



menziesia

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Vaccinium membranaceum
(black huckleberry)

Photo: Dawn Hanna

Cover story: *Vaccinium membranaceum*

Photographer Dawn Hanna captured the cover image of *Vaccinium membranaceum*.

She writes: "Every autumn, I make numerous trips to the subalpine in Cypress Provincial Park in West Vancouver and Mount Seymour Provincial Park in North Vancouver. The colours of all the foliage are jaw-droppingly gorgeous. And then there are all these beautiful *Lycopodiums*, *Selaginellas* and -- at Cypress -- *Botrychium multifidum* (leathery grape fern).

It's a reminder of just how amazing native flora can be -- and a reminder that it's not just flowers that deserve to be captured in a photograph."



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

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NPSBC

Native Plant Society of British Columbia

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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

Ron Long, President

rlphoto@shaw.ca 604-469-1651

Virginia Skilton, Vice President

dvskilton@shaw.ca 604-536-3529

Eleanor Anderson, Treasurer

ke_anderson@shaw.ca

Helen Gowans, Secretary

easterisland05@gmail.com

Dawn Hanna, Past President

dawnhanna@telus.net

Hugh Daubeney

hdaubeney@shaw.ca 604-731-8537

Jamie Fenneman

fennj@hotmail.com

Evening speakers coordinator
vacant

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

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Arbutus menziesii:

A beauty undimmed by the seasons

By Moralea Milne

Glossy, evergreen leaves with a silvery underside; thin, peeling, cinnamon-coloured bark that reveals a satiny smooth, green trunk that matures to deep reddish brown and clusters of scarlet to orange berries; the arbutus tree embodies the colours of the Christmas season. Incorporating a few of the gracefully contorted red twigs with branches of white-fruited snowberry (*Symphoricarpos albus*) and orange-hipped Nootka rose (*Rosa nutkana*) creates an outstanding native flora arrangement for any holiday table.

Although the red berries can persist past Christmas time, they have often already been consumed by band-tailed pigeons, cedar waxwings, varied thrush and many other species of birds and animals. The white, honey scented spring flowers are ambrosia to bees and the succulent new leaves produced after a fire are eaten by deer and elk.

Arbutus, known by the scientific name *Arbutus menziesii* and commonly called madrone in the United States, is restricted to our “Mediterranean” type climate, with dry summers and warm winters. Because good drainage and open, bright conditions are critical, they often inhabit rocky, nitrogen-poor locations where they are protected from drying winds, frequently in association with Garry oak (*Quercus garryana*) and Douglas fir (*Pseudotsuga menziesii*). They are adapted to survive periodic fires by the ability to resprout from the base or from underground burls and this adaptation commonly produces multi-stemmed specimens. They are drought tolerant and their deep, widespread roots help to prevent erosion.

The BC Register of Big Trees catalogues a record specimen at Witty’s Lagoon with a height of 28.4 m (92 ft), a circumference of 4.15 m (13 ft 7 in) and a spread of 21.03 m (69 ft), definitely worth a visit to the park. Look for it just past the Nature House,

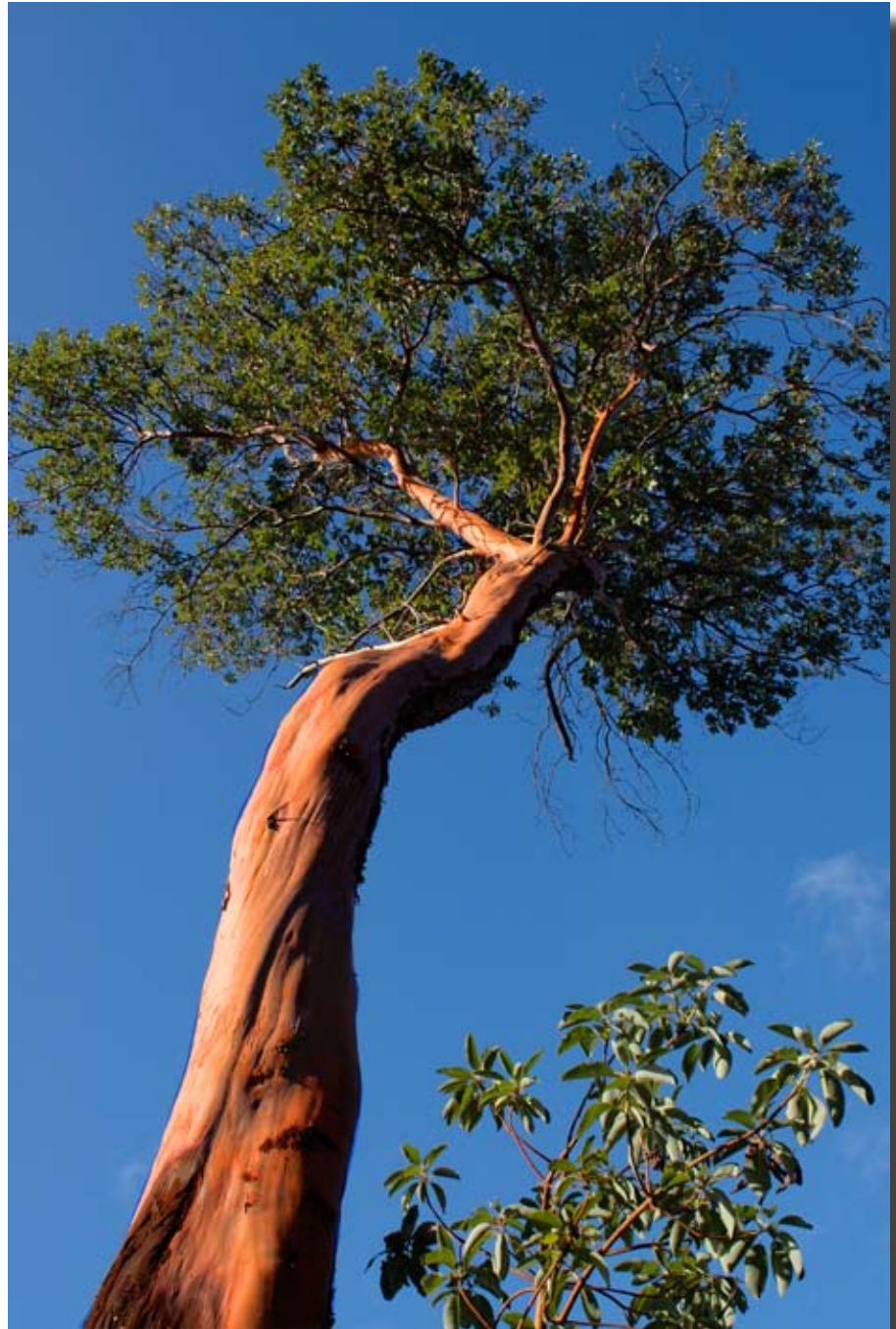


Photo: Dawn Hanna

on the way to the bridge that crosses Sitting Lady Falls. Other nearby record size trees occur at Esquimalt Lagoon, in Colwood and at the Esquimalt naval base. (To find the location of other record-sized arbutus trees, go to http://bigtrees.forestry.ubc.ca/files/2011/11/Big_Trees_Register.pdf)

Arbutus trees were the equivalent of a modern day drugstore, as First

Nations from California to British Columbia made use of the trees. Berries were eaten fresh, made into cider, cooked and dried for later consumption or used as bait to catch steelhead. Either the berries or the bark were added to the cooking of camas bulbs, to impart

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Arbutus, cont. from page 3

a pinkish colour. The berries and leaves were used to make a preparation to treat skin conditions, especially from contact with poison oak (*Toxicodendron diversilobum*) and the leaves were chewed to alleviate stomach aches and cramps. The bark and leaves were used as a post-childbirth contraceptive and were part of a mixture to treat tuberculosis. The bark was made into a tea for colds and sore throats and an infusion of the bark was applied as a beauty wash, its astringent properties used to close pores and soften skin.

The Straits Salish people tell of survivors of the “great flood” anchoring their canoes to arbutus at the top of Mount Newton and they honour the role the arbutus played in their survival by not burning the wood in their stoves.

The rest of us haven’t discovered quite so many uses for arbutus. Although the wood is fine grained and dense, it is brittle and doesn’t dry evenly, causing cracks. It is used for pulp, firewood and woodworking and it produces a beautiful veneer.

If you enjoy participating in the miracle of creation, or perhaps you would like to have arbutus on your property, they are easy to germinate from seeds. Soften the berries in water and separate out the seeds. Pre-chill seeds in the fridge (not the freezer compartment!) for two months or plant seeds in fall in well-drained, coarse soil, in a protected, sunny location out of the wind. They produce a long taproot and deeply resent being transplanted, so it is practical to plant the seeds in their permanent home. If they are to be started in a pot, they should be given plenty of root depth and kept in the pot until they are 2 feet tall. Use a soil mix of peat, sand and gravel. Although drought tolerant, any plant will survive better if they are watered deeply, once a month during the summer, for the first few years. However, the trees are subject to several soil borne fungus problems and the water should not be allowed to splash from the soil to the trunk or leaves. Use a deep mulch to retain moisture and prevent contamination by the fungi. They are somewhat slow growing, so plant now to leave a legacy for your children and community.

To ensure the health and longevity of arbutus on your



Photo: Dawn Hanna

property remember they are adapted to dry, poor soil conditions. Watering and fertilizing them as frequently as you maintain your lawn will eventually kill them. Preserve the root zone by not disturbing or compacting the soil and permit the leaves to slowly rot in place.

A quote from Arthur Kruckeberg, a Northwest naturalist, and professor emeritus of botany at the University of Washington, in *The Natural History of Puget Sound Country* encapsulates the beauty of arbutus: “Foliage, bark, flower and fruit of madrone consummate one of Nature’s most ornamental works of art”.

Database simplifies finding Canadian plant names and distribution

Environmental consultants, research ecologists, nature conservation agencies and many others all need to put names to plants at one time or another. The sources used often are not scientifically up-to-date, making it difficult to figure out the accepted name or proper vernacular to use. The VASCAN database simplifies this task for all users.

The database content was developed by a team of botanists led by Dr. Luc Brouillet, curator of the Marie-Victorin

Herbarium. Data are maintained and improved thanks to input from the whole botanical community. The software was developed under the leadership of Peter Desmet, formerly of Canadensys, a Canada-wide biodiversity information network based at the Biodiversity Centre.

The VASCAN database comprises names for 5,124 vascular plants in Canada, Saint Pierre and Miquelon (France) and Greenland.

The database contains accepted scientific names as well as synonyms,

and Canadian vernacular names in English and French (recommended or alternate regional usages). For each plant, the distribution within Canada at the provincial or territorial level is provided both in map and text form. All information is documented with a source.

Data are being continuously updated with the help of Canadian botanists and amateur scientists. All VASCAN data have been released to the public domain and are fully accessible without restriction.

Friend or Foe? A perspective on natural pest management of native plant gardens

Editor's note: This article appears courtesy of the California Native Plant Society.

By Betsey Landis

Managing native plant gardens is a learning experience. Let the native plants and native fauna either control, repel, destroy, or adapt to "pests." An established healthy garden is a lively community of plants, insects, birds, reptiles, snails, slugs, worms, small mammals, you, your family, pets, and visitors.

You select new plants for your garden that meet your requirements for beauty, structure, and usefulness. The native plants you select will do well in your garden if your garden has the right soil texture, nutrients, drainage, and room for necessary root growth, suitable sun exposure, and seasonal water supply.

How do you know which garden resident or visitor is friend or foe? Walking around the garden frequently or sitting and watching the garden is the best way to learn. Pest management consists of monitoring life cycle changes in the plant and animal species, the weather, and whether you, as garden manager, are supplying too much or too little water, keeping garden litter under control, washing off powdery mildew, detritus, and dust from leaves as needed, removing weeds before they flower and seed, and pruning at the best time.

For example, in intense sunlight, pruning to open up dense canopy can cause previously shaded plant leaves and stems to sunburn (sunscauld). In extreme heat, growing plant tips or buds may shrivel and soft stems split, appearing diseased. Extremely cold temperatures usually blacken new growth. In either temperature extreme, the entire plant may die. Native plants may recover by sloughing off dead growth or stump sprouting.

Is it surprising that discussions of integrated pest management involve environmental factors affecting soil,



Photo: Dawn Hanna

Friend or foe? It's all a matter of perspective. For this fly, the crab spider is definitely not friendly. But for the native rose

drainage, nutrients, heat, cold, and sun exposure? Unless major disturbance (drought, flood, fire, bulldozers) or invasion (alien pests, large mammals) of the garden occurs and disrupts the garden's natural defenses, there is no need to resort to any pesticides or other radical measures.

Which garden inhabitants are "pests," friends, or both? Native plants will tolerate insect damage when the insects supply pollination or other services to the plants later. Consider some caterpillars, messily munching plant parts, but then morphing into butterflies that pollinate flowers and enhance the garden with their beauty. As garden manager, be patient. Discover which caterpillars are essential to the life in the garden and which caterpillars you may have to deal with.

Plant species may time their flowering and fruiting cycles so they are completed before an insect is in the most plant-predatory part of its life

cycle. Or they may schedule a second period of growth for the more benign or beneficial part of a plant predator's life cycle. Many plants have chemicals in their mature leaves, stems, and roots that repel or are toxic to plant predators.

Don't like flies or beetles? Some hover fly genera (e.g., *Syrphus*) are pollinators as adults. Their larvae eat aphids and other plant predators. Stink beetles (*Eleodes* spp.) consume decomposing plant material as adults, but their larvae eat plant roots. Rodents and scorpions eat stink beetles. Both larval and adult ladybird beetles (family *Coccinellidae*) enjoy aphids, mealy bugs, other soft-bodied insects, and mites.

Spiders are essential, fascinating members of the garden community, especially when an insect population explodes. They hide in tunnels and crevices, spin gauzy clumps, cast strong nets of elaborate design, lurk

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Friend or foe, cont. from page 5

under leaves and petals, or drift through the air on gossamer threads. If you do not like them, respect them as hunters.

Keep in mind that birds and rodents need more food when raising families. A feeding area with seeds and cut-up fruit far from the garden helps lessen impacts of this temporary population explosion on your more vulnerable plants. During spring and summer, visiting the garden shows the resident mammals and birds who is in charge. Observing their feeding activities tells you when to tour the garden to protect your plants, and when not to disturb the creatures eating the plant pests.

Betsey Landis is an author, lecturer, and researcher on California native plants and native plant gardening, and a member of the Los Angeles/Santa Monica Mountains Chapter of CNPS.



While we might not appreciate the leaf-munching behaviour of the caterpillar form of Lorquin's admiral, the butterfly's presence in a native plant garden more than compensates for a little damage.



Researchers cite horse dung as a growing threat to protected areas

An Australian research team has found that horse dung – from horses ridden by recreational riders – are a significant source of introduced weeds and invasive plant species in protected areas.

Associate Professor Catherine Pickering, of Griffith University, said the study looked at the number and types of weed seeds that can be dispersed through horse manure.

"We reviewed 15 studies on seed germination from horse dung; six from Europe, four from North America, three from Australia and one study each from Africa and Central America," Pickering said.

"Of the 2,739 non-native plants that are naturalized in Australia, 156 have been shown to germinate in horse dung. What is very concerning is this includes 16 of the 429 listed noxious weeds in Australia and two weeds of national significance."

The study found a similar threat is emerging overseas with seeds from 105 of the 1,596 invasive/noxious plant species in North America also germinating in horse dung.

"Not only are the seeds dispersed through dung but the manure provides the means by which the introduced plant to take hold," Pickering said. "Habitat disturbance from trampling has been demonstrated to further facilitate the germination of seedlings from dung in both natural and experimental studies."

The study highlights the range of plant species that have the potential to be dispersed over long distances but the extent to which this dispersal is harmful depends on the individual plant species. Some plants germinate from dung and go on to reach maturity and flower, while others germinate but don't survive. But there are other factors to consider.

"Additional threats come in the form of trampled soils and vegetation, nutrient addition via dung and urine, and changing hydrology via damage to riverine systems," Pickering said. "To maintain the conservation value of protected areas, it is vitally important to understand and manage the different potential weed dispersal vectors, including horses."

"Legislators everywhere should take these into consideration before opening parks to this recreational activity."

The study findings have been published in the journal *Ecological Management and Restoration*.



A tale of two species: Reflections on invasives and natives

By Hugh Daubeney

This title seems applicable to a big screen saga involving aliens invading earth. However, it is equally applicable to the situation of invasive plant species affecting the welfare of native species. I was reminded of this last spring when I was staying in Cornwall in southwest England. *Rhododendron ponticum* (common rhododendron) was flowering in all its glory. The vigorous bushes covered with large clusters of violet-purple flowers were everywhere, flourishing along the sides of the steep, twisting, narrow roads and along the railroad tracks, at the edges of cultivated fields, in the woods and on banks leading down to the beaches and even in some of the magnificent gardens in the county.

The species also occurs along the mild Atlantic coast north to Scotland and in Ireland. Fossil records indicate the species was in the United Kingdom (UK) before the last ice age but it did not recolonize when temperatures rose. In modern times, its range has included parts of the Mediterranean region of southern Europe and Turkey and through to northern India.

However, in the late 18th and early 19th centuries, plants of the species were brought to the UK for ornamental purposes and, as well, to be used as rootstock for less vigorous types in temperate maritime climates. Plants spread both by sucker-producing roots and by seed. Because growth is lateral and horizontal, a single plant can eventually cover many metres with thickly interlaced, impenetrable branches.



Rhododendron ponticum (common rhododendron) is a beautiful shrub, but is causing ecological problems in the United Kingdom and other European countries where it has been introduced.

The thickets shade out endangered native flora, including mosses and lichens. The species is capable of dominating large areas of wetland with its canopy, while the main stems and roots are well back on suitably dry land. In

other words, plants do not appear to have preference as to soil type. Another disturbing trait, the honey produced from the pollen can be poisonous if consumed in sufficient quantities. The only method of control appears to be "rhodiebashing", essentially digging out the plants and subsequently destroying them. This is an ongoing

practice. I could not help but think of the great concern, and rightfully so, in British Columbia with the conservation of our limited populations of native rhododendron, particularly *R. macrophyllum*.

The *Rhododendron ponticum* situation in the UK is somewhat analogous to that of Scotch broom (*Cytisus scoparius*) in southwestern BC. Scotch broom is native to milder areas of Europe, including Scotland in the north and the Mediterranean countries in the south. In 1850, Captain Walter Grant intentionally brought the broom to BC, via seed from plants growing in Hawaii where it had been introduced from Scotland. Grant put three plants into his garden near Victoria from which it spread in a few years up the east coast of Vancouver Island before invading the Gulf Islands and southern mainland.

Through the years spread was encouraged by highway departments that used plants as bank stabilizers because of deep root structure and



Cytisus scoparius
Scotch broom

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rapid growth. At the same time the bushes with their brilliant yellow pea-like flowers became synonymous with spring in the coastal areas. They flourished in open areas such as roadsides, power lines and meadows. The vigorous bushes compete with native plants, including those of the endangered Garry oak ecosystems, as well as newly planted coniferous forests. Control of *C. scoparius* appears to be at about the same stage as that for *R. ponticum* in the UK and is often referred to as "broombusting". It is essentially another form of "rhodiebashing".

The rhododendron in the UK and the broom in BC are just two more examples of species, introduced largely for ornamental purposes, that have subsequently run amok and in doing so endanger native species.



Scotch broom has invaded the sand dune ecosystem in Iona Beach Regional Park.

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 of Michigan State University 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.

The CBF cold response pathway was discovered by Thomashow's team, and it has been shown to be active in plant species as they ready themselves for cold weather.

"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 other 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.

Identifying the genes involved in this process gives researchers the potential tools to fine tune this regulation and increase crop productivity, he added.



Photo: Dawn Hanna

Polystichum munitum (sword fern)

Book review

Wildflowers of the Coast: Word Portraits of Selected Flowering Plants and Shrubs of the Pacific Northwest

John G. Fitch (with illustrations by Bonnie Moro)

Paperback, 180 pages, \$8.95

Lucretius Press, 2013

Review by Grahame Ware

This is a delightful book. It isn't often that poetry and botany are integrated in prose. But who better to do this than University of Victoria Emeritus Classics Professor John Fitch?

A deep love of nature pulses throughout this book as well as a sense of place heightened by an understanding of history – Greek, Roman and British Columbian. This book is very refreshing compared to the freeze-dried descriptions found in field guides and botanical texts.

In a sense, this is John Fitch's ode to coastal Pacific Northwest wildflowers done with a dash of a call-to-arms for the use of narrative and less jargon in natural history and, specifically, botany. As he says in the introduction:

"The possibility of conveying botanical information, in addition to aesthetic appreciation, through poetry demands a further comment. In the last century poetry unhappily became divorced from systematic and scientific knowledge of all kinds. This divorce was due in part to the notion that systematic knowledge, however precise, is not objective: it is created by human beings, from a certain point of view, often by imaginative leaps of thought, with passion and excitement. These are characteristics of human thinking that are not at all alien to poetry. Admittedly, the relationship between poetry and knowledge is constantly in need of renewal, as knowledge changes and advances with dizzying speed. But perhaps the current divorce is only temporary."

We hope so. Seventy poems are presented, covering plants such as *Erythronium oregonum* (white fawn lily), *Philadelphus lewisii* (mock-orange), *Dodecatheon hendersonii* (broad-leaved shooting-star) and *Brodiaea coronaria* (harvest brodiaea).

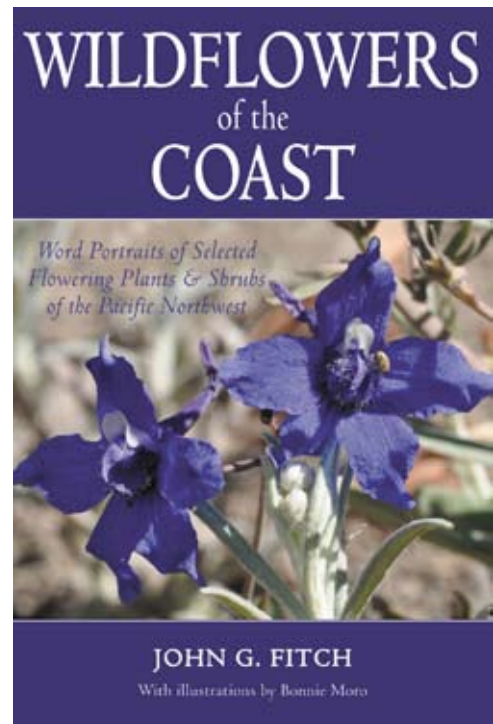
Just 20 illustrations accompany the text and I wish there was more of Bonnie Moro's fine work. But this is a nice production and it is well worth the money.

What I like is the way that Fitch uses his classical sensibilities combined with the use of a didactic narrative structure to inform easily and poetically in regards to a given plant. For example, let's look at the beginning of his entry on *Rosa nutkana* (Nootka rose):

"It thrives in open places, roadsides, abandoned fields, the edges of beaver ponds. Its stock, deep-rooted and sturdy, produces abundant flowers borne singly at the tips of the canes, which are armoured with serious thorns. The flowers are simple but showy, often two or three inches across, their wildness emphasized by the unkempt stamens at the centre; delicate and short-lived, but rich in beauty and scent."

This passage reads like Chess Lyons if he'd gone to Reed College. Easy and wonderful stuff. The strength and information of the poetic descriptions have a lateral way of imparting knowledge about the coastal wildflowers of the Pacific Northwest. I really believe that this project by Fitch is not only an artistic achievement but a scientific one as well.

In this sense, he has succeeded on the level that he intended, namely to demonstrate the ability of poetic narrative with its sense of space and meditation – to inform on deeper levels than mere monosemic and digital discourse. This is especially true when dealing with the English language, which relies more on simile and image than any other language that comes to mind.



Here is the entry for *Rubus parviflorus* (thimbleberry).

"Some thimble! The berry is more like a shallow dome, a skull-cap. Even on the underside, where the berry was held on its white receptacle, the hollow is more of a cone than a thimble. The flesh is soft as a raspberry, needing only a nudge to fall ripely into your hand or your mouth. The flower is fine and showy, like a Nootka Rose (but smaller, and white not pink), with five broad, overlapping petals, crinkled like tissue paper, and with shaggy stamens at the centre."

The writing is subtle yet evocative and quite precise. We can recommend this book without reservation for those quiet days in winter when one's soul longs for spring and summer but all we have are memories. Fitch's words are the only stimulus we need to transport us back to those warmer times.

Wildflowers of the Coast is available in select stores and online at amazon.com. One can also purchase the book directly from the author by email: jfitch@uvic.ca

Researchers look at harvesting effects on beargrass

Beargrass (*Xerophyllum tenax*) is an ecologically, culturally, and economically important plant in Canada and the western United States. Recently, a report published by the U.S. Forest Service's Pacific Northwest Research Station, identified critical knowledge gaps and areas for future research. It also documented how changes in disturbance, including fire, may affect the species across its range.

"Beargrass is emblematic of a web of natural and cultural diversity," noted Susan Stevens Hummel, a research forester at the station and lead author of *The Natural and Cultural History of Beargrass (Xerophyllum tenax)*. "This means that organisms and processes – like people, plants, and pollinators – are interrelated."

Beargrass is a member of the lily family that, when in bloom, produces a single stalk capped with clusters of white flowers. It grows in a wide variety of habitat types and conditions, but in just two geographic areas – from the mountains of northwestern Washington south into west-central California, and from Canada south into Wyoming along the Rocky Mountains.

The plant provides food, habitat, and raw material for an array of wildlife species – from bees and flies, to rodents, bears, deer, and elk. Beargrass has longstanding cultural value and is harvested by First Nations for use in basketry and regalia, and for medicinal and decorative purposes. It also is coveted by the commercial floral greens industry, which generates more than \$200 million a year in the Pacific Northwest.

Hummel, together with her coauthors at the Xerces Society and the station, found that historical and contemporary land use practices in beargrass habitat, combined with the rise of the commercial floral greens industry, are creating shifts in disturbances within beargrass habitat.

"We found that beargrass is experiencing decreased disturbance from natural and human-caused fire, but increased disturbance from leaf harvest by the floral industry," Hummel said. "Our report looks at each of these different disturbance types and their potential effects on beargrass, its pollinators, and on human gatherers."

Among the report's findings:

- Disturbance effects on pollinators and on beargrass reproduction and abundance are not well understood;



Xerophyllum tenax (beargrass)

- Traditional and commercial harvesters seek different leaf properties and use different methods to harvest beargrass;
- No coordinated effort exists among landowners to monitor the volume of beargrass being harvested each year.

"This report clarifies for land managers the importance of beargrass and offers researchers a list of knowledge gaps about the plant," Hummel said. "By addressing some of the key issues identified in the report, forest management practices can be developed to help sustain the ecological web of which beargrass is a part."

The full report can be obtained at www.treesearch.fs.fed.us/pubs/42172

Researchers decode birch tree genome sequence

Scientists from Queen Mary, University of London have sequenced the genetic code of a birch tree for the first time. The genome, which is around 450 million letters, will help researchers understand the genetic basis of traits such as disease resistance and growth shape.

There are over 60 species of birch trees around the world, with huge ecological and commercial importance. They are an essential part of the boreal forest located around the North Pole, which is the world's largest land-based ecosystem.

The team sequenced the genome of a dwarf birch (*Betula nana*) from Scotland, a species that is nationally scarce in Britain but common further north in Europe. (Editor's note: According to the *Illustrated Flora of British Columbia*, *Betula nana* is found in BC in wet to moist bogs, fens, streamsides, marshes, meadows and rocky slopes from the montane to the alpine zones; and is common throughout BC east of the Coast-Cascade Mountains.)

Lead researcher Dr Richard Buggs, from Queen Mary's School of Biological and Chemical Sciences said: "Dwarf birch is an excellent model for birch genomics, as its small size makes it easy to grow and experiment with, and it has a smaller genome than some other birch species. This genome sequence is a valuable resource for scientists studying birch trees around the world."

The threat of an American pest is currently hanging over British birch



Autumn in the boreal: Dwarf birch leaves create a colourful contrast to lichen.

populations. The bronze birch borer - a type of beetle - is a common and serious threat to birch trees in North America. British birch species show unusually low resistance to the pest, unlike their American counterparts, and if the pest were to come into the UK then it could cause widespread devastation.

(Editor's note: The bronze birch borer (*Agilus anxius*) is native to North America, but is considered to be a significant urban pest, affecting mostly paper birch (*Betula papyrifera*), according to the Ministry of Forests pest guide. However, BC birch species are also affected by introduced pests and diseases such as birch leafminers [introduced from Europe])

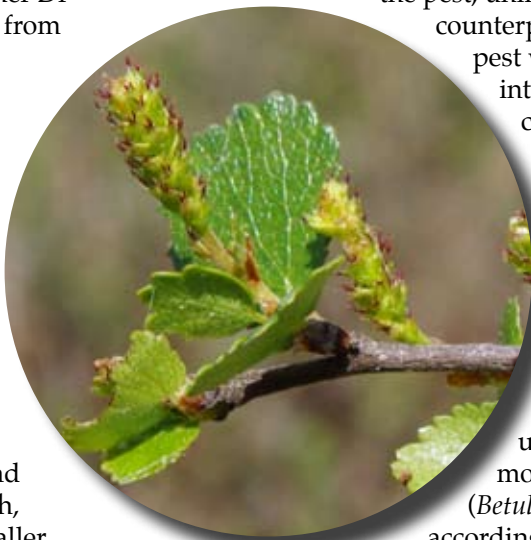
Alan Watson Featherstone, executive director of Trees for Life,

a charity that conserves dwarf birch near Loch Ness, said: "This is a tremendous breakthrough. Together with our woodland restoration work at Dundreggan, where we have one of the greatest concentrations of dwarf birch in Scotland, it will do much to benefit the conservation of this important species."

Queen Mary, alongside conservationists Trees for Life, and Highland Birchwoods are partnering to supervise a PhD student, James Borrell, who is surveying the genetic diversity of dwarf birch populations in Scotland.

Borrell noted: "This newly sequenced genome will be a hugely valuable tool in our effort to conserve this species. We are building on this to survey the genomic diversity of dwarf birch trees in Britain to inform management strategies."

The research was carried out jointly with the University of Edinburgh and funded by the Natural Environment Research Council. It was published in the journal *Molecular Ecology*.



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 npsbcmembership@gmail.com

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 npsbcmembership@gmail.com

Growers test more native species for sale

As consumer interest in native plants increases, nursery growers are challenged to expand their product range by adding new native species to their collections.

Surveys have indicated that landscape architects and master gardeners would like to use more native plants, but that a broad palette of native plants is not currently available from most growers.

Growers looking to capitalize on the native plant market are looking to scientists to recommend new species suitable for the commercial nursery industry.

In a recent issue of *HortScience*, researchers Julia Cartabiano and Jessica Lubell from the Department of Plant Science and Landscape Architecture at the University of Connecticut report on their study of four native shrubs that are relatively unknown in the horticultural trade: *Ceanothus americanus* (New Jersey tea), *Corylus cornuta* (beaked hazelnut), *Lonicera canadensis* (Canadian fly honeysuckle), and *Viburnum acerifolium* (maple-leaf viburnum). They said that these shrubs have the potential to become revenue generators for the nursery industry if successful propagation protocols are developed.

Cartabiano and Lubell evaluated the impact of cutting timing on propagation success of the four native shrubs.

Cartabiano and Lubell said that, although *Corylus cornuta* and *Viburnum acerifolium* showed the most promise as commercially viable nursery crops, further propagation research could validate all four of the native species in the study as recommended crops for general wholesale nurseries.



*Corylus
cornuta*

Coming events

NATIVE PLANT SOCIETY OF BC

SOUTH COAST NATIVE PLANT STUDY GROUP

(A subgroup of the Native Plant Society of BC)

December 5

BC Plants at risk; Recent activities of the CDC with Jenifer Penny
Conservation Data Centre botanist Jenifer Penny will talk about ongoing activities and special projects of the CDC including ranking and mapping plants in BC, field work for the Nature Conservancy of Canada in the Okanagan and the Kootenays, work updating the BC flora list, listing and mapping of macro-lichens, mosses and hepatics, inventory training sessions and more ...

Jenifer Penny has been worked at the CDC since 1995. She holds a Bachelor of Science in Biology from University of Victoria and is a registered professional biologist. She is the co-author of *Rare Native Plants of BC* and author/co-author of four COSEWIC status reports. She is chair of the BC Flora update committee.

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 more presentations, 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

The calendar of events for 2014 is still being finalized. Please check the



Photo: Dawn Hanna

Lupinus rivularis streambank lupine (red-listed in BC)

website at www.vandusengarden.org for new offerings of programs, courses and workshops to come.

UBC BOTANICAL GARDEN

The calendar of events for 2014 is still being finalized. Please check the website at www.botanicalgarden.ubc.ca for details of courses, workshops and other offerings to come.

NATURE VANCOUVER BOTANY SECTION

Thursday, January 16

Nitrogen fixation in the boreal forest: Putting the "N" in Nature

with Nicole Linfoot
Have you ever looked at the splendour of the forest around you and wondered what makes the trees grow? All plants need nutrients to grow and the health of our boreal backyard relies on the tireless work of unseen microbes in the soil recycling nutrients for the plants in the ecosystem. One such nutrient is nitrogen. Nitrogen is critical in many life processes and its presence or absence often dictates the productivity of the entire ecosystem. Just how nitrogen is cycled in the boreal and what microorganisms are responsible is one of the most current research topics in ecology today; scientists are only now starting to unravel the mystery. Join us in learning about what makes the nitrogen

cycle so unique in our forest and why ecologists are trying so hard to understand it.

Nicole is the Assistant Bander at the Lesser Slave Lake Bird Observatory. She has been banding birds for 6 years now and has banded over 6,000 birds. She graduated from Northern Alberta Institute of Technology with an Honours Diploma in Renewable Resources in 2008.

Thursday, February 20

A Walk on the Wild Side: Exploring the ethnobotanical riches of Wreck Beach and human wellness

with Judy Williams

An account of medicinal and other uses of plants used by First Nations and pioneers that can be found at Wreck Beach. The presentation also examines how some of these plants are being used in research today to combat such diseases as multiple-sclerosis and asthma.

Judy learned respect and love for our Pacific Northwest plants from her part-Haida grandfather who taught her Chinook jargon for many of their names. Later in secondary school, a biology class became a treasure chest enabling her to learn the common and Latin names for many of the plants she already knew from roaming the woods in the area since childhood.

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

Bracken fern thrives despite lesser defenses against herbivores than flowering plants

They dominated Earth for 200 million years and numerous different species can still be found all over the world: mosses, horsetails and ferns. Researchers from the Max Planck Institute for Chemical Ecology in Germany, have now found that bracken ferns (*Pteridium aquilinum*) do not release any volatiles when they are attacked – unlike many flowering plants.

Such an emission of volatile compounds may attract the pest insects' enemies, such as ichneumon wasps or predatory bugs that parasitize herbivores. Researchers found that volatile emissions can be also elicited in fern fronds, if they are treated with the plant hormone jasmonic acid (a substance that induces the synthesis of volatile substances in flowering plants). But bracken ferns do not use this defense to fend off herbivores.

Ferns are so-called vascular cryptogams, because they don't produce flowers and seeds like the spermatophytes or seed plants. Ferns reproduce and spread entirely via spores. Their metabolic activities and especially their defenses against herbivores, however, are similar to flowering plants.

Ferns can be found in large populations all over the world, although their evolutionary age is more than 400 million years. *Pteridium aquilinum* is one of the most widely distributed plant species and can occur in a variety of habitats.

Herbivores attack bracken ferns strikingly less often than flowering plants. One explanation could be that fern fronds contain especially toxic substances that keep pest insects at bay: Chemical composition analysis detected indanones, cyanogenic glycosides and tannins, amongst other substances. But can these "living fossils" also use indirect defenses against their enemies, like other plants do?

Beans, corn, cotton, poplar trees, potatoes and other flowering plants produce the plant hormone jasmonic



Tough enough?: Insect herbivores prey on bracken ferns, just as they do on other plants. But bracken ferns don't use the same array of defenses.

acid in their leaves after herbivore attack. Jasmonic acid stimulates the synthesis of volatile substances, such as compounds of the terpenoid family. This defense strategy is used by plants to attract the enemies of the insect larvae that are eating it.

Venkatesan Radhika, PhD student in the Department of Bioorganic Chemistry of the institute, wanted to find out whether bracken ferns could also emit these attractants when they were attacked. She used larvae of two species to damage the fern fronds: fern specialist *Strongylogaster multifasciata* and the generalist herbivore *Spodoptera littoralis*. She also used a robotic device, MecWorm, which continuously punched the fern frond with a metal bolt, thereby mimicking the mechanical wounding caused by feeding herbivores. The result: Fern fronds released only very small amounts of volatile compounds, if any at all. Even the signal molecule jasmonic acid could hardly be detected in the fronds.

However, if fern fronds were directly treated with jasmonic acid,

they responded like the leaves of flowering plants and released a typical odour bouquet. The scientists studied this effect in more detail and discovered that the release of volatile terpenoids from the fern could even be induced by treatment with early precursors of jasmonic acid synthesis (OPDA and linolenic acid). Biochemical experiments revealed that these volatile terpenoids are produced by the same metabolic pathway already known from flowering plants.

"It is likely that the herbivory-induced accumulation of jasmonic acid was not sufficient to trigger the production of volatile compounds," says Wilhelm Boland, director of the department.

Is it possible that ferns do not need indirect defenses by means of volatile emission? Is the presence of highly toxic substances in the fern fronds enough to fend off herbivores? "We can only speculate," says Boland. It remains interesting that even without some defenses that bracken ferns successfully colonize our planet to this day.



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.

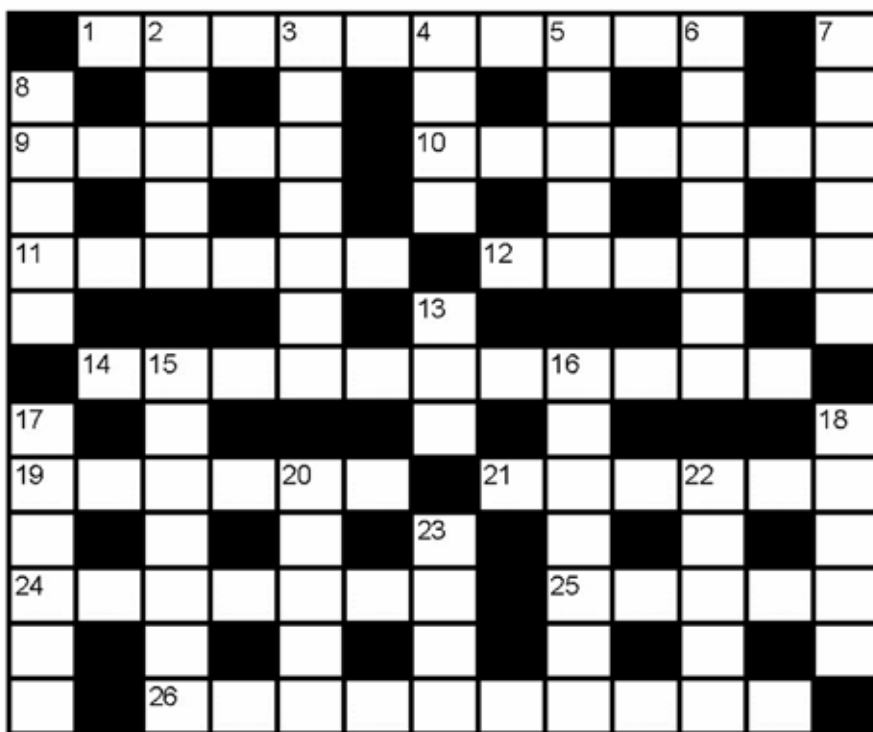
The keys are interactive and let you identify species in a few simple steps. The software includes:

- 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. With uneasy laughter, I add a name for salal (10).
9. A rock star's brush with nettle (5)
10. Large bovine drops left on stampede to marsh plant (7)
11. Confused coons take time for spherical brown alga (6)
12. Adds new twigs on good, flat boats (6)
14. Coastal shrub in Kootenay town – no fruit (11)
19. A minor bully can relax in army (2,4)
21. Lizards, for example, return mixed-up socks (6)
24. Conservation officers in glue produce simple sugar (7)
25. The Arabic communist came back to the small tree (5)
26. Half of only company to take stage for club-moss (10)

DOWN

2. Those French people go after ax to get between leaves and stems (5)

3. The French member of the wedding party knows what's important in choosing an airplane seat (3,4)
4. Poor traveller feared spider (4)
5. Straight-edged king (5)
6. Where in Madrid could you add Parisian iron for a source of water? (7)
7. Greek letters in streets provide glittering rocks (7)
8. Consuming university is coming back to no good (5)
13. !Kung returned, losing king but finding African antelope (3)
15. Genderless use a lax mix (7)
16. Led mare confused by shiny stone (7)
17. Harass endangered mammal (6)
18. Sack leader in two universities on both ends of railway for loan-sharking (5)
20. Tolerant in ways to ice (5)
22. Large antelope eats last of fuzz in vine (5)
23. Half of head politician is a source of fibre (4)

Answers on page 16

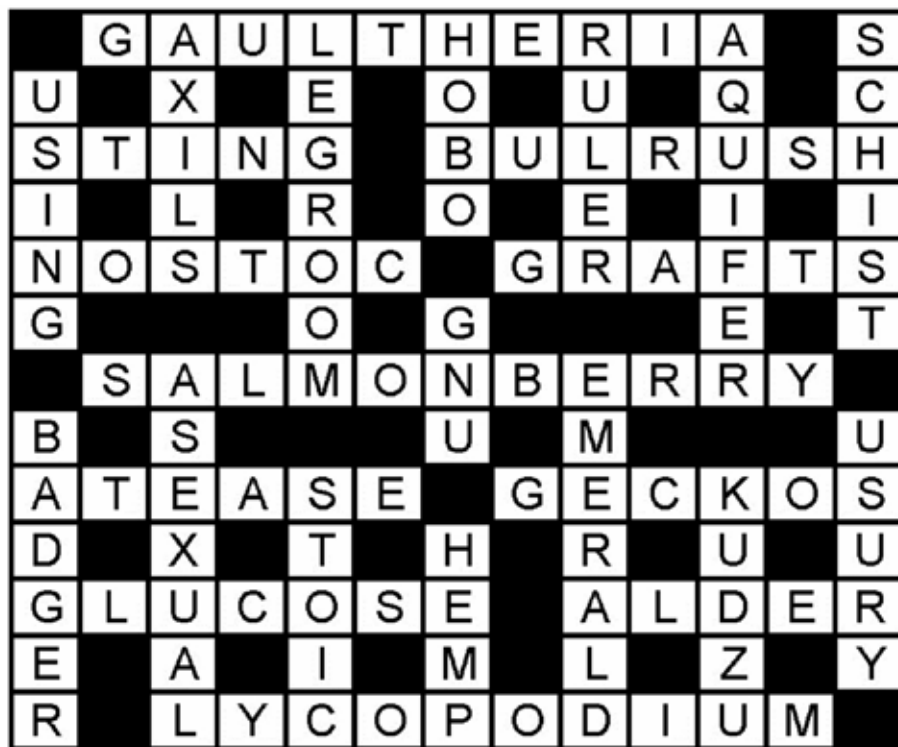
How it works

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



ACROSS

1. Gaultheria (laughter anagram + I + a); 9. Sting (double meaning); 10. Bulrush (BUL(l) + rush; 11. Nostoc (coons anagram around T); 12. Grafts (G + rafts); 14. Salmonberry (Salmo + N + berry); 19. At ease (a tease); 21. Geckos (e.g. backwards followed by sock anagram); 24. Glucose (gluCOSe); 25. Alder (al + red backwards); 26. Lycopodium ([on]LY + CO + podium).

DOWN

2. Axils (ax + ils); 3. Leg room (le + groom); 4. Hobo (double meaning); 5. Ruler (double meaning); 6. Aquifer (aqui + fer); 7. Schists (S-chis-TS); 8. Using (U + is backwards + N + G); 13. Gnu (Kung backwards without K); 15. Asexual (use a lax anagram); 16. Emerald (led mare anagram); 17. Badger (double meaning); 18. Usury (S [first letter of sack] in two Us + RY); 20. Stoic (hidden in wayS TO ICe); 22. Kudzu (kud-Z-u); 23. Hemp (he [first half of head] + MP).

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