menziesia

Newsletter for the NPSBC Native Plant Society of British Columbia
Summer 1999 Volume 4, Issue 3

Spring Weekend in Vancouver

Photography of native plants — and native plant habitats in the urban context — were the focus of the Spring Weekend and Annual General Meeting of the NPSBC Native Plant Society of British Columbia, held in Vancouver April 23-25, 1999.

Beginning on Friday evening, the University of British Columbia Botanical Garden and a spectacular sunset over the Strait of Georgia provided the setting for a talk by noted local photographer, Ron Long. Ron works for Simon Fraser University and for 15 years was the photographer in the Biology Department where he covered a broad spectrum of plant and animal subjects. He has photographed over 1,000 species of British Columbia plants — a ten-year project — and estimates that he has images of all of the liliaceous species in the province.

Ron carefully drew the blinds in the Reception Centre to block out the sunset and make sure the lighting conditions were correct and then began a very informative illustrated talk on his extensive work photographing native plants. He introduced members to the tools and techniques that he has developed over his career including his use of the macro-lens. He then presented multiple photographs of each species, contrasting the different methods he had described.

The following day, Ron and some of the members participated in a workshop photographing plants in the BC Native section of the Botanical Garden. Participants commented on the personal attention that Ron gave to each of them and they are looking forward to meeting with him again - once their film has been developed - to review their photographs. Perhaps some of these pictures will find their way into the Society's proposed photographic archive. [see page 2]

For those less photographically-inclined, a field trip was held in Pacific Spirit Regional Park, an 800-hectare second-growth forest bounded by river on the south and ocean to the west and north. Formerly part of the University Endowment Lands, the site surrounds the university campus and became an official regional park in 1989. The trip was led by Don Benson, a member of the Vancouver Natural History Society who has botanized in the Vancouver area for ten years. Participants covered quite an extensive route through ravines in the north section of the park to see vine maple, *Acer circinatum*, salmonberry, *Rubus spectabilis*, stink currant, *Ribes bracteosum* and Pacific bleeding heart, *Dicentra formosa*. They concluded the trip at the nature reserve to view the flowering slender toothwort, *Cardamine pulcherrima* var. *tenella*.

Following a brief rest, members gathered together at the Arbutus Club, an attractive venue near the University to hold its Annual General Meeting and Devil's Club Dinner. Unfortunately, David Williams was unable to speak on Wells-Gray Provincial Park due to a persistent case of pneumonia but we are

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NPSBC Board of Directors

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certain to hear Dave's enthusiastic descriptions of his work with the Friends of Wells-Gray at some future date. After a most delectable dinner, it was back to work for the members to review and refine the proposed Code of Ethics for the Society.

There was thoughtful discussion about the meaning of specific words and implications of different phrasing and in the end, members came to consensus on a Code for the Society (see page 3). This document is meant to direct the activities of members of the Society and it is hoped that it can be used to promote knowledge and understanding of native plants and habitats amongst all British Columbians. Development of more substantive ethical use principles and guidelines will proceed based on the code.

On Sunday morning, members travelled east for a tour of the Delta Nature Reserve. The reserve is located on the outer edge of Burns Bog, the largest raised peat bog on the west coast of the Americas. The reserve covers 60 hectares or 5% of the bog and is its only protected portion. Much of the bog is used for landfill and cranberry farming and it is under constant threat of further development

Described as "a northern island in a southern clime," the bog features many subarctic species growing at their southernmost extreme. Three looping trails took visitors on boardwalks through this portion of the 5,000 year old bog which incorporates a red-cedar grove and a spiraea meadow. Featured plant species include stunted shore pine *Pinus contorta* var. *contorta*, labrador tea, *Ledum groenlandicum*, bog-laurel, *Kalmia microphylla*, velvet-leaf blueberry, *Vaccinium myrtilloides* and cloudberry, *Rubus chamaemorus* as well as the everpresent sphagnum moss.

The tour was led by Tracy Hetherington and Suzanne Diamond of the Burns Bog Conservation Society who discussed bog ecology and the continuing pressures to develop the bog, include a recent failed effort to make it the site of the relocated Pacific National Exhibition. Suzanne was also a wealth of information of the medicinal uses of plants and members are looking forward to the book she is planning to publish on this topic.

Fortunately, the weather was sunny throughout most of the weekend (unlike most of the rest of spring this year) and a pleasant time was had by all participants. Thanks to Claudia Schaefer and Theresa Duynstee for organizing the Spring Weekend and to Ron Long, Don Benson, Tracy Hetherington and Suzanne Diamond for sharing their knowledge with our members. §

Proposed photographic archive

Prompted by the photography lecture and field workshop with Ron Long at the Spring Weekend in April, members present at the Annual General Meeting discussed the possibility of developing a photographic archive for the Society. The purpose of the archive would be to have images of native plants and habitats in British Columbia on file which could be used by members for research and educational purposes. Members have been questioned about an archive through the membership survey and there has been substantial interest expressed in having such a resource.

The preferred format would be slides and the method of distribution of images is being discussed - in slide form, or as images on the Society's proposed new website or on CD-ROM. Photographs from members and non-members alike would be welcome and credit would be given

wherever the image was used in publication. The possibility of cooperating with public institutions with other photographic collections was also discussed. If you have an interest in contributing to this project, contact the Society office in Vancouver. §

New directors

The Board welcomes three new directors to its ranks, Susan Bastin and Brenda Costanzo from Victoria, and Frank Skelton from Vancouver. The Board maintains its existing regional balance with three members from Vancouver Island and South Coast Islands Region, seven from the South Coast, three from the Interior and one from the North Coast region. Our new President is Tom Wells from Delta and the new Vice-President is Claudia Schaefer of Vancouver; Ross Waddell continues as Secretary and Sylvia Mosterman as Treasurer.

Susan Bastin is manager of C.E. Jones & Associates Nursery, a large wholesale (and newly retail) nursery that has been supplying restoration projects for many years. Susan has been responsible for opening a retail component and has done a lot of work to promote the Society in the Victoria region through the nursery and at events such as the Victoria Flower & Garden Festival. She formerly worked in the nursery industry in the Interior.

Brenda Costanzo manages the herbarium in the Biology Department at the University of Victoria. She also teaches about native plants at Camosun College and worked on the establishment of native plant gardens at the University and Swan Lake Christmas Hill Nature Sanctuary. Brenda was instrumental in organizing the popular Native Plant Symposium at the University, held annually in March.

Frank Skelton is an enthusiastic native plant gardener whose garden on the west side of Vancouver has been featured on national television and in books and magazines. He has a native plant consulting business, Twinflower Enterprises and is Chair of the Native Plant Section at the VanDusen Botanical Garden Spring Plant Sale. He also serves on the organizing committee of the UBC Celebration of Native Plants. Formerly, Frank was an electron microscopist at the Agriculture Canada Research Station at the University of British Columbia, and he maintains an interest in plant microscopy.

Biographies of the new President, **Tom Wells** and Vice-President, **Claudia Schaefer**, will be featured in coming issues of *Menziesia.* §

Important message about membership

Please note that at the 1999 Annual General Meeting of the Society, the Associate Membership category [$15 - Non-Voting] was discontinued and a new **Household Membership** was instituted. Household memberships are open to individuals living at the same address and provide for full participation in the Society including voting privileges (two votes per membership) and holding office. Members are informed of all activities of the Society and the household receives one copy per issue of the newsletter.

Renewing members can do so in the Associate category for the remainder of 1999, however this category will no longer be available to new members.

Also note that all memberships begin on January 1 and expire on December 31. Persons who join in the last quarter of the membership year (October 1 to December 31) have the option of receiving back issues of the quarterly newsletter, *Menziesia*, for that year or having their membership rolled over to the next year beginning January 1. §

Code of Ethics

[Adopted at the Annual General Meeting of the Society on April 24, 1999.]

MEMBERS OF THE SOCIETY:

- Understand that plants are essential to all life.
- Acknowledge the intrinsic value of native plants and habitats.
- Recognize the botanical history and diversity of the province.
- Acknowledge human impacts on native plants and habitats.
- Are respectful of and receptive to First Nations' traditional knowledge and unique relationship with the plant world.
- Conserve native plants and habitats and maintain biodiversity of natural ecosystems.
- Preserve and protect rare native plant species and habitats.
- Promote restoration of altered land and reintroduction of appropriate native plant species.
- Encourage establishment of native plants in developed areas.
- Share knowledge and promote understanding of native plants and habitats.

The next phase of development will be more substantive principles and guidelines directing activities in four areas. Members who wish to contribute to the discussion in any of these areas can contact the Society office in Vancouver.

- Field Activities
- Research & Education
- Collection
- Conservation & Restoration

Crossword Answers

Across: 1 Stigma, **3** Sap, **7** Tendril, **8** Petal, **9** Leaf.
Down: 1 Stolons, **2** Whorl, **4** Panicle, **5** Petiole, **6** Pollen.

Plant Jumble Answers

Douglas-fir, Sitka spruce, lodgepole pine, white spruce, limber pine.
Secret tree: Hemlock.

NPSBC Grass Workshop

Westridge Farms, South Langley, May 28 - 30

By Brenda Costanzo

The 25 people who attended Adolf and Oluna Ceskas' grass workshop at the end of May, experienced not only great weather, but a wonderful setting and exceptional instructors. The weekend began on Friday evening with an introduction to grasses by Adolf, held in one of the converted horse barns of our hostess, Robbie Arber. I think we were all a bit anxious and intimidated as we sat down in front of the dissecting scopes. However, Adolf began with the basics by introducing five morphological characters of the Poaceae Family that were important for us to understand. He and Oluna patiently described these characters to us as a warm-up exercise: spikelet, floret, glume, lemma and palea. During the review at the end of the hour, Adolf asked us to define all five. When he got to the last one, someone told him it was actually "Pale Ale," and on that note, the class adjourned to the "Artful Dodger" pub down the road...

Saturday morning we began in earnest, utilising taxonomic keys provided by Adolf and materials collected from the farm. We worked our way through approximately six genera. As we dissected, discussed and delved into the grass specimens, we discovered there was *sooo* much to learn: Leymus or Elymus; Poa or Festuca ?!? Adolf's hints included: learn the five characters, diagram the lemma (length, shape, venation, hairiness) and use the best available keys (references appear at the end of this article). We discussed taxonomic name changes and synonymy, and what the 'newest' name was. Adolf commented that in 20 years these new names would revert to the old names. So, some of us figured we would just stick with the old ones and wait it out.

After lunch on Sunday, we toured the old horse meadows of Westridge Farm to identify and review what we had learned in the morning. We walked up the property to investigate the ornamental beds around Robbie's home. Westridge Farms, established in 1995, cultivates 600 species of ornamental and native grasses. Robbie raised thoroughbred horses for 20 years before switching to this new venture. The display beds around Robbie's home introduced us to the marvellous colours, textures, and structural features that grasses add to a garden. Best of all, they require no mowing!

On Saturday evening Eva Antonijevic presented a wonderful slide show to the group. Eva works part-time for Robbie and her slides demonstrated the beauty of a variety of grasses and sedges that are grown on the farm. The seasonal diversity of these plants both impressed and inspired us. Eva thoughtfully provided a species list of her slides, a booklet on Westridge Farm and a nursery species list.

Adolf (centre) and participants having a close look at young grass leaves - "are they rolled or pleated?"

Photo: David Williams

Another warm, wonderful day dawned on Sunday, and we walked to a nearby park where we sought out more grass species. Unfortunately, we saw only about a dozen native or introduced species throughout the park due to the disturbed nature of the site. We did get to practise our field skills, and it was also an opportunity to talk with other members of the group. We wrapped up after lunch so that the participants could travel back home to the Interior and the Island.

I am sure everyone who attended, no matter what their background, gained confidence in keying out grasses. We congratulate and thank the Ceskas and David Williams for all the hard work and preparation that went into the workshop. We thank our hosts Robbie and Eva for their invitation to use the farm for the weekend, and also for initiating an impetus to throw out our lawn-mowers. §

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NPSBC Willow Workshop

Williams Lake, June 11-13

By Cindy Broberg

This June a small entourage got together with George Argus and Anna Roberts in Williams Lake for an NPSBC workshop on *Salix* identification. Both Anna and George made willow identification almost painless with their helpful hints. For example, big buds means the specimen is precocious. Traditional willow keys just don't spell it out for you like that!

They also put willow characteristics into context so ones overall understanding of *Salix* improved. The only *Salix* capable of reproducing clonally via root shoots are members of the Longifoliae subgenus (*S. exigua*, *S. melanopsis* and *S. setchelliana*) which are 'new' species endemic to the New World. Most *Salix* can reproduce vegetatively but only by producing adventitious shoots; some riparian species have brittle branches for dispersal downstream.

The willow workshop contained both lab and field components, as well as a short biology lecture by George. We received an assortment of dichotomous and picture keys, as well as an interactive computerized key, INTKEY, to work with over the weekend. INTKEY is a godsend. It essentially allows you to identify any of the 176 species in the database by characteristics you choose—everything from leaf size to ovary indumentum to geographic origin.

There are some 600 spp. of willow worldwide; approximately 140 spp. are found in Canada, about 50 in B.C. We encountered the following: *S. barclayi*, *S. bebbiana*, *S. brachycarpa*, *S. candida*, *S. discolor*, *S. drummondiana*, *S. exigua*, *S. glauca*, *S. lucida* ssp. *lasiandra*, *S. maccalliana*, *S. myrtillifolia* var. *myrtillifolia S. pedicellaris*, *S. planifolia*, *S. prolixa*, *S. pseudomonticola*, *S. scouleriana*, and *S. sitchensis* (lab). I hope I didn't leave any out!

Taxonomically the genus is frustrating, especially for the beginner, because *Salix* is so environmentally and genetically variable. First hybridization and then introgression occurs between species. Generally hybrids are weak, but hybridization events occur frequently when normally incompatible pollen germinates at the junction of the stigma and style. Thank goodness willows have different flowering seasons! Secondly, approximately 40% of *Salix* species are allopolyploids.

Without any effort we encountered the poplar and willow borer, *Cryptorhynchus lapathi* L. The weevil is non-selective with regards to native *Salix* species and also attacks black cottonwood. The easiest indicator of attack is the production of large amounts of frass from galleries [usually at the bottom third of willow stems]. The adults (we found two) are distinctive: about 1 cm long, generally black with either a white or pink bum, and with a long snout that rests in a thoracic groove. Larvae can be found under the bark of willow earlier in the season, but later on have to be excavated from galleries deep inside woody stems. They are creamy white, C-shaped with a dark reddish-brown head capsule.

Larvae severely weaken tree stems with their tunnelling action, causing stems to break. They also create holes in the bark through which *Cytospora* canker can enter. I believe it is the combination of weevil, canker and usually some other stress (e.g., water, light, etc.) that is the cause of so many devastated willows.

Well, that about covers my weekend. If you want to identify willows, get your hands on INTKEY (unless you're lucky enough to know people like George or Anna)!! §

What's in a name?

By David Williams

Having attended Verna Miller's ethnobotany course this past June it seems fitting that we look at the names of some of the plant species examined during the weekend. First on the list has to be saskatoon, *Amelanchier alnifolia*. *Amelanchier* comes from the French name for *A. ovalis*, a species native to Central and Southern Europe. Just how important this plant is to First Nations peoples is indicated by the fact that they recognize seven different "varieties" of *Amelanchier*, while modern day taxonomists recognize three. The specific epithet "*alnifolia*" is in reference to the leaf shape, being similar to that of *Alnus* (alder). A bit of a stretch, I think.

For an interesting account of the common names saskatoon and serviceberry see Joe Arnett's column in the Spring '99 edition of *Menziesia*. It is interesting to see how *Amelanchier* is catching on in the horticultural industry. Dirr's "Manual of Woody Landscape Plants" now lists five species and a number of hybrids under cultivation in North America.

No. 2 in the list has to be soapberry, *Shepherdia canadensis*. *Shepherdia* is named after John Shepherd (1764-1836), curator of the Liverpool Botanic Garden and one of the first gardeners to raise ferns from spores. *S. argentea*, (silver buffaloberry) another North American species is much more highly prized in the horticultural industry. Again, see Joe Arnett's column for an account of common

See "Name" on page 12

NPSBC Ethnobotany Workshop

Twaal Valley, May 21-23

By Paige Woodward

We drove in convoy across the Basque Ranch after breakfast, a dozen-odd strangers being introduced to the plant traditions of the NlaKapmx Nation. To the north and south, chilblain warnings were still in force. Here in sagebrush country, 10 minutes from Cache Creek, it was shirtsleeves-hot and dry.

Verna Miller, a NlaKapmx and a director of the NPSBC, was our guide. Botanist and fellow director David Williams assisted her.

The rolling hills of the Basque were cow-chomped, rutted, dusty. The plants were mostly grey: sagebrush, rabbitbrush, pussytoes. Then pink flashed in the dust. One, two, many — countless! What looked like a carpet of roses stretching to the horizon.

Bitterroot, Verna explained as we leaped from our vehicles. *Lewisia rediviva*. An important spring food. It flowers flat on the ground before its leaves come up.Too bad. Once it's blooming, it's really too bitter to eat, no matter how you cook it.

Some of us had never seen this legendary plant before. Others had been accustomed to hover over a single pot of it in a cold frame. Now we couldn't walk without trampling them.

Anne Chatelain, assisted by Rob Hill, collect dandelion greens to prepare a salad.

Verna demonstrated her digging stick. Better than any pitchfork, it freed *Lewisia* taproots cleanly from the caked soil, root-hairs and all, leaving little disturbance on the surface for weeds to infiltrate.

The traditional NlaKapmx digging stick was made of strong, flexible wood like juniper or yew, Verna told us. People found a good one and kept it for life. The stick she showed us, a present from a friend, was made of steel but otherwise timeless — waist-high, with a T-bar handle and a pointed digging end. It looked like a T becoming a J — had a slight curve at the bottom.

All that weekend Verna led us to plants that were once as ordinary in NlaKapmx life as celery, potatoes, aspirin and ice cream from the supermarket are today. We gathered some of these plants to eat or to study and left the rest in the ground for the future. The land began to come alive. We were its ally. It was ours.

In NlaKapmx tradition, Verna said, plants have special qualities as food, as medicine, as the material from which useful things are made; and they also have a spiritual aspect [see "Notes on food plants..."].

This wisdom is what Verna is trying to learn, and to share. She told us that she picked up some plant lore as a child, tagging along when her grandmother collected medicine. But nowadays, when she talks with elders, it's not always plain which plant they're talking about; and sometimes a plant no longer grows where it used to; and memories fade.

On Saturday afternoon one of our vehicles got stuck in mud so thoroughly that it took the entire group several hours to free it. Out of this came esprit de corps and a wilderness hint worth sharing: People who drive across the sinkholes in decommissioned logging roads — who, us? — should carry chicken wire for traction.

Later we dug a traditional firepit to slow-cook our dinner. The final ingredient, after all the food was layered in, was boughs of Douglas maple (*Acer glabrum*) that carried our gratitude upward on their steam. We ate:

- Segments of brittle prickly-pear cactus (*Opuntia fragilis*). The spines were easy to remove; the flesh gelatinous, its flavour reminiscent of pickled sweet peppers.
- Corms of western spring-beauty (*Claytonia lanceolata*). They looked like tiny new potatoes and were just as delicious.
- Bulbs of nodding onion (*Allium cernuum*), like smoky, wet caramels.
- Salmon wrapped in silver foil instead of leaves, as in the old days.
- A salad of baby dandelions exquisitely dressed with oil, vinegar, and hard-boiled egg — prepared by two participants with French cuisine in their background.

We shared other things from outside, too: carrots, turnips and potatoes; beef-tenderloin jerky; Doritos and freeze-dried peanuts.

Closing the pit oven.

Photos: David Williams

Our official beverage was juice of soopolallie (*Shepherdia canadensis*). It was refreshing, but it must be admitted that we also drank plain water, Earl Grey tea and Chardonnay.

Next day we filled the pit with dirt again and replaced the turf on top.

As she led us down the Twaal Valley, from one rich plant site to another, Verna talked a little more about ethnobotany. Nature survives, though much abused. Our sense of belonging here survives, too. So much hard-won knowledge has been lost that we may never recover it all. But anyway, traditions always evolve. We are all seekers, discovering and making the traditions of the future. §

(Paige Woodward and her mother, Pat Woodward, run Pacific Rim Native Plants, a nursery on Chilliwack Mountain.)

Notes on food plants important to Interior First Nations

By Verna Miller

Common English name is followed by name in the NlaKapmx language.

Nodding onion - qwlewe

Important food and was harvested before bloomimg. To the uninitiated - easily mistaken with the mountain and meadow death camas. Dead giveaway (no pun intended) is the very distinct sweet onion scent of the nodding onion. Great compliment to other foods cooked in the poit oven. Wonderful raw or in salads.

Soapberry - sxwusm.

Known as Indian ice-cream. Fruits not eaten in the same manner as other berries. Mixed with water and whipped into a meringue-like consistency and eaten. Also refreshing as a juice which is also touted to have medicinal properties particularly for kidney ailments. Harvesting method unique in that a branch is firmly grasped and tapped with a stick so berries would fall onto a mat placed below the bush. An important trade item for the "Old People." Medicinally the leaves and twigs were also used for stomach ailments, sedative, and in a concoction with chokecherry twigs to stop hemorrhaging after childbirth. Used for spiritual aspect to purify hunter prior to hunting. Decoction of twigs used to rid one of dandruff and the berries were used as a shampoo.

Spring-beauty - tetuwn

Important root food. Cooked in pit ovens or in water with hot rocks. Contemporary method is the same as cooking potatoes. Stored in winter for use throughout the season. Sometimes cooked mashed and mixed with Saskatoon berries and dried in cakes.

Saskatoon - scaqwm

THE MOST IMPORTANT food, even today. It was eaten alone or mixed with a variety of other foods. It was also dried and stored in large quantities. The wood is very hard and is used for materials such as digging sticks, firedrills, and dipnet hoops. Medicinally, stems and twigs made a decoction drunk after childbirth to help clean and heal the womb. Decoction of saskatoon and bitter cherry used as a form of birth control.

Rocky Mountain juniper - punlthp

High spiritual and material value. Bows, drums, clubs, and hafting implements made of juniper due to the hard wood. The outer prongs of the fishing spears are made out of juniper. Wood sometimes mixed with sagebrush to smoke skins for a dark colour. Medicinally, the berries eaten raw in very small amounts for kidney problems. Strong decoction of berries used to kill ticks on horses. Decoction of branches and berries for colds, TB, and a muscle relaxant for childbirth. Decoction also relieves itchy skin conditions by bathing in and drinking medicine.

Douglas-fir - c'q'althp

Covers all four aspects food item comes from. The sugar crystals provided by the needles, branches, and cones. This anomaly takes place in only certain areas under certain conditions in the Nicola Valley. Medicine comes from the pitch to heal dislocated bones, sores, and cuts. Shoots are used in footwear to ease and prevent foot ailments. Spiritually fir boughs are used in cleansing ritual for hunters before a hunt; by girls during first menses; and, for adults during bereavement. Materials provided ar the centre pole for the fish spear. A young sapling fir provided the main shaft. Pitch was also used for caulking and sealing the dugouts.

Bitterroot - tlkupen

Folk name is "sand roses." An important food. In old times of great abundance dug by the sackful, dried and stored for use in fish-head soup, or with saskatoons, and fish eggs in a pudding. Pit cooked fresh. Also an important trade item. Originally, an area 18 miles from a point five miles north of Spences Bridge to as far as Rattlesnake Mountain provided the largest beds of bitterroot. §

Photos: David Williams

Plant profile:
Cornus unalaschkensis

By Richard Hebda

British Columbia forests are renowned for the trees they grow. Within these great forests there are other botanical treasures that live on the forest floor. Among these the bunchberries are among the widespread.

Bunchberries belong to the dogwood family (Cornaceae) along with our provincial floral emblem, the Pacific dogwood (*Cornus nuttallii*) and red-osier dogwood (*Cornus sericea*). Bunchberries grow as low, carpeting herb-like shrubs. A root-stem system (rhizome) spreads just below the ground and from it sprout 5-20 cm (2-8") tall flexible stems. Each upright stem bears a pair of small leaves about halfway up and a whorl of full-sized (2-8 cm long) oval leaves at the top. The leaves are usually dark green and somewhat glossy but may yellow in full sun. The veins appear to be well pressed into the leaf surface. Tear through the leaf and you will see several thin whitish strands along the other edges, a characteristic of dogwood leaves.

A flower head forms in late spring to early summer at the top of the stem. Four to six modified leaves called bracts surround the cluster of tiny flowers in the centre. Most people think that these white bracts are the petals but they are not. True flowers huddle cheek-to-jowl within a central clump. Each flower consists of a tiny toothed tube of greenish sepals which surrounds a tiny funnel of four purplish petals. Within the throat of the flower hides the pistil. Four spindly stamens stick out from the mouth. The berry-like fruits mature in late summer and early fall into a bright red bunch (hence the common name).

Cordilleran bunchberry differs from the common and widespread bunchberry (*Cornus canadensis*) which has greenish white petals and no well-developed leaves on the stem.

Cordilleran bunchberry haunts moist old-growth forests and thickets of British Columbia's coastal strip. It thrives on acid soils rich in humus, draping over rotting logs and crowding under shrubs at the edges of bogs and in the sub-alpine zone. Cordilleran bunchberry's range extends both north and south along the coast into Alaska and the northwestern United States. Common bunchberry replaces Cordilleran bunchberry east of the Coast Mountains.

Cordilleran bunchberries were much savoured by the Native people of the coast. The berries were eaten raw, with eulachon fish grease and with sugar. Haida occasionally steamed the fruit, mixed it with water and grease and stored it for the wnter. Although berries have a pulpy texture and a large seed, their taste is pleasantly sweet.

Bunchberries make excellent garden subjects, especially in moist shaded settings under trees and on the north side of buildings. They combine well with shrubby members of the heather family (Ericacae) such as rhododendrons or azaleas. They need moist, airy humusy soil to thrive and do not enjoy warm sunny settings. We grow bunchberries with tall ferns under a tree in the Native Plant Garden of the Royal British Columbia Museum but they never seem to flower the way they do in the wild. Raise bunchberries from seed or buy them from a garden centre or nursery where they are occasionally available. Sow the seed in the fall in a pot of peaty soil and leave over the winter. Plants with a vigorous root system raised in a pot succeed best.

The old name "*Cornus*," an ancient name for dogwoods, may be derived from "cornu" an old name for horn, because of the very hard wood of some of the tree species. The species name "*unalaschkensis*" recalls that the plant was named after Unalaska Island in the Aleutian Islands. §

(This text was originally published in *Coastal Grower* magazine of Victoria, BC. For subscription information, call 250-478-0825.)

Note: Most readers will be familiar with the botanical names *Cornus canadensis* and *C. unalaschkensis* for common and western bunchberry. In some recent literature, bunchberries have been separated into the genus of *ChamaeperiCLYmenum* (emphasis on the fifth syllable). In the three articles on bunchberry here, the botanical names are those used by the respective authors.
Cornus canadensis = *Chamaepericlymenum canadense* = Common bunchberry = Canada bunchberry
Cornus unalaschkensis = *Chamaepericlymenum unalaschkense* = Western bunchberry = Cordilleran bunchberry
Cornus suecica = *Chamaepericlymenum suecicum* = Northern bunchberry

Photos: Frank Skelton

Allopolyploidy in western bunchberry

By Anthony J.F. Griffiths and Fred R. Ganders

In some cases related plant species are capable of hybridizing, but the resulting hybrids are sterile and cannot reproduce. Although hybrid sterility may have several causes, a frequent cause is that the chromosomes contributed by each parent species are so different that they do not pair and separate properly during sex cell formation. The resulting egg or pollen cells do not each have a complete single set of chromosomes, and egg or pollen cells having extra chromosomes or lacking chromosomes are usually inviable.

However, rarely, abnormal cell division in such hybrids (or in non-hybrids, for that matter) results in cells with a doubled set of chromosomes. If a sterile inter-specific hybrid has by chance doubled the number of chromosomes in its cells, then each parent set is present in duplicate; therefore, each parent set has a partner to pair up with during sex cell formation and production of eggs and pollen cells is normal.

Such a hybrid with a doubled chromosome number has four sets of chromosomes and is called an allotetraploid. Because the two chromosome sets from each parent species can pair normally, the allotetraploid is fertile. It is also genetically isolated from its two parents, since they have only two sets of chromosomes. A hybrid between an allotetraploid and diploid results in a plant with three sets of chromosomes; these triploid hybrids are sterile, since three sets of chromosomes cannot pair evenly.

Allopolyploidy, the occurrence of several sets of chromosomes of different origin, is actually very common in plants, and many species have originated in this way. Allopolyploids have also been synthesized by botanists and plant breeders; the grain crop triticale is an allopolyploid synthesized from a sterile hybrid of wheat (*Triticum*) and rye (*Secale*) using a drug, colchicine, that can double chromosome numbers.

Allotetraploids are usually intermediate in appearance between their diploid parent species. They may or may not be intermediate in physiological or ecological characteristics, and they may expand their range into habitats or geographical areas not occupied by their parents. Unfortunately, the identification of new allopolyploids is not possible without a good research microscope, so amateurs can do little but observe already proven cases.

Western bunchberry *Cornus unalaschkensis* Ledeb.

Three species of bunchberries, dwarf herbaceous dogwood, occur in western North America, and all three occur in British Columbia. They are very similar and not always easy to identify without using microscopic characters, but in British Columbia they have fairly distinct geographical ranges. By far the most common bunchberry in British Columbia, and the only one found in the southern half of the province west of the Rocky Mountains, is western bunchberry. It is a tetraploid and is morphologically intermediate between the two diploid species, Canada bunchberry, *Cornus canadensis* L., found from the Rocky Mountains eastward, and northern bunchberry, *Cornus suecica*, found in the northwestern-most part of coastal BC and, more commonly, in Alaska.

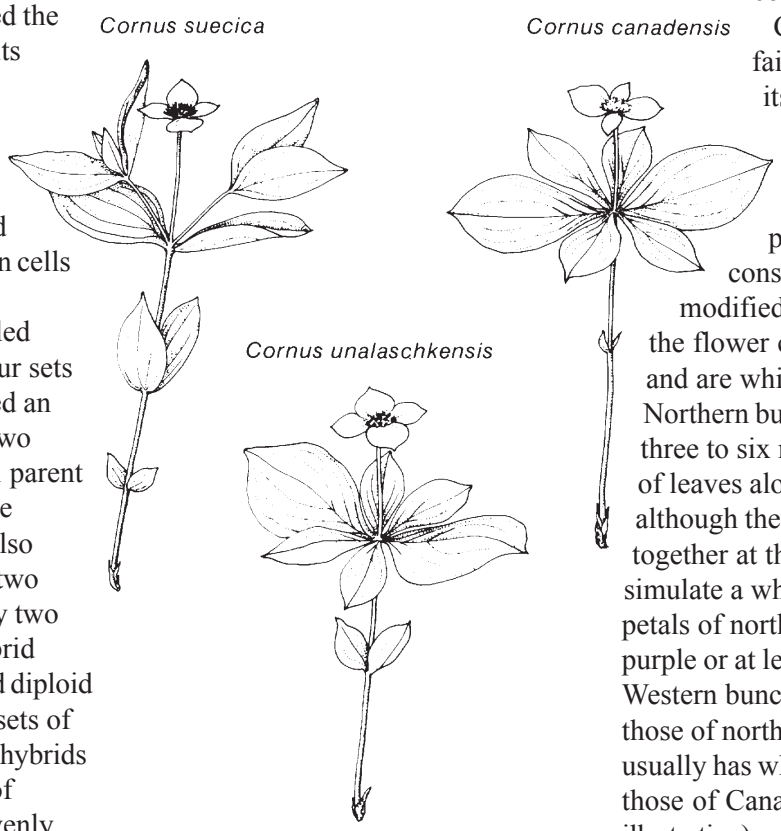


Illustration: Lesley Bohm, from *Wildflower Genetics*

Canada bunchberry is fairly easily recognized by its whorl of four to six leaves at the top of the stem and its greenish white flower petals. (Note: the four conspicuous bracts or modified leaves that surround the flower clusters are not petals and are white in all three species.) Northern bunchberry usually has three to six more or less equal pairs of leaves along its short stem, although they are sometimes close together at the top of the stem and simulate a whorl of leaves. The petals of northern bunchberry are purple or at least partly purple. Western bunchberry has flowers like those of northern bunchberry but usually has whorls of leaves like those of Canada bunchberry (see illustration).

The geographical range of western bunchberry is almost completely separate from its two parent species, being south of that of northern bunchberry and west and south of that of Canada bunchberry. However, the ranges of northern bunchberry and Canada bunchberry overlap north of the Alaska panhandle, and hybrids between these two species have been found there. The hybrids look like western bunchberry, but they are diploid (no chromosome doubling having occurred) and mostly sterile; only about half their pollen is viable, and they rarely set seed. Current hybridization between the two parent species takes place outside the present range of western bunchberry and apparently has not yet led to the production of allotetraploids there. The hybridization and allopolyploidy that produced western bunchberry took place sometime between the last glaciation, and the tetraploids survived farther south than the parent species and subsequently recolonized an area where the parents had not occurred or had been eliminated. §

(Excerpted and reprinted with permission from *Wildflower Genetics* by Anthony Griffiths and Fred Ganders, Flight Press, 1983.)

The explosive pollination mechanism in *Chamaepericlymenum canadense* L.

By Ted Mosquin

This is the time of year to go out and take a look at the floral pollina-tion method of *Chamaepericlymenum canadense,* Canada bunchberry. All parts of the flower are synchronized to explode in a split second to affect pollination. Another species in the genus, *C. suecicum* possesses an identical mechanism. The basic elements of the mechanism are: a sensitive antenna-like structure projecting from one petal of the unopened flower bud, reflexive petals (on a tensile 'spring'), and stamen filaments also possessing "elbow springs" which act to catapult the pollen in the anthers upwards toward the top of the flower. In comparison to all other "rapid movement" pollination mechanisms in the Angiosperms, this explosive mechanism is singularly unique.

Explosive or other rapid-movement floral mechanisms related to pollination are rare in the plant kingdom. In known examples where rapid movements do occur, it is the anthers or the stamens which move more or less alone or in consort with restraining petals. Examples described in the literature include the "explosive anthers" of *Pilea microphylla* Liebm. (Taylor 1942, p. 608), often referred to as the "artillery plant" and *Urtica* (H.G. Baker, pers com.) both members of the Urticaceae. Another example occurs in *Kalmia angustifolia* L. (Marie Victorin 1942, p. 466) a member of the Ericaceae where the anthers are partially embedded in the petals and are simply released at maturity catapulting their pollen in the direction of the stigma (and at any pollinating insect) but with the petals playing a stationary role. The examples of *Medicago* (alfalfa) and *Sarothamnus* (Scotch broom) both in the Leguminosae have been widely reported in the literature (e.g. Meeuse 1961). In the genus *Lopezia* (Onagraceae) and in the genus *Hyptis* (Labiatae) the stamen, when touched, snaps upward and deposits pollen on the underside of an insect visiting the flower (P. Raven, pers. com).

I first learned about the pollination mechanism in *C. canadense* in 1968 while conducting observations and experiments on the reproductive biology of native plants in Banff National Park, Alberta. It was not until 10 years later that I was to find out that mine was not the first observation or recording of this explosive mechanism. The first and, to my knowledge, the only previous reference is contained in a one-line note by Marie-Victorin (1942) in Flore Laurentienne. In his description of *Chamaepericlymenum canadense* L. he noted that "Les vrais pétales et les étamines vent élastiques et réagissent lorsque un insecte les touche." He did not record any observations on an "antenna" nor did he comment on the presence of a similar mechanism in *Chamaepericlymenum suecicum* L. although the latter species was also included in his flora.

The inflorescence of *Chamaepericlymenum canadense* is comprised of four white showy involucral bracts surrounding a few to several dozen small, relatively inconspicuous flowers. The true petals are a very light greenish yellow to nearly white in colour. The filaments and anthers are also very light coloured. However, the ovary, style and stigma are a very dark purple and provide striking miniature contrast points in the inflorescence. In the Banff area the number of flowers in each inflorescence varied from 8 to 15.

The pollination mechanism of *C. canadense* is so intrinsically interesting as well as unique in the plant kingdom that I feel it would be worthwhile to record here a brief description of how the discovery was made. This account is based on plants growing near Altrude

Creek about one mile south of Mt. Eisenhower Junction in Banff National Park.

Lying stomach down on the forest floor looking through a microscope, I began to examine the plants searching for a series of flowers in various stages of maturation. Normally, it is relatively easy to assemble such a sequence ranging from young buds to flowers that are very old and in a state of senescence. But each flower of *C. canadense* was either still in the bud stage or completely open with the petals very strongly reflexed outwardly or downward. In all open flowers the anthers extended upward, well above the tip of the stigma, and were empty of pollen. While the absence of flowers in the process of opening was puzzling, I attributed it at first to local environmental factors and continued to examine more inflorescences. The absence of pollen in the open flowers also seemed unusual but as the area was frequented by many species of pollen-feeding flies (Syrphidae), I speculated that perhaps the pollen had been collected by these colourful flower visitors.

Then with dissecting needles I began opening one of the buds, only to discover that it seemed to transform itself in a fraction of a second into a fully open flower. I turned to a second bud, opened it and found four normal-looking, fully developed, undehisced anthers. I tried a third and was again surprised by what appeared to be a tiny explosion and what seemed like a small amount of pollen flying in all directions. I realized then that I might be looking at a unique phenomenon—perhaps never before witnessed by humans and perhaps undescribed. It was then that I began to pay more attention to another unusual characteristic of each flower. On the abaxial side and near the tip of one of the four petals of each unopened flower and projecting upward was a miniature "antenna" just over one mm long. It did not take long to establish that even the slightest touch of the dissecting needle to the antenna of any "ready to pop" flower would trigger the explosive mechanism; the petals would reflex, the anthers would spring out simultaneously like four tiny catapults and shoot their entire pollen loads into the air above the inflorescence.

The mode of attachment of the anther to the filament, its position, and the timing of its development within the bud cast some light on the morphological basis for the popping action. In the young bud, that is, one that is not mature enough to be tripped by mechanical means, the four anthers are undehisced. As the bud matures, anthers dehisce fully while still in the bud (but do not release their pollen). Once dehiscence is complete the pop mechanism seems to become activated and the slightest touch to the antenna will cause the flower to burst open.

The attachment of the anther to the filament is basal but in the enclosed bud the anther itself is pointed downward so that in younger buds the attachment of the filament appears to be terminal. This means that the abaxial (outside) surface of each anther is appressed tightly against the upper part of the pistil.

Typical inflorescence of* Chamaepericlymenum canadense *showing the four white involucral bracts and about 25 individual flowers of which some six have not yet popped open.

As the bud and the pollen mature, slits are formed on the abaxial surfaces of the anthers. At this stage both the reflexed tip of the filament as well as the petals come under a powerful tension which is released only when the pop mechanism is triggered. During the "popping" the arched tips of the filaments act as elbow springs and the four anthers snap upward. The "popping" of the flowers occurs so rapidly as to be scarcely perceived by the naked eye even through the microscope. After popping, the stamens assume a more or less vertical position and appear to be empty of pollen. Pollen grains are light yellow in colour and slightly sticky; they are too large and heavy to be carried away by the wind.

Aside from the popping mechanism, which seems to be a device favouring cross pollination, little is known about the breeding system of plants of this genus. When a flower pops, some pollen is deposited on its own stigma so automatic self-pollination is possible. It would be interesting to find out whether an incompatibility system is associated with the popping mechanism.

While at Banff, I failed to record a single insect visitor on flowers of this species. However, Sadlier and Sadlier (1977, p. 100) published a photograph showing a wild species of the leafcutter bee genus, *Megachile*, visiting an inflorescence in which about two-thirds of the flowers had already popped. The leafcutter bees are known to be major collectors of pollen (Hobbs and Lilly 1954; Krombein 1967; Rank 1982) which they use in quantity to provision their nest cells. My observations of *Chamaepericlymenum* flowers showed a complete lack of nectar and it is likely that various *Megachile* species, which occur throughout the North American range of *Chamaepericlymenum* (Ivanochko 1980) are the principal pollinators. Pollen eating flies (Syrphidae) may also be effective pollinators. However, in

view of the sensitivity of the antenna of any "ready to pop" flower, it would appear that even very small insects such as woodland midges could act as pollinators should they happen by chance to fly from one inflorescence to another. In view of the seeming force of the popping mechanism and the presence of the needle-like antenna, it would be surprising if the fully mature buds did not pose some threat to life and limb of the smaller and more fragile of the woodland insects.

The colour of the involucral bracts is creamy white and it is known that the bracts strongly absorb ultraviolet light (UV photo in original article). This means that the higher groups of pollinating insects such as the bees would be able to distinguish the bracts from the adjacent and background objects quite clearly (Mazokhin-Porshnyakov 1969). Thus it is not the flowers but rather the involucral bracts which make it possible for bees to effect cross pollination.

The conclusion that *C. suecicum* has an explosive mechanism very similar to *C. canadense* is based upon examination of herbarium specimens at Agriculture Canada (DAO) and the National Museum of Natural Sciences (CAN). The flowers of these two species are essentially identical except that the floral parts of *C. suecicum*, including pistil, stamens, petals and the tiny sepals are all deep purple in colour. An understanding of the reproductive biology of a taxonomic group will strengthen the foundation upon which taxonomic judgements are made (Ornduff 1969). *C. canadense* is usually included with the genus *Cornus* (Marie-Victorin 1942; Harrington 1954; Scoggan 1957; Moss 1959; Munz and Keck 1968), a north-temperate genus of shrubs and trees with some 45 species (Lawrence 1951). Some modern European floras recognize *C.canadense* and *C. suecicum* as a distinct genus: *Chamaepericlymenum* (Shiskin 1951; Clapham et al. 1962) although all

Photo of herbarium specimens of individual flowers of Chamaepericlymenum canadense. Left: unopened flower with characteristic antenna; entre: young flower opened apparently by pressure in a plant press showing the position of an antenna on one petal; right: more mature flower in which the petals and stamens have fallen off.

authors with the exception of Marie-Victorin (1942) were apparently unaware of the unique nature of the floral mechanism. The reproductive characteristics described herein provide strong added argument, I feel, for separate generic status for these species.

To make certain that any species in the genus *Cornus* did not contain the antenna feature so characteristic of the pop flowers of these species of *Chamaepericlymenum*, I examined petals of flowering specimens of all species of *Cornus* in the extensive herbarium collections at Agriculture Canada (DAO) and the National Museum of Natural Sciences (CAN) at Ottawa; all had petals with smooth abaxial surfaces; petals lacked any semblance of pollination structures described here.

The widely used but mundane common name of this species is "bunchberry." A much more interesting, meaningful and dynamic name would be "pop flower." §

(Reprinted with permission from The Canadian Field-Naturalist, Volume 99, Number I, Jan.-Mar. 1985. This article also appeared in BEN #194.)

References

For a list of the extensive literature cited, please contact the editor.

"Name" cont'd from page 5

names for *Shepherdia*.

I will always remember having this thirst quenching drink on that hot weekend in the Twaal Valley, and how surprised I was in finding that you didn't even have to preserve the berry extract. We will have to defer to the chemists on this one.

Next is spring-beauty, *Claytonia lanceolata*. No one will question the common name, for indeed, this delicate little flower, its white petals with faint pink lines is definitely a thing of beauty. *Claytonia*, along with *Ranunculus glaberrimus* (sagebrush buttercup) is one of the first indicators of Spring in the Kamloops area.

Claytonia is named in honour of John Clayton (1686-1773) who came to Virginia from England in 1705 and was recognized as the greatest botanist in America at the time. "*Lanceolata*" refers to the basal leaves – lance-shaped, with the widest point below the middle.

I recall another common name for *Claytonia lanceolata*, Indian potato. What a pleasant surprise it was to taste the corms after they came out of the pit oven. Yes, they tasted just like potato! Mind you, one would certainly have to expend a lot of energy in digging up the thumb-sized corms.

Let's end with bitterroot, *Lewisia rediviva*. Yet another genus named after someone of importance in the field of botany. This time, after Captain Meriwether Lewis (1774-1809), who with Captain William Clark made in 1804 to 1806, the first coast-to-coast expedition of North America. The specific epithet "*rediviva*" comes from the Latin for "Brought back to life," in reference to the fact that *Lewisia* magically appears in the spring, and just as magically disappears shortly afterward.

What a thrill it was to find *Lewisia*

See "Name" on page 15

Garry Oak parkland

The ecological gem of southeastern Vancouver Island and the Gulf Islands

By Dr. Nancy Turner, Dr. Richard Hebda and Brenda Beckwith, with input from 50 others attending the International Garry Oak Symposium and Community Festival, May 5-9, University of Victoria

The majestic Garry oak, which lends its name to many Island places (Oak Bay, Royal Oak), is more than just another tree. Its gnarled limbs, broad canopy, and the meadows and rocky hilltops where it grows, combine into as distinctive a landscape and habitat as any major ecosystem in Canada.

The array of species associated with the Garry oak parkland ecosystem compares in numbers of rare and endangered species to two noted national biodiversity hotspots, the Carolinian hardwood forest ecosystem of southern Ontario, and the dry grasslands of the southern Okanagan region. Furthermore, the Garry oak parkland is threatened not just in Canada but throughout its range.

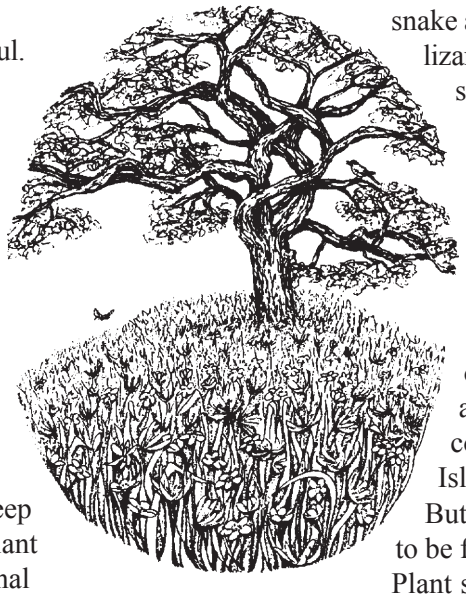
In May, scientists, conservationists, indigenous people, educators, municipal officials artists, and community activists shared their knowledge, experiences and concerns about the Garry oak and its associated plants and animals at the University of Victoria as part of a symposium and community festival. They celebrated the Garry oak parkland and all that this unique ecosystem offers to residents and visitors of southern Vancouver Island.

Garry oak parkland has been an integral part of First Nations' lifeways for thousands of years. The Songhees, Saanich, Hulquiminum and other Salishan peoples of Southeast Vancouver Island and the Gulf Islands relied on Garry oak meadows for many resources, including game, berries and root vegetables. A special delicacy was the bulbs of two species of edible blue camas, almost as widely used and traded as salmon. First peoples managed these bountiful resources using controlled burns and other techniques to maintain optimal habitats for these species, and to enhance their productivity.

Captain George Vancouver, when he sailed near what is now Victoria in 1792, described the Garry oak parkland as enchantingly beautiful. James Douglas, founder of Fort Victoria called the parkland a perfect Eden. However, early settlers to the area drained wetlands, cleared the woods and brush, established farms and orchards, and set their cattle, horses, pigs, and sheep to graze in the luxuriant meadows. The original parklands were soon ploughed and replaced with roads and houses. Today, as our population grows, we continue to convert the remaining meagre patches to extensive parking lots, streets, buildings and lawns.

Never, in the last 10,000 years, has the tree itself been more threatened than today. Scattered oaks remain, including magnificent old giants, but there are fewer and fewer each year. They have been ravaged by a succession of insect pests - winter moth, oak phylloxeran, and jumping gall wasp. Now gypsy moth damage is a concern. Young oaks are especially vulnerable and few seedlings survive to replace the elders in the urban core. Some municipalities, including Saanich and Oak Bay, have tree cutting by-laws that protect mature oaks to some extent. Nowhere are seedlings, saplings and young oaks protected. They succumb to mowing, bad pruning and clearing.

Of even greater concern are the parkland's many other lifeforms, both plant and animal, associated with the increasingly fragmented and diminishing Garry oak habitat. Birds once abundant - meadowlark, horned lark, Lewis' woodpecker, bluebird and vesper sparrow, for example – are no longer to be found. Reptiles, such as the Pacific garter snake and the alligator lizard, and amphibians such as the western toad and even the tree frog, are diminishing in numbers. Butterflies, native bees and other insects, too, are far less common. The Island Marble Butterfly is no longer to be found.



Plant species that used to grow commonly but are now hard to find include: Macoun's meadowfoam, deltoid balsamroot and especially the once abundant native grasses such as California oatgrass and Roemer's fescue. Even wild strawberries, which used to abound, have declined in much of their former range. Aggressive invaders such as Scotch broom, gorse, ivy,

Illustration: Kathy Thomson from *Native Plants in the Coastal Garden*

orchard grass, Himalayan blackberry, cheat grass, bullfrogs, starlings, English sparrows and grey squirrels are replacing native species at an alarming rate.

The Garry Oak Parkland is too precious to lose. To secure its survival we all must work together to preserve and enhance what is left and restore areas that have been degraded. It is time Canada and the world recognized the value of this remarkable and threatened ecosystem.

Victoria is known as the Garden Capital of Canada. Yet our spectacular wildflower meadows, which are even more priceless and remarkable than our glorious gardens, are little known. It is time to change, to reverse the destruction of the ecological gem of Southeastern Vancouver Island and the Gulf Islands, the Garry oak parkland.

We urge the community to:

1. Recognize and inform others that the Garry oak parkland is the smallest and most threatened major distinctive Canadian ecosystem. It is globally significant.
2. Respect and acknowledge Aboriginal traditional use and management of these exquisite parklands.
3. Support efforts to protect remnant patches such as those identified in the Federal/Provincial Sensitive Ecosystems Inventory (SEI), the CRD Parks acquisition plan and by local conservation groups.
4. Encourage conservation of existing publicly owned Garry oak parkland such as Beacon Hill Park, Mount Tolmie, the Garry Oak Woodlands at Government House and Uplands Park.
5. Foster Garry oak parkland habitats on private property by growing and encouraging native species and reducing lawn cover. (Saves water too!)
6. Learn more about our special species and their habitats through publications, field trips and by joining local groups such as the Garry Oak Meadow Preservation Society, the Native Plant Study Group, the Victoria Natural History Society, the Society for Conservation Biology - Victoria Chapter and others. (For a complete list call John Olafson at [250] 658-8993.)
7. Much can be done to protect the Garry oak parkland at the municipal level. Insist that local governments protect Garry oak parkland in land use decisions and enact tree preservation by laws to protect trees particularly in construction zones.
8. In this election year, supporting candidates who know and care about environmental issues would be instrumental in conserving these precious spaces. If such candidates don't exist consider throwing your hat into the ring! §

Sex-related seed-predation in *Sidalcea hendersonii* (Malvaceae)

By Melanie Marshall and Fred R. Ganders

Henderson's checker-mallow, *Sidalcea hendersonii* Wats. (Malvaceae) is a perennial herb inhabiting low elevation wet meadows and tidal marshes from southwestern British Columbia to Oregon. In British Columbia, *Sidalcea hendersonii* is listed as "blue" - vulnerable (Douglas et al. 1998). This designation is used for indigenous species of special concern because of characteristics that make the species particularly sensitive to human activities and natural events. Several factors contribute to the plant's rarity including human encroachment into wetland habitats, displacement by aggressive invasive species such as *Lythrum salicaria*, purple loosestrife, and insect seed predation.

Sidalcea hendersonii is gynodioecious. This is a mating system whereby populations consist of separate coexisting hermaphroditic individuals and female individuals. Hermaphroditic *Sidalcea hendersonii* flowers contain both functional anthers and ovaries, are self-compatible but protandrous. Female flowers have functional ovaries but nonfunctional stamens. In gynodioecious species, female plants would seem to have a reproductive disadvantage relative to hermaphrodites since they do not contribute genes through pollen (Lewis, 1941). Females must produce significantly more seeds than hermaphrodites for male sterility mutations to be maintained in gynodioecious populations (Charlesworth and Ganders, 1979).

We investigated the genetic and ecological factors contributing to the maintenance of females in British Columbian populations of *Sidalcea hendersonii* - see Marshall 1998. Crossing experiments indicated that male sterility is controlled by a dominant nuclear allele. High frequencies of female plants in the majority of populations surveyed, in combination with the nuclear determination of sex, elevates the theoretical requirements for female fitness in this species. Females did have higher fitness, producing more surviving offspring than hermaphrodite plants in an experimental population. However, no inherent fitness advantages were evident in natural populations where females and hermaphrodites did not differ in viable seed production.

Two species of Curculionid beetles (weevils), *Macrorhoptus sidalcea* Sleeper and *Anthonomus melancholicus* Dietz, parasitize the flowers of *Sidalcea hendersonii* in British Columbia. *Anthonomus*

***Different flower types of* Sidalcea hendersonii.**

Photo: Helen Kennedy

melancholicus is restricted to populations of *Sidalcea hendersonii* located on Vancouver Island, where the frequency of females was unusually high. In populations where female plants were abundant, weevil larvae destroyed significantly more seeds from hermaphrodite plants, substantially reducing hermaphrodite seed production overall. The extent and mode of seed predation was dependent upon which weevil species was present in the population. In populations where *Macrorhoptus sidalcea* was present, the seed was only partially consumed. While *M. sidalcea* larvae feed on the interior of the seed, creating small tunnels in the seed coat, *Anthonomus melancholicus* larvae appear to consume the entire fruit. Sex-related predation was evident only in populations where *Anthonomus melancholicus* occurred (on Vancouver Island) and was correlated with the more destructive feeding pattern of this weevil.

The basis for discrimination between flower types was not investigated, but adult *A. melancholicus* weevils are likely attracted to hermaphrodite flowers because hermaphrodite flowers also contain pollen, a known food source. Extensive predation of hermaphrodite seed could provide the necessary advantage to females of *Sidalcea hendersonii*. To our knowledge, this study provides the first evidence that sex-related predation may be responsible for high female frequencies in natural populations of a gynodioecious species. §

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Notice to all NPSBC members

Any member of the NPSBC can organize a field trip, slide show or workshop in their community on behalf of the Society. If interested, please call an NPSBC director.

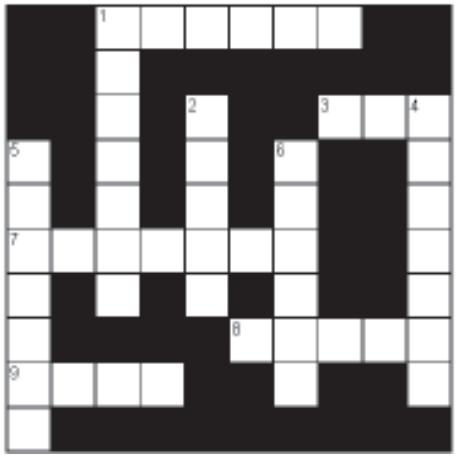
"Name" cont'd from page 12

in such abundance in the Basque Ranch area, just a short distance from Verna's house. Needless to say, the photographers among us were delighted.

If you were going to purchase just one book on plant names, *Stearn's Dictionary of Plant Names for Gardner's*, published by Sterling Publishing Co. Inc., is a must. Thanks to Brian Compton for the reference, I now have the encyclopedic (927 pages) book, *Native American Ethnobotany* by Daniel E. Moerman, published by Timber Press. Dave, not another book!! I can hear my wife Lois, "There is such a thing as a library you know"! §

E-mail: dwilliams@cariboo.bc.ca

Plant Puzzles by Claudia Schaefer



Botanical Crossword

Across

1 Pollen lands here (6)
3 Plant 'juice' (3)
7 A modified stem or leaf for climbing (7)
8 A showy appendage (5)
9 Green food factory (4)

Down

1 Above-ground runners (7)
2 Leaves arranged in a circle around the stem (5)
4 A type of inflorescence (7)
5 A leaf stalk (7)
6 Male flowers produce it (6)

Plant Jumble!

Unscramble the words below to form common names of conifers in BC. The 'secret' letters can then be arranged to make another conifer name.

GUARDSFOIL
1 word Secret letter: occurs in 2nd position

SAPSUCKERIT
2 words Secret letters: occur in 4th position

LEOPOLDPEEING
2 words Secret letters: occur in 1st and last positions

PETRISUCHWE
2 words Secret letter: 2nd and 10th positions

REPELBINIM
2 words Secret letter: 3rd position

For answers, see page 3.

If you enjoyed these puzzles, hated them, found them too easy or too hard, or have other puzzle ideas, let me know! E-mail me at Schaefer@planeteer.com or send a note to Claudia Schaefer, 4253 Quebec Street, Vancouver, BC, V5V 3L1

New members

Since March 15, 1999

Individual Members

Cindy Broberg, Burnaby
Ken Bryant, Vancouver
Bill Chalmers/Western Biologicals Ltd, Aldergrove
Alastair Craighead, Victoria
Marnie Cullum, Delta
Tom Duralia, Richmond
David & Doreen Enns/Landing Nursery, Vernon
Environmental Youth Alliance, Vancouver
Jonathan & Michelle Grant, Saltspring Island
Linda Humeniuk, Vancouver
Dour Erickson/Interior Reforestation, Cranbrook
Ann Grant, Vancouver
Perry Grilz, Prince George
Sheila Hayes, Victoria
Rob Hill, Vancouver
Sam Howard/Langley Environmental Partners Society
Jan Kirkby, Pender Island
Chris Lane, Errington
Donna McLaren, Cortes Island
Frank Mitchell, Sooke
Gregory Paris, Vancouver
Krista Payette, Vancouver
Adrienne Peacock, Belcarra
Daphne Richardson, Vancouver
Stephen Ruttan, Victoria
Barbara Sherman, Coquitlam
Rose-Marie Silkens, Sayward
Jocelyn Steedman, Victoria
John Wilcox/Duck Creek Farm, Saltspring Island

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Diane Falvey, Vancouver
Elma (Emily) Hanon, Surrey
Federation of BC Naturalists, Vancouver
J. Hawkeye Rondeau, San Jose, CA
Sandra Stevenson, Duncan
Swan Lake Christmas Hill Nature Sanctuary, Victoria
Clare Winstanley, Richmond

Mission Statement

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

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