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Will Kershaw with Jack Pine Witches'-broom.
Photo by Ed Morris, Belanger Bay, Manitoulin Is.

Field Trip Reports:

FIELD BOTANISTS of ONTARIO

FIELD BOTANISTS OF ONTARIO NEWSLETTER

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Standard source for scientific names of vascular plants:

Newmaster, S.G., A. Lehela, P.W.C. Uhlig, S. McMurray and M.J. Oldham. 1998. Ontario Plant List. Ontario Ministry of Natural Resources, Ontario Forest Research Institute, Sault Ste. Marie, Ontario. Forest Research Information Paper No. 123, 550 pp. + appendices.

Field Trip Reports:

Orchid Walk on the Bruce Peninsula

FBO Annual Meeting at Red Bay, Bruce County on June 24th, 2001.

On a warm but beautiful day in late June, on the week-end of the Field Botanists of Ontario Annual General Meeting, several FBO members joined Allan Anderson of the University of Guelph on an interesting and rewarding wild orchid tour of the Sauble Beach, Red Bay and Howdenvale areas of the South Bruce Peninsula.

Those of us in attendance parked our cars at the Sauble Falls Provincial Park parking lot on the Sauble Falls Parkway and proceeded down a grassy bank past a few Red Osier Dogwood bushes (*Cornus stolonifera* Michx.)[1] and Ninebarks (*Physocarpus opulifolius* (L.) Maxim.) to our first orchid find of the day, a small group of Shiny or Wide-leaved Ladies' Tresses (*Spiranthes lucida* (Eaton) Ames). The flowers of this small plant spiral around a slender spike, and the lips of the flowers have bright yellow centres.

Our next stop, a dune at Sauble Beach, yielded several Grass Pinks (*Calopogon tuberosus* (L.) B.S.P.)[2] growing in the sand in full sun, accompanied by the lovely little Rose Pogonia, also known as Snake Mouth or Goldcrest (*Pogonia ophioglossoides* (L.) Juss.). Allan explained that, while the lips of most orchids start out in an upward position and revolve to a downward position while flowering, that of *Calopogon tuberosus* stays up. To compensate, when a bee lands on the lip, the latter drops on the column below and some pollen is picked up and distributed by the bee to another Grass Pink. Scattered among the orchids were small blue-flowered Spiked Lobelia (*Lobelia spicata* Lam.), a common plant on the Bruce.

We were greeted by a patch of Mossy Stonecrop or Wallpepper (*Sedum acre* L.) as we entered a nearby wood, where we found Hooker's Orchid (*Platanthera hookeri* (Torr. ex A. Gray) Lindl.). The flowers grow on a single stalk which rises from two large basal leaves. Each flower has a strongly up curved, hook-tipped lip.

At Oliphant, we explored a fen near the shore, where we admired more Grass Pinks and Rose Pogonias, and studied Long Bracted Green Orchid, or Frog Orchid (*Coeloglossum viride* (L.) Hartm. var. *viriscens* (Muhl. ex Willd.) Luer) which is truly an all green spire. The green flowers with the rounded cap and downward pointing lip occur at the bases of the small upper leaves. Punctuating the fen vegetation at intervals was Tall White Bog Orchis (*Platanthera dilatata* (Pursh) Lindl. ex Beck) also known as Bog Candles or Fragrant Orchid, whose pure white flowers are set off by green leafy stems. We spent a few minutes enjoying the pleasant fragrance of these beautiful plants, which are pollinated by a small white moth.

We found a few Showy or Queen Ladies' Slippers (*Cypripedium reginae* Walter) in full bloom. Other plants we saw were Arrow-grass (*Triglochin maritimum* L.), which has tiny rose-purple flowers on a grass-like stem, and Intermediate or Spatulate-leaved Sundew (*Drosera intermedia* Hayne), an insectivorous plant. The hairs on its leaves exude a sticky substance which forms into tiny droplets to entrap insects. As we were leaving Oliphant we spotted Wild Sweet William or Meadow Phlox (*Phlox maculata* L.) and Southern Blue Flag (*Iris virginica* L.), an iris with broader flowers, petals more flared, and taller than the common Blue Flag (*Iris versicolor* L.). Jim Pringle told us that *I. virginica* hybridizes with *I. versicolor* to produce a form called *Iris* x *robusta* E.S. Anderson.

On Adis Drive, off Huron Road on the way to Petrel Point, Allan showed us Common or Oval-leaved Twayblade (*Listera ovata* (L.) R. Br.). It is an introduced orchid whose green flowers have a long double lip.

At Petrel Point, Red Bay, we met members of the Niagara Field Naturalists, out to enjoy nature, as we were. The fluffy white balls of Cotton-grass (*Eriophorum vaginatum* L. ssp. *spissum* (Fern.) Hulten) were much in evidence all over the area. As we proceeded along the boardwalk on the north side of the complex (the section most recently acquired by the FON), we observed several Showy Ladies' Slippers in bloom, also a few yellow-flowered Horned Bladderwort (*Utricularia cornuta*

[1] *C. alba* L. ssp. *stolonifera* (Michx.) Wang.

[2] *Calopogon pulchellus* (Salisb.) R. Br.

Michx.) in the water close to us. These are carnivorous plants which entrap invertebrates through tiny bladders on intertwined thread-like underwater leaves. In a ditch across the road at the south part of Petrel Point, Allan pointed out Loesel's or Bog Twayblade (*Liparis loeselii* (L.) Rich. ex Lindl.). Along the boardwalk we saw Long-leaved Sundew (*Drosera linearis* Goldie) and more Arrow-grass.

We ate our lunch in Howdenvale, seated at or sprawled on the grass around a picnic bench beside the general store. After lunch, at a property on Howdenvale Road, Allan took us into the woods to show us four plants of Large Round-leaved Orchid (*Platanthera macrophylla* (Pursh) Lindl.), whose two basal round leaves were large enough to be bread and butter plates. The white flower has a very long lip. It was growing close to twin maple trees and an Indian Cucumber Root (*Medeola virginiana* L.). Also, while there, we identified a few ferns: Intermediate Wood Fern (*Dryopteris intermedia* (Muhl. ex Willd.) A. Gray), Rattlesnake Fern (*Botrychium virginianum* (L.) Swartz), New York Fern (*Thelypteris noveboracensis* (L.) Nieuwl.), and a Club-moss (*Lycopodium* sp.) were also duly noted. Then we came across four plants of Broad-lipped or Broad-leaved Twayblade (*Listera convallarioides* (Sw.) Nutt. ex Ell.). The lip of the flower is very long, broad, and notched at the apex.

We returned to the Sauble Falls Parking Lot, and then a drive to Walker's Woods. A pleasant mature forest west of Sauble Falls Provincial Park just off Sauble Falls Parkway yielded nothing, so we said our good-byes and left for home, confident that we had seen most of the orchids of the South Bruce Peninsula and learned a great deal.

Many thanks to Allan for leading an excellent outing, and thanks to Jim Pringle for his valuable input.

Dorothy Edwards

References included A Guide to the Orchids of Bruce and Grey Counties, Ontario and A Guide to the Ferns of Grey and Bruce Counties, Ontario, both by the Bruce-Grey Plant Committee of the Owen Sound Field Naturalists; Orchids of the Western Great Lakes Region, by Frederick W. Case, Jr.; A Field Guide to the Ferns, by Boughton Cobb, from the Peterson Field Guide Series; and Shrubs of Ontario, by James H. Soper and Margaret L. Heimburger.

Features:

Using Volunteers to Conduct Botanical Research: the Best Use of Anybody's Time?

By Sarah Mainguy and Mary Ann Johnson

It is well worth investigating the use of volunteers to conduct long-term monitoring programs in Ontario. It's not just that volunteers are cost-effective: Ontario is a big province, and there are many more volunteers than there are professionals. But can volunteers be used to provide data with the statistical accuracy needed for long-term research? To give an example of the question in a more specific context: could the Field Botanists of Ontario and their ilk be happy fenced into spaces of less than 25 m^2 for hours on end? On June 3rd, 2000 Jeremy Lundholm led a trip to the Carden Plain alvar in Victoria County to find out.

It was not that the botany wasn't interesting. As in all alvars, the terrain is starkly appealing: scrubby, sparse grasses and herbs interspersed with clumps of common juniper (*Juniperus communis* L.), clinging to the minimal shallow soil and moisture that have collected in shallow depressions and cracks in the calcareous bedrock. The resident plants must deal with extremes in heat and moisture as the thin soils become instantly saturated after a rainfall, and dry out quickly in a few hours. Alvars appear frozen in time: succession is almost at a standstill because of the harsh conditions and grazing by cattle. The plants typical of this alvar are not the familiar non-native grasses and coarse herbs of successional habitats on the deeper soils further south. There were many botanical highlights: indian paintbrush, (*Castillea coccinea* (L.) Spreng.), early saxifrage (*Saxifraga virginiensis* Michx.), prairie smoke (*Geum triflorum* Pursh), Bicknell's geranium (*Geranium bicknellii* Britton), houstonia (*Hedyotis longifolia* (Gaertn.) Hook.), and rock

sandwort (*Minuartia michauxii* (Fenzl) Farw.).

Janet Grand, of the Couchiching Conservancy, has been involving local landowners and Ontario's field botanists in documenting the alvar's vegetation and raising awareness of its fragility. One of her most important initiatives is to insist on a rigorous monitoring program in order to be able to quantify the changes taking place in the alvar over time. A monitoring program ideally should provide enough information to serve as an early warning system: in this case it should alert the Couchiching Conservancy to any problems while still leaving time to deal with them. There are many pressures on alvars that need to be watched closely. Successional processes can threaten plant species. The pasturing of cattle, which helped keep succession to a minimum for so many years, has gradually declined in the region: the area does not provide lush forage for cattle, either. Will succession therefore accelerate? Pressures on the land will surely increase with the inevitable human impulse to make the land pay its way. Will the numbers of people increase in the region, and will those people have impacts on the alvar?

The twelve trip participants were there to kick off the monitoring program: to inventory the flora and estimate the percent cover of the dominant species in five 4.5 x 4.5 metre fenced exclosures and in control plots outside the exclosures. The data will be used over the long term, so the information needed to be accurate, precise, representative and replicable. By the end of the trip, the tedium of this type of research was apparent to everyone. Cover estimations are somewhat subjective, so it made sense to have only one or two people doing the estimates, leaving others with nothing to do. There was only so much to see inside such a small area. Inventories needed to be accurate, and many of the dominant species were grasses and sedges, which can be a challenge for any botanist. Nomenclature for other species has changed: taxonomists have been splitting and lumping since Newcomb's and Peterson's wildflower guides were published and many of the scientific names in these guides are no longer in use. On the other hand, the task got done. A later visit with FBO in August, led by Jeremy to ensure consistency, added many species to the inventory and there is now a complete baseline data set. Would the task have been done if fund raising had been required to hire a professional? Possibly not.

Are there precedents that can be used for establishing sites and protocols for volunteer vegetation monitoring? There are many additional benefits to using volunteer programs: they contribute to a sense of community and stewardship, and provide an education tool for the community at large. The need for long term monitoring is so obvious, and the sheer numbers of potential volunteers so great, that despite the drawbacks there are several programs that rely heavily on volunteers.

The Ontario Tree Atlas[1], run by the University of Guelph Arboretum, is a volunteer program. One thousand, three hundred and forty-one volunteers participated in collecting data on tree species all over Ontario between 1995 and 1998. The results will be published in an atlas format. The program is considered a considerable success by its organizers. The use of volunteers meant that over 61,000 observations were collected: far more than would have been possible with the use of paid professionals. Most tree species are easy to identify, and there are relatively few tree species (about 133 species of trees and tree-like shrubs) with which to become familiar: a small proportion of the 2500 or so plant species in Ontario. However, there are also some that require expert identification: among these are many of the rarest species in Canada, notably the oaks, willows and hickories. The tree atlas dealt with these difficulties by insisting on rigorous documentation of difficult species with specimens including fruit, leaves, winter buds, twigs and any other characters necessary for accurate identification. Some volunteers were reluctant to do the extra effort involved with completing the paperwork for submitting specimens (which included critical locality and habitat data). Records that were "out of whack" were checked, including field checking of some extralimital records (Rob Guthrie, University of Guelph Arboretum, pers. comm.).

The Environmental Monitoring and Assessment Network (EMAN)[2] is spear-

[1] www.uoguelph.ca/~rguthrie/

[2] www.eman-rese.ca/emanops/ontario/intro.html

heading the establishment of many long-term monitoring programs across Canada. EMAN has developed a suite of core variables or indicators of environmental change, and is implementing the programs in partnership with the Canadian Nature Federation. It is strengthened by volunteer networks such as Environment Canada's Breeding Bird Survey. Many of the programs are being set up to use simple, standardized methodologies that can be implemented with volunteers. The goal is to provide an early warning of significant new ecosystem stresses, but also to facilitate a cooperative and holistic approach to ecological enquiry and ecosystem understanding. The web site is a focus for integrated environmental monitoring, experimentation and data recording, and makes available research results that provide increased ability to interpret changes identified by the volunteer network.

Initially, the sites were established within existing protected areas such as national parks, biosphere reserves, and research stations. EMAN is now establishing monitoring sites across Canada within an ecological framework, by ecozone. It is an inclusive network, and those who wish to participate are welcomed. The network includes such diverse programs as Frogwatch, set up to monitor breeding amphibians, Icewatch, which monitors dates of ice freeze up and break up, and Wormwatch. However, to date, vegetation monitoring programs include only those that rely on identification of a few species: Plantwatch, a national program recording observations on plant phenology (timing of emergence and reproduction), Lichenwatch (distribution of indicator lichen species to monitor pollution and global warming), and Treewatch (assessment of tree health through visual inspection of trunk and crown condition).

Have we reached a conclusion? Vegetation can certainly be monitored by volunteers if methods are standardized, simple and the species easy to identify (or procedures are in place to allow verification of species identification), and the programs are interesting enough to inspire the same effort year after year. However, even long-established volunteer programs such as the Breeding Bird Survey acknowledge that observer effects are a major concern when estimating trends. Observer bias can make results of trend analysis unintelligible. The methodologies need to be simple and set for a long-term observer, or observer effort needs to remain constant. The observer must have the required identification skills from the beginning. The site or route selection should be random, and cover a wide geographical area and all habitats within the area. In many monitoring programs, especially if the site selection is not random, there are many biases that can be attributed to the observer such as an increase in observations with increased observer skill. Many monitoring programs therefore may have to rely on experts acting on a volunteer basis to make them cost-effective.

The Carden Plain type of field trip could still work: with the caveat that there should be fewer volunteers (or higher "leader/volunteer ratio") and a better understanding of the data collection process before starting. The protocols for cover estimation in the plots were only decided upon at the last moment. Making a species list is a great type of trip for FBO group, but anything more quantitative should be done only with small groups and the leader should have complete understanding of the protocols well in advance of the trip.

Some Notes on the Nature of Witches'-Brooms

W.D. McIlveen

INTRODUCTION

Most naturalists will have seen a number of unusual growths on some trees and occasionally other plants as they go out into the field. One of these is a brushy structure that is referred to as a "witches'-broom." By definition, a witches'-broom is a symptom in woody plants where many twigs are densely clustered together, resulting in a mass of shoots that resemble a broom.

CAUSES OF WITCHES'-BROOMS

Various agents have been proposed as causing brooms on plants. Some are well documented causes, while in the majority of cases, the cause of the broom is simply not known. Some of the known agents can cause other disease symptoms as well and this does

little to clarify the causal relationship. In most cases (the main exception being Dwarf Mistletoe), the number of plants affected is quite small and of little economic consequence. As a result, relatively little research effort has gone into studies of the brooming phenomenon By contrast, the fungus *Crinipellis perniciosa* causes a witches'-broom that has caused devastation of Brazil's cocoa crop. Some of the causes of brooming are reviewed below with much of the information based on Hepting [3].

Dwarf Mistletoe

Dwarf Mistletoes belong to the higher plant genus *Arceuthobium* (Family Viscaceae). Worldwide, 32 taxa in 28 species of the genus *Arceuthobium* have been recognized [2]. These plants are very small, parasitic, vascular plants that form systemic brooms in their hosts, primarily conifers. Following infection, a swelling is formed at the point of infection. Eventually the infection leads to the production of profuse, dense masses of distorted host branches (Fig. 8).

Two species of *Arceuthobium* occur in Ontario [6]. The range of *Arceuthobium americanum* barely reaches into northwestern Ontario where it has been documented as far east as Sioux Lookout [2]. This species includes Jack Pine as a host but this only occurs in Canada [3]. By comparison, *Arceuthobium pusillum* is much more widely distributed in Ontario except for the Hudson Bay Lowland and the far south west. The most southerly collection appears to have been one made at Snelgrove in 1918. Currently, the species is particularly abundant along the west shore of the Bruce Peninsula where many spruce trees are heavily broomed.

Fungi

In *Amelanchier*, a witches'-broom caused by *Apiosporina collinsii* (related to the causal agent of Black Knot in cherry) is both a twig disease and a leaf disease and affects four *Amelanchier* species (*A. alnifolia, A arborea, A. florida, and A. laevis*). Perennial mycelium in the twigs results in shoot proliferation.

Another brooming disease, is caused by *Taphrina amelanchieri* on *A. alnifolia* in

Figure 1: Ball form of witches'–broom on White Cedar.
Photo by W.D. McIlveen.

Figure 2: Elongate form of witches'–broom on young White Cedar.
Photo by W.D. McIlveen.

Table 1: Summary of witches'-broom types noted on various tree species, 2001.

Species	Crown	Cone	Ball	Elongate	Tuft	Loose Tuft	Total
White Cedar			2	3			5
Eastern Hemlock			1				1
White Pine	1	3	3				7
Red Pine			1				1
Tamarack	2						2
Sugar Maple					2		2
Silver Maple						1	1
Black Ash						1	1
Total	3	3	7	3	2	2	20

California. A *Fusicladium* species has also been reported as forming witches'-brooms on *A. alnifolia* in Washington. Perennial mycelium of *Taphrina cerasi* in twigs of has caused witches'-broom in Sweet Cherry. The fungus attacks a number of *Prunus* species.

In New England and the Lakes States, a witches'-broom caused by the subcuticular perennial mycelium of *Taphrina americana* in both Paper Birch and Yellow Birch.

Figure 3: Cone form of witches'–broom on White Pine.
Photo by W.D. McIlveen.

Microstroma juglandis causes a leaf spot or white mold as well as witches'-brooms on, hickory, walnut, and pecan. The host range included *Carya cordiformis, C. glabra, C. illinoenses, C. ovata*, and *C. tomentosa*. The fungus fruits on the foliage in brooms. The formation of short shoots, with swellings accompanying inhibition of apical extension, together with callus growth results in decided swellings and galling of stems. The brooms are associated with these swellings.

The witches'-broom of Hackberry is caused by the combined action of two agents, the gall mite *Aceria* sp. and the powdery mildew fungus *Sphaerotheca phytophila*. Two forms of brooms can form: an open type where irregular stubby twigs arising from swellings at a branch base and a closed type where the leader fails to develop and a compact broom develops from a large, irregular gall. Many of the twigs in a broom will die back in the winter. Buds on the surviving twigs are numerous, larger than normal, usually grayish, and with looser scales than normal buds. The overall effect on the tree is many clumps of thick growth throughout the canopy.

In Common Juniper, *Gymnosporangium claviforme* (a rust fungus) as well as the closely-related *G. gracile* causes swollen-shoot symptoms following infection of the host. *Gymnosporangium nidus-avis* is a widely distributed species that produces witches'-brooms in *Amelanchier* species. Another rust fungus, *Pucciniastrum goeppertianum*, causes a witches'-broom on lowbush blueberry in Nova Scotia. The alternate host for this fungus is Balsam Fir.

Insects

Since the 1970s, witches'-brooms caused by

an aphid, often called the Russian aphid because of its area of origin, started to attack ornamental honeysuckle shrubs. During the feeding process, the aphids introduce toxins into the plant, causing the leaves to distort and discolor. The leaves fold up over the aphids, which protects the insects against insecticides. The new plant shoots also fail to elongate properly producing an over-abundance of side shoots that grow into the characteristic witches'-brooms. Also, it is not uncommon to find a clumped growth of branches at the top of Black Spruce trees. It is believed that in part this is due to the actions of very small insect larvae that kill the apical meristem of the main shoot on the tree during feeding .

Virus

A witches'-broom on Butternut and other *Juglans* species may be caused by a virus. A large number of brooms may occur in one tree and the tree may be killed. This disease virtually wiped out the attempted culture of Japanese Walnut (*Juglans sieboldiana*) in the eastern United States. In another type of broom in walnut, single, isolated brooms appear to result from localized stimuli of mutagenic origin. A systemic brooming disease of Ironwood occurring in North Carolina has been attributed to a virus. Viruses are not regarded as causing any brooms in conifers.

Mollicutes

Formerly thought to have been caused by a virus are a series of plant diseases now known to be caused by bacteria-like organisms related to Mycoplasmas or Rickettsias. These are graft-transmissible or transmissible by certain insects. Several of these were even given Latin names. *Chlorogenus robinae* was the now invalid name given to a witches'-broom on Black Locust. Symptoms on this host include vein-clearing, greatly reduced leaflet size, proliferation of buds and branches and a brooming habit from a single broom to many intermixed with normal branches. Systemic brooming of Siberian and native elms is caused by the Elm Yellows mycoplasma. Red and White Ash, and to a lesser extent Green Ash, are attacked by the Ash Yellows disease. Some brooming occurs on infected trees but much of the brooming occurs at the base of the tree. The disease is spread by the ubiquitous leafhopper *Philaenus spumarius*.

Mycoplasmas are believed responsible for Apple Proliferation which includes brooming, enlarged stipules, and small tasteless fruit. Brooms have been reported on *Cornus amomum* and *Cornus racemosa* [8], willows [4], walnuts [5], and lilac [1]. Neinhaus [7] found that European Larch could be infected by soil-borne rickettsia-like organisms.

Animals

The action of Red Squirrels clipping cones from Black Spruce has caused a bunchy appearance in the tree crowns. Occasionally, large bunches of cones can accumulate in localized areas of the crown, thereby giving the appearance of a witches'-broom in the tree.

Figure 4: Crown form of witches'–broom on White Pine.
Photo by W.D. McIlveen.

Physical and Chemical Causes

Growth interruption may occur as a consequence of temperature extremes. Zalasky [9] noted that in some cases, trees cankered by low temperatures would sucker readily and become bushy as a result of multiple stems. Road salt will also kill the buds on terminal shoots of woody plants (Fig. 7). Lateral buds will produce new shoots but these in turn can be damaged by succeeding years application of road salt. The overall result is the formations of a witches'-broom-like growth habit. While some of the injury may be due to direct toxicity of the salt, one effect may be the induced loss of mineral elements like potassium, calcium, or magnesium that confer some degree of tolerance to low temperatures. Without this added protection, the terminal bud succumbs to the low temperature.

Unknown Causes

Witches'-brooms, not associated with any organism have been reported to occur on Jack and other pines. Most pine species have had brooms described that appeared to be induced by a localized over-stimulation of buds and not by any particular organism. At least one grafted scion from a White Pine continued to produce a broomed scion but without any transmission of a brooming agent to the stock plant.

Figure 5: Crown form of witches'–broom on Tamarack.
Photo by W.D. McIlveen.

LOCAL RECORDS

Over the past summer, notes and descriptions were made of any witches'-broom that were encountered. The records included such items as host species, form, height and estimates of size. Most of these were observed in northern Halton.

Although the number of records available is small, it is apparent that White Pine and White Cedar were the most commonly affected species (Table 1). Of the 20 records, 16 brooms were noted on conifers. In general, the brooms on the conifers were larger than those on deciduous trees with the largest ones being 4 meters wide by 4 meters long. The types of brooms could be classified into approximately 6 types. These are illustrated in the accompanying illustrations and summarized in Table 1. The brooms on deciduous species were all of the tufted growth (Fig. 6) form whereas conifers were all of the other forms. Cone forms were seen only on White Pine (Fig. 3) while elongate oval forms were seen only on White Cedar (Fig 2). The ball or globular form was noted on four conifers (Fig.1) while the crown

Figure 6: Loose tuft form of witches'–broom on Black Ash.
Photo by W.D. McIlveen.

designation was observed on White Pine (Fig. 4) and Tamarack (Fig. 5). The significance of these general shapes is not known but it may be possible with further data to assign or rule out certain causal agents for each at some time in the future.

Foliage in the brooms on maples was retained longer in the fall than on the normal branches. Foliage colour was judged to be similar in brooms ans non-broomed branches. Sometimes, brooms on pine appeared to be slightly darker in colour but this may only have been an artifact of the foliage being more tightly compacted in the broom. No clear relationship between brooming and production of cones was evident.

The fact that many of the brooms occurred fairly high in the tree crowns (16 of 20 were 7 or more meters above the ground) indicates that the trees were well established before the brooms were initiated. Generally only single branches were converted to brooms, and in one case, all of the tree except for that single large broom was dead. The brooms on the Tamarack and one of the White Pine were of the crown type (Fig. 3). All of the branches at the top of the tree appear to have been converted to a broom but a leader was retained or developed in the Tamarack (Fig. 5). Two thirds of the brooms observed had originated on the south or southwest side of the host tree. The reason for this was not obvious, but exposure and the point of broom initiation seems to share an initiation factor that does not occur by chance alone.

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Figure 7: Road salt induced witches'–broom on Manitoba Maple.
Photo by W.D. McIlveen.

Figure 8: Dwarf mistletoe mass on black spruce.
Photo by Ed Morris, Manitoulin Island.

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Letters:

More on Cowslips in Canada.

Dear Ed,

After I wrote the cowslip article, I discovered accidently that 'cowslip' is used as a common name for Marsh Marigold (*Caltha palustris* L.) in North America. This discovery explained a conversation I had with a complete stranger at Hope Bay. When I mentioned the unique display of cowslips in the vicinity, he said "Oh! We have lots of them in Strathroy every spring!"

The irony is that there is a second common name for Marsh Marigold in Britain--they are King-cups (i.e. [oversized] Buttercups). How in the world Cowslip got transferred I can't imagine. It must have been someone with very poor eyesight! Thought it might be worth [noting].

sincerely
Joan Crowe

Joan,

*I thought you might also find it interesting that my mother applies the name Cowslips to the Anemones (*Anemone canadensis *L.) that grow in her father's lakeside apple orchard in Prince Edward County. She is eight-generations removed from Britain, and would never have seen their Cowslips. I suspect it would be quite easy for my ancestors to reapply British names to local plants that they would have only read about, perhaps casually mentioned in a novel.*

-Ed

Iris lacustris feedback.

Hi Ed,

I'm glad you brought up the fruiting of *Iris lacustris* Nutt. in the newsletter. I'd like to see more topics of this kind put out for discussion among the members.

I did finally see fruits on *Iris lacustris* at South Baymouth, and when I saw them I realized that I had been looking in the wrong place. Whereas *Iris versicolor* L. has the capsules up on a stalk above the leaves, the ovaries of *Iris lacustris* sit right down on the ground, hence under the leaves. One has to move the leaves around and look between them to see the small fruits.

The questions you raised are still valid ones, though, since fruiting seems to be an exception rather than the rule. Other FBO members may not have answers to your questions, but it would be interesting to know if anyone has observed fruiting in other *Iris lacustris* populations (e.g. on the Bruce Peninsula).

Judith Jones

Thank-you Judith. If you or anyone else comes across a fruiting plant next June, please send me a picture of it.

-Ed

Notices:

AGM planned for Sept. 14-15, 2002.

Save the date! The FBO AGM returns to south-western Ontario Sept. 14-15, 2002. This time we are planning to hold it at St. Thomas, Elgin County. Some the destinations being considered for field trips include Springwater Park (old growth forest), Hawk Cliff, Port Burwell Park (dunes and beaches), Dutton Prairie (Compass Plant), Dunwich Swamp, St. Thomas Railroad yards (Skeleton-weed), Yarmouth Natural Heritage Area (Crooked-stem Aster), and Sparta Historic Village.