



Sarracenia

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Pyrola elliptica habit and habitat. (See p. 13) H. Mann

Message from the editor.

Here, at last, is the next issue of Sarracenia, I am sorry for the long interruption, but as many of you will know Leila, my co-botanist, sub-editor and eagle-eyed proof reader, needed much care during her final months and it has taken me some time to adjust to life without her. I hope there won't be an increase in typos etc. in this and future editions !

Thank you to all those contributors who have still supplied me with material during the past year or so. This will be a quick issue with what is easiest to edit, and I hope that Vol. 21#3 will follow soon. I am also including some of the latest pictures posted on the newsgroup <https://groups.google.com/forum/#!forum/nfwildflowers> and recommend that members follow it for the latest NF plant news.

Fall Field Trip Schedule, Avalon Peninsula – 2015

This list has been updated and some trips have been deferred due to the late season, tide times and leaders' commitments. All field trip dates are subject to change if the weather is too foul! Dates in square brackets are the first backup dates. All dates, including first backup dates, are either Saturdays or Sundays. Further details by email closer to the day.

August 22 [23] Whitbourne [full day] [option of continuing on to Cataracts Provincial Park, and the Rocky River?]

Leader: John Maunder

Some species of special interest:

- Mass blooming of Scottish Heather (*Calluna vulgaris*) [spectacular]
- Black Dogberry (*Sorbaronia sp.*) in berry
- Black Alder, European Alder (*Alnus glutinosa*)
- Water Horsetail (*Equisetum fluviatile*) massive beds
- Whorled Watermilfoil (*Myriophyllum verticillatum*)
- Acadian Quillwort (*Isoetes acadensis*)
- Tuckerman's Quillwort (*Isoetes tuckermanii*)

August [29] 30 Harricott (H), The Tickles, Collin's Pond (CP) [full day]

[Meet at east side of Colinet Bridge, near *Angelica* occurrence, time TBA]

Leaders: John Maunder/Howard Clase

Some species of special interest:

- Floating Hearts (*Nymphoides cordata*) in bloom (CP)
- Wild Angelica (*Angelica sylvestris*) (ColinetJunc.)
- Virginia Glasswort (*Salicornia depressa*) (H)
- Maritime (= Rich's) Seablite (*Suaeda maritima*) (H)

- Northern Sandspurry (*Spergularia canadensis*) (H)
- Ditchgrass (*Ruppia maritima*) (H)
- Common Trailing Cinquefoil (*Potentilla simplex*) (H)
- Horned Gentian (*Halenia deflexa*) (The Tickles)



Horned Bladderwort, Tickle Trail 2010.08.04

September 5 [6] Bristol's Hope. [full day]

Leaders: Howard Clase, Gene and Karen Herzberg

Species of special interest:

- Lesser Water-plantain (*Baldellia ranunculoides*) [only known North American occurrence!]

September 12 [13] Mundy Pond, St. John's. [2 hours]

Leader: Glen Ryan

Species of special interest:

- Brenda's Goldenrod (*Solidago brenndae*)?

September 26 [27] Southside Hills [½ day] (Shea Heights Communication Towers)

Leader: John Maunder

Species of special interest:

- Pink Crowberry (*Empetrum eamesii*), plus the interesting "red-berried variant"

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Uncommon Wildflowers of Newfoundland 14: Shinleaf (*Pyrola elliptica* Nutt.)

By Henry Mann

Although plant rarity categories are relatively well defined, the term “uncommon” is more nebulous. In addition to the general environmental reasons for plant distribution and abundance (climate, substrate, habitat, etc.), “uncommon” also carries with it reasons of human perception such as who, why, where and when. Botanists and naturalists are more attuned to noticing individual species whereas the general public may only see overall vegetation. For most individuals, 90% or more of our plant species could be considered uncommon. But even for naturalists if there is no immediate reason for searching out certain species on



Figure 2: *P. elliptica* leaf blades.

outdoor travels, many will often go unnoticed.

Most individuals do not frequent certain habitats (salt marshes, bog



Figure 3b: Woodland orchid seed, highly magnified



Figure 3a: Shinleaf seed, highly magnified

ponds, alpine barrens, swamps, etc.) so even the common species of these habitats are rarely observed. Many herbaceous species are small, blend into the green background and may only be noticed if and when they produce showy flowers, usually

apparent for but a few short weeks. Shinleaf, the species featured in this article, is uncommon to most individuals for all these reasons, however, there are other interesting aspects of its biology that are also important contributing factors.

P. elliptica is an evergreen herb or sub-shrub of the Heath Family, the *Ericaceae*, (Figure 1 - see cover). Its elliptic, longer than broad leaf blades readily distinguish it from our other pyrolas, and they are the source of its specific name (Figure 2). Shinleaf is a small plant of drier shady woodlands growing in isolated patches characteristic of species that infrequently establish by seed, but once established only spread slowly by underground rhizomes. Shinleaf may be found in suitable habitat throughout the Island, but apparently absent from the Great Northern Peninsula and Labrador.

Seeds are so tiny that they can hardly be seen with the naked eye

and are termed “dust seeds”. When seen at high magnification they are elongated structures composed of dead, air-filled cells containing a tiny spherical embryo, and unusually for seeds, contain almost no nourishment for the germinating seedling (Figure 3). They are so tiny and light that even the slightest breezes will carry them aloft. Having no food reserves of its own, the seed must come in contact with a suitable soil fungus to establish germination and for subsequent nourishment. Although tens of thousands of seeds are produced, very few ever successfully germinate and reach maturity, no doubt at least partially determining population commonness. In addition, the adult plant is “mixotrophic”, that is, has a symbiotic relationship with soil fungi, sharing resources with the fungi and their mycorrhizal forest trees. Successful habitat for shinleaf then also must include necessary requirements for the other interacting partners.

But the plant–fungal relationship is even more interesting than this. Certain species of soil fungi that initiate germination and nourish the developing seedling are apparently abandoned by the green plant as it reaches maturity in favour of another group of fungi that have mycorrhizal associations with surrounding trees and which can supply a much more plentiful source of nutrients. Still more strangely, it appears that the plant may associate with a different suite of fungi if it is in a better lit area of the forest as compared to deep shade. The closer one looks, the more the forest appears to be one massive sharing symbiotic system rather than individual species slugging it out. Perhaps our concept of “survival of the fittest” has more to do with cooperation than competition!

White waxy shinleaf flowers are produced in a raceme, each having a characteristic “elephant’s trunk” style (Figure 4). Stamens are quite interesting in the Pyrolas, and in the family as a whole, in that at maturity pores open at the ends of the anther sacs (Figure 5). Chief pollinators are bumble bees and other “buzzy” bees whose wings vibrate the anthers causing the little “salt shakers” to deposit pollen onto the bees who will transport it to other flowers. Apparently bees make a distinctive buzz when visiting flowers which is of a higher pitch than the buzz of flight, thus giving the anthers a good shake.



Figure 4: A raceme of shinleaf flowers, each flower with a characteristic bent protruding style.

This sonication or “buzz pollination” also occurs in some other members of the Heath Family (*Ericaceae*) and several other families including the Tomato Family (*Solanaceae*). Greenhouse growers know that in the absence of bees and wind, tomato flowers need to be artificially vibrated to achieve maximum pollination and fruit set.



Figure 5: Shinleaf flower showing open pores at anther tips for pollen release.

Why do some pyrolas and some orchids only grow in woodlands? There is a principle in Nature which may be stated in human terms as, “If opportunities exist, life will find a way.” Consider those two great groups of flowering plants, the monocotyledons (monocots), and the dicotyledons (dicots) which have developed into their modern forms quite independently, without even “knowing” the other existed. Pyrolas are dicots, while orchids are monocots. Both have sometimes encountered the same problems and opportunities and amazingly have sometimes come to almost exactly the same conclusions and solutions. For some in each group the prime problem was surviving in deep shade, and the prime opportunity was a habitat with few competitors and some potential partners. Modern woodland pyrolas

and woodland orchids have the following common features:

- Although green and photosynthetic, they can flourish in deep shade
- Have dust seeds almost indistinguishable from each other
- Have seeds that must come in contact with an appropriate fungus to germinate
- Have seedling stages dependent on fungal nourishment
- Are mixotrophic as adults (i.e. obtain nourishment in three

ways, by root absorption, by photosynthesis, and by fungal mycorrhizal relationships)

All these parallel developments are adaptations for living in deep shade environments. Given the constraints of surviving with little sunlight, the most efficient option has been to strike up a relationship with mycorrhizal fungi and their tree partners. Trees, of course, have good access to sunlight and produce a lot of organic nutrients, some of which can be siphoned off by their root fungi and by the orchids and pyrolas. We know that mycorrhizal fungi also provide nutrients back to

the trees, but what about the orchids and pyrolas? Are they just freeloaders or do they provide some benefit to the tripartite relationship? I believe the jury is still out on this question, but in all these relationships we seem to hear Nature saying, "When faced with long-term survival, the preferred pathway is cooperation, even among such foreign life forms as green plants and fungi. The alternate options may often lead to extinction."

Perhaps there is a concept here for the human species to ponder.

Happy Botanizing!

Notes to contributors.

Sarracenia is prepared using OpenOffice.org – a free office suite that offers capabilities far beyond the needs of the ordinary user, and is largely compatible with MSOffice. (The latest version is OOo 4.1.1). As a fan of OOo I would be happy to help anyone who is interested in trying it out. It includes several other programs as well as the word processor such as the equivalents of Excel and PowerPoint.) It would help me as editor if contributors would take note of the following guidelines when submitting articles, I will be happy to discuss the details, and I will send proof copies to authors whenever possible.

General.

The editor will be responsible for the overall format and layout of the magazine. Contributors should keep to default formatting as far as possible. Please avoid excessive use of the space bar and block capitals. Leave the the fancy formatting to me!

Text.

Text should be supplied **without** embedded pictures or tables, but type

styles like italics, underlining, etc. should be included. The "native" format for OOo is Open Document Text (.odt) but I can also handle files in .rtf, .doc, .docx, and .wpd formats. All word processors give the option of saving in rich text format (.rtf), this preserves italics etc. Please do not use simple text (.txt) as all these styles will be lost. Typos may be corrected, but changes of substance will only be made after consultation with the author. It is my normal practise to send proofs to authors before publishing.

Pictures and Tables.

These should be supplied **separately**; pictures preferably as .jpeg files, raw formats like tiff are very bulky and will have to be compressed. Please do not resize to very small sizes, such as are usually used in e-mails, these may not contain enough detail when printed, even though they look fine on the screen, but very large files can be resized, 5 MB maximum if possible. Pictures will likely be cropped – but leave that to me, it depends upon the space available. You

should indicate in the text where you would like them to be placed if it isn't obvious. Captions may be included at the end of the text or separately as convenient.

Hard copy.

Material which is already printed will have to be scanned into electronic form, (I can do this). Illustrations will be kept as is, but text will either be re-typed or converted via an optical character reader. The format may be changed, but I shall only do this in consultation with the author.

Scientific Names.

Scientific names will be *italicised*, they need not include authorities if they follow those in the latest edition (currently 2000, but a new, 2015, edition is expected soon) of the "Annotated Checklist of the Vascular Plants of Newfoundland and Labrador" by Susan J. Meades, *et al.* All articles should include both the scientific name and the common name of each plant, normally at first mention. The main text may use either. Only scientific names will be indexed.

Recent Members' Pictures.

Here are a few of those that have been sent to me recently:



John Maunder was testing out his new Nikon P900 camera along the Skerwink trail recently and stopped to test it to see what maximum 83x magnification would show on the top of the offshore rock in the centre of the left-hand picture. Result on the right. A bit fuzzy but good enough to identify four species growing there:- Yarrow (*Achillea millefolium*), Roseroot (*Rhodiola rosea*), Seaside Plantain (*Plantago maritima*) and, best of all, the white flowers are



Draba glabella – a new site for this species. How things have improved in the ten or so years since we first bought digital cameras. Maybe in another ten years we can be stay-at-home botanists identifying plants in inaccessible locations on our computers from high resolution satellite images! Not so much fun as field trips though, as at Mad Rocks last weekend (July 18 -19th - thanks Carmel).



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