of the impressive, predominating trees. To remedy this situation, Frank Gilliam and Mark Roberts have provided a compilation of the current knowledge of the complex and diverse herbaceous plant layer in eastern North American forests. This work will be useful to anyone interested in forest ecology, but is primarily aimed at the scientific community.

Although many scientists study herbaceous plants, as the numerous contributors demonstrate, this book is one of the few to integrate multiple facets in forest ecology. The varying perspectives provided by the authors gives a clear understanding of the dynamic nature of herbs, while exploring related subjects such as nutrient cycling, invasive species and conservation. Chapters are enveloped by four broad themes: the environment of the herb layer, population dynamics, community dynamics across space and time, and the role of disturbance. The book includes countless research articles (over 1,000 references), but the reader is not overwhelmed by details. Rather, a sense of the "big picture" predominates, leading, arguably, to the best part of the book: the last chapter. Here, we not only have a synthesis of the main ideas from each theme, but there is also a useful section outlining topics that require further research. These include the contribution of herbs to carbon production, the effects of herbs on tree composition and how non-native plants invade natural ecosystems.

Review by Barbara V. Ramovs

Calendar of Events

May 14, 2005

NORTH AMERICAN NATIVE PLANT SOCIETY ANNUAL WILDFLOWER SALE

Parc Downsview Park

Carl Hall Road, Toronto, ON

For more information e-mail

nanps@nanps.org or leave a voicemail message at (416) 631-4438.

June 5-10, 2005

26TH ANNUAL INTERNATIONAL WETLANDS MEETING

Coastal Plain Wetlands: Ecological, Landscape and Regulatory Transformations

Charleston, South Carolina

Hosted by the Society of Wetland Scientists:

<http://www.sws.org/charleston2005>.

June 16-18, 2005

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University of Pittsburgh

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Submit proposals to:

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June 17-19, 2005

MONTANA NATIVE PLANT SOCIETY ANNUAL MEETING: BADLANDS II

Antelope, MT

Visit www.umt.edu/mnps/ for details.

June 17-19, 2005

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July 9-12, 2005

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Native plants: Not necessarily environmentally and economically beneficial?

by Pat Woodward

"The use of native plants not only protects our natural heritage and provides wildlife habitat, but can also reduce fertilizer, pesticide, and irrigation demands and their associated costs *because native plants are suited to the local environment and climate.*"

Right?

Wrong!

Evolutionary biologist Stephen Jay Gould took particular exception to the assumptions underlying this quotation (which he attributed to Bill Clinton) in his last collection of essays, *I Have Landed*. Published in 2002, close to the time of his death, this parting shot from Gould once again draws an unsentimental bead on fuzzy thinkers who extend evolutionary theory to justify their own world views and predilections.

So where is the error? Native plants are suited to their local environment and climate.

Yes, but. Gould precisely defines the limit of evolutionary theory's support for Mr. Clinton, and, by extension, for us members of NPSBC (Native Plant Society of British Columbia) in our enthusiasms. He contests our point of view through two analyses: a functional argument based on adaptation; and a geographic argument based on appropriate place.

Because we can no longer rest secure in the notion that native plants must be "right and best because God made each creature to dwell in its proper place," Gould says, "any claim for preferring native plants must rest upon some construction of evolutionary theory — a difficult proposition to defend (as I shall argue) because evolution has been so widely misconstrued, and, when properly understood, so difficult to utilize for the defense of intrinsic native superiority."

NATIVE PLANTS NOT "OPTIMALLY" ADAPTED

Looking first at the adaptation of plants to be "best fitted" for their ecological niches, and even "truly beautiful," Gould points out that these characteristics, while they are appreciated by horticulturists, are accidental benefits. Gould's reasoning is based on "a clear and careful distinction between the historical origin and [the] current utility of organic features" of plants. The actual series of events and conditions that took place as local environments changed is all that has directed evolutionary natural selection. In summary, Gould says, "The 'struggle for existence' can

only yield local appropriateness. Moreover, and even more important for debates about superiority of native plants, natural selection is only a 'better than' principle, not an optimizing device."

We can all think of a few instances of native plants that grow where most others cannot survive and thus are *close to optimally* fitted for specific difficult environments — arctic willows, desert cacti, water-bound tule — but, far more frequent in our experience are those species that have evolved to *adequately* adapt to common environments — white spruce, dandelions, burr-reeds. For them, many habitations are acceptable and in many areas they jostle with thousands of adequately adapted others; all are fitted, and the evolutionary question of "best fitted" seems beside the point. You may have noted, as does Gould, that among these environmentally tolerant plants are those often considered to be weeds. Getting back to Mr. Clinton, we have to admit that a huge population of non-native plants may be equally suited to a particular local environment.

NATIVE PLANTS NOT NECESSARILY GEOGRAPHICALLY APPROPRIATE

The second argument advanced by Gould dispatches the unjustifiable assumption that native plants are maximally appropriate for their geographic location. He points out that "Organisms do not necessarily, or even generally, inhabit the geographic area best suited to their attributes. Since organisms (and their areas of habitation) originate as products of history laced with chaos, contingency, and genuine randomness, current patterns [of plant distribution] (although obviously workable) will rarely express anything close to an optimum, or even 'best possible on this earth now'..." After describing Darwin's research into "the mechanisms whereby organisms achieve fortuitous transport as species spread to regions beyond their initial point of origin," Gould goes on, "Natives, in short, are the species that happened to find their way (or evolve in situ), not the best conceivable

species for a spot." A corollary observation is sharply relevant to ecologists: "the proof that current incumbency as 'native' does not imply superiority against potential competitors exists in abundance among hundreds of imported interlopers that have displaced natives throughout the world."

To wrap it up, Gould states, "In summary, of my entire argument from evolutionary theory, 'native' plants cannot be deemed biologically best in any justifiable way."

Well, lots of luck to you, Mr. Clinton, and to all of us who care about restoration, regeneration and the like.

REBUTTALS, ANYONE?

Before you sharpen your points, you should know that Gould does allow some merit to intrinsic native superiority; if he cannot defend it through evolutionary theory, he hastens to support it on ethical and aesthetic grounds. "I do understand the appeal of the ethical argument that we should leave nature alone and preserve as much as we can of the life that existed and developed before our very recent geological appearance. Like all evolutionary biologists, I treasure nature's bounteous diversity of species." Gould winds a wily argument and you will enjoy following it in this, his last word on native plants.

Pat Woodward is co-owner of Pacific Rim Native Plant Nursery in Chilliwack, British Columbia and a member of the British Columbia Native Plant Society. She can be reached at pat@hillkeep.ca. This article was reprinted with permission from Menziesia, the BCNPS newsletter.

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California's Coastal Terrace Prairie

by Mike Wood

California, known for its remarkable diversity of plant and animal life, is equally remarkable for its diversity of distinct and not-so-distinct plant communities. There is a direct correlation between California's biologic diversity and its geologic diversity. The tremendously varied micro-climates, topography, soil types and organisms and their interactions over time have produced a wealth of plant life.

A discussion of California's plant communities and the science (or art) of community classification is well beyond the scope of this article. Suffice it to say, just as taxonomists can be categorized as "lumpers" or "splitters", so too can ecologists when it comes to classifying plant communities. With ecologists, however, the category to which plant communities belong usually has more to do with the scale at which they are working than presumed evolutionary relationships. Many habitat classification schemes have been proposed. The number of distinct habitats, plant communities or plant associations in California described by ecologists ranges from as few as 15 to an unbelievable 2,073.

A dictionary definition of prairie is: an extensive area of flat or rolling grassland; especially, the plain of central North America. In the United States, grasslands currently cover an estimated 310 million acres or 125 million hectares (over 16 percent of the total land area), more than any other single vegetation type. The California prairie, also known as the foothill-valley grassland, covers approximately 5.35 million acres (2.16 million hectares), with another 3.87 million acres (1.56 million hectares) found beneath an oak over-storey, occupying over nine percent of the total land area of the state. Coastal terrace prairie represents a tiny fraction of that total.

Views of the Pacific Ocean aside, coastal terrace prairie would look quite familiar to mid-westerners. This dense, tall grassland community is dominated by both sod- and tussock-forming native perennial grasses. However, coastal terrace prairie is much more patchy in occurrence and variable in species composition, reflecting differences in slope aspect, soil texture, geology and moisture availability. This vegetation community occurs on sandy loam soils of uplifted marine terraces and slopes near the coast. It is restricted to cooler, more mesic sites within the zone

of fog incursion. The rich loamy soils of these marine terraces are ideal for the cultivation of Brussels sprouts.

Unlike so many of California's plant communities, which are subject to a prolonged summer drought period (as many as eight consecutive rain-free months), the coastal habitats receive substantial summer moisture in the form of fog drip. This is especially true from Point Conception in Santa Barbara County northward to the Oregon border. Those of you who have visited San Francisco in June or July expecting warm sunny days are

many of the native species that comprise our interior grasslands, annuals are a less important part of the community structure. Coastal terrace prairie is distributed from Santa Cruz County to Oregon and its range closely matches that of northern coastal scrub, with which it is generally associated.

The dominant species vary from north to south and with distance from the ocean. Coastal terrace prairie is also commonly referred to as *Festuca-Danthonia* grassland, for the two most common genera. On the San Francisco Peninsula and Marin Headlands



PHOTOGRAPH COURTESY MIKE WOOD

California coast in bloom

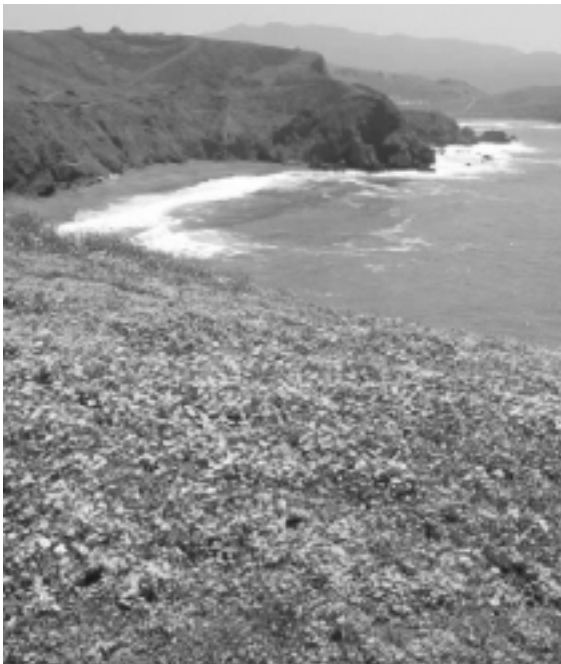
well aware of the effects of that famous fog that creeps in on little cat feet. We just call it our natural air conditioning. Mark Twain wrote, "the coldest winter I ever spent was summer in San Francisco". It is exactly this unique climate that sustains the prairie grasslands of the central and northern California coast.

Although coastal terrace prairie includes

across the Golden Gate, characteristic native grass species include California oatgrass (*Danthonia californica*), red fescue (*Festuca rubra*), Idaho fescue (*Festuca idahoensis*), California brome (*Bromus carinatus*), coastal tufted hairgrass (*Deschampsia cespitosa* ssp. *holciformis*), blue wildrye (*Elymus glaucus* var. *glaucus* and *E. g. var. jepsonii*), big squirreltail (*Elymus multisetus*), Torrey melic

(*Melica torreyana*), purple needlegrass (*Nassella pulchra*), foothill needlegrass (*Nassella lepida*), and one-sided bluegrass (*Poa secunda*). Pacific reedgrass (*Calamagrostis nutkaensis*), a magnificent native that typically occurs in habitats that are seasonally or permanently saturated with shallow freshwater, is also a component of this ecosystem. It's valuable for controlling soil erosion and is capable of persisting even with the encroachment of eucalyptus and invasive grasses.

Wildflowers are also present in the coastal terrace prairie and frequently occur in profusion. Characteristic species include common



Coastal terrace prairie

California aster (*Symphyotrichum chilense*), seaside daisy (*Erigeron glaucus*), goldfields (*Lasthenia californica*), the daisy-like annual coast layia (*Layia platyglossa* ssp. *platyglossa*), lupines (*Lupinus* spp.), California poppy (*Eschscholzia californica*), farewell-to-spring (*Clarkia rubicunda*), California buttercup (*Ranunculus californicus*), beach strawberry (*Fragaria chiloensis*), Wright's Indian paintbrush (*Castilleja wightii*), California blue-eyed grass (*Sisyrinchium bellum*), the deep purple-flowered harvest brodiaea (*Brodiaea elegans* ssp. *elegans*), and blue dicks (*Dichelostemma capitatum*), among many others.

Like all of California's native grasslands, coastal terrace prairie has been subjected to a long history of human-caused disturbance. Intensive livestock grazing, changes in fire

regime, erosion, land development, and invasive exotic species all have resulted in the loss of native grassland habitats throughout the state. Along the coast, the expansion of planted groves of eucalyptus, Monterey pine (*Pinus radiata*) and Monterey cypress (*Cupressus macrocarpa*), and the spread of pampas grass (*Cortaderia selloana*) and Cape ivy (*Delairia odorata*) have overrun many areas of coastal terrace prairie and coastal scrub habitat.

Although native to the Monterey Peninsula, about 80 miles (130 kilometres) to the south, Monterey pine and cypress are not indigenous to the San Francisco Peninsula. The first European settlers in San Francisco found the treeless, wind-swept coastal hills quite unbearable. To "remedy" the situation, in the middle of the 19th Century they began a program of tree planting of unprecedented proportions.

The very fog drip that sustains the prairie contributes to its demise as the non-indigenous trees become established. They so efficiently sweep the moisture from the marine air that they create favourable conditions for the invasive understory species, effectively eliminating the native flora.

Perhaps surprisingly, it's not just the exotic interlopers that threaten coastal terrace prairie. With the removal of livestock grazing and fire suppression, native shrub species such as coyote brush (*Baccharis pilularis*), poison oak (*Toxicodendron diversilobum*), toyon (*Heteromeles arbutifolia*) and California blackberry (*Rubus*

ursinu) also invade native coastal grasslands, and their spread represents almost as great a threat as that posed by invasive non-natives.

Dramatic, yet soothing, the coastal grasslands are a sheer joy to drive past and even more enjoyable to explore on foot. Spring or winter, you'd be hard pressed to find a more spectacular place to botanize than California's Pacific coast.

Mike Wood is an ecological consultant based in Walnut

Creek, California. His work involves endangered species, wetlands and habitat restoration. He is co-chair of the Rare Plant Committee of the Yerba Buena Chapter of the California Native Plant Society.

Members' Comments

I noticed in the winter 2005 issue of the *Blazing Star* that Jim French's comments on wood poppy included the sentence: "I find it interesting that this plant should be so uncommon in the wild since it reseeds itself quite reasonably in my woodland gardens." Well, it does so in my gardens as well, but I have noticed germination only seems to occur when there is deep and constant snow cover. Actually, last spring (2004) saw a bumper crop of new seedlings, which I have distributed to several friends nearby. Other years, I find very few, if any seedlings. So, perhaps the lack of adequate snow cover in several recent years is the culprit. Especially since constant snow cover is more likely to occur in a mature forest, itself an increasingly rare sight in Carolinian Canada.

- Matt Hurst, Burlington, Ontario

Native Plant Book Updated

Lorraine Johnson's much-loved and often-referenced book *100 Easy-to-Grow Native Plants for Canadian Gardens* has been updated. Most of the original plant entries remain the same as does the propagation section, but the nursery listings have been updated. Any native plant lover – gardener or not – who does not possess a copy of this book should seriously consider a trip to the local bookstore.

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Continued from page 1

A fungal disease known as butternut canker (*Sirococcus clavigignenti-juglandacearum*) is reported to have already eliminated butternut from North and South Carolina. Although this tree species is still relatively common throughout much of its range in eastern North America, it has been estimated that up to 90 percent of all individuals have contracted the disease.

Butternut canker was first reported in 1967 in Wisconsin, yet was not described until the year 1979. The origin of this fungus is as yet unknown, however there have been a few theories put forth to explain its sudden appearance.

The most commonly thought and most accepted possibility is that the fungus was introduced from Asia. There are a number of facts that support this theory, such as the low genetic diversity of the species of fungus, the lack of resistant butternut, and the sudden appearance of the canker in the latter half of the 20th century. Also, the closely related Asian walnut (*Juglans ailantifolia*) is susceptible to this pathogen. However, it is capable of survival in spite of infection.

Another theory is that this disease is in fact indigenous to North America and has recently experienced a population expansion, possibly due to differences in climate or any number of environmental and biological factors. A third possibility is the recent evolution of this species of fungus.

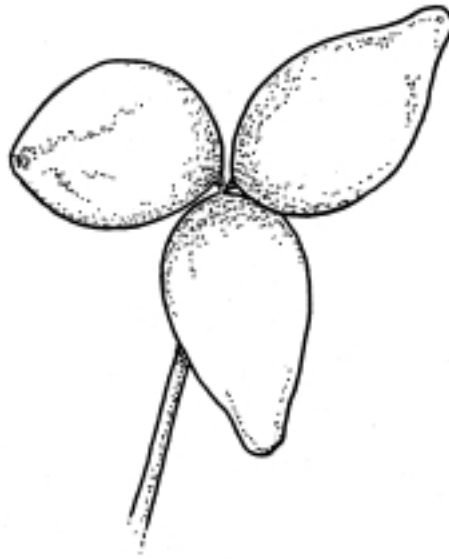
Symptoms of the disease include dying branches and stems. Initially, cankers develop on branches in the lower crown. Spores developing on these dying branches are spread by rainwater to tree stems. The resulting stem cankers typically develop 1-3 years after the initially infected branches die. Trees are killed by the formation of these cankers on the main stem, which impede nutrient flow. Large trees can withstand a number of cankers, although eventually cankers will form around the entire stem and effectively girdle the tree. Immature trees are much more susceptible and often perish in one season.

Although rainwater can move the disease around an individual tree, there are other means by which the spores are transferred from one individual to another. The nut husks of butternut can be infected with butternut canker and there is the possibility for seedling infection upon germination. There are also a number of insect vectors that can transmit the disease amongst trees, such as the butternut curculio and other species that have been found to carry the sticky spores of butternut

canker and frequent the trees.

Upon hearing about the butternut's plight, one might ask what can be done?

First...protect them. If you know the location of a butternut, try to preserve it. Prune off



branches that have the butternut canker. Each individual is important to the continued existence of this species, for its production of nuts and its genetic diversity.

Second...spread the word. Tell people about the butternut. Most people have never heard of this beautiful tree. The more people who know, the greater the chances of protection for this species

Third...grow them. The nuts can be collected in the early fall, although one must be prompt, as squirrels can strip a tree rather quickly. Before winter storage or planting, the husks should be removed. A relatively easy way of doing this is to allow the husk to rot and then use a pressure washer to remove the pulp. A word of caution: a pair of gloves is essential when handling the husks, as they contain a substance that can dye clothing and skin. It is a good idea to rasp the hard shell, as this will improve germination. The nuts can be pushed into the ground in fall, or stored in moist, cool conditions for the winter (1-4 degrees Celsius or 34-39 degrees Fahrenheit) and then planted in the spring. Be sure to transplant them early as they quickly grow an extensive taproot. It is important to carefully protect the seeds and young plants from rodents. Tree cages, netting or chicken wire should be used. I have lost many seedlings to determined squirrels and chipmunks.

Although the prognosis looks grim, we may be able to save the butternut with concerted efforts by tree lovers, conservationists and government. I encourage all of us to do our part.

Keri Pidgen is a biologist currently living in Sault Ste. Marie, Ontario. She co-founded the native plant nursery, Grow Wild! Based in Claremont (www.grow-wild.com). Contact them at (705) 738-5496.

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