Edmonton Native Plant Society

WILDFLOWER NEWS

'Growing Nature's Garden'

NOVEMBER 2019

A frosty *Symphoricarpos occidentalis*, western snowberry. Whitemud Park, October 24, 2019

From Your Editor:

Welcome to the Wildflower News for November.
"To the attentive eye, each moment of the year has its own beauty, and in the same field, it beholds, every hour, a picture which was never seen before, and which shall never be seen again."
- Ralph Waldo Emerson, *Nature*

In This Issue:

LETTERS:

I just wanted to say thank you for yet another excellent Wildflower News (September 2019). I was particularly delighted and absorbed by the excellent article by Ms. Cotterill on Indian Pipes and her fabulous description of the complex nutritional web and taxonomy. Thank you so much for your generosity with your knowledge and time; this newsletter is an incredible learning resource, I so look forward to it each month
Sincerely
Clara Qualizza

Thank you Clara; we're very pleased you enjoy our WN! Each month we, too, are grateful that Patsy does such a great job in sharing some of her immense knowledge with us. Hope you also enjoy this month's article by her, as well as a great explanation of what's happened to the figwort family by Lorna Allen and Linda Kershaw.

EVENTS - if you would like us to list your event that involves native flowers, please email us at engedmonton@gmail.com by the 20th of the previous month.

Wednesday, November 6 - The Edmonton Native Plant Society's 2nd Annual General Meeting - The agenda will be followed by a presentation on *Bunchberry Meadows*. Refreshments and snacks will be served. Free Edmonton area wildflower seeds. ENPS would love to see all their members there!

Memberships will be available at the door. Members have a vote; may make nominations from the floor; and may vote by proxy.

Time: 7:00 to 8:30 p.m.
Location: Orchid Resource Centre, 4457 99 Street NW (parking on 44 and 45 Avenues)
Admission: Free.

Saturday, November 16 - Wagner Natural Area Open House - The theme this year is: **Research at Wagner: Past, Present and Future.** Refreshments provided.
Time: 2:00 to 4:00 pm.
Location: Pioneer Centre, 301 Jespersen Avenue, Spruce Grove
Admission: Please confirm your attendance by email info@wagnerfen.ca

Monday, November 18 - Edmonton Nature Club Plant Study Group - *ABMI, NatureLynx App and other Citizen Science Activities* - Jordan Bell, Citizen Science Coordinator at the Alberta Biodiversity Monitoring Institute, will tell us about the development of the ABMI's citizen science application, NatureLynx, and his other duties at the ABMI, together with Jessica Haines, of MacEwan University, who is doing research at the ABMI.

Time: Room open at 7:00 p.m.; presentations begin at 7:30 p.m.
Location: Room L 116, The King's University, 9125 50 St NW, Edmonton
Admission: Free, although membership in the Edmonton Nature Club is encouraged.

City of Edmonton: *Touch the Water Promenade* - This project will focus on a central stretch of the North Saskatchewan River Valley in two connected areas. One area is adjacent to the Rossdale neighbourhood and the other is upstream on the north shore of the river, along River Valley Road. The Promenade is proposed to extend from Rossdale along the northern bank of the river to Government House Park, west of Groat Road Bridge. To share your views about a vision for a new riverfront promenade in central Edmonton, there are two Public Engagement Events:

Saturday, November 9, 2019
11a.m. -1 p.m.
Commonwealth Community Recreation Centre, 11000 Stadium Road NW

Saturday, November 16, 2019
11a.m. - 1 p.m.
Kinsmen Sports Centre, 9100 Walterdale Hill NW

An online survey will also be available for those who are unable to attend in person, and will be posted in early November 2019 to edmonton.ca/TouchTheWater

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NEWS... If you have a news item involving native plants that you would like posted, please email us at engedmonton@gmail.com

From the City of Edmonton on Our Urban Forest

"The urban forest is an increasingly important City asset, and we invite you to share your views on strategies for managing and protecting public trees in places like parks, boulevards, the river valley, ravines, roadways, and more. More specifically, we want to hear your feedback on the City's Corporate Tree Policy, proposed Tree Protection Bylaw and the Urban Forest Asset Management Plan.

Your input will provide valuable insight in managing our urban forests and the results will be shared with Council as part of three separate reports throughout 2020-2021. We value your time and participation in this survey."

Management and Protection of Urban Trees survey.

Survey info:
Please allot at least 12-18 minutes to provide feedback.
Survey closes: November 7 at 11:59pm.

Where are they now? Gail Fennell by Judith Golub

Gail Fennell was a long-time ENPS volunteer involved in so many projects, and initiating so many more: co-steward at times for John Janzen Nature Centre native plant bed; introduced native plantings around Doug Kelly stormwater pond; grew natives from seed; started our greeting cards; did wondrous native plant species lists and many other files on the computer for us; convinced the city to grow their own natives at Old Man Creek Nursery; and many, many more activities.

Leaving us for Regina to be with family, Gail hasn't slowed down one bit!

She is very actively involved in volunteering with Nature Regina in looking after the Native Plant Garden at the Royal Saskatchewan Museum Regina, collecting seed, taking photos, writing weekly reports, and convincing them to launch a 2020 calendar to celebrate the 25th anniversary of the RSM native plant garden.

Working in the garden this year, she comments that "16 amazing people have helped me, including 2 young boys who come with their mum, are curious about everything in the garden, and do as much work as the adults. We've put in almost 500 hours total so far, not counting meetings, growing out plants and all the rest of what has to be done to steward a space. Truly blessed, I am, to know these people. The credit for our success in year 2 of 5 rejuvenating the garden all goes to those volunteers."

Still energetic as ever, Gail says "Native plants in Regina is still a hard sell - think Edmonton 20 years ago. I have found a property manager who is willing to let us seed and plant around a large storm water pond. He wants to get rid of the leafy spurge creeping in. I want people to see there are beautiful native plants. It's a win-win."

ENPS really misses your verve, enthusiasm and ideas, Gail! Hope Nature Regina realizes how lucky they are to have you.

Gail, left, working with other Nature Regina volunteers on the Native Plant Garden at the Royal Saskatchewan Museum Regina.

Fern Families by Patsy Cotterill

There are over 11,000 species of ferns worldwide (compared with about 300,000 angiosperms and 800 gymnosperms). They range in size from tree ferns to small, aquatic ferns consisting only of leaves. They reach their greatest diversity in moist temperate and tropical forests where they can form an extensive ground cover or exist as epiphytes attached to tree trunks and branches, but also occur in rocky mountain habitats where there is adequate moisture. Bracken (*Pteridium* species) can cover such large open areas in temperate climates that it is considered a weed.

Fern taxonomy
The ferns and their allies such as the horsetails, clubmosses and spike-mosses were once called the Pteridophytes, and this is still a convenient term, seen in most textbooks, separating these spore-bearing plants from the seed-bearing plants or Spermatophyta, the gymnosperms (including conifers) and flowering plants or angiosperms. However, as usual, molecular taxonomy has altered our view of relationships within this group and hence the terminology has changed. In the *Flora of Alberta* (1983) our provincial ferns were considered to belong to three families: the Ophioglossaceae, the moonworts or grape ferns, the Polypodiaceae, the largest family of miscellaneous ferns, most of which we would instantly recognize as ferns, and the Marsileaceae containing a single species of plants that look more like clovers than ferns. These families have now been given the higher taxonomic rank of order, with the

ending – *ales*. Thus the former family Polypodiaceae is now the order Polypodiales and in Alberta comprises 10 families, containing 32 species. However, this makes little difference for identification purposes as the genera of Polypodiaceae in many cases have been elevated to family level and the same characters are used to differentiate them. To see what I mean by this, take a look at Linda Kershaw and Lorna Allen's key to the ferns and fern allies, available at https://anpc.ab.ca/wp-content/uploads/2019/04/Pteridophytes-2019-04.pdf This article also provides excellent illustrations of fern morphology. The Marsileaceae remains our single family within the order Marsileales with a single species. The Ophioglossaceae, our only family within the Ophioglossales, contains 18 species, most of which are rare or localized ferns that are very difficult both to find and to identify. Compared to other parts of the world, however, fern diversity is not high in Alberta with its dry, continental climate. Moist, rocky habitats in the Rocky Mountains contribute a number of species.

Fern structure

Most ferns have rhizomes, at or below ground level, which are horizontal and creeping or short and erect, from which the leaves, or fronds, arise. Roots anchor the rhizomes. The fronds usually have a stiff stalk (stipe) bearing the leaf blade, which may be simple (undivided) or divided once or more times (pinnate). If the frond is once-pinnate it only has pinnae; if it is twice-pinnate the pinnae are further divided into pinnules and if these are further divided (thrice-pinnate) the ultimate divisions are called segments. It is this repeated division of frond blades that gives many fern species their beautiful, feathery look.

Unicellular spores are borne in huge numbers on the underside of the fronds in structures called sporangia. These in turn are grouped into brown or dark clusters or strips called sori (sing. sorus). The sorus may or may not be covered by a transparent flap-like structure called an indusium. In some ferns there are two types of fronds, those that are vegetative only, and those that are specialized for spore-bearing, in which case these ferns are said to be dimorphic. (An easily observed local example is the ostrich fern, *Matteuccia struthiopteris*.) All these features provide characters that are used to distinguish fern species, along with others, such as the presence and type of scales on the stipe, rhizome and rachis (leaf stalk between the pinnae).

Fern reproduction

Ferns have an interesting life cycle of which most of us see only a part. The fern we see is the spore-bearing phase of the life-cycle, the sporophyte (*spore-plant*), which has a double set of chromosomes (diploid). The spores, however, contain only one chromosome set (haploid) as a result of a reduction cell division. The spore germinates to form a tiny green plant or prothallus of only 2-3 mm across, the gametophyte. This haploid plant grows male sex organs on its surface, which produce male and female haploid gametes. These combine during fertilization to reconstitute the diploid plant, and a tiny fern frond begins to grow upon the prothallus, which soon disintegrates. Hence the gametophyte is very short-lived in contrast to the long-lived sporophyte plant. This sequence is known as the alternation of generations. Seed plants (flowering plants and conifers) have a similar life cycle, with the sporophyte being the obvious plant that we see, but in this case the gametophyte remains within the seed-bearing organ of the plant and does not have an independent existence. In mosses, by contrast, it is the gametophyte which is the obvious, long-lived green plant, and which bears the short-lived diploid sporophyte on its plant body as stalked spore capsules. The haploid spores germinate to produce the moss plant. For explicit diagrams of these life cycles, please consult Wikipedia or any biology textbook.

The reason I go into this alternation of generations phenomenon is that it's always been a sore point with me that I've never actually or knowingly seen a fern gametophyte. However, on reading an article on fern propagation by David D'Entremont in *The Blazing Star*, the magazine of the North American Native Plant Society of Ontario, I have decided to try germinating some fern spores to see if I can observe this elusive, diminutive fern stage. The winter 2019 issue of *The Blazing Star* isn't available online yet, but if anyone would like to join me in this experiment I can provide them with a pdf of the article.

Now for a quick look at some of our commonest local fern species.

Local ferns

Our commonest fern in the Central Parkland is the **narrow spinulose shield fern, *Dryopteris carthusiana*** (Dryopteridaceae). Large (up to 1 m), lanceolate fronds arise in tufts from a stout, scaly rhizome and are twice-pinnate, although the pinnules themselves are dissected; they end in a narrow point. The stipes are covered in light brown scales. The sori on the pinnule undersides have a kidney-shaped indusium with a notch on one side (best seen in younger fronds before the sporangia mature and release the spores). A similar but less common species, co-occurring in moist forest habitats, is **broad spinulose shield fern, *Dryopteris expansa*** (formerly *D. assimilis*), a very beautiful fern distinguished by its broader, triangular frond which is three-pinnate, and darker scales. The basal pinnule on the lowest pinna is noticeably larger than the opposite pinnule.

Left: Tuft of fronds of narrow spinulose shield fern, *Dryopteris carthusiana* photographed in North Cooking Lake Natural Area on 26 June 2015.

Right: Sori on undersides of pinnules of narrow spinulose shield fern. (Photo'd 19 October 2019).

Common oak fern, *Gymnocarpium dryopteris* (Cystopteridaceae), is also common in shady moist spots in forest and forms attractive patches by means of its creeping, slender black rhizomes. It is easily recognized because its delicate fronds have three main divisions which are more or less equal in size, the divisions themselves being pinnately or twice-pinnately divided. The round sori, which lack indusia, line each side of the pinnule underside. Fronds are deciduous in the fall and new fresh green blades appear in May.

Common oak fern, *Gymnocarpium dryopteris* in Patricia Ravine. (Photo'd 19 August 2009)

Fragile bladder fern, *Cystopteris fragilis* (Cystopteridaceae), is found on lowland forest slopes but is most commonly seen growing in rock crevices in the mountains where the clustered, twice-pinnate fronds tend to be smaller. The sori are round, with a hood-like indusium that withers and becomes difficult to see as the sporangia mature.

Fragile bladder fern, *Cystopteris fragilis* in Patricia Ravine on 29 May 2014.

Lady fern, *Athyrium filix-femina* (Athyriaceae), is a tall, tufted fern, also of moist wooded habitats but of more occasional occurrence. (I found it years ago in "Winterburn Woods Natural Area" off Winterburn Road but I don't know if it remains after the Hamptons was built. It would be worthwhile to try to cultivate it.) The blades are twice-pinnate although the oblong pinnules are toothed or incised giving the frond a lacy appearance. The best way to distinguish this fern from the rather similar narrow spinulose shield fern is by the sori, which are elongate with an obvious flap-like indusium attached along one side.

Lady fern, *Athyrium filix-femina*, in "Winterburn Woods" natural area, 5 June 2011.

Ostrich fern, *Matteuccia struthiopteris* (Onocleaceae), forms extensive colonies in our Edmonton ravines and elsewhere, especially along creeks or in seepages, and is also commonly planted in gardens. Fronds are of two types (dimorphic), tall (to 1.5 m), lanceolate green fronds which are once-pinnate but have incised pinnules (hence the frond is described as pinnate-pinnatifid), and shorter, narrower fronds in the centre of the tuft that are specialized for spore production. These turn dark brown and appear dead as the spores mature.

Left: Ostrich fern, *Matteuccia struthiopteris*, creating extensive ground cover in woods near the river at the south end of 199 Street NW.

Right: Ostrich fern from the same population, showing dimorphism; the young vegetative fronds are on the outside of the tuft, the spore-bearing ones in the middle.

In addition, we have a number of species in the family Ophioglossaceae (order Ophioglossales), the moonworts or grape ferns, some of them so small and strange that they are hardly recognizable as ferns. This family is so-called because the sporangia are large, round and yellow and resemble clusters of grapes. The stipes arise from a cluster of fleshy roots and bear a vegetative or sterile blade (or frond) and a spore-bearing blade (sporophyll) which are both variously divided. The gametophytes usually develop underground and are not seen.

Virginia grape fern or rattlesnake fern, *Botrypus virginianus*, is our largest grape fern (20-50 m) and likely the most common, growing in open woodland and woodland edges and thickets. The sterile blade has three divisions which are twice-pinnately divided and give an overall fern-like appearance.

Leather(y) grape fern, *Sceptridium multifidum*, is also a substantial plant albeit not so tall, with a sterile frond consisting of three divisions that are further pinnately dissected. The frond often appears to lie close to the ground and remains green throughout the winter, with new green leaves being formed in the spring.

Left: Virginia grapefern or rattlesnake fern, *Botrypus virginianus*, growing in aspen woods in Wagner Natural Area, 18 July 2017. This common species is the tallest (to 50 cm) member of the Ophioglossaceae family in Alberta.

Right: A robust specimen of leathery grapefern, *Sceptridium multifidum,* growing in Bunchberry Meadows, 1 August 2019. (The red line is a runner of common wild strawberry, a common associate of grape ferns.) The sporangia are not yet mature.

Another common family member is **moonwort, *Botrychium lunaria***, which is especially frequent in the mountains. In this species the sterile blade is once-pinnate with 3-7 pairs of fan-shaped pinnae; the fertile blade with its panicle of sporangia rises above it on the same stipe.

Common moonwort, *Botrychium lunaria,* taken at Whitehorse Creek (probably in July). Photo by David Fielder.

A good place to look for these last three species is open sandy soils on banks where the vegetation is low, often in association with common wild strawberry (*Fragaria virginiana*). We found more than 25 specimens of leathery grape fern in such a situation in a sandy meadow in Bunchberry Meadows this year – possibly a record population as the grape ferns rarely occur in large numbers!

All photos by Patsy Cotterill, except as indicated.

References:
D'Entremont, David. Fern Propagation. The Blazing Star, Winter 2019, 20 (1)

en.wikipedia.org/wiki/Fern

http://ontarioferns.com/ This is a good website to see close-ups of some of our ferns, including sori.

Kershaw, Linda and Lorna Allen. Illustrated key to the ferns and fern allies (Pteridophyta) of Alberta. April 2019. ANPC website: https://anpc.ab.ca/wp-content/uploads/2019/04/Pteridophytes-2019-04.pdf

Specimens in the Cotterill herbarium.

Figworts? What Figworts? by Lorna Allen and Linda Kershaw

Reprinted with permission from the authors from *Iris* - The Alberta Native Plant Council Newsletter, No. 82 May 2019

Look at any but the very newest of floras and you will likely find a moderately large plant family, the Figworts (Scrophulariaceae), made up of numerous genera and species. In Alberta, we have (whoops, *had!*) 19 genera (Table 1) and 74 species, including some of the cutest (think monkey flower), oddest (elephant's-head) and prettiest. A field of paintbrush is stunning!

Field of paintbrush *(Castilleja* sp.)

Plant classification has been developed to reflect evolutionary relationships, with the goal that "all of the species assigned to a given group share a more recentcommon ancestor with each other than with any species outside the group" (Olmstead 2002). DNA research has lead to the conclusion that many of the members of the classic Figwort Family are, in reality, only distantly related. So, sadly, this intriguing family has now been, well, dismembered.

Table 1: Genera traditionally included in the Figwort Family (Scrophulariaceae) in Alberta

Bacopa (water-hyssop)	*Linaria* (toad flax)	*Penstemon* (beardtongue)
Castilleja (paintbrush)	*Melampyrum* (cow-wheat)	*Rhinanthus* (yellowrattle)
Chaenorhinum (dwarf- snapdragon)	*Mimulus* (monkeyflower)	*Scrophularia* (figwort)
Collinsia (blue-eyed-Mary)	*Nuttallanthus* (field-toad flax)	*Verbascum* (mullein)
Euphrasia (eyebright)	*Odontites* (bartsia)	*Veronica* (speedwell)
Gratiola (hedge-hyssop)	*Orthocarpus* (owlclover)	
Limosella (mudwort)	*Pedicularis* (lousewort)	

Of the Alberta genera once included in the Figwort Family, only mudwort (*Limosella*), mullein (*Verbascum*) and figwort (*Scrophularia*) remain. The rest have been reassigned to other families. To add to this indignity, no record has been found of any figworts (*Scrophularia* spp.) actually occurring here, so it has been dropped from the list of Alberta species. From 19 genera and 74 species, the Figwort Family in Alberta now includes only two genera and a total of four species; the rest have been reassigned to other families.

The Orobanchaceae or Broomrape Family is one that has had ex-figworts added to it. In the *Flora of Alberta* (Moss 1983), there are two genera and four species in the Broomrape Family, all lacking chlorophyll and all parasitic — using haustoria (parasitic connections to the roots of other plants) they have no need to produce their own food through photosynthesis. A number of the genera of the old Figwort Family are hemiparasites — capable of both photosynthesis and of developing haustoria to become partially parasitic. The genera that have the ability to develop haustoria (parasites or hemiparasites) are now all included in the Broomrape Family (Table 2).

Table 2: Genera in Alberta now included in the Broomrape Family (Orobanchaceae)

Genera traditionally in the Broomrape Family	*Boschniakia* (groundcone)
	Orobanche (now *Aphyllon*) (broomrape)
Genera added from the Figwort Family	*Castilleja* (paintbrush)
	Euphrasia (eyebright)
	Melampyrum (cow-wheat)
	Odontites (bartsia)
	Orthocarpus (owlclover)
	Pedicularis (lousewort)
	Rhinanthus (yellowrattle)

Another family that wins big in the Figwort Family dismemberment is the Plantain Family (Plantaginaceae). Blame this one on DNA, because the reasons these plants have been grouped together are less obvious. From a single genus, *Plantago*, the Plantain Family in Alberta now includes 11 genera (Table 3), eight from the figworts, plus two from small families that are no longer recognized.

Table 3: Genera in Alberta now included in the Plantain Family (Plantaginaceae)

Genera traditionally in the Plantain Family	*Plantago* (plantain)
Genera added from the Figwort Family	*Bacopa* (water-hyssop)
	Chaenorhinum (dwarf-snapdragon)
	Collinsia (blue-eyed-Mary)
	Gratiola (hedge-hyssop)
	Linaria (toadflax)
	Nuttallanthus (field-toad flax)
	Penstemon (beardtongue)
	Veronica (speedwell)
Genera added from the Water-starwort Family (Callitrichaceae)	*Callitriche* (water-starwort)
Genera added from the Mare's-tail Family (Hippuridaceae)	*Hippuris* (mare's-tail)

If you've been paying attention, you will know that this leaves only those cute little monkey flowers (*Mimulus*) unaccounted for. They have been added to a small family, the Phrymaceae or Lopseed Family. In the *Flora of Alberta* (Moss 1983) there is a single genus of monkeyflowers, *Mimulus*, and three species. Several more species have been found in Alberta since the flora was written, but with all the taxonomic changes, the only remaining *Mimulus* in Alberta is now *Mimulus ringens*. *Erythranthe* is the accepted genus for the others (and there are eight of them), including the three monkeyflowers in the 1983 flora, now in the Phrymaceae family.

Square-stem monkeyflower (*Mimulus ringens*)

With the mixing of genera between families, and with the addition of new species (let alone new families), the development of illustrated keys for this set proved to be a challenge. A new version for the illustrated key to this group, the Figworts and Allies (Allen and Kershaw 2019), will be posted soon on the ANPC website, to help with sorting through all of these changes. At a session of the Central Alberta Plant Study Group (Edmonton), participants worked through the rough draft key and had many helpful suggestions. Thanks to V. Crisfield and D. Fabijan for organizing the session and to the group for their assistance.

Left: Hoary plaintain (*Plantago media*)

Right: Pink monkeyflower (*Erythranthe lewisii*)

Left: Elephant's-head (*Pedicularis groenlandica*)

Right: Clustered broomrape (*Aphyllon fasciculatum, Orobanche fasciculata)*

References Cited

Allen and Kershaw. 2019. Key to the Alberta Figworts and Allies (Orobanchaceae, Phrymaceae, Plantaginaceae, Scrophulariaceae). Compiled and written by Lorna Allen and Linda Kershaw, https:// anpc.ab.ca/

Moss, E.H. 1983. The Flora of Alberta. Second Edition, Revised by John G. Packer. University of Toronto Press, Toronto, Ontario.

Olmstead, Richard G. 2002. Whatever happened to the Scrophulariaceae? Fremontia 13, Volume 30:2, April 2002.

(Wildflower News would like to thank Linda and Lorna for giving their permission to reprint their article. We are also extremely grateful for the tremendous amount of work that they have done in creating keys for Alberta plant families. ENPS recommends membership in the Alberta Native Plant Council (https://anpc.ab.ca), and joining their Facebook page (https://www.facebook.com/ABNPC/) - some wonderful plant postings on there!)

Aims of the Edmonton Native Plant Society:

- ✤ Promote knowledge of the Edmonton area native plants.
- ✤ Conserve our native plant species and their habitats.
- ✤ Preserve native plant species and habitat for the enjoyment of present and future generations.
- ✤ Educate individuals, business and local governments about native plants.

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Autumn colour of high bush cranberry, *Viburnum opulus*