menziesia

Winter 2013 NPSBC Native Plant Society of British Columbia www.npsbc.org Volume 18, Issue 1



Polypodium scouleri
(leather polypody)
Photo: Dawn Hanna

Cover story: *Polypodium scouleri*

Photographer Dawn Hanna captured the cover image of *Polypodium scouleri*.

She writes: "This particular specimen of leather polpody was growing on a tree near the shore at Schooner Cove in Pacific Rim National Park. Getting the shot involved climbing a large pile of driftwood and balancing on a protruding log about 15 feet above some rocks. Who ever said native plant appreciation wasn't dangerous? :-)

Polypodium scouleri is found on the west coast of North America from BC as far south as Guadalupe Island off Baja California. I think it is among the most beautiful of BC's ferns."



In This Issue:

Feature articles are the sole responsibility of their authors. Opinions expressed therein are not necessarily those of the Native Plant Society of BC.

Features:

Pink Mountain Biodiversity Research 3
Plants unpack winter coats 4
Native plants play starring role in water conservation in Summerland 5
A closer look at bitter cherry 7
Invasive species threaten native plants ... 9
Plant sniffs out danger 10
Climate change affects Erythonium.... 11
Gene helps plants flower in spring 12
Douglas fir used in nanodevices 14

Departments:

Coming events 13

Regular columns:

Canning's crossword 15



Discussion Group

Subscribe to the NPSBC electronic list for information and discussion on native plants and habitats, current projects and upcoming events.

TO SUBSCRIBE: Visit http://lists.vvv.com/mailman/listinfo/npsbc and follow the instructions.

TO SEND MAIL to the list (after subscribing), email npsbc@lists.vvv.com

TO CHANGE SETTINGS or send enquiries to the list administrators, visit http://lists.vvv.com/mailman/listinfo/npsbc

NPSBC

Native Plant Society of British Columbia

Our Mission

The purpose of the Native Plant Society of British Columbia is to encourage knowledge, appreciation, responsible use and conservation of BC's native plants and habitats.

Board of Directors

Dawn Hanna, *President*
dawnhanna@telus.net

Ron Long, *Vice President*
rlphoto@shaw.ca 604-469-1651

Eleanor Anderson, *Treasurer*
ke_anderson@shaw.ca

Helen Gowans, *Secretary*
easterisland05@gmail.com

Hugh Daubeny
hdaubeny@shaw.ca 604-731-8537

Laura Duncan
gardenlaura@shaw.ca 250-427-2600

Jamie Fenneman
fennj@hotmail.com

Terry McIntosh
ttmcintosh@shaw.ca

Moralea Milne
moraleamilne@gmail.com 250-478-3838

Virginia Skilton
dvskilton@shaw.ca 604-536-3529

Evening speakers coordinator
Terry McIntosh

NPSBC inquiries:
Ross Waddell, Information Coordinator,
604-255-5719 information@npsbc.org

menziesia

Dawn Hanna, Editor and Layout
Erin Skelton, Proofreading

Menziesia submissions and queries:
dawnhanna@telus.net
Menziesia is published four times a year.
Subscription is included with NPSBC membership.

Pink Mountain Biodiversity Research Initiative needs your support

Story and photos by Ron Long

Pink Mountain is located 120 km north of Fort St. John in northern British Columbia. The mountain is unique in the province for its rich flora and fauna. Preliminary studies on the flora of the summit plateau reveals that Pink Mountain hosts more red- and blue-listed species (endangered or threatened) than any other location in the province north of Vancouver (Conservation Data Centre information). Examinations of adjacent peaks show only a few flowering plant species, suggesting Pink Mountain is exceptional for its diversity.

To date, 12 red- and blue-listed plant species have been identified. In addition to the listed species, Pink Mountain also hosts a number of botanical curiosities. For example, the southernmost populations of some Arctic species, such as the rare *Rhododendron lapponicum*, can be found. Two species of orchids not otherwise known to occur in tundra habitats are located on the mountain, while subalpine plants such as *Zygadenus elegans* can be found on the tundra summit. The exquisite and odd can also be found: two miniature gentians and a rare *Corydalis* are also here, as are five species of the partially-parasitic genus *Pedicularis*.

The exceptional plant biodiversity of Pink Mountain is matched by an extensive fauna: large populations of elk, moose, whitetail deer, Stone's sheep, mountain caribou and black bear frequent the mountain, as well as smaller rarely-seen animals like the pine marten. The mountaintop supports a substantial population of hoary marmots and a diversity of birds such as the golden eagle and horned lark. Pink Mountain is known worldwide in the butterfly community for its assemblage of rare Arctic butterfly species. Geologically, Pink Mountain is also the southernmost occurrence of permafrost in BC.

Much of this is recent knowledge and has been determined despite the fact that no comprehensive biodiversity survey has ever been done on Pink Mountain by qualified scientists. There is more to discover in this unique location, and many questions yet to be answered. Despite its importance to BC's biodiversity, Pink Mountain is under threat of development from the proposed construction of a wind farm.





Gentiana prostrata (moss gentian), above, and *Rhododendron lapponicum* (Lapland rosebay), at right, are two of the stunning species found on Pink Mountain.

Wind turbines have already been tested on the summit of Pink Mountain, and the impact of maintaining that single test site has been severe and has been observed to directly affect one of the threatened plant species. The only known site of a blue-listed buttercup species on the summit was extensively damaged by heavy equipment, easily halving the number of plants. The installation of dozens of wind turbines will destroy the ecological uniqueness of Pink Mountain.

A letter writing campaign over the past two years has made the provincial government aware of the special assemblage of plant and animal species that exist on Pink Mountain, and has pressed for the creation of a preserve on a portion of the summit. Results have been

Pink Mountain, continued on page 4

Pink Mountain, cont. from page 3

disappointing and no indication of interest has been received from the government. More needs to be done.

Presentations to nature societies and gardening clubs around the province have generated significant interest from club members wanting to preserve the ecological integrity of Pink Mountain. While I invite continued help with lobbying the government on behalf of Pink Mountain's biodiversity, it is also necessary to bolster the argument for preservation with additional scientific evidence. With this evidence in hand, the government will be hard-pressed to ignore the need to preserve Pink Mountain.

A proposed Pink Mountain Biodiversity Research Initiative (PMBRI), intended to further document and study the flora and fauna of Pink Mountain, has been endorsed by the UBC Botanical Garden and the Native Plant Society of BC. PMBRI will involve three months of field study to cover the entire bloom and seed-set period of the flora of Pink Mountain, with a preceding planning period. Several months of lab and herbarium analysis will follow the field study. Seeds will be collected for propagation and for eventual distribution to gardeners through a seed exchange program.

Certain organizations are being asked to commit up to $3,000 (suggested $500 to $1000) to help fund the initiative. Once a commitment of $30,000 has been raised to fund this yearlong study by a doctoral student and several undergraduate assistants, the organizations will be asked to submit the actual funds.

But it's not just organizations that can help. You can lend your individual support to the Pink Mountain Biodiversity Research Initiative with a personal donation.

The University of BC Botanical Garden will support PMBRI through managing the donated funds and administering the hiring of the researchers, as well as providing research support (e.g., helping to identify plant specimens). A full accounting of funds will be available to all contributing organizations.

At the end of the research period, the scientific report will be submitted to the BC Minister of Resource Operations, the BC Minister of Environment and to all contributing organizations.



Pedicularis lanata (woolly lousewort)

As time is of the essence, the study must be carried out during 2013, so your early commitment before February 1, 2013 would be much appreciated.

If your group would like to know more about Pink Mountain before (or after) making a funding decision, I am available to give a detailed slide presentation.

Thank you for your support. Please contact me with any inquiries at rlphoto@shaw.ca

Plants unpack winter coats when days get shorter

Mechanisms that protect plants from freezing are placed in storage during the summer and wisely unpacked when days get shorter.

In a recent issue of the Proceedings of the National Academy of Sciences, Michael Thomashow, Michigan State University professor of molecular genetics, demonstrated how the CBF (C-repeat binding factor) cold response pathway is inactive during warmer months when days are long, and how it's triggered by waning sunlight to prepare plants for freezing temperatures.

"We knew that when plants are exposed to cold, nonfreezing temperatures, they can better survive below-freezing temperatures," said Thomashow, who co-authored the study with Chin-Mei Lee, MSU plant biologist. "What this new research demonstrates, though, is that plants' defense mechanisms are also triggered by shortening daylight."

It's widely known that waning daylight triggers trees' defenses against freezing, but this has never been demonstrated in herbaceous plants. The paper not only shows that such plants use shorter days as a cue for the impending winter, but that the mechanism also is turned off during the warm growing season.

"The CBF pathway is actively turned off during the summer to prevent the allocation of precious resources toward unneeded frost protection," Thomashow said.

~ adapted from information provided by Michigan State University

Native plants play starring role in water conservation project in Summerland

By Eva Antonijevic

Last summer saw the implementation of a large scale water conservation project at the Summerland Ornamental Gardens in the Okanagan. A key feature of the project plan is to increase the number of native plants in our xeriscape garden to make the Gardens become more reflective of the surrounding natural landscape.

To that end, local schools and teachers were invited to take part in a series of planting days throughout the month of October. We were overjoyed by the positive response received from school groups agreeing to take part in our water conservation planting events. Hence there was lots of excitement as Friends of the Gardens and master gardeners led a number of classes from local middle and high schools in planting over 4,500 native plants in our xeriscape garden. By engaging over 120 children and 30 teachers and volunteers in our planting events, the job proved to be an easy task.



Photo: Eva Antonijevic

McNicoll Park Middle School students planted masses of native plants in the Xeriscape Garden with master gardeners.

Now we are looking forward to the spring to observe how our plantings have fared. Sagebrush Nursery supplied us with our native seedlings. We planted masses of *Gilia aggregata* (scarlet gilia) (250 seedlings), *Eriogonum heracleoides (*parsnip-flowered buckwheat*)* (320), *Heuchera cylindrica* (round-leaved alumroot) (100), *Achnatherum hymenoides* (Indian ricegrass) (350), *Poa secunda* (Sandberg's bluegrass) (250) and *Koeleria macrantha* (junegrass) (250) to mention just a few. Additionally our board member lepidopterist Dennis St. John and I cast seeds in the garden collected from the wild this summer. Some of our favourites are *Lomatium dissectum* (fern-leaved desert-parsley), *L. utriculatum* (spring-gold), *Fritillaria pudica* (yellow bells), *Phlox longifolia* (long-leaved phlox), *Mentzelia laevicaulis* (blazing star), *Tetradymia canescens* (grey horsebrush), *Penstemon pruinosus* (Chelan penstemon), *Calochortus macrocarpus* (sagebrush mariposa lily) and *Arabis holboellii* (Holboell's rockcress). Dennis, of course looks at each plant not just for its aesthetic value but also for the importance of the habitat it provides for his beloved butterflies. For example he notes that *A. holboellii* is a host plant for Becker's white, large marble, Stella's orangetip, cabbage white and probably several other native whites.



Fritillaria pudica

For those of you that may not know, the Summerland Ornamental Gardens (SOG) comprise the largest publicly accessible botanical collection in the Okanagan region.

The Gardens were established in 1916 on a six-hectare site on land above Okanagan Lake, which later became the ornamental horticultural research section of the Agriculture Canada Research Station. In the early 1980s, Agriculture Canada phased out the ornamental horticulture program, and the Gardens fell into disrepair. In 1991, a group of local volunteers created the non-profit society Friends of the Research Station Gardens in collaboration with Agriculture Canada to conserve, enhance and maintain the gardens, and to continue educating the public about gardening possibilities in the Okanagan Valley. With the founding of

continued on page 6

Summerland, cont. from page 5

the Friends of the Gardens, the educational purpose of the gardens was restored.

The Friends created the first major Xeriscape Demonstration Garden in Canada in 1991. The Okanagan region has some of the lowest precipitation in Canada, limited water resources and some of the highest water consumption in the country, the largest percentage directed to outdoor use.

As the Okanagan Valley population and water demands grow even further, the Friends are stepping up efforts to help Okanagan residents make informed decisions about water use in their gardens.

In 2012, the Friends successfully secured project funds from the following granting agencies: Real Estate Foundation of BC, Environment Canada's EcoAction Community Funding Program, Okanagan Basin Water Board's Water Conservation and Quality Improvement Grant Program, Vancouver Foundation, Community Foundation of South Okanagan and TD Friends of the Environment Fund.

Planting native plants with schoolchildren is just one element of our Water Conservation Project. The great reward of having the students helping out at the gardens is not simply the immediate benefit of their volunteer labour but how it bodes for its future sustainability. No volunteer based organization can survive long term without community engagement.

Anyone wanting to get a tour of the gardens or to get involved can contact me at: friends.summerlandgardens@gmail.com.

Eva Antonijevic is the Community Programs Director at the Summerland Ornamental Garden.



A young native plant gardener lends a hand in the fall planting of the xeriscape garden. *Photo: Eva Antonijevic*

Friends of Summerland Ornamental Gardens
Xeriscape Demonstration Garden
Native Plants Planted in Fall 2012

SHRUBS
Amelanchier alnifolia (Saskatoon)
Artemisia tridentata (big sagebrush)
Ceanothus velutinus (snowbush)
Ceanothus sanguneus (redstem ceanothus)
Ericameria nauseosa (common rabbit-bush)
Elaeagnus commutata (silverberry)
Holodiscus discolor (oceanspray)
Philadelphus lewisii (mock-orange)
Purshia tridentata (antelope-brush)
Ribes cereum (waxy currant)

FLOWERS
Antennaria dioica (pussytoes)
Erigeron filifolius (thread-leaved fleabane)
Eriogonum umbellatum (sulphur buckwheat)
Eriogonum heracleoides (parsnip-flowered buckwheat)
Eriogonum niveum (snow buckwheat)
Gaillardia aristata (brown-eyed Susan)
Ipomopsis aggregata (scarlet gillia)
Heuchera cylindrica (round-leaved alumroot)

GRASSES and BULBS
Allium cernuum (nodding onion)
Bouteloua gracilis (blue grama)
Festuca idahoensis (Idaho fescue)
Koeleria macrantha (junegrass)
Acnatherum hymenoides (Indian ricegrass)
Poa secunda (Sandberg's bluegrass)
Pseudoroegneria spicata (bluebunch wheatgrass)

SEEDS
Lomatium dissectum (fern-leaved desert-parsley
Lomatium columbianum (Columbia desert-parsley)
Lomatium utriculatum (spring gold)

A closer look at native cherry sees beyond the bitterness

By Dawn Hanna



Photo: Dawn Hanna

Spring is in the air: Native pollinators such as mason bees delight in the appearance of bitter cherry blossoms.

Imagine a tree with almond-scented blossoms that herald the promise of spring, fruits that feed a multitude of birds and small furry creatures, and beautifully textured red bark.

You'd think that such a tree would inspire odes. That such a tree would be much sought after by gardeners and backyard wildlife enthusiasts. But you might be surprised to find that this tree is one of those native plants whose praises go unsung, whose odes have gone unwritten.

Prunus emarginata, otherwise known as bitter cherry, is more like the wallflower at the sidelines of the dance floor than the belle of the ball. For proof, you need go no farther than Google. Type in the common name of almost any deciduous tree native to BC – arbutus, bigleaf maple, black cottonwood, even red alder – and the phrase "beautiful tree" and you'll instantly get results. If however, you type in "bitter cherry", you will find only disappointment.

Bitter cherry is yet another in the long list of underappreciated BC native plants. But let us count the ways in which we can love and appreciate *Prunus emarginata*:

The delicate white blossoms of bitter cherry are a harbinger of spring. They emerge just after the leaves have appeared – and long before most other trees flower. On the coast, that can be as early as early as April (in the interior, it's a May/June thing). The species name, *emarginata*, refers to the petals. It's derived from the Latin *emarginatus*, which means "without a hem or border", but botanically speaking (according to the *Dictionary of Plant Names*) means "with a shallow notch at the end as though a piece has been removed." In the case of bitter cherry, it refers to the "notched" appearance that the apex of the petal can sometimes have.

Gazing at them,
I've grown so very close
to these blossoms;
to part with them when they fall
seems bitter indeed!
~ Saigyo, a 12th century Japanese priest/poet

While writers throughout the centuries have waxed, well, poetic about cherry blossoms, no such paeans have been written to the blossoms of our bitter cherry. Or to the roots, branches, bark or any other parts of the tree.

In fact, *Prunus emarginata* has its detractors. Some orchardists are not fans as it can be a reservoir of something called peach x-disease phytoplasma, which can be transmitted via insects to commercial peach trees. (The recommended orchardists' solution is to cut down the native species [i.e., bitter cherry], not remove the introduced species [i.e., peach]. Sigh.)

Prunus emarginata can also be a rather vigorous grower – more than 20,000 stems per hectare can spring up from a seedbank after disturbance. So bitter cherry is still sometimes controlled in tree plantations (either by herbicide or mechanical brushing) for fear they might inhibit the growth of young conifers. Old school foresters thought of bitter cherry as a "weed" tree – a volunteer species that as the BC Ministry of Forests Tree Species Compendium notes: "is not grown for timber production as its wood is of little commercial value."

However, foresters today recognize that *Prunus emarginata* does have other values. As a component of an early seral stage forest, it protects the soil. In riparian buffers, it helps reduce streambank erosion and protects aquatic environments. Bitter cherry has also been used in rehabilitating decommissioned roads, and in remediating mine sites, tailings and spoils.

And, if that were not enough, it also provides food, forage, cover and more for a wide range of wildlife species.

For example, bitter cherry is a larval host plant for a variety of

continued on page 8

Bitter cherry, continued from page 7

butterflies including admirals, azures, swallowtails, orange tips, elfins and blues. And after it is finished being a nursery for caterpillars, bitter cherry's blossoms provide nectar for adult butterflies.

Deer (both mule and black-tailed), elk and black bear browse on the leaves, buds and twigs of bitter cherry. Even non-native mammals such as sheep and cattle like to feed on bitter cherry leaves when they can get their tongues around them. But, bitter cherry – like most *Prunus* species – contains hydrogen cyanide in the leaves, twigs and seeds. And there have been reports of livestock poisonings.

Black bears also nosh on the namesake fruits, as do numerous species of birds, small mammals and even the occasional banana slug. But most humans find bitter cherry far too bitter for snacking. (One source suggests that a ratio of 10 parts sugar to one part bitter cherry can make the fruit palatable.)

Despite the intense bitterness of the fruit and the toxicity of its parts, bitter cherry was used by native peoples across North America in a wide variety of ways. The fruits were eaten fresh, used to make bitter cherry jelly or eaten as a laxative for "sour stomach."



Photo: Dawn Hanna

Beautiful and useful: A welcome bit of colour in the leafless days of winter, bitter cherry bark has been used for a multitude of purposes over the centuries.

Bitter cherry bark – which can be a beautiful red – was steeped or boiled and used to treat maladies such as heart trouble, tuberculosis, eczema, eye problems, colds and as a general tonic. Bark ash was rubbed on a baby's chest to protect him or her from rashes. The bark was also used to hold poultices, plasters and splints in place.

The bark – and other parts of the plant – were used in other non-medicinal ways.

If, for example, you go to the Museum of Anthrolopogy's online catalogue (http://collection-online.moa.ubc.ca/collection-online/home) and search for "cherry bark" (anthropologists, apparently, are not sticklers for plant names), you can see hundreds of baskets that were made using the bark of bitter cherry. It was also used by First Nations to make mats, ropes, string and as ornaments on bows, arrows and more.

These days, bitter cherry is being used in a variety of ways you may not have heard of. Its wood, with its fine grain and ability to take a high polish, is sought after by specialist furniture makers. It provide graft stock and disease resistance (via its genes) for commercial sweet cherry production. Bitter cherry is even being investigated for its spermicidal abilities.

So in a couple of months, when the almond-scented blossoms of bitter cherry emerge to signal the return of spring, be sure to take a moment and reflect upon the many attributes of *Prunus emarginata*. Perhaps you'll even be inspired to compose a haiku in its honour.

Between our two lives
there is also the life of
the cherry blossom
Basho, a 17th century Japanese poet



Pucker up: Let those who might sample the unripe fruits of bitter cherry (above) beware. Even the ripe berries are reputed to require 10 times the sugar to make them palatable.

Invading species can extinguish native plants despite recent reports

Ecologists at the University of Toronto and the Swiss Federal Institute of Technology Zurich (ETH Zurich) have found that, given time, invading exotic plants will likely eliminate native plants growing in the wild despite recent reports to the contrary.

A recent study published in Proceedings of the National Academy of Sciences (PNAS) reports that recent statements that invasive plants are not problematic are often based on incomplete information, with insufficient time having passed to observe the full effect of invasions on native biodiversity.

"The impacts of exotic plant invasions often take much longer to become evident than previously thought," says lead author Benjamin Gilbert of the University of Toronto. "This delay can create an 'extinction debt' in native plant species, meaning that these species are slowly going extinct but the actual extinction event occurs hundreds of years after the initial invasion."



Life on the edge: Native plants on a California reserve (in yellow bloom on mound at right in background) are found in a marginal, patchy habitat following invasion by exotic grasses (in green at foreground). *Photo: James Cornwell*

Much of the debate surrounding the threat posed to biodiversity by the invasions of non-native species is fueled by recent findings that competition from introduced plants has driven remarkably few plant species to extinction. Instead, native plant species in invaded ecosystems are often relegated to patchy, marginal habitats unsuitable to their nonnative competitors.

"Invasion has created isolated 'islands of native plants' in a sea of exotics."

However, Gilbert and co-author Jonathan Levine of ETH Zurich say that it is uncertain whether the colonization and extinction dynamics of the plants in marginal habitats will allow long-term native persistence.

"Of particular concern is the possibility that short term persistence of native flora in invaded habitats masks eventual extinction," says Levine.

The researchers conducted their research in a California reserve where much of the remaining native plant diversity exists in marginal areas surrounded by invasive grasses. They performed experiments in the reserve and coupled their results with quantitative models to determine the long-term impacts of invasive grasses on native plants.

"Invasion has created isolated 'islands of native plants' in a sea of exotics," says Gilbert. "This has decreased the size of native habitats, which reduces seed production and increases local extinction. It also makes it much harder for native plants to recolonize following a local extinction."

"Our research also allows us to identify how new habitats for native flora could be created that would prevent extinction from happening. These habitats would still be too marginal for invaders, but placed in such a way as to create 'bridges' to other habitat patches," says Gilbert.

~ from materials provided by the University of Toronto.

Plant sniffs out danger to prepare defenses against pesky insect

A plant may start to prime its defenses as soon as it gets a whiff of a male fly searching for a mate, according to researchers at Penn State University.

Once tall goldenrod (*Solidago canadensis* var. *scabra*) plants smell a sex attractant emitted by true fruit fly males, they appear to prepare chemical defenses that make them less appealing to female flies that could damage the plants by depositing eggs on them, the researchers said.

"It's become increasingly clear in recent years that plants are responsive to odours," said researcher Mark Mescher. "But previous examples of this are all plant-to-plant. For example, some plants have been shown to respond to the odour of insect-damaged neighbours by priming their own defenses. What's new about this is that it seems that plants may sometimes be able to smell the insects themselves."

A tall goldenrod plant's reaction to these odours also appears to make it less attractive to other insects that might feed on it.

(Editor's note: While tall goldenrod is not known to occur in BC, the province is home to at least eight species of Solidago.)

In a field study, the researchers exposed some plants to the odour of the male fly and then counted the number of exposed and unexposed plants on which female flies laid eggs by noting the distinctive scarring that occurs when females puncture the stem to lay their eggs inside.

The researchers found that females were significantly less likely to lay eggs on plants exposed to the male emission and about four times more likely to lay eggs on plants in a control group that were not exposed to this odour cue.

Compared to the control group, other herbivores, such as beetles, also caused significantly less damage to the tall goldenrod plants exposed to the fly emissions, both in the field and in laboratory experiments.



Solidago canadensis var. *scabra* (tall goldenrod)

"It would seem that the plant senses the odour of the fly," Mescher said. "Then, it primes its defenses so that it can respond faster to the threat."

Over years of evolution, the true fruit fly has established a close relationship with tall goldenrod, according to Mescher.

The male fly, which in the Northeast usually emerges in mid-May, perches on the upper leaves of the tall goldenrod plants and emits a chemical blend that may act as an attractant to the female flies, which emerge later. Once a female mates with the male, it deposits its eggs in the stem of the plant.

Fellow researcher John Tooker said that the female flies lay their eggs only in tall goldenrod plants, so there is a close association between the two species.

A few weeks after the fly's eggs hatch a bulbous growth, called a gall, appears on the stem of the tall goldenrod plant. The gall does not kill the tall goldenrod, but the galled plant does not produce as many seeds as those without galls. Its seeds also tend to be smaller and less likely to germinate.

"It seems that plants that are able to anticipate an attack by the fly and defend themselves against this damage will be more successful, producing higher quality seeds for the next generation," noted Tooker. "So there must be a strong advantage for plants that can perceive the fly odour."

The researchers are not sure how tall goldenrod plants are able to detect the odour of the fly.

"Our understanding of plant olfaction in general remains quite limited," said Mescher.

But the researchers said they believe that other plants may use insect odours to detect danger and prepare defenses.

"I suspect that this may be happening in many plants," said Tooker. "But we don't yet know how widespread it is."

~ Penn State University

Climate change effects on mountain habitats alter critical timing for hummingbirds

Erythronium grandiflorum, also known as glacier lily, is a tall, willowy plant that graces mountain meadows throughout western North America. It flowers early in spring, when the first bumblebees and hummingbirds appear. Or did.

The lily, a plant that grows best on subalpine slopes, is fast becoming a hothouse flower. In Earth's warming temperatures, its first blooms appear some 17 days earlier than they did in the 1970s, researchers at the University of Maryland have found.

The problem, say the biologists, with the earlier timing of these first blooms is that the glacier lily is no longer synchronized with the arrival of broad-tailed hummingbirds, which depend on glacier lilies for nectar. By the time the hummingbirds fly in, many of the flowers have withered away, their nectar-laden blooms going with them.



Yellow alert: Erythronium grandiflorum, also known as glacier lily or avalanche lily is an important nectar source for early season foragers in the subalpine.

Broad-tailed hummingbirds migrate north from Central America every spring to high-mountain breeding sites in the western United States. The birds have only a short mountain summer to raise their young. Male hummingbirds scout for territories before the first flowers bloom.



Broad-tailed hummingbird

But the time between the first hummingbird and the first bloom has collapsed by 13 days over the past four decades, say researchers David Inouye and Amy McKinney. "In some years," says McKinney, "the lilies have already bloomed by the time the first hummingbird lands."

The biologists calculate that if current trends continue, in two decades the hummingbirds will miss the first flowers entirely.

"Northern species, such as the broad-tailed hummingbird, are most at risk of arriving at their breeding sites after their key food resources are no longer available, yet ecologists predict that species will move northward as climate warms," says Saran Twombly, program director in the National Science Foundation's Division of Environmental Biology, which funded the research.

"These conflicting pressures challenge society to ensure that species don't soon find themselves without a suitable place to live."

Broad-tailed hummingbirds that breed farther south have fewer challenges.

"In Arizona, for example," says Inouye, "there's no obvious narrowing of the timing between the first arriving males and the first blooms of, in this case, the nectar-containing Indian paintbrush."

Higher latitudes may be more likely to get out of sync ecologically because global warming is happening fastest there.

As the snow continues to melt earlier in the spring, bringing earlier flowering, says Inouye, the mountains may come alive with glacier lilies long before hummingbirds can complete their journey north.

"Where have all the flowers gone?" then will be "where have all the hummingbirds gone?"

~ National Science Foundation

Volunteer opportunities

Below are current volunteer opportunities. Read them over. If you have any questions or if you're interested in helping out, please send a note to dawnhanna@telus.net

Field trip leaders
Consider leading a field trip at one of your favourite native plant haunts. You don't have to be an expert – just someone who wants to share! If you've attended an NPSBC field trip in the past, you'll know that many participants are terrific sources of information. What's important is getting out and experiencing native plants! Open to locations all over the province! *Time commitment: One trip a year might involve an hour or two of preparation time and the trip time itself.*

Field trip coordinator
It helps to have a central person who can pull information together about field trips – ensure that all the bases are covered (driving directions, meeting times and places, descriptions) and provide that information to the membership coordinator, the webmaster and Menziesia editor for promotion to the membership. *Time commitment: Dependent on the number of field trips, but likely 1 to 4 hours a month.*

Workshop coordinator
From time to time, the NPSBC offers workshops to its members. Recent workshops have included Bryophytes of the Garry Oak, Grasslands Ecology and Plant Photography. We would like to offer more workshops to members, but need someone to coordinate registration and venues. *Time commitment: Dependent on the number of workshops, but likely around 2 to 4 hours a month.*

***Menziesia* contributors**
No matter where you live in the province, you can always lend a hand with *Menziesia*. We are always looking for native-plant related articles. While it's great to get articles written by professionals, you don't have to be an expert to contribute. Write about a great place to find native plants in your part of the province; share a hint about about your successes (or failures) with native plant gardening; write a book review, pen a note about a native-plant related project (maybe a restoration project or budding nursery in your community). If it involves native plants and BC, it's a great way to start a conversation! *Time commitment: As much as you want.*

Project related coordination
There are a number of projects that the NPSBC has been involved with or would like to be involved with, but at the moment, we are short on members who can help coordinate. Examples include PlantWatch, social media such as Facebook, digitizing plant lists, coordinating native plant salvages, Millenium Seed Bank, etc. If you have an interest in any of these or have a native-plant project that you'd like to propose, please contact President Dawn Hanna at dawnhanna@telus.net



Gene helps plants flower in spring

Insight into plants' body clocks shows how they adjust to changing seasons, causing flowers to bloom in spring.

University of Edinburgh researchers tested computer models of gene networks in a simple cress plant to determine the role played by a protein, known as TOC1, in governing these daily cycles.

The model shows how 12 genes work together to run the plant's complex clockwork, and reset the clock at dawn and dusk each day. Researchers found that the TOC1 protein, which was previously linked to helping plants wake up, is in fact involved in dampening gene activity in the evening. This helps plants stay dormant at night.

"The 24-hour rhythms of biological clocks affect all living things including plants, animals and people, with wide-ranging effects on sleep, metabolism and immunity," noted Professor Andrew Millar.

The findings contradict what scientists had previously understood about the gene and its role in early morning activity. Scientists in Barcelona independently reached a similar conclusion to the Edinburgh team.

The two studies pave the way for further research to define how the cycles improve plant growth and allow plants to adapt to our changing environment.

These internal 24-hour cycles - known as circadian clocks - also allow animals and plants to make tiny adjustments as daylight changes, and adapt to changing seasons. Researchers hope their discovery will bring them a step closer to understanding other seasonal rhythms that affect plants and people.

"We are now far better placed to understand how this complex process impacts on the plant's life and what happens when the rhythms are interrupted, for example by climate change," said Millar.

Coming events

NATIVE PLANT SOCIETY OF BC

SOUTH COAST NATIVE PLANT STUDY GROUP
(A subgroup of the Native Plant Society of BC)

Presentations
Thursday, February 7
The Enigmatic Genus *Botrychium* in British Columbia
with Jamie Fenneman
The genus *Botrychium* goes by a variety of colourful names – moonworts, goblins, grape ferns – and is one of the most fascinating genera of vascular plants in BC. Their small size, cryptic nature, confusing taxonomy and mysterious biology have combined to place them among the most sought after and enigmatic of the province's plants. We are fortunate in that the Pacific Northwest appears to hold the highest diversity of species, particularly of the subgenus *Botrychium* (the moonworts), in the world. Join botanist Jamie Fenneman as he uncovers some of the secrets of the genus *Botrychium*, including a discussion of both the biology of the plants as well as the diversity of species that exist in the province, and see why it has become a favourite of so many botanists.

Thursday, March 7
Research on the Ethnobotanical Virtues of Devils' Club and Chaga with Thomas Courtemanche
Out of our forests come some of the most fantastic and powerful medicines. One has been the most used medicinal plant on the NW coast for years and the other is a circumboreal superherb emerging as a powerful medicine. Respectively known as Devil's Club (*Oplopanax horridus*) and Chaga mushroom (*Inonotus obliquus*), they might do wonders for our health. We will look at the ecology, biology and mythology behind these plants; be prepared to sample these fascinating medicines with geographer, outdoor enthusiast, and UBC horticultural student Thomas Courtemanche.



Botrychium lunaria
common moonwort

Thursday, April 4
Archival Research on Botanists and Native Plants
with the students of UBC Geog 429,
Students from UBC's Geography 429 (Research in Historical Geography)S will present their projects on archival research on botanists and native plants in British Columbia. More details to come!

Presentations are held at 7 p.m. in the Cedar Room at VanDusen Botanical Garden at 37th and Oak in Vancouver. Admission is free for NPSBC members, a $2 donation is suggested for non-members.
Please check www.npsbc,ca for updates on additional field trips and workshops to come.

VICTORIA NATIVE PLANT STUDY GROUP
(A subgroup of the Native Plant Society of BC)
Evening presentations have resumed for the season.

Please check the website at www.npsg.ca for more information.

VANDUSEN BOTANICAL GARDEN

Saturday, February 23
Seedy Saturday
A celebration of heritage varieties and organic gardening featuring more than 30 growers, seed companies and exhibitors. Native plant seeds are also available for sale by the VanDusen Seed Collectors. Admission by donation. Held at the Floral Hall from 10 a.m. to 4 p.m.
Sunday, March 17
Medicine Wheel Ceremony
Join elders from the First Nations community in a spiritual ceremony to mark the changing of the season. Wear clothing appropriate for the weather, bring a small stone to bless and leave at the wheel as well as a food item to share at the pot luck meal at the conclusion of the ceremony.
Held from noon to 3 p.m. at the First Nations' Medicine Wheel in the Canadian Heritage Garden. For more information, contact Marina Princz at library@vandusen.org or 604-257-8668.

Sunday, April 28
VanDusen Plant Sale
THE sale of the year. More than 40,000 plants for sale, including a variety of native plant species. Catalogues available in advance at the Garden Cashier for $2 starting April 1. Bring your wheelbarrow and a friend. Master gardeners will be on site to give advice. Other features include Plant Check and Plant Pick Up areas. Visa, MasterCard, personal cheques and cash accepted. Admission to the Garden is free this day. Held from 10 a.m. to 4 p.m.

UBC BOTANICAL GARDEN

March 24
Drawing Nature
Join botanical painter Alison Watt in the Garden Pavilion for this one day class covering some basic drawing techniques and how to create a wonderfully full palette with only a limited number of watercolours. Learn to make your drawings more vibrant by adding colour to small items

Events, continued on page 14

Events, cont. from page 13

like leaves, cones, stones, berries, feathers, shells, etc. The course runs from 10 a.m. to 4 p.m. Cost is $100 for public, $90 for UBCBG members. For more information, go to www.botanicalgarden.ubc.ca or call (604) 822-3928.

Tuesday, April 23
Biodiversity in the Garden
Why do some gardens seem run down, constantly bothered by invasive weeds, pests and diseases, while others only seem to get more robust and interesting as they age? The answer may as simple as increasing complexity in the landscape. Join Douglas Justice, associate director and curator of collections at UBCBG, as he describes ecological systems and how complexity and biodiversity make gardens more resilient. The talk runs from 5:30 pm to 6:30 pm at the Reception Centre at the UBC Botanical Garden, 6804 SW Marine Drive.

Please check the UBCBG website at www.botanicalgarden.ubc.ca for the latest offerings.

NATURE VANCOUVER BOTANY SECTION

Thursday, February 21
Truffles and Tribulations with Brooke Fochuk
This introductory talk will discuss the relationships between truffles, trees and animals. We will look at common truffles (subterranean fungi) found in the Pacific Northwest and harvesting practices as well as some of the current research being done. As well, we will look at how truffles are cultivated and finally harvested. We will discuss uses for truffles, methods of preservation and finish with a demonstration by Dexter the truffle dog!

Thursday, March 21
The changing ecology of Southeast Asian rainforests with Jedediah Brodie
Trees and animals in tropical forests depend on each other for seed dispersal and food, and these mutualistic interactions help support the astounding biodiversity of rainforest ecosystems. Brodie will explore the ecology and evolution of plant-animal interactions in tropical Asia, and look at how they are affected by human disturbances such as hunting, logging and climate change. *Jedediah Brodie is an assistant professor of Conservation Ecology* at UBC, and *serves on the board of directors for the Society for Conservation Biology Asia Section.*

Thursday, April 18
Seeing Beyond the Obvious with Leona Isaak
Nature lovers and photographers can be a powerful force in helping to preserve this natural world. Leona will show you how to improve your garden photography – from the overall perspective of your garden to the small plants and flowers. The presentation is for anyone with a camera – from a simple point and shoot to a digital SLR. The evening also includes Leona's photographs. *Leona has been teaching and leading photography workshops for over 20 years.*

All presentations take place at 7:30 at the Unity Church, 5840 Oak Street in Vancouver.For more information, go to www.naturevancouver.ca

Douglas fir needles may sterilize nano devices for medical applications

Recently published research suggests that the needles of *Pseudotsuga menziesii* (Douglas fir) could be used to sterilize nano devices destined for medical applications.



Chemist Poushpi Dwivedi of Motilal Nehru National Institute of Technology in Allahabad, India explains that one of the most troubling problems in biomedicine is bacterial infection at the site of implanted medical devices, prosthetics and sensors. Despite advances in sterilization procedures and aseptic measures pathogenic microbes can still invade biomaterials and tissues.

The researchers are developing an antimicrobial, self-sterilizing composite material that uses Douglas fir needles, silver and chitosan (a substance derived from the shells of crustaceans such as crabs and shrimp) to create what is called a bionanocomposite that can be used to safely coat medical implants and surgical devices to preclude microbial growth.

Silver nanoparticles have been tested widely for their potential as antimicrobial agents (silver is known to have bactericidal properties). Using biological agents has emerged as an efficient and effective way to make novel types of silver nanoparticles with uniform size and shape and biocompatible surfaces for use in medicine. The team has now used an extract from *Pseudotsuga menzietii* together with silver nitrate solution to generate nanoparticles. These particles can then be readily dispersed in chitosan polymer to make a material that can coat metals and other materials. The plant extract acts as a natural chemical reducing agent to convert the silver ions in the nitrate solution to nanoscopic silver metal particles.

The full study about this remarkable use of Douglas-fir is titled *Potentiality of the plant Pseudotsuga menziesii to combat implant-related infection in the nanoregime* and can be found in the *International Journal of Biomedical Nanoscience and Nanotechnology.*



Flora ID Northwest

Flora ID Northwest's computer plant keys contain complete descriptive information for all vascular plant species known to grow in British Columbia, the Pacific Northwest and Southwest Canada. They include both native and introduced species.

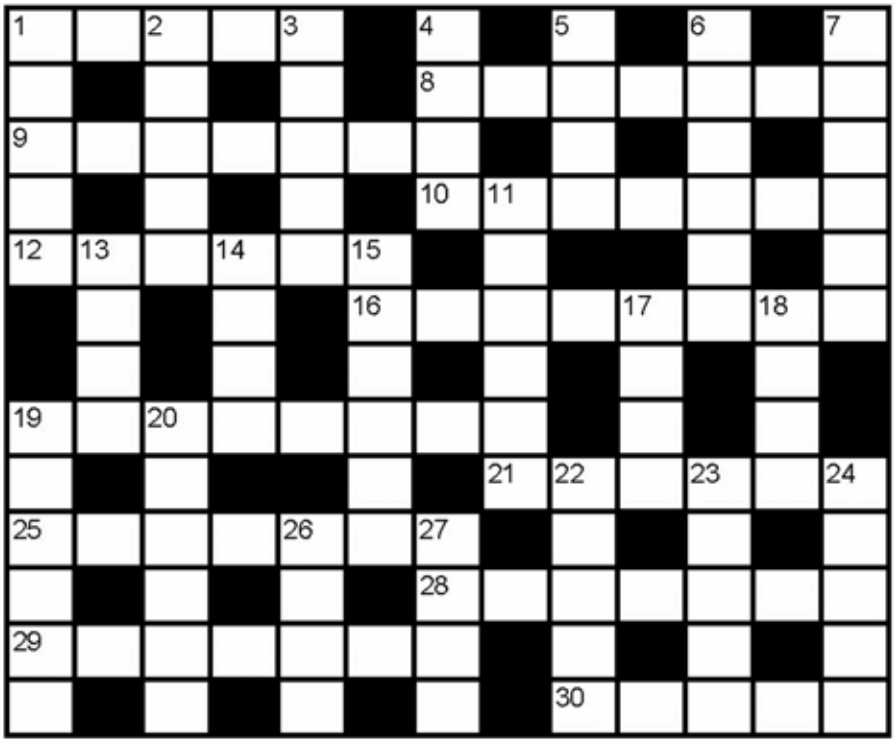
The keys are interactive and let you identify species in a few simple steps. The software includes:

- Definitions of terms (with line drawings)
- Colour photos
- Descriptions of the habitat and range
- Extensive reference
- Help screens to guide you through the program
- A user's guide and tutorial

These CD-format keys are available through the NPSBC at the special discount price of $75 for the BC edition and $150 for the Southwest Canada or Pacific Northwest editions, including postage and handling (Compare with the regular price of US$100 for the BC edition and US $200 for the others). For an order form, go to www.npsbc.org

Note: Flora ID operates on PCs only.

Cannings' Cryptic Crossword



By Richard Cannings



ACROSS

1. Kind of duty goes both ways (5)
8. Unicellular alga from European Union confused angel (7)
9. Cracks United Nations canal structures (7)
10. Wild gingers as members of the Araceae (7)
12. Bambi loses tail—oo!—in large grass (6)
16. Second-rate reptilian sound in snowstorm (8)
19. Nori post office right next to harpy cocktail (8)
21. Chromosome site temperature creates grasshopper (6)
25. Socialist hordes become algal phenomenon (3,4)
28. Direction in pains produce dry seeds (7)
29. Bogs, for example, in funky aromas (7)
30. Former spouse at Alma Mater Society tests (5)

DOWN

1. Morsel of liquor in truck radio (5)
2. Membrane found in level umbel (5)
3. Tropical tree about… about nothing (5)
4. My French – a raised plain (4)
5. Silver Egyptian god in Indian city (4)
6. Wager university on the French birch (6)
7. Church service journalist piled up (6)
11. April's muddled, looking for corkscrew (6)
13. Gold note comes back in hairstyle (4)
14. Small glitch in flab liposuction (4)
15. British award the old 500 followed (6)
17. Final letter on company metal (4)
18. Skates on sunshine? (4)
19. Alpine habitat for Spanish month (6)
20. Right – a plate of brassicaceous vegetable
22. Red pigment from disorganized chore (5)
23. Lichen even in nuisance tax (5)
24. Good man set to go back to trials (5)
26. Mid-month ideas lose a little something (4)
27. Each saint from where the wise men came from (4)

Answers on page 16

How it works

Every clue contains the definition of the answer plus a cryptic clue to the word or the letters that form it. Some examples:

1. Back an Oz IRA for snowbird destination? (7) Answer: ARIZONA (an Oz IRA backwards)
2. Echo loses hot, lethargic feeling for environmental study. (7) Answer: ECOLOGY (echo loses H (hot) + logy (lethargic feeling)
3. Mashed pea seed for fishing or diving (4,3) Answer: DEEP SEA (anagram of pea seed; watch for words like confused jumbled, crazy, mashed -- they often signal an anagram.)

Cryptic crossword answers explained

from puzzle on page 15

C	I	V	I	C	■	M	■	A	■	B	■	M
R	■	E	■	A	■	E	U	G	L	E	N	A
U	N	L	O	C	K	S	■	R	■	T	■	S
M	■	U	■	A	■	A	S	A	R	U	M	S
B	A	M	B	O	O	■	P	■	■	L	■	E
■	F	■	L	■	B	L	I	Z	Z	A	R	D
■	R	■	I	■	E	■	R	■	I	■	A	■
P	O	R	P	H	Y	R	A	■	N	■	Y	■
A	■	A	■	■	E	■	L	O	C	U	S	T
R	E	D	T	I	D	E	■	C	■	S	■	E
A	■	I	■	D	■	A	C	H	E	N	E	S
M	U	S	K	E	G	S	■	R	■	E	■	T
O	■	H	■	S	■	T	■	E	X	A	M	S

ACROSS

1. Civic (reads the same in both directions); 8. Euglena (EU + angel anagram); 9. Unlocks (UN + locks); 10. Asarums (as +arums); 12. Bamboo (BAMB(i)-OO); 16. Blizzard (B + lizard homonym); 19. Porphyra (PO + R + harpy anagram); 21. Locust (locus + T); 25. Red tide (double meaning); 28. Achenes (ache-NE-s); 29. Muskegs (musk-EG-s); 30. Exams (ex + AMS).

DOWN

1. Crumb (C-rum-B); 2. Velum (hidden in leVEL UMbel); 3. Cacao (ca + ca + o); 4. Mesa (mes + a); 5. Agra (ag +Ra); 6. Betula (bet + U + la); 7. Massed (mass +ed.); 11. Spiral (April's anagram); 13. Afro (or + fa backwards); 14. Blip (hidden in flaB LIPosuction); 15. Obeyed (OBE + ye + D); 17. Zinc (Z + Inc.); 18. Rays (double meaning); 19. Paramo (para + mo.); 20. Radish (R + a + dish); 22. Ochre (chore anagram); 23. Usnea (even letters in nUiSaNcE tAx); 24. Tests (St + set backwards); 26. Ides (ide[a]s); 27. East (ea + St.).

Join the Native Plant Society of British Columbia

You'll receive **menziesia** four times a year and receive first notice of our presentations, workshops and field trips.

Annual Membership fees

- ☐ Individual $25
- ☐ Household $30
- ☐ Student $20
- ☐ Sustaining member $75
- ☐ Support NPSBC's work with a donation $_____

Please make cheques payable to Native Plant Society of BC.



1. **Join online at www.npsbc.ca/about.html** ***or***

2. **Fill out the form and mail it to the address below**

Name _____

Address _____

City _____ Prov _____

Postal Code _____ Phone _____

Email _____

menziesia is published four times a year by the Native Plant Society of BC, Suite 195, 1917 West 4th Avenue, Vancouver BC V6J 1M7

Publication Agreement No. 40063490