The Blazing Star

Spring 2006, Volume 7, Issue 2

Newsletter of the North American Native Plant Society

Native Plant to Know

Fringe tree

(Chionanthus virginicus)

by Catherine Siddall

Illustration by Brigitte Granton

In my ongoing search for native North American woody plants to use in residential gardens in the Toronto area, some years ago I noted with excitement the enticing characteristics of fringe tree. This unusual Carolinian beauty is captivatingly illustrated in Michael Dirr's comprehensive *Manual of Woody Landscape Plants* and in the more recently published *The American Woodland Garden* by Rick Darke. Since reading about this lovely small tree, I have sought it out, planted it and cared for it in a number of gardens in the city, including my own. It has not disappointed.

Fringe tree is an apt common name for *Chionanthus virginicus*. The tree's flowers (beautifully drawn here by Brigitte Granton) have long, ribbon-like, white petals, the reason for its other common name, old man's beard. Not only are the flowers a pretty sight, but they are a treat for the nose too. Fringe tree is a joy to work

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The *Blazing Star* is . . .

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

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Letter from your President

The world of plants seldom makes it onto the editorial pages of a major daily newspaper, especially the *New York Times*. But on March 19, 2006, the *Times* featured a serious article on the North American plant kingdom, written by George Ball, former president of the American Horticultural Society and current president of the Burpee Seed Company.

The article begins by celebrating the native plant kingdom: "Our lives would be poor and grim without the strawberry, cranberry, columbine and trillium". But Ball goes on to remind us that there are more worthy plants than just natives. Where would we be without being able to "feast our eyes on… magnificent tulips and roses – all exotics of European origin"? The article questions the wisdom of denying ourselves the pleasure of cultivated imports.

Two spirited responses were published on March 26th. In the first Joan Gardner Ehrenfeld, a professor of ecology at Rutgers University writes: "No ecologist argues that all garden plants should be jettisoned. Rather, ecologists have documented the tremendous damage done to natural ecosystems, including rangelands and production forests, by a small number of garden species that escape their domestic setting, reproduce abundantly without human intervention and displace native species."

Ehrenfeld goes on to say: "A recent careful estimate of the economic damage done by nonnative plants puts the cost at $35 billion a year". She encourages gardeners to "give up the relatively few species known to cause problems and focus on the numerous species that can be enjoyed without worry and without guilt".

Kathleen Learned, a member of the Washington Native Plant Society, writes: "Encouraging the use of native plants is not 'radical', but wise. …English ivy and Russian olive are just two examples of plants that are still promoted by some gardeners but have become serious management problems, competing for water, space and soil nutrition in very destructive ways".

NANPS could not agree more. We stand at the forefront of the struggle to guarantee that our native plants survive and flourish.

Grif Cunningham

NANPS Plant Sale

SATURDAY, MAY 6 2006 – 10AM – 3PM
Markham Civic Centre
101 Town Centre Blvd., Markham
(north of Hwy 7, west of Warden)

If you live within 200 kilometres of Markham you should have received a plant sale flyer with this issue. Please post the flyer prominently in your community, at your local grocery store, school, gym or club. Pass the word on to all your friends and neighbours! It is important that we sell all the plants, of course, but it is equally important to introduce as many people as possible to native plants. Where better than at NANPS annual sale where avid gardeners are surrounded by thousands of indigenous forbs, ferns, vines, shrubs and trees along with dozens of hard-working and knowledgeable volunteers?

After picking up your plants, don't forget to visit the other booths hosted by a variety of environmental organizations…. Everything from conservation to bugs to mushrooms! Native plants are an integral part of the environment and these groups can help you understand the connections.

NOTE: all plants sourced from ethical growers. Only native plants of local origin are sold, ensuring hardiness and genetic suitability. Carry-out service will be available for large or advance orders.

Volunteers needed for our Annual Plant Sale! Here is a great opportunity for you to get to know your fellow NANPS members, and enthusiastic native plant lovers! We need people on the Friday, May 5 to set up and Saturday, May 6, the day of the sale, to staff tables, organize and put together plant orders, put up and take down tables, and to talk to fellow gardeners about native plants. All levels of experience welcome. Arrangements can be made for carpooling. Contact Eva at volunteer@nanps.org or call 416-631-4438.

Elm Recovery Project

The white elm (*Ulmus americana*) once arched gracefully over the streets of eastern North America. Their v-shaped, umbrella-like crowns made white elms easily identifiable and much admired.

Dutch Elm Disease (DED) changed all that. The fungus, carried by the large and small European elm bark beetle, was first identified in Belgium in 1918. It was introduced into North America in 1930 when it arrived in Ohio on elm burls imported for the furniture industry. Two other entry points are known: New Jersey in 1933 and Quebec around 1940. The disease spread rapidly virtually eliminating the elm as an urban tree and reducing its status as a forest species in Ontario by the early 70s. Slippery or red elms (*Ulmus rubra*) and rock elms (*U. thomasii*) were especially hard-hit; very few large ones survive today. The white elm fared slightly better.

The scientific community now knows that DED attacks every elm. Strong young immune systems enable many of these trees to live for 15-30 years, reaching 20-40 centimetres (eight to 16 inches) in diameter. At that point many will succumb to the disease. Others outlive the first or even second wave of the disease reaching 60-90 years of age with trunks up to 620 centimetres (20.3 feet) in circumference. These scattered elms have been discovered as far afield as Windsor, Sault Ste. Marie and Ottawa.

The late Henry Kock, interpretive horticulturist at the University of Guelph Arboretum, decided to design a "dating service" for these lonely Ontario elms. The university spread the word about the Elm Recovery Project asking members of the public to report on any elms they knew about with a circumference greater than 213 centimetres (seven feet). So far over 500 good candidates have been reported. Researchers sent out to investigate these elms will check the area around the candidate tree for dead elms, an indication that the survivor is resistant to DED. Non-resistant elms that are too young to be killed by the disease but old enough to flower are very common in the Ontario landscape. Their airborne pollen is the common pollinator of isolated, resistant survivors resulting in offspring that may or may not carry the genetic traits for resistance to DED.

Cuttings are taken from the most promising elms and grafted onto seedlings grown from the seeds collected from a large tree in Guelph. These seedlings are planted out onto a test site where their genetic resistance traits are verified by the University of Toronto's Faculty of Forestry forest pathology researchers over a few years. The best of these trees are selected to be maintained in a seed-producing orchard as part of the Gene Bank at the Arboretum. In 12 to 14 years, the seed orchard will begin to produce genetically diverse DED-resistant seeds that can be distributed to growers.

Photograph courtesy Sean Fox

This white elm in Teeterville, Ontario has a trunk circumference of over 500 centimetres (16 feet). It is one of the largest elms found to date in Ontario.

Dutch Elm Disease likely originated in Asia, where occasional branch death is the most notable damage it incurs. This observation indicates that resistance to the disease is a long-term natural tendency, and holds great promise for the closely related elms of North America.

Researchers at the university are further encouraged by the fact that the white elm is fast-growing and sturdy. It can reach a trunk circumference of 145 centimetres (4.8 feet), a height of 15.2 metres (50 feet) and a crown spread of 12.2 metres (40 feet) just 25 years after planting. In an ideal world the tree can easily live to be 150 years or more. But development, storms and road widening are taking their toll of mature elms. With the help of the Elm Recovery Project, in a relatively short period of time these magnificent trees could make a significant contribution to the urban and rural landscape.

To learn more about this project, to make a donation to the Henry Kock Memorial Fund or to report a large elm visit http://www.uoguelph.ca/arboretum/SpProjects/Elm_Recover1.htm.

This article was adapted from a brochure published by the University of Guelph Arboretum. To obtain copies write to Elm Recovery Project, University of Guelph Arboretum, Guelph, Ontario, N1G 2W1 or call 519-824-4120 x58162.

Berrying the Pump Stations

by Sara Stein

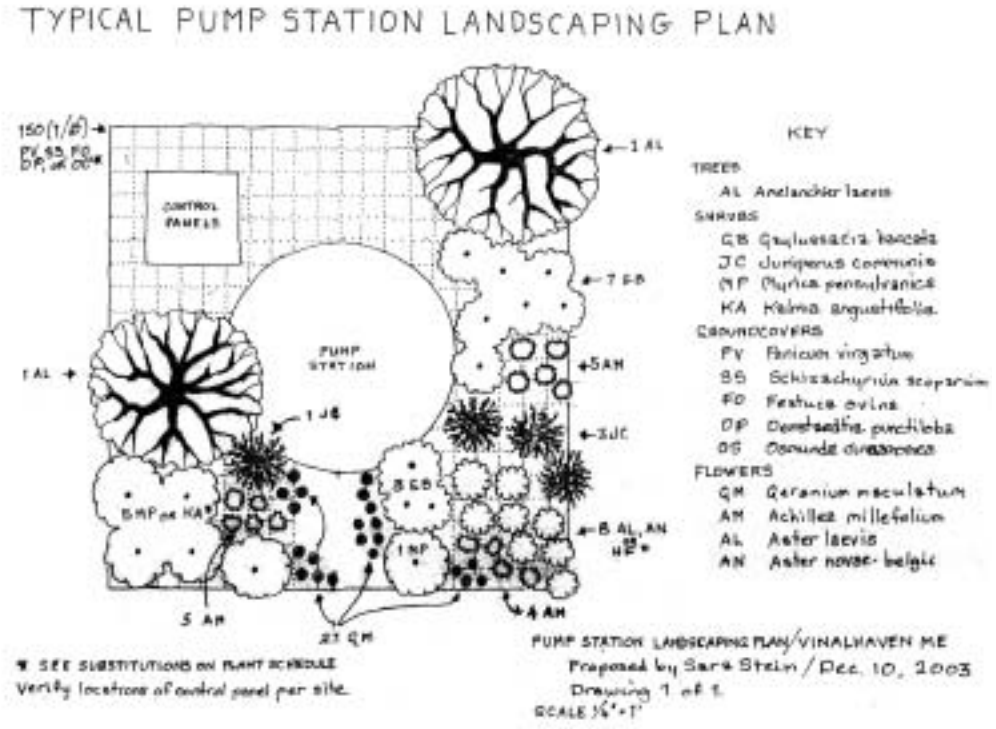

ILLUSTRATION COURTESY SARA STEIN

You can eat your way along the roadsides of Vinalhaven, Maine, all through the summer and, if you are a bird, gorge during fall migration and snack through the winter as well. Blueberry follows Juneberry, and fruiting continues through raspberry, huckleberry, blackberry, gooseberry, chokeberry, chokecherry, crabapple, dogwood, hawthorn, bayberry, Virginia rose, Virginia creeper, mountain-holly, elderberry, juniper, mountain ash, sumac, and a variety of viburnums with names like wild raisin and cranberry bush. These scrambles of fruit crowd the roadsides wherever there is sun enough to bloom and bear. Were you to clear the spruce woods that rise behind them, leaving open space to either side, what remained would be called hedgerows.

Hedgerow is not a term that has comfortably entered horticultural vocabulary, at least in part because hedgerows are more habitat than ornament, though all the species that form these communities are individually used as ornamentals. They are not hedges which, trimmed or untrimmed, are composed of a single species. They are not even shrub borders: a hedgerow typically includes small trees, and the vegetation grows so entangled that no individual species can grow to be a specimen. Grasses, ferns and flowers push into the edges, work their way wherever there is space, forming a ground-filling mulch from which the larger species grow.

Pollinators work the flowers through the days; fireflies emerge at night; moths and butterflies overwinter in the protective duff. This abundance of food – high-protein insects and high-calorie fruits – keeps birds well-fed throughout the year. The thicketing growth offers prime nesting sites during the breeding season. Starchy fall fruits fuel songbirds for migration. And for those that stay the winter, there is no better protection from cold wind and hungry hawks than hedgerow habitat. Vinalhaven is a fishing village on an island 15 miles (24 kilometres) off the coast of Maine. Stern houses – tall-roofed, plain clapboard, basic white – rise from the harbor over granite hillsides that once were quarried for such notable buildings as the U.S. Customs House, Pennsylvania Station, and the Cathedral of St John the Divine in New York City. Those were prosperous days, and the year-round population then was twice what it is now. From the beginning, though, the town was less prettified than many along the coast, for it has always been more a working community than a summer resort. Arriving from the ferry, you see first the workaday lobster processing plant. You pass a ramshackle boat yard, then a low and modest firehouse that serves also as the Town Office. And then, right beside the Town Office, you see the first of ten ugly sewer pump stations that were installed along village streets a few years ago.

Each is a square plot 20 feet (six metres) to a side. In the center, a concrete tank holds submersible pumps that force the sewage uphill to the treatment plant above the harbor. The tanks are buried to their rims, leaving a 10-foot (three-metre) round of concrete at ground level. Next to the concrete circle, in the rear comer of the square plot, stands a control box. It is made of glaring steel, and is about the size and shape of a Port-O-San. Other towns, forced by law to install a sewage system, have had the wherewithal to bury their pump stations. Vinalhaven did not: we had to berry ours.

One of these pump stations stands at the head of our driveway, directly across the narrow street from our neighbor's front door. A few are along roadsides where they are less conspicuous. One is on someone's front lawn. Another edges a salt marsh. The contract with the engineers did not include an obligation to plant the stations, though they submitted a landscape plan. The plan featured paperbark maple, Scotch broom, a west coast juniper, and Chinese silvergrass plunked in a square of mulch. One could not have devised a planting that more conspicuously set off the pump stations from the island's native vegetation.

There were other problems. Who would weed and water these plots? Who would keep the mulch replenished? How would ornamental grasses and broom survive in shaded sites and at the edge of a salt marsh? Indeed, how would the landscaping be accomplished at all within the very modest town budget of $16,000US for all 10 pump stations, a total area of 4,000 square feet (372 square metres)?

I was volunteered into worrying these problems by the Town Sewer Committee. Of course I thought of hedgerow habitat. No one waters the roadsides; no one weeds them. They mulch themselves. A shadblow is cheaper than a paperbark maple. Native grasses can be planted from plugs or seed, not quart or gallon pots. Ferns – acres of them to be had on the island by permission from willing landowners – can be dug for free. I had only to walk the roadsides to choose the species that would grow in company with one another, blend with surrounding vegetation, and best serve wildlife.

In dry, sunny locations, I chose black huckleberry (*Gaylussacia baccata*) for its long-time summer fruiting and brilliant scarlet fall color, along with bayberry (*Myrica pensylvanica*) and common juniper (*Juniperus communis*) for their contrasting foliage and winter fruit. I substituted sheep laurel (*Kalmia angustifolia*) on the two moist sites. A pair of shadblows (*Amelanchier laevis*) – small trees and the earliest summer fruit – was included in most locations; crabapples were substituted where they were already prominent in the landscape. In shaded places, the herbaceous matrix from which these trees and shrubs were to grow was in some places hayscented fern (*Denstaedtia punctiloba*) or cinnamon fern (*Osmunda cinnamomea*) as well as cranesbill (*Geranium maculatum*). In sunny sites, I used little bluestem grass (*Schizachyrium scoparium*) and asters (*Aster novae-belgii* and *A. laevis*). For the few people whose pump station was on their lawn, I planned to seed the matrix with sheep fescue (*Festuca ovina*), a gone-wild, short, fine-textured bunchgrass widely naturalized on the island, and not needing mowing.

The Town got two bids from landscaping companies. Both came in at twice the budget.

The Vinalhaven Garden Club consented to be General Contractor. They got wholesale bids on the plant materials. The prices came in within budget – but with nothing left for labor. Who was to install this total of 2,420 grass and flower plugs, shrubs in gallon cans, and 22 balled and burlapped trees? Not the ladies of the Garden Club. Not I alone - the soil with which the sites had been graded was fill, compacted to pick-ax hardness. Shovels were a joke. We needed a backhoe and expert supervision to prepare for and coordinate so ambitious a project.

One Saturday a group of landscape architecture students from Rutgers University came to visit my place in New York to learn more about native plantings. Landscape architecture students don't just draw fancy designs: they dig and haul and prune and plant as part of their training. Two of the students, Ben Cassidy and Jamie Morren, agreed on a week-long internship on the island, and they formed the core of our work crews. The rest of the labor was island volunteers: volunteers to locate and purchase stock at bulk prices; to load stock van by van and pick-up by pick-up at mainland nurseries as far away as 80 miles (130 kilometres); to hold and water the plants for weeks prior to planting; to arrange for topsoil and mulch; to locate a backhoe and two operators; to house and feed the interns; to stake the sites and hack and dig and plant and grade and mulch 4,000 square feet of landscape. One grandmother in her 80's joined the mulching crew with grandchildren.

The planting was finished in three days.

The growth of a hedgerow is a force of nature: a bare spot appears due to some disturbance – plowing, roadwork, a fire – and in move the grasses and the flowers, the shrubs, the small trees, the community of edge habitat, an ecology. So it was with this island community. There was a vacuum to be filled, and like a force of nature the species of people arrived: the planners who saw the ultimate picture, the pioneers who prepared the strategy of what was to follow, the followers who dug in the roots of their labor, the touchers-up who placed asters where butterflies would find them. People together contributed to this enterprise, and they constituted an island ecology as surely as were the landscapes they developed, all according to their skills and their fit within the general scheme. People are more often destroyers of habitat than they are recreators of their role within ecology, but in this case there was no division between garden and habitat, Nature's compulsion to fill a vacuum, and people's alliance with that force.

I am so proud.

I can't say the results have been astonishing, not yet. The steel control boxes measure 4.5 by 4.5 feet (1.4 metres) on each side and stand nine feet (three metres) high; the pairs of young shadblows won't ever completely screen their shiny hides. But they will grow and

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Clear Creek Forest & Orford Ridges Native Plant Nursery Tour

SATURDAY, MAY 13, 2006
Bus leaves Toronto Botanical Gardens at 8AM sharp
Open to NANPS members only
$40/person non-refundable

The Nursery tour is followed by a tour of a nearby pond, then lunch, then Clear Creek Forest. Rain or shine. Non-smoking bus. Bring lunch, snacks, water, camera and binoculars. Return by 7PM.

Seating is limited. Please confirm seat availability before sending in your cheque: http://www.nanps.org/clearcreek/frame.shtml.

Tickets on sale now at excursions@nanps.org or leave a voice mail message at 416-631-4438.

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lace together, and the thicketing shrubs – the bayberry, the huckleberry – bunched and planted toward the edges, will soon enough violate the strict square sites and spread irregularly into the surrounding bunchgrass. The ferns will push outward too. The flowers will seed themselves about. The birds will come.

And gardeners who helped with this project, and other islanders too, and summer folk who value the island's wildness, and members of the volunteer Sewer Committee, and the students too, will have before them evidence that this rich mix of woody border, flower garden, display of ornamental trees and shrubs and grasses – this hedgerow habitat – is a benificence to the community, human and animal alike.

This article was originally published in Wild Ones Journal*, November/December 2005. Reprinted with permission of Wild Ones: Native Plants, Natural Landscapes, www.for-wild.org.*

Sara Stein

Sara Stein, a passionate writer and advocate for native plant landscaping, and Honorary Director of Wild Ones, passed away last year after a long battle with lung cancer. Author of children's books and articles on a broad array of news topics, she is probably best known for the books that helped propel the movement towards more ecologically sound home landscapes in North America. *Noah's Garden*, published in 1994, "introduced a generation of gardeners to the unwitting destruction of the suburban environment caused by traditional landscaping practices", according to the dust-jacket of her subsequent book, *Planting Noah's Garden: Further Adventures in Backyard Ecology*. The article reprinted here was, sadly, one of her last.

The Unsung Heroes: Seaweeds in Human Culture and History

by Zoe Dalton

While hiking the rocky shorelines of coastal British Columbia this February, I became intensely curious about a world of organisms little known to inland dwellers: the seaweeds. Rarely mentioned in general botanical literature, this group of marine algae is of great historical, cultural and economic importance. Used as food and valued in medicine and technology for centuries by peoples from Japan to Britain to North America's Pacific Northwest coast, the seaweed stands out as an under-appreciated member of the world's flora.

Belonging to the Kingdom Protista (as opposed to Plantae), seaweeds are not plants *per se*. However, given that biological investigation has been roughly divided into the study of animals (zoology) and the study of non-animals, seaweed science (phycology) falls to us, the botanists.

Macroscopic seaweeds, those of greatest significance from an ethnobotanical perspective, fall into two main phylogenetic divisions: the red algae (Rhodophyta) and the brown algae (Phaeophyta). Both are primarily marine in origin, and each is immensely diverse: there are approximately 4,000 species of red algae and 1,500 species of brown algae. The Rhodophyta predominate in warmer, tropical waters while the Phaeophyta comprise most of the algae found in cooler regions of the world.

A red algae familiar to many of us is the one known to the Japanese as *nori*. A night out at a Japanese restaurant wouldn't be complete without a serving of sushi – rice and miscellaneous other goodies surrounded by a delicate wrapping of this tasty seaweed.

As for a representative of the brown algae, even the most casual of seaside visitors would be hard-pressed to miss the conspicuous bull kelp (*Nereocystis luetkeana*) – a ubiquitous seaweed along both our continent's coasts. With its ball-like float and long hollow stipe, this unmistakeable algae provides a gratifying identification experience for the newly-emerging seaweed aficionado. (The stipe

Illustration courtesy Hamilcar Pereira

Bull Kelp

is the stem-like structure of a seaweed, sent up from the holdfast - the part of the seaweed that is anchored to the sea floor. The float is a hollow, ball-shaped structure at the upper end of the stipe. Filled with a variety of gases that ensure its buoyancy, the float maintains the blades at the water's surface where they can perform their all-important role in energy capture, or photosynthesis.)

Seaweed ethnobotany is made especially interesting by the fact that these organisms are as important to human cultures worldwide now as they have ever been. For example, seaweeds remain a critical source of food in Asian fare. Today 10% of the Japanese diet is comprised of seaweeds in one form or another.

Algae such as *Porphyra* (a red algae, and the genus to which nori belongs) have been cultivated in Asia for centuries. This specialized form of marine aquaculture was already a significant affair in Japan in the 1600s, when seaweed farmers would root bamboo stakes in the sea floor to act as a substrate for *nori* growth.

The importance of seaweeds in people's diets extends far beyond Asia.

Throughout the British isles, *Porphyra* species (also known as laver) were pounded, mixed with oats, and often fried as a cake. Laver bread was, and still is in some cases, widely eaten. A good source of many nutrients, these cakes have been referred to as a complete survival food.

The annual harvest of *Porphyra* species by First Nations peoples of the Pacific Northwest was a significant cultural event. Along the British Columbia coast, early spring was considered prime harvest time. The algae, tender and sweet at this time of year, provided an important green vegetable when terrestrial greens were not yet ready for consumption. Due to the incredibly rapid growth of some edible seaweeds (certain species can grow two and a half centimetres or one inch per day during the summer), multiple harvests were even possible. First Nations who relied on these harvests would use cues from the terrestrial plant world to help determine the optimal time for harvest and re-harvest: the flowering or leaf expansion of trees, herbs and berry bushes acted as a sort of calendar, indicating when seaweed collection should take place.

Nutritionally speaking, seaweeds are a mixed bag. Many species are rich in protein and carbohydrates and are, almost universally, excellent sources of essential minerals such as calcium and potassium (a 100 gram portion of kelp provides over 1,000 milligrams of calcium), as well as a variety of other trace elements. However, the protein and carbohydrates present in seaweeds are often nutritionally inaccessible because humans lack the enzymes required to break them down. *Porphyra* is the most notable exception: humans are actually able to access 75% of the algae's protein content – an exceptionally high proportion of accessible protein for a seaweed.

Historically, seaweeds played an essential role in a variety of technological applications. For example, the coastal First Nations of British Columbia, used the long stipe of bull kelp in deep sea fishing, and the bulb as a water-tight storage container for important fats such as seal oil.

Seaweeds remain invaluable to us today. Seaweed derivatives are used in everything from cosmetics to paint to ice cream, and as a substrate for biochemical experimentation (think high school Petri dish). The basis for a multi-billion-dollar industry worldwide, seaweeds constitute an important part of the global economy. The jelly-like substance that can be extracted from a variety of algae species provides an excellent stabilizer and emulsifier for a variety of food and industrial purposes. Browse the ingredients in the dairy section of the grocery store and you're likely to see the words carrageenan and agar - both seaweed derivatives that act to thicken and firm up our yogurts, ice creams and a diversity of other products.

Seaweed extracts also act to stabilize solutions used in welding and the manufacture of paper. In addition, because of their high mineral content, some seaweeds are harvested for their ash content. Ash can be used as a basis for soap manufacture and in the extraction of metals, among other applications.

As with terrestrial environments, there are concerns about the future health of the ecological systems of which these organisms are a part. In both Britain and North America, concerns have been raised about contamination of marine algae. Consumption of seaweed in the British Isles, for example, has begun to decline as fears about nuclear contamination of this resource intensify. And on the Pacific coast of North America, contamination of seaweeds by effluent from pulp and paper mills worries traditional harvesters. Add to this industrial-style resource over-extraction, and those who have relied on these marine algae for centuries have real cause for concern.

However, the humble seaweed has managed to pull off remarkable feats in the past. If given the chance to step into the spotlight, the unassuming seaweed may, with its rich cultural history and its significant role in the global economy, be just the ticket the oceans need to bring their ecological plight into the public consciousness.

Zoe Dalton's passion for nature led her to pursue a master's degree in ethnobiology. She is now a freelance nature writer and a lover of all things wild. Zoe's husband, illustrator Hamilcar Pereira, is a digital sculptor by profession and an avid free diver who loves to view the wonders of the ocean up close.

Calendar of Events

May 6, 2006
NANPS ANNUAL PLANT SALE
Markham Civic Centre
Markham, Ontario
Visit www.nanps.org for further info.

May 13, 2006
Clear Creek Forest & Orford Ridges
Native Plant Nursery Tour
Chatham-Kent, Ontario
Open to NANPS members only – visit www.nanps.org.

June 6-9, 2006
Billings Land Reclamation Symposium
Billings, Montana
For more information about this mining and land restoration/reclamation conference visit www.billingslandreclamationsymposium.org.

July 14-16, 2006
Wild Ones Annual Conference
Native Plant Landscaping: More than a Garden, It's a Lifestyle
Napierville, Illinois
For more info or to register online visit www.for-wild.org/2006Annual/

Native Orchid Culture

by Paul Heydon

Many orchid species are rare in the wild due to habitat loss from human encroachment and changes in succession. Members of the family Orchidaceae produce seed capsules that can contain hundreds of thousands of seeds but their cultural requirements are so specialized that they will only germinate under very limited conditions.

PHOTOGRAPH COURTESY RON HEPWORTH

Showy lady's-slipper

Orchid seeds are among the smallest known in the plant kingdom and are often referred to as "dust" seed. While most seeds have stored food reserves that enable the seedlings to grow to a size where they can acquire their own food, orchid seeds lack these food reserves. In nature, orchid seeds may germinate but will not develop past the stage of germination without infection from a suitable fungus. Infection can occur through pores in the seed or it can occur after germination through the protocorm's rhizoids (roots). The fungal hyphae are cylindrical thread-like filaments that invade the embryo's cells in the form of pelotons, which are then absorbed by the orchid. Hyphae form coils called pelotons within cells; this greatly increases the surface area between orchid and fungi. Pelotons are short-lived, only lasting a few days before they degenerate and are digested by the orchid cell. In this way the fungus supplies the young seedling with carbohydrates, water, and mineral nutrients; this continues at least until the plant is sufficiently developed to produce and acquire its own food. It is not known what the fungus receives in return for supplementing the seed with nutrients. The relationship is believed to be one-sided, with the plant living parasitically off the fungus, a process known as mycotrophy.

Many epiphytic and some terrestrial orchids produce chlorophyll shortly after germination and produce some of their own food, although not in quantities that would enable them to exist without mycotrophy. Some genera like *Cypripedium* (lady's-slippers) lack chlorophyll for their first year and are completely mycotrophic until they produce leaves. Some species retain the same fungal partner throughout their lifespan while others change fungal associations; this is likely related to the plant's requirements and fungal availability.

The culture of orchids and our knowledge of their biology have increased considerably in the last century. There are now techniques for symbiotic germination that involve the culture of the fungus as well as the orchids. It was discovered that orchids could be germinated asymbiotically on nutrient agar (which is a solidifying substance - polysaccharides - extracted from red algae) in much the same way that bacteria were cultured. One biologist found that the addition of a carbon source (sugars) allowed the orchid to grow past the initial stage of germination. At present, the commonly preferred culture method is through *in vitro* (in glass) asymbiotic* germination and growth. Many horticulturists are now growing orchids from seed on nutrient agar in glass flasks and this process is known as *in vitro* germination.

Due to the complexity of the methods, media, and materials employed in *in vitro* asymbiotic germination a full account of orchid germination will be posted soon on www.grow-wild.com. This article offers only a brief synopsis of orchid germination; some steps have been omitted due to space considerations and technical garble. Anyone wanting to sow orchids from seed is advised to use the

Native Plant Gardens Wanted

If you have a native plant garden, established or under development, NANPS wants to hear from you. Give others a chance to learn from your experiences and feel the joy of native plant gardening. Yards in all regions wanted.
Please contact nanps@nanps.org to be considered for future garden tours.

account that will be posted as it is more detailed.

Many places now sell asymbiotically germinated seedlings which eliminates the laboratory work. In asymbiotic germination, the fungus is not required and the orchid seeds and plantlets obtain nutrients from reagents** added to agar. Energy is supplied to the medium by adding sugars, such as glucose. In all *in vitro* orchid culture, the medium and seed surface must be sterilized. Media and water can be sterilized by either an autoclave or a pressure cooker as they both function in the same manner. Boiling water is insufficient to kill all bacterial and fungal spores in the media and flasks. To achieve sterility the temperature must be raised to at least 110º C (230F) for a period of time. When the autoclave is set to 15 psi , the pressure is sufficient to increase the boiling point of the water to 121º C (250F). If the flasks are sterilized for 15 minutes one can expect virtually no contaminants. Sowing and reflasking must be carried out under aseptic (sterile) conditions. If the conditions are not sterile bacteria and fungi will grow much more rapidly than the seedlings on the media. Therefore it is extremely important that all media, jars, water, instruments, and seeds be sterilized.

The sowing of the seed takes place in the laminar flow hood that is considered a superior aseptic sowing area by most tissue culturists. Most models work on the premise of a fan forcing air through a HEPA filter that removes 99.97-99.99% of particles as small as 0.3 µm. Most people do not have access to a laminar flow hood. Instead a box can be turned upside down and used in a similar manner. This usually results in a greater percentage of contamination than the former. Thoroughly sterilize all inner surfaces of the flow hood or box with a spray bottle or a soaked rag of 10% bleach or 70% ethanol and then turn the unit on for at least 30 minutes before use. Having satisfied the requirements for sterility of flasks, media, instruments, and workspace, you must now decontaminate the seed in 5% bleach. The sterilizing time depends on the species being cultured. Some take as little as five minutes whereas other species can be left in the solution for many hours. Remarkably, the dust-like seed of the orchid can undergo chemical sterilization that kills all or most of the micro-organisms present without major damage to the embryo. After the required time has elapsed remove the filter from the bleach and place it in the autoclaved, distilled water. Agitate them for a couple of minutes. Swab the work area regularly with bleach/alcohol and re-sterilize tools before each use. If the instruments are not flamed, be sure to dip them in sterilized water to avoid damaging the seeds with harsh chemicals. The seed is then spread evenly over the agar.

After the seed is sown place the flasks in the refrigerator for three months to break the seed dormancy. Keep the refrigerator at 2-5 º C (35-41F). Once removed from the fridge place the species that produce chlorophyll under fluorescent light and the species that are achlorophyllus in complete darkness. The achlorophyllus species should be grown for eight months before they are deflasked. Both should be grown in temperatures ranging from 18-24 º C (64-75F). It is best to try to emulate the natural cycle of the plant being cultured. Once they go dormant they can be deflasked. Dormant achlorophyllus plant roots will start to turn dark brown while chlorophyll-producing seedling leaves will start to turn brown, although if the medium is lacking a nutrient or nutrients, or there is a build up of phenolic compounds, this can have the same effect.

Take the orchids out of the flask by tapping the bottom of the jar, allowing the media to come out of the hole with the seedlings. When the seedlings are out, rinse all the nutrient agar off them as agar left on the plant can cause rot. Then untangle the roots and place the seedlings in a sealed Ziploc bag with enough water to keep the humidity at 100%. Some other species such as the grass pink orchid (*Calopogon tuberosus*) can be stored in the flask. Both the Ziploc bags and/or flasks containing the seedlings are then placed in the refrigerator at 3-5˚ C (37-41 F) to overcome dormancy.

For lady's-slipper seedlings, excluding the pink lady's-slipper (*Cypripedium acaule*), use 1/2 part grow mix with sedge-peat, sphagnum peat moss and no added fertilizers to 1/2 part perlite in communal flats. For seedlings of fen and bog species such as grass pink, rose pogonia (*Pogonia ophioglossoides*), and dragon's mouth (*Arethusa bulbosa*) use 50% peat moss to 50% silica sand. The orchid compost should be watered only with rain or filtered water. Tap water can be used but only every third watering. It is best to let the tap water sit for a few days so that the chlorine evaporates. The seedlings should be fertilized once or twice a month, using 1/4 the recommended strength complete 20/20/20. The seedlings should be checked every other day for a few weeks, as this is when they are most vulnerable to desiccation and fungal attack. It is best not to over-water the seedlings especially the lady's-slippers; they will rot.

When the seedlings have outgrown their communal container they can be planted separately into their own pots or planted out in the garden. I usually grow the seedlings for a year in the communal flats. The communal flats for the bog species can be grown in full sun whereas the lady's slippers are best situated in a place that is shaded from noon to about 2 pm but receives direct sunlight for the rest of the day. The seedling grow mix works well for adult plants but it is preferential to use different composts once they are moved to the garden from their communal flats or their pots. For the lady's-slippers of Ontario (excluding the pink lady's-slipper) use a standard mix of 50% sand, 30% sedge-peat, and 20% perlite. (Make sure the sand is well washed. If the sand is silica-based add dolomitic limestone.) This compost does not compact and remains well-aerated. Compacted soil is deadly for the lady's-slippers. It is best to dig out a hole that is at least 60 centimetres (24 inches) deep and line it with a pond liner or some similar material as this will help to prevent the soil from drying out completely. The liner should have a few holes punched into it to allow for drainage. Moderate watering is best (do not overwater or allow to dry out).

Ram's-head lady's-slipper

PHOTOGRAPH COURTESY RON HEPWORTH

The small yellow lady's-slipper (*C. parviflorum*) and large yellow lady's-slipper (*C. pubescens*) are very adaptable and grow well in regular garden soil as well as the mix mentioned above. I have a rather large clump of small yellow lady's-slippers that is in almost full sun. I only water three or four times a year when it becomes really dry and/or needs a fertilizer application. Fertilizer can be used once a month during the growing season to all species of lady's-slipper orchids. Add the fertilizer at 25% of the recommended strength after the patch has been thoroughly watered. All the lady's-slippers in Ontario do well in more sun than shade. Ram's-head lady's-slipper (*C. arietinum*) in cultivation seems to do better in 30-50% shade.

To cultivate fen and bog species dig out an area at least 60 centimetres (24 inches) deep. Line the hole with a pond liner or some other suitable material that will prevent the water from draining out completely, then fill with 4/10 silica sand, 4/10 half sphagnum peat, 1/10 sedge-peat, and 1/10 charcoal chips (optional). The bog should never dry out even after the plants have gone dormant. In the artificial bog, keep the water table level 15 to 20 centimetres (six to eight inches) below the surface. Use of rain or distilled water is preferred and fertilizer (20/20/20) should be used every six weeks at 1/4 the recommended strength. With a little patience and sound cultural practices most species should flower within three to six years after sowing.

Paul Heydon is a biologist who recently joined the NANPS Board of Directors. He owns Grow Wild Native Plant Nursery in Claremont, Ontario. Contact him via e-mail at info@grow-wild.com.

**Asymbiotic- Without a symbiont which is a relationship between dissimilar organisms in which both partners benefit.*
***Reagent- A chemical substance that is used to create a reaction in combination with some other substance*

Wild Ones Online Discussion Group

Wild Ones: Native Plants, Natural Landscapes, has created an Internet discussion group on Yahoo Groups, called WildOnesNativePlants. Members of Wild Ones can post questions, discuss native plant landscaping, and exchange ideas and information. Currently there is an interesting discussion going on about cup plant (*Silphium perfoliatum*).

Wild Ones members can join the discussion group by going to http://groups.yahoo.com/group/wildonesnativeplants/join.

Waiting for the Macaws and other stories from the age of extinctions
By Terry Glavin
Toronto: Viking, 2006
ISBN 0-670-04422-9
Hardcover, $35, 318 pages

Some books that are written about endangered species focus on what might be called computations of dread — numbing numerology that leads to despair. Terry Glavin, in *Waiting for the Macaw*s, takes a decidedly different tack. While the staggering statistics are included (12.5% of the world's known plant species threatened with extinction; one in eight bird species; one in four mammals, etc.), this is essentially a book of stories and a book of hope. Basically, Glavin is sending back dispatches from both far-flung and familiar places where people have a choice: "For every sad and well-documented story of a species dying out because of humans, there is almost always an overlooked story of ordinary people struggling against the forces of extinction."

Glavin's stories traverse the globe. He travels to a traditional whaling village in Norway. He waits for a glimpse of the scarlet macaw at a wildlife preserve in Costa Rica. He visits a fish market in Russia where he finds endangered species for sale. He meets with the Angh of Longwa on the border of India and Burma, and the Angh says to him, "If the tiger vanishes, our souls, too, will vanish."

This simple, profound statement perhaps best captures the book's message. When we lose species, we lose languages, cultures, ways of life, in essence, ways of seeing the world: "We are not gaining knowledge with every human generation — we are losing it."

But Glavin doesn't spend much time with despair. Instead, he offers the following as his reason for hope: "Deep within the human consciousness is an ancient and abiding desire to be in the presence of flourishing, abundant, and diverse forms of life." As for what we can do, he gives an answer that is perhaps the best and only one possible: you do what you can.

❁

The Urban Cliff Revolution: New Findings on the Origins and Evolution of Human Habitats
By Douglas Larson et al
Markham: Fitzhenry & Whiteside, 2004
ISBN 1-55041-848-3
Hardcover, 198 pages

We have a lot more in common with our "cavemen" ancestors than we generally like to think, according to *The Urban Cliff Revolution*. Written in a highly readable style by five academics, the book marshals evidence from a wide range of disciplines — everything from ecology to anthropology and psychology — to argue that far from representing an anomaly, our cities and built habitats reproduce the cliffs, talus slopes, and rock outcrops that early humans exploited to meet their needs.

The conventional telling of our ancestry focusses on savanna habitats, but these authors turn their attention to the cliffs that are often in close proximity to savannas, suggesting that "the true needs of our ancestors could not have been satisfied by savanna habitat alone. Instead, the exploitation of rock outcrops and cliffs adjacent to savannas and watercourses is what allowed our species to succeed."

Taking this idea further, into the realms of both psychology and evolution, they argue that early humans came to associate cliffs with safety, security and resources of home, and that over time these feelings have been "shaped and reinforced by natural selection." Thus, our attraction to cliffs and, by extension, to the tall buildings of cities, is "a kind of residual biological memory of a habitat that nurtured us." The way we design and construct our built environment "duplicates the characteristics of our original dwelling sites."

This has significant implications for both philosophical *and* practical debates about everything from weeds to ecological restoration, and the authors don't shy away from taking a rather provocative stance in relation to both. While they state that the flora and fauna native to an area "are more desirable functionally and aesthetically," they ask us to, in effect, own up to our nature as agents of disturbance, and "respect the organisms that are taking advantage of human benevolence by expanding into the ideal habitats we keep creating for them." Thus, they see the so-called "Planet of Weeds" we've created as something that can guide us. For example, they argue for a radical reconfiguration of ecological restoration goals: "We should not try to reconfigure the habitat to make it suitable for the species that occupied it *prior* to the disturbance. Instead, we should consider, for use in a restoration protocol, the native flora and fauna that can recognize and exploit a site *as it stands*. Rather than trying to revegetate abandoned building sites with the forest that was there before the human disturbance, we should use the species more suited: those native to rock outcrops and cliffs. Restoration to a *suitable* target is much less expensive than conventional restoration to the *original* target."

To regard the human-built environment as functioning, or potentially functioning, like a fully natural habitat is compelling on many levels. And, guaranteed, you'll look at rats and pigeons in an entirely new way after reading this book.

Reviews by Lorraine Johnson, a former President of the North American Native Plant Society. An updated edition of Lorraine's popular book,* 100 Easy-to-Grow Native Plants*, was recently published by Whitecap Books

Continued from page 1

around when in flower as we discovered one year after we had planted a large specimen. The fragrance was delightful on the still, warm, late spring day.

Another notable characteristic: the tree produces flowers at a young age – possibly as young as three years. The specimens that I know do not flower heavily, no doubt due to my placement of them in semi-shade to shady situations, but the overall effect is that of a frilly party dress. The spring flowers produce blue berries in the summer and fall that are relished by birds.

The fringe trees of my acquaintance are really more shrubs than trees with low branches and a rounded aspect; they reach no more than seven feet in height. Although I have read that they sucker, these plants seem to lack sufficient vigour to put out suckering growth. Exotic-looking in bloom, I think the leaves look quite tropical too. The leaves are large for the size of the plant (seven to 20 centimetres or three to eight inches) and a simple, oblong shape. The mid-green colour (similar to magnolia) in the growing season is a nice backdrop for perennials in summer. In fall the leaves turn yellow. As Dirr suggests in his description, I have found that fringe tree is adaptable to different soil conditions, and it's hardy (USDA Zones 3 to 9) as well as shade-tolerant. It is also free of pests and diseases. I do think that it prefers moister soil conditions, borne out by the fact that its natural habitat is stream beds. No doubt a rich, acidic soil will benefit the plant too.

Fringe tree occurs naturally south from New Jersey to Texas and Florida so it is not native to southern Ontario but then again neither is the mockingbird who has been returning every year now for several years to entertain me with his large and delightful vocal repertoire.

In my experience this plant is relatively easy to establish from a container- grown specimen. Unfortunately, fringe tree is very difficult to propagate which explains why it is uncommon in the wild and hard to find in cultivation.

Before I started using the Internet, I searched for local lore about this plant in the old-fashioned way and found few who even knew it. After a talk focused on native plants by horticulturist Frank Kershaw at the (now) Toronto Botanical Gardens, I thought to ask him about fringe tree. He replied that the oldest specimen he knew was in Mount Pleasant Cemetery. One of my questions was what mature height the fringe tree might attain in our climate. I figured it would be significantly less than the seven plus metres (25 feet) suggested by the aforementioned authors who knew it in its preferred more southerly habitat. I went on a cold, rainy, late fall day to seek out the cemetery specimen. I found the lonely small tree easily enough. It was no thing of beauty. (It didn't help that I was viewing it after the leaves had fallen.) Badly pruned or just misshapen by the pruning required after winter dieback, it was not an impressive sight. Nor had it grown to a height much above three metres (10 feet).

Undeterred, I acquired a very small specimen for myself when I spotted it at a wholesale nursery. I chose an individual that had the blue berries. Because my typical city yard is small I could only fit in one fringe tree. I was never to see berries on my plant again. Try and acquire at least two if you can. Chances are there will not be another fringe tree in your neighbourhood. But it's well worth the trouble of seeking one out.

Catherine Siddall designs, builds and maintains gardens. Catherine is a partner in Siddall and Cope which offers services to groups wanting to establish community gardens or naturalization projects. Call her at (416) 531-2253 or e-mail catherine.siddall@gmail.com.

Paul McGaw Memorial Conservation Award

It's not too late to submit your nomination! The Paul McGaw Memorial Conservation Award recognizes the extraordinary contribution of an individual or group to the conservation, protection or restoration of the natural heritage/native flora of North America at the community, regional, provincial, national or continental level. Visit www.nanps.org/awards/frame.shtml. Please submit your nomination by May 15th to nanps@nanps.org or call voicemail 416-631-4438.

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