



A PUBLICATION OF THE NORTH AMERICAN NATIVE PLANT SOCIETY

Native Plant to Know

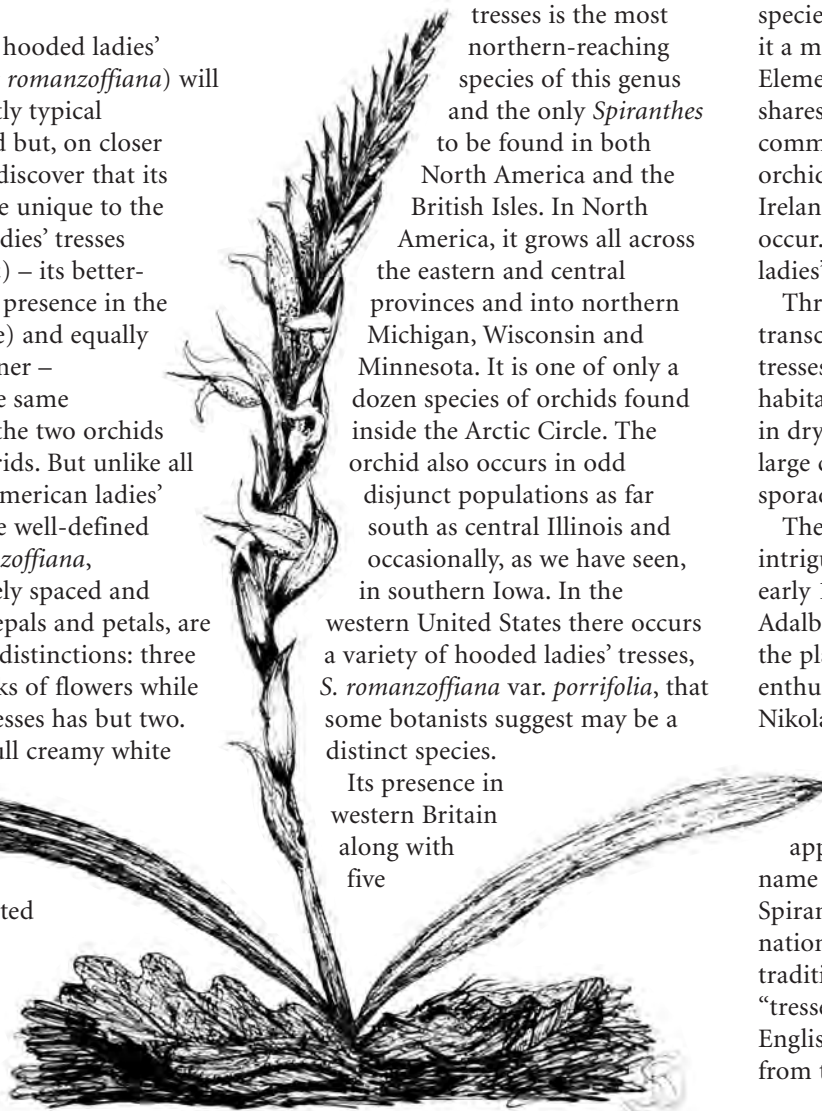
Hooded Ladies' Tresses

Spiranthes romanzoffiana

by Stephen Johnson and Mary Stark

A casual glance at hooded ladies' tresses (*Spiranthes romanzoffiana*) will reveal an apparently typical spirantheid orchid but, on closer inspection, you'll discover that its hooded flowers are unique to the genus. Nodding ladies' tresses (*Spiranthes cernua*) – its better-known (due to its presence in the horticultural trade) and equally widespread congener – occupies much the same wetland habitats; the two orchids have possible hybrids. But unlike all the other North American ladies' tresses orchids, the well-defined hoods in *S. romanzoffiana*, composed of closely spaced and seemingly fused sepals and petals, are distinctive. Other distinctions: three distinct spiral ranks of flowers while nodding ladies' tresses has but two. The flowers are dull creamy white

and although we detected no odour, hooded ladies' tresses apparently can produce a scent rather like coumarin.



Hooded ladies' tresses is the most northern-reaching species of this genus and the only *Spiranthes* to be found in both North America and the British Isles. In North America, it grows all across the eastern and central provinces and into northern Michigan, Wisconsin and Minnesota. It is one of only a dozen species of orchids found inside the Arctic Circle. The orchid also occurs in odd disjunct populations as far south as central Illinois and occasionally, as we have seen, in southern Iowa. In the western United States there occurs a variety of hooded ladies' tresses, *S. romanzoffiana* var. *porrifolia*, that some botanists suggest may be a distinct species.

Its presence in western Britain along with five

other typically western hemisphere species has led English botanists to call it a member of the "American Element." In England, *S. romanzoffiana* shares the countryside with the common European ladies' tresses orchid, *Spiranthes spiralis*, but in Ireland, it is the only *Spiranthes* to occur. Hence it is known there as Irish ladies' tresses.

Throughout its wide and transcontinental range, hooded ladies' tresses typically occupies fen or swamp habitats but occasionally can be found in dry forest edges. It rarely forms large colonies but is usually found sporadically as individual plants.

The species name has always intrigued us. It was authored by the early 19th century botanist Ludolf Adalbert von Chamisso who named the plant to honour his botanically enthusiastic patron, the Russian noble Nikolai Rumiantzev, Count

Romanzoff. The Anishinaabe name for *S. romanzoffiana* is beamsquandawish which apparently means "spiral." This name may have been applied to all *Spiranthes* species occurring in their nation's boundary. In the western tradition, the common epithet "tresses" derives from the Middle English tresse which itself may come from the Latin word *trichia* for hair

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ILLUSTRATION BY STEPHEN JOHNSON

The *Blazing Star* is . . .

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Editorial

In the new year, the North American Native Plant Society will be celebrating 30 years of advocating for the study, conservation, cultivation and restoration of native plants and native plant habitat. It's hard to believe that a wine and cheese party for native plant gardeners at Jim French's house in Toronto become the galvanizing event that led a diverse group of individuals to form our organization in 1985.

Along the way there have been plant sales, seed exchanges, speakers series, plant rescues, restoration projects, letters of indignation and battles with local governments, outstanding publications (*Wildflower* magazine, *The Blazing Star*), information sheets, outings and field trips (including an art camp in Temagami) and the purchase of two properties for native plant conservation (Shining Tree Woods and Zinkan Island Cove). In 1985, NANPS founders could not have anticipated the arrival of the digital age which has spawned a comprehensive and informative web-site, an e-newsletter (*The Local Scoop*), a rapidly expanding Facebook following and Twitter feed. It has been quite a journey!

For many of us, including myself, the journey has been much shorter but no less interesting and while anniversaries are great opportunities to look back and relive memories, NANPS is busy looking forward. Projects on our wish list include expanding the number and scope of our native plant sales, an expanded speaker series including video productions of the talks (to be made available online) and sponsorship of native plant talks in cities across Canada and the U.S., a trailer to house our tools and plants for restorations, rescues and plantings (see page 3, *Future Projects for NANPS*), and the ability to support permanent staff including a plant sale coordinator and a full-time executive director.

Of course, the ultimate goal for NANPS, and a dream held close by its founders, is a permanent home – an office and property where we can showcase the best that our native plants have to offer.

Our current slate of projects and activities is sustainable given our membership numbers and plant sale funds, but NANPS cannot move forward with additional projects such as the ones listed above without additional funding. We are busy applying to funding agencies to support our initiatives but competition is stiff.

One source of funding which NANPS has rarely approached is our membership. Unlike many other charities, we have made few direct appeals for funding, but now is the time and place. As NANPS heads into its 30th year, this is a great opportunity to move forward with new initiatives that can only happen with additional funding.

Please consider making a donation to NANPS or remembering NANPS as part of your estate planning so we can forge ahead as advocates for native plant conservation. If you are able to make a gift to support our efforts, contact me at pkelly@nanps.org or 519-824-4965 or speak with a NANPS board member. Gifts can be made to support operating funds or they may be targeted for specific initiatives. We are all looking forward to our next 30 years. As a registered charity, we provide tax receipts for donations.

Thank you for being part of the NANPS community!

Peter Kelly

NANPS Executive Director



Staghorn sumac (*Rhus typhina*)

PHOTOGRAPH BY MUKIB KHAN

NANPS EVENTS

NOVEMBER 15, 2014 **NANPS AGM & Awards Ceremony**
Markham Civic Centre
101 Town Centre Blvd.,
Markham, Ontario

NANPS will have a table at the following events:

NOVEMBER 18-20, 2014 **Latornell Conservation Symposium**

Nottawasaga Inn,
Alliston, Ontario
Visit latornell.ca.

NOVEMBER 23, 2014 **Eco-Fair at Artscape**
Wychwood Barns, 601 Christie St.,
Toronto, Ontario, 12pm – 4pm
Visit ecofairtoronto.org for more information.

**JANUARY 31-
FEBRUARY 1, 2015** **Guelph Organic Conference & Expo**

Wychwood Barns, 601 Christie St.,
Toronto, Ontario, 12pm – 4pm
Visit ecofairtoronto.org for more information.

MARCH 13-22, 2015 **Canada Blooms**
Direct Energy Centre
Toronto, Ontario
For details: canadablooms.com.

For more information about NANPS Speakers Series and other events please visit www.nanps.org.

FUTURE PROJECTS AT NANPS

We have been busy at the North American Native Plant Society exploring ways to move the organization forward in 2015 and beyond. The NANPS Executive has felt that we could accomplish more and expand our agenda with the help of suitable donors. To this end, in the past year we applied to several granting agencies for funding and I am excited to share with you the good news that we have been awarded funds from two sources – **The McLean Foundation and Helen McCrea Peacock Foundation at The Toronto Foundation** – to turn two of these project ideas into reality.

The McLean Foundation granted NANPS \$5,000 towards the video production of two native plant talks. Given that we are currently living in the digital age, the message delivered by an engaging speaker need not be restricted to the audience in the room. The McLean Foundation grant will enable NANPS to hire a professional videographer to shoot footage of two speakers in 2015 (tentatively scheduled for April and June) who will address topics related to native plant cultivation, restoration or conservation. These videos will then be made available online for interested viewers

across the continent. This will help NANPS fulfill its North American mandate for education on issues related to native plants even though we are geographically based in Toronto, Canada. We welcome suggestions for dynamic speakers with interesting topics.

Another exciting project that will come to fruition in 2015 is the NANPS Community Native Plant Restoration and Rescue Trailer. The Helen McCrea Peacock Foundation at The Toronto Foundation granted NANPS \$8,000 to purchase a 1½ by 2½ metre (five foot by eight foot) utility trailer. This trailer will be outfitted with shovels, buckets, pots, gloves, a watering hose, wheelbarrows – everything needed for a group to conduct a native tree planting or complete a restoration project. While NANPS will certainly make good use of the trailer for its own projects, it will also be loaned to community groups whenever possible for their native plant projects. The trailer will feature our name and logo and will also help raise awareness about NANPS. Look for it this spring!

We express our sincere appreciation to The McLean Foundation and Helen McCrea Peacock Foundation at The Toronto Foundation for their generous support of these two projects.

Peter Kelly, NANPS executive director



Brown-eyed Susan (Rudbeckia triloba)

PHOTOGRAPH BY PETER KELLY

WANTED: More Seeds for NANPS Seedex

We urge you to collect seeds from native plants where possible and remember to send in the seeds you have already collected for our annual seed exchange. Send them separated by species and identified with the source/parentage to NANPS, Box 84, Station D, Toronto, Ontario, M9A 4X1. Questions? Contact seeds@nanps.org.

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Sustainability in an Arid Climate

by Kaesha Neil

When you think about sustainability, what comes to mind? Type or amount of energy used? Recycling? Reusing shopping bags? How much food you throw away? What about the landscaping around your home or even in public spaces?

Here in the Phoenix metropolitan area in Arizona, when most people think of sustainability and their yard, water use comes to mind. Phoenix is located in the Sonora Desert and this means most of our water is shipped in from the Colorado River or pumped from the ground. Therefore, water use is a huge concern. Government agencies and environmental organizations encourage homeowners to plant low-water-use plants. Lists of these plants exist, but they focus on characteristics such as growth type, flower colour and attractiveness to hummingbirds or other pollinators. Ever since I started thinking about buying a home (I bought it four years ago), I have spent a good deal of time considering the types of plants to

include because I want every plant to have more than one purpose.

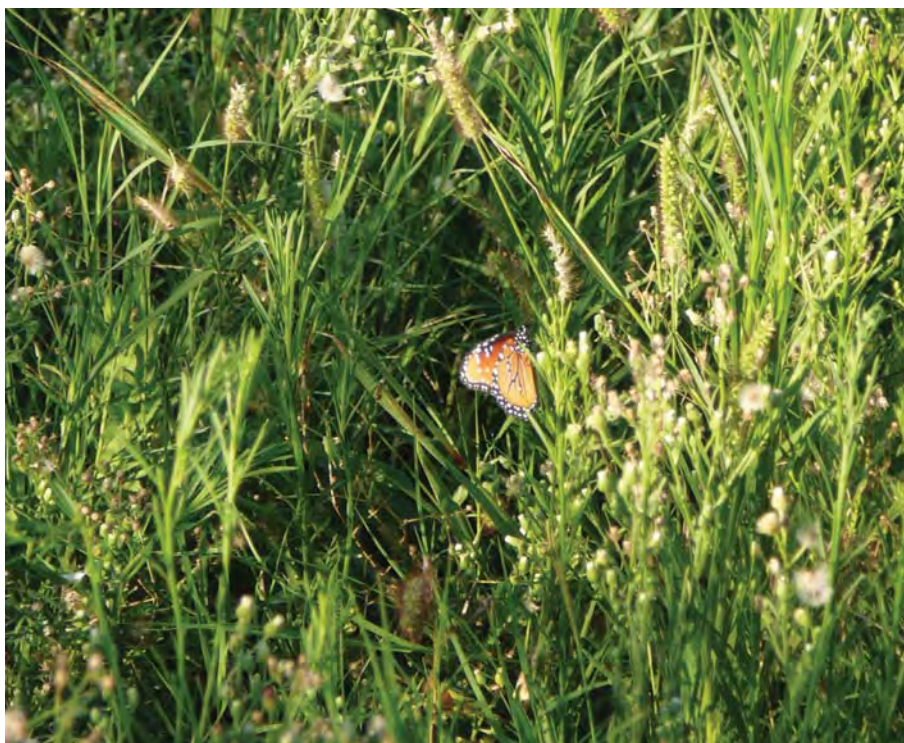
Sustainability is a hot topic. Controversy erupts when debating what is sustainable or, more accurately, more sustainable. Arguments over local food vs. organic vs. fair trade are not uncommon. Or planting xeriscaped yards vs. grass yards. What if you have children or dogs that want to play outside? What if you plant desert plants, but keep them on a high water schedule after they are established to keep them looking lush and pretty? Few people like to look at dead-looking, dormant sticks during the driest and hottest part of the year. Moreover, it is hard to argue the sustainability of several million people living in a desert relying on shipments of food and water to survive. But this is my home and as an ecologist and citizen I think a great deal about how to be more sustainable. While there are many things to consider with this topic, the one I want to focus on is how I choose my plants.

I only grow plants that provide food

for me or my animals, offer food or shelter for native wildlife or provide some other product I can use (e.g., wood, medicine, sponges). Because I have to expend time maintaining my yard and spend money for water, I want to make sure that my yard does not exist just to give me weekend chores or employment to a landscaper. Because I want to raise animals such as chickens, miniature cows and maybe some goats, sheep or rabbits and I want to grow vegetables and fruits, a purely xeriscaped yard does not work for me. Still, my yard is more sustainable than a green lawn with a few shade trees grazed and browsed only by a lawnmower and pruners.

My first planting included dryland cool-season and warm-season bunch grasses such as blue grama (*Bouteloua gracilis*), Indian ricegrass (*Oryzopsis hymenoides*), galleta (*Pleuraphis jamesii*), alkali sacaton (*Sporobolus airoides*) and little bluestem (*Schizachyrium scoparium*) whose leaves and seeds are relished by both wild grazers and livestock. The variety in height (for example, 12-18 inches or 30-45 centimetres for the blue grama, up to five feet or 1.5 metres for the alkali sacaton), colour (all the variations of greens, blue-greens, browns and more) and texture (thin leaves of Indian ricegrass, thick leaves of blue grama) create an interesting and beautiful landscape. I also planted wildflowers including the red Mexican hat (*Batibida columnifera*), yellow-orange California poppy (*Eschscholzia californica*) and pink evening primrose (*Oenothera speciosa*) to go with the variety of non-native weeds and grasses already there. There are also native “weeds” present, such as wild sunflowers (*Helianthus annuus*) and amaranth (*Amaranthus* spp.). The result is a polyculture pasture that sustains a healthy, productive soil, pollinators and animals.

I have trees in the pasture for shade. Vegetation provides cooler shade than artificial shade and it also provides food. Cows (or sheep or goats) can



PHOTOGRAPH BY KAESHA NEIL

A monarch butterfly visiting the pasture.



The “weedy” sunflower (*Helianthus annuus*) does not need help to grow. Kaesha pulls many of the plants to feed to the neighbouring livestock and to keep the large plants from creating a sunflower forest in her yard. The chickens like the dropped seeds even though they’re smaller than those of cultivated sunflowers.

browse the branches of the velvet mesquite (*Prosopis velutina*), said to be one of the best tasting of the mesquites and my personal experiences support this, screwbean mesquite (*Prosopis pubescens*), desert willow (*Chilopsis linearis*), hackberry (*Celtis pallida*), coyote willow (*Salix exigua*), honey locust (*Gleditsia triacanthos*), iron wood (*Olneya tesota*) and acacia (*Acacia farnesiana*). The animals can also consume their pods. The chickens like the seeds and fruit of these trees. I eat the pods of the mesquite (chewed whole or ground into flour) and the berries of the hackberry. My niece has a pet rabbit and the pruned branches and legume pods from all of these trees are great additions to the rabbit’s diet. The leguminous trees are nitrogen fixers for the soil, increasing the productivity of the grasses. I also have a couple of western soapberry (*Sapindus drummondii*) trees; the fruits are enjoyed by birds and contain saponins, which are soap-like compounds that can be used to clean clothes or one’s body or hair. These kinds of plants have been used for centuries as cleaning agents.

I am also experimenting with some oak trees including chinkapin (*Quercus muehlenbergii*), California

black oak (*Quercus kelloggii*) and emoryi oak (*Quercus emoryi*) for acorns. These particular ones were chosen because their acorns are known to be “sweet” meaning they contain very low amounts of tannins and do not require soaking before consumption. I have planted a black walnut (*Juglans nigra*) but I also want to try the native Arizona walnut, *Juglans major*. A couple of pecan trees (*Carya illinoensis*) that were present when I moved in round out the North American native nut trees in my yard.

My young orchard contains low-chill varieties of most of the typical domesticated and non-native fruit and nut trees such as apples, plums, figs, peaches, grapes, pears, apricots, almonds, cherries and others as well as atypical choices such as mulberry, quince, sugar cane, Asian pear,

pomegranates, olive, dates, jujube and hibiscus. However, I have made a point to find and put in uncommon fruit trees native to the Americas. It is experimental, given the climate, and very difficult to find nurseries selling what I want. But I enjoy the challenge. For instance, I found a Mexican elderberry (*Sambucus mexicanas*) native to the southwest and a couple of mayhaw trees (*Crataegus opaca*) native to the south. Once the tree canopy develops and I see how the trees are growing, I plan to try pawpaw (*Asimina triloba*), raspberries/blackberries (*Rubus* spp.), the North American native persimmon (*Diospyros virginiana*) and red mulberry (*Morus rubra*). When it matures, the orchard will provide shade for me, the animals and the permanent vegetable beds as well as food. I generally maintain the fruit trees at a semi-dwarf size to keep the harvest reasonable and water/nutrient needs lower.

The trend in landscapes for the past few decades has been away from fruit trees in the yard because they are “messy” with fruit drop. I believe their fruit should be greedily harvested and eaten, not considered a nuisance. After all, what is more sustainable than food from your own yard? I love having my

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The ripening fruit of the cow’s tongue prickly pear (*Opuntia engelmannii* var. *linguiformis*), a variety with elongated pads that resemble its namesake. The magenta fruit is striking in the landscape and in the kitchen.

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PHOTOGRAPH BY KAESHA NEIL



The pods of the velvet mesquite (*Prosopis velutina*), ready for picking. The harvest is still light for these young trees, so Kaesha feeds what she collects to the neighbour's cows and sheep. Grinding requires a special grinder due to the hardness of the seeds. When she has a large enough harvest, Kaesha can rent a grinder from a local non-profit.

orchard for the same reason I love my vegetable garden: I can grow fruits that are not available at local markets, I avoid using pesticides, I support genetic diversity in my food plants, I can increase the diversity of foods in my diet, I grow more nutritious and better-tasting food on healthier soil, and I provide a portion of the food that I, my family and my animals consume (so that it does not have to be shipped in).

Some of my plants are useful in other ways. I grow roses that not only produce pretty flowers, but petals and hips for culinary uses. The trimmings can be fed to rabbits, cows and other livestock; the chickens enjoy the hips. The North American native rose *Rosa woodsii* is known for good-tasting hips, but I have to wait until the trees mature before I can experiment with planting cuttings under the canopy where they will be protected from the heat and the intensity of the sun. I grow prickly pear cactus (*Opuntia* spp.) in an area that rarely receives water other than rainfall. The fruits make a wonderful magenta-coloured

syrup and the chickens love the pulp and seeds which I find too hard to chew. The pads and fruit can also be consumed by livestock, such as cattle, once the glaucids (tiny spines) have been removed by rubbing or burning them. Mixed in with the cactus are beebush (*Aloysia gratissima*) that attracts pollinators and is browsed by livestock, candellila (*Euphorbia antisiphilitica*) that produces a wax, agaves such as *Agave lechuguilla* that are a traditional source of fibres and soap, chuparosa (*Justica californica*) and ocotillo (*Fouquieria splendens*) that also attract bees and other pollinators.

I like to make things—all sorts of things—so a backyard source of natural supplies keeps me occupied with my experiments and crafts. For example, the coyote willow provides branches for baskets and garden supports, and bark for use in assisting germination of seeds and rooting of cuttings of many different plants and for making medicinal teas. The Mexican elderberry also has medicinal uses, such as supporting the immune system and cardiovascular health. Another experiment is the native southeastern American beautyberry (*Callicarpa americana*) that produces bright purple fruits in the fall. The fruits are eaten by

birds and people and the leaves contain mosquito-repelling compounds. Of course, all the shrubs and trees can provide wood for crafts, smoking foods, construction, furniture building and burning for fuel. There are many more undemanding and giving plants in my garden.

My yard is still young and developing, but it gives me great pleasure to look out and see its potential and its present gifts. Sustainability means different things to different people in different places. For me, it means carefully choosing plants for my yard that not only look nice, but thrive in or tolerate my challenging microclimate without excessive input from me. They're not just pretty faces.

Kaesha Neil is an urban and landscape ecologist who teaches biology for the Maricopa Community College District. She has a B.S. in Biology and Ph.D. in Plant Biology. She also teaches classes on food preservation, a variety of home-made items, gardening and composting for a local non-profit, the Valley Permaculture Alliance. She shares her yard and garden with Mottled Java chickens, Muscovy ducks, a pair of chatty Royal Palm turkeys, a few stray cats and a variety of wildlife.



While the majority of the flower show occurs in the spring, the evening primrose (*Oenothera speciosa*) will bloom throughout the hot summer as long as it is not mowed/grazed and it receives plenty of water.

PHOTOGRAPH BY KAESHA NEIL

Growing Lilies from Seed

by *Darcie McKelvey*

Growing native lilies from seed is not an impossible task, but it does require patience and a methodical process. I am referring to wood lily (*Lilium philadelphicum*), Michigan lily (*Lilium michiganense*) and Canada lily (*Lilium canadense*), the lilies native to Ontario that I have grown.

GERMINATION

The seeds have a D germination pattern, requiring a period of warm moist stratification followed by cold stratification, although wood lily responds to this slightly differently than the other two.

Lily seeds, usually abundant, are available in the fall. After I harvest the seeds in late fall, I put a known number of seeds in moist vermiculite in a heavy duty freezer bag, one with a double zipper. I write the species, the

heats up, evaporates and then condenses, but there is no leakage. The bags are left in this warm spot for several months. It can take up to three months for the seeds to germinate.

With Michigan lily and Canada lily, what you eventually get is a number of small bulbs. It is important to count the number of seeds you have started as most of them will germinate, but the bulbs will be very small and not easy to find in the vermiculite. When I have located the majority of the bulbs, I plant them close to the surface in a 10 x 10 centimetre (four by four inch) pot in real soil without fertilizer (rather than a soil-like but lifeless medium). I place the seeds in a pot, usually 13 bulbs to a pot, using an “X” pattern. Nine of the bulbs form the “X” with the remaining four filling the spaces. This builds on the natural strength of plant triangulation (in threes) and allows me to more easily

period, the bulbs will start forming leaves. At the beginning of May or even as late as mid-May, it will be warm enough for the bulbs to go outside.

I would warn you not to expect a lot of leaves. In its first outdoor season, a lily will start with one small leaf perhaps to be joined by a second leaf later in the season. I take the number of leaves as a sign of the plant’s strength/health. When the leaves disappear, having completed their “growing season,” I may choose to put them back into the refrigerator for another two and a half months – their second “winter.” Whether I do this depends on when the seeds go dormant; I hope to leave them outside in the actual winter coming up. If I can stick them in the fridge for a substantial period of time and still have them available to experience another three months of growing

PHOTOGRAPH BY DARCIE MCKELVEY



Wood lily bulbs germinating.



Canada lily bulbs germinating.

PHOTOGRAPH BY DARCIE MCKELVEY

quantity of seed and the date on the outside of the bag. I place the seeds on the ledge of my gas-powered fireplace. This heats up every night to a toasty temperature. I have read that others put the seed on top of the refrigerator, another warm spot. The vermiculite will stay moist for a very long time in a heavy duty freezer bag. The water

sort out the weeds.

The Michigan lily and Canada lily then require at least three months of cold stratification. I use an old refrigerator to stratify most seeds. Since lilies prefer moist situations, I often put the pots in a plastic bag, which I leave open at the top. When I remove the seeds from their cold

season (August to October, for example), then I am accelerating their growth and lessening the time I will have to wait for them to flower. Until they are several years old, I grow my Canada and Michigan lilies under a 70% shade net and my wood lilies under a 30% shade net for the early

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and hot part of the summer.

Wood lily germination is somewhat different. Let's go back to the zippered bag stage. Instead of forming small white bulbs in the vermiculite, this lily will create a thin leaf that resembles a piece of grass. If you look carefully at this, you can see a distinction between the "root" and the "leaf" and will be able to insert the correct end into your real soil mixture. The trick is to keep the leaves [not leaves] growing as long as possible. As above, each wood lily plant may produce a second or third leaf later in the season. I want to emphasize that wood lilies do not go into the refrigerator to stratify before they produce a leaf, as did Michigan lily and Canada lily.

CARE OF SEEDLINGS

Many of the juvenile lilies will perish en route to adulthood. I leave the Michigan and wood lily bulbs in the same 10 x 10 centimetre pot until the end of the second season, before considering repotting them into individual pots. Experience has taught me that the plants don't transplant easily.

My Canada lilies were an exceptionally strong bunch to raise. By this I mean they were vigorous right from the beginning, germinating quickly. Each lily produced a large leaf, and then second and third leaves before going dormant. I started in January 2010 with 50 seeds. The bulbs were planted in two pots in late April 2010, which went into the refrigerator until mid-August 2010. They grew until the



PHOTOGRAPH BY DARCIÉ MCKELVEY

Wood lilies in pots.

fall and spent winter outside with typical winter protection for seedlings.¹ In May 2011, I potted the surviving 12 plants into individual pots which are narrower but deeper. In the fall of 2011, I had five pots with lily leaves still visible – another sign of vigor. Those five pots grew throughout 2012 and 2013 without further transplanting. It was only in June 2014 that I put three of them, in a triangular formation, into the garden. I left out the strongest and weakest bulbs. In September, there was only one lily with green leaves. The other two were there

but the leaves were gone and only yellow stems remained. If one of them fails to survive the winter, I will have the opportunity to replace it with the strongest bulb, which I set aside.

WHERE TO PUT LILIES IN YOUR GARDEN

Lilies are not easy to site in the garden. I have had the most



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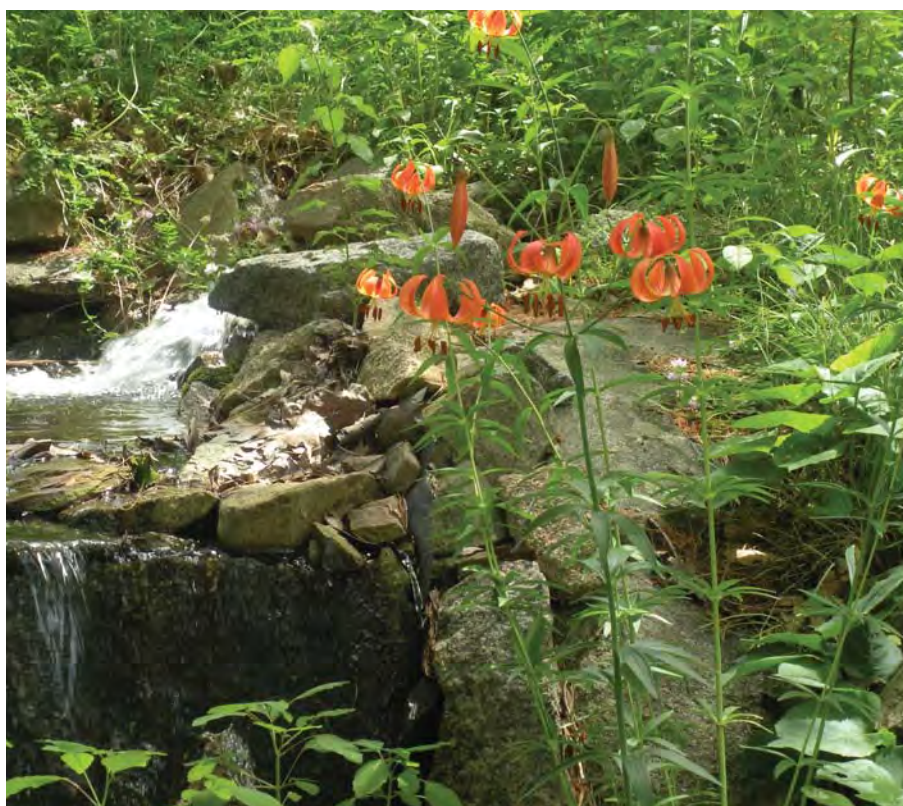
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experience with Michigan lilies. Their flowers scorch easily, so they must be planted in an area with considerable shade. I have them in several locations in my garden, in triangular format, and shaded in each moist spot. They bloomed this year during the second week of July but I have seen them blooming in June during warmer years. If you are lucky, they will be pollinated by hummingbirds.

Despite their name, wood lilies are supposed to be able to tolerate a drier, more open situation. I planted three of them one fall and they bloomed the subsequent year, then disappeared the next. I thought they were lost, probably as a result of bad siting, but one reappeared last year and this year I had three again.

CONCLUSION

Only one of the three wood lilies produced seed this year, but a scant amount. I stuck 22 seeds into a moist vermiculite mix in September and left it on my kitchen counter. I was waiting for it to get colder, so that my gas-powered fireplace would kick in. However, I noticed on October 10th that I have 12 germinating seeds in the bag. This raises some problems since it



Michigan lilies

is not easy to grow things in October, due to an uncooperative sun and cooler temperatures. I am left with trying to grow the seedlings under lights for a month or two, and then possibly storing them in my refrigerator. If you manage to obtain fresh wood lily seeds, be aware that

they may germinate when simply placed in a moist bag. It may be preferable to hold off the process (e.g. store them in a dry state and do not refrigerate) until February or March, when the sunlight has a different aspect and spring is not too far off. That way, the seedlings will have an opportunity to grow outside.

Stay tuned to *The Blazing Star* for updates on my native lilies in the years to come.

Darcie McKelvey is a past NANPS director, a regular volunteer at our annual plant sale and a loyal donor to the NANPS Seed Exchange. She is a dedicated member of the Waterloo-Wellington Wildflower Society and edits their newsletter, The Dogtooth. Darcie is involved in co-creative gardening à la Michaëlle Wright, Perelandra Centre for Nature Research.



Wood lily in bloom.

¹ This involves placing the pots in a tray and covering it with a reasonably stout transparent plastic bag with a few holes punched into it. After lining up the trays on the ground, I place five to eight centimetres (two to three inches) of leaves on top.

What is Local? Choosing Native Plants

by Clement F. Kent

The ancient Greeks found hundreds useful for big numbers. One hundred hundreds was a myriad – a very big number. But 10,000 years is a short time in the life of a species which can take millions of years to evolve.

Two myriads of years ago, the Virginia tidewater region where I now live was open boreal woodland, and the hills of the piedmont where I go to hike and enjoy Carolinian forests were taiga-like – sparse spruce and dwarf birch interspersed with dwarf willows and tundra plants. Toronto was buried under kilometres of ice. The Carolinian forests I love survived only far to the south in Georgia and Alabama. Mastodons, mammoths and giant ground sloths roamed the ice-free zones.

One myriad of years ago, southern Ontario had a mixed broadleaf and conifer forest while Virginia had the magnolias and other species typical of southern temperate forests. Many tree and smaller species had moved north, but some were stranded. In previous warm interglacial times Osage orange (*Maclura pomifera*), pawpaws (*Asimina triloba*) and other big-fruited trees had been found far to the north, but this time they didn't follow the oaks, maples and beeches northward. And the great megafauna were gone.

Why did some plants follow the

warmth north and others fail?

It's likely, as explained in Connie Barlow's *The Ghosts of Evolution*, that the giant browsers helped spread the large, hard fruits of Osage orange and other plants like Kentucky coffeetree (*Gymnocladus dioica*). But humans had arrived from Asia and soon after their arrival giant sloths and mammoths went extinct. As a result of this human-aided great extinction, Carolinian forests had a distinctly different makeup from previous postglacial periods. Loss of the great browsers had other effects: as elephants still do in Africa, North



PHOTOGRAPH BY CLEMENT KENT

Osage orange tree laden with softball-sized fruit about 20 feet (six metres) above ground level.

American elephants had kept large areas in a more open mixed savannah with small clumps of forest. Very quickly after the great extinction, savannah habitats were replaced by much denser forest stands in many locations, much reducing the eastern North American range of

many of the beautiful meadow species we love to grow.

The species of plants that were "local" in a particular state or province was much changed, both by early human impacts and by the changing climate. Once again, we live in a time of great human impacts and rapidly changing climate. Osage orange clearly was not found in Ontario 500 years before European settlement; it was restricted to a small range in Texas and Arkansas. But it grows and sets fruit very nicely on the campus of York University in Toronto. Should it be seen there as an exotic species moved by misguided people or as a plant re-establishing the range it had before human settlement? Unfortunately, we cannot bring back its sister species. In a review of the impact of megafaunal extinctions,



ILLUSTRATION BY ROBERT BRUCE HORSFALL

Giant ground sloths, another probable disperser of large hard fruit in the Americas.

C.N. Johnson (2009) mentions the lost Osage orange sister species:

“...extinction of large-fruited species that were widespread in the Pleistocene, such as in the genus *Maclura*, which declined from several species to a single narrowly distributed survivor, the Osage orange *Maclura pomifera*...”

Johnson notes that in surviving tree species with large fruits dispersed by megafauna:

“...most have restricted distributions, reflecting the fact that few or no living animals disperse their seeds. Molecular genetic analysis of several species demonstrates lack of gene flow, by showing moderate levels of genetic variability within populations but high differentiation among populations...”

GENE FLOW AND LOCALITY

Gene flow is the movement of different versions of genes by dispersal and cross-pollination. The lack of gene flow among relict populations can be viewed as a bad thing or a good thing. Pawpaw trees examined with genetic methods seem to have a level of gene flow six times lower than required to prevent buildup of deleterious mutations (Huang et al 2000). This buildup of “genetic load” (the occurrence of deleterious genes) is most threatening in small populations and can produce “inbreeding depression.”

The countervailing condition occurs when populations are found in very different habitats, such as low and high elevations on a mountain. If each population is well adapted to its own habitat but not to the other, mating between them can cause “outbreeding depression” as a result of “migrant load”.

Those who advocate using only locally sourced seed are trying to avoid outbreeding depression. But a recent review (“Evolutionary rescue in a changing world” 2014) states “To date

there have been no experimental demonstrations [...] that migration load has a sufficiently strong influence to prevent evolutionary rescue” of populations. In other words, by trying to avoid a hypothetical problem (outbreeding depression) we deny ourselves the chance to ameliorate genetic load. And, as native plant populations are chopped up into small remnants by human development, genetic load will certainly increase, threatening the genetic diversity the

drove the megafauna extinct. After more than a myriad of years of gene pool depauperization due to human actions, is it not time to consider active steps to reverse the trend?

At the other end of the spectrum, there are plant species where recent studies show gene flow is surprisingly large. Botanists have studied the dispersal abilities of seeds for many years. Even among seeds with wings like maple keys or elm seeds, most end up no farther than 10 metres (30 or so



Osage orange fruit.

plant populations need to adapt to climate change.

For Osage orange and pawpaws, gene flow used to happen in the guts of giant herbivores. Mammoths and mastodons could travel many kilometres in the day or two it took a seed from being eaten to ending up in dung. Barlow gives many other examples. For these native plant “ghosts of evolution” inbreeding and loss of genetic diversity has been going on in the 11,000 years since humans

feet) from the mother tree. At that rate trees restricted to Georgia during the last glaciation ought to have taken over 100,000 years to reach Ontario, but we know that they covered that distance much, much faster. We now know that during thunderstorms and other extreme wind events, more than one percent of maple keys can travel more than 11 kilometres (seven miles), and even heavy hickory nuts can go 650 metres (700 yards). Pollen

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is the other form of gene flow. Bumblebees can forage up to five kilometres (three miles) from their nest, and wind-blown pollen of some plants is viable over many kilometres.

Therefore, gene flow by seeds and pollen can maintain genetic diversity over reasonably large distances, given sufficient time. If a native plant is common enough to have stands every kilometre or so, then the entire population will have a well-mixed gene pool. We shouldn't worry about local seed sources for these common species.

However, once a species becomes rare enough that local populations are more than five kilometres apart (for animal-pollinated flowers with heavy seeds) or 100 kilometres (60 miles) apart (for wind-pollinated flowers or species like milkweeds or *Asclepias* with light seeds), gene flow will likely be reduced. This may lead to local adaptation or it may lead to inbreeding and loss of fitness (maladaptation).

If local, widely separated populations contain thousands of individuals, inbreeding is probably not a large problem. These are the species that are the best candidates for the locally collected seed rule.

But if distant populations are small (hundreds of individuals or less) we should worry more about inbreeding and consider ignoring locality rules for seed.

DIFFERING POINTS OF VIEW ABOUT TIME

Graham Buck summarizes one point of view on native plants in his article "Applying Ecological Restoration Guidelines to Naturalization" in the spring 2010 issue of *The Blazing Star*. He says, "A native plant is a plant that existed in a given state or province before the arrival of Europeans" and "Osage orange (*Maclura pomifera*) and black locust (*Robinia pseudoacacia*), although commonly referred to as natives by Ontario landscapers and garden centres, are all considered by

ecologists as not native to this province."

I've argued above that Osage orange wasn't found in Ontario 500 years ago due to human extinction of the megafauna. Why should we use 500 years, rather than 50,000 years, and Europeans rather than Native Americans, as our criteria?

Misconceptions due to too short a timeframe are often found in the conservation literature. For instance, Foster et al 2003 state that open field and meadow habitats in the New England area are the result of European settlement and as a result cannot be considered natural. However, Johnson notes that before the Native American extermination of native megafauna, large parts of North America were dominated by a more open, savannah-like landscape maintained by browsing. Using Foster's logic we might consider the climax Carolinian forest to be an unnatural human-created landscape which replaced the pre-human mixed forest-meadow biome.

Indeed, conservation biologists who have studied our continent's past ecosystems have called for the reintroduction of megafauna under the banner of "Pleistocene Rewilding." Such large-scale changes in fauna would produce very large changes in flora, yet would be a reversion to the pre-human native state of North America.

DIFFERING POINTS OF VIEW ABOUT SPACE

Graham Buck also notes, "Even if a plant is not provincially rare, it can still be regionally rare and introducing it to new parts of the county [Waterloo Region where Graham owns a native plant nursery] is akin to introducing provincially rare plants to new areas of the province – you are doing more harm than good."

Scientific points of view about plant distributions and genetic load often disagree with this. A species may have become rare due to loss of habitat and

be suffering from increased genetic load. Or, it may have been dispersed by Native Americans before European arrival north of its range 500 years ago, like the clonal stands of pawpaw along canoe-able waterways north of its range in Ontario where the trees seem quite healthy but cannot set fruit, as they need to outcross (introduce unrelated genetic material to a breeding line) to produce seed. Planting even one genetically distinct individual from 100 kilometres away in southwestern Ontario near such stands would result in high fertility and genetic rescue. Fossils show that during the Pleistocene era, pawpaws grew as far north as Toronto. I planted two Ontario-sourced pawpaw seeds in my Toronto garden and look forward to eating their fruit someday.

Invasive species are a huge issue for native plants, and the locality rules of Graham Buck and others are a proper reaction to such problems. But in some cases, I think it's an overreaction. One thing is certain: we need a better understanding of which rare native plants suffer from inbreeding and high genetic load. Fortunately, tools for discovering this have become common and inexpensive in universities in the last decade. Native plant societies, conservationists and university researchers should work together to gather genetic data on species at risk, so future plantings can be maximum benefit and minimum risk.

Clement Kent works on neurogenetics at the Howard Hughes Medical Institute in Ashburn Virginia. He received his Ph.D. in genetics at the University of Toronto and did postdoctoral work in population genetics at York University. He is a past president of the Horticultural Societies of Parkdale and Toronto and is author of How to Make a Pollinator Garden (available from Pollination Canada). He thanks Professors Spencer H. Barrett and Joel Shore for their comments on this article.

New & Noted

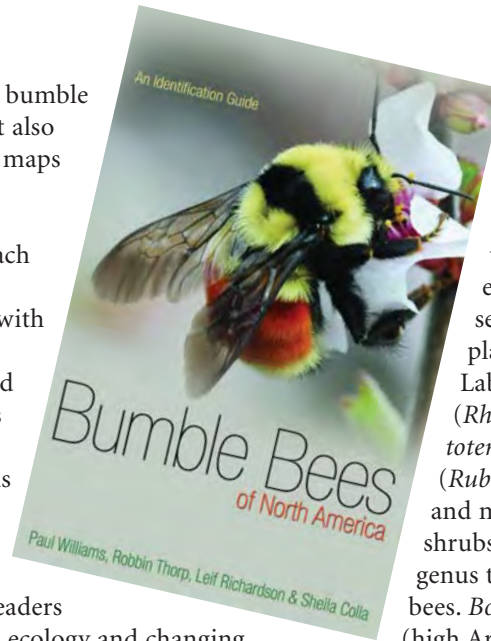
Bumble Bees of North America, An Identification Guide

By Paul H. Williams, Robbin W. Thorp, Leif L. Richardson & Sheila R. Colla
Princeton University Press, 2014
ISBN: 9780691152226
Paperback, 208 pages
\$24.95 USD

In 1998, Robbin Thorp, professor emeritus of entomology at University of California Davis, was the first to warn that some North American bumble bee species were declining. Today, only 16 years later, about half of the 46 bumble bee species in the United States and Canada are diminishing. The Franklin bumble bee, *Bombus franklini*, has not been seen since 2006. The good news is that some species such as the common eastern bumble bee (*B. pensylvanicus*) and western bumble bee (*B. occidentalis*) are increasing.

Bumble Bees of North America, by Dr. Thorp and three other renowned entomologists, is “the first comprehensive guide to North

comprehensive bumble bee ID guide. It also provides range maps and top-view identification diagrams for each species supplemented with 150 colour illustrations and photos. Graphs of seasonal activity patterns and a bumble bee terminology glossary help readers understand the ecology and changing geographic patterns of these important pollinators. The authors outline six human-made threats to bumble bees: habitat loss, insecticides, climate change, pathogen spillover, introduction of exotic and invasive bees, wasps and plants, and intentional and accidental bumble bee destruction. The authors encourage us to provide shelter as well as pollen-



facts. For example, many of us would be surprised to learn that in the Arctic, in the tundra/taiga ecoregion, grow several pollen-laden plants such as northern Labrador tea (*Rhododendron totentosum*), cloudberry (*Rubus chamaemorus*) and many berry-bearing shrubs of the *Vaccinium* genus that attract bumble bees. *Bombus hyperboreus* (high Arctic bumble bee) is found in tundra regions from Alaska to Ellesmere Island and *B. sylvicola* (forest bumble bee) can be found on Baffin Island.

Bumble bee identification can be challenging. Hair colour patterns vary considerably. The top-view identification diagrams provide as many as seven patterns for the queen Nevada bumble bee (*Bombus*



Male confusing bumble bees (*Bombus perplexus*) drink nectar from blue flag iris flowers (*Iris versicolor*).



A queen orange-belted bumble bee (*Bombus ternarius*) collects pollen and nectar from willow flowers (*Salix* sp.) to provision her first brood of workers.

American bumble bees to be published in more than a century.” It is accessible to both the layman and serious apiologist. Carefully organized, it begins with an introduction that is a must-read before moving on to the

and nectar-rich plants for bumble bees to help mitigate these threats.

A forage guide organized by eight geographic ecoregions illustrates the typical native plants that attract bumblebees. It’s laden with fascinating

nevadensis). *B. bimbricus* (two-spotted bumble bee) is compared to/contrasted with similar bee species such as *B. impatiens* (common eastern bumble bee), *B. perplexus* (confusing

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bumble bee – yes, that is its common name!) and *B. sandersoni* (Sanderson bumble bee).

The authors warn that introduced bees alter the natural ecosystems within which native bumble bees have evolved. That said, the common eastern bumble bee, which was introduced to British Columbia for commercial pollination and is now quite prevalent, has not become a problem yet.

Bumble bee colonies (the males,

workers and the old queen) die off after each growing season except in the tropics. Little is understood about where the new queens overwinter. They have been found to use the burrows of other animals or dig holes in loose soil or debris such as compost.

Bumble bees are critical pollinators of many native plant species comprising the diverse ecosystems of North America. The authors note that commercial bumble bee pollination of

crops is an industry worth over \$10 billion. Bumble bee declines could have ripple effects on native plant populations and the birds and mammals depending on these plants for sustenance. All excellent reasons to do our best to protect them.

I commend this book to all lovers of native plants.

Review by NANPS Board Member Harold Smith

Calendar of Events

January 15-17, 2015

CALIFORNIA NATIVE PLANT SOCIETY CONFERENCE
San José, California

Details at:

www.cnps.org/cnps/conservation/conference/2015.

February 19-20, 2015

2015 LAND AND WATER SUMMIT
Albuquerque, New Mexico

Sponsored by the Xeriscape Council of New Mexico,
www.xeriscapenm.com.

May 28-31, 2015

FLORIDA NATIVE PLANT SOCIETY CONFERENCE
Tallahassee, Florida

Visit www.fnps.org/conference.

June 3-6, 2015

NATIVE PLANTS IN THE LANDSCAPE CONFERENCE
Millersville, Pennsylvania

Online registration opens March 16, 2015,
www.millersvillenativeplants.org.

See page 3 for NANPS Events.



PHOTOGRAPH BY MONICA DENNIS

Green soldier bug on swamp milkweed (Asclepias tuberosa)

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In Memoriam: ROSEMARY GAYMER 1924-2014

In 1995, to celebrate her 70th birthday and 40 years in Canada, Rosemary Gaymer embarked alone on an 11,000 mile (6,800 kilometre) journey across Canada and the United States in her camper van. Her friends and supporters pledged money for each plant species she observed and recorded enabling her to raise \$3,000 for the North American Native Plant Society's land acquisition fund in the Clear Creek watershed. This parcel would complement the lands of high ecological value that NANPS owns at Shining Tree Woods in southern Ontario.

Last March, in her 90th year, Rosemary Gaymer passed away peacefully at her home in Mississauga, Ontario. Born in London, England, she grew up on an estate farm in Suffolk where she acquired her life-long passion for nature study. In 1955, she emigrated to Canada, where ornithologist Jim Bailey of the Royal Ontario Museum mentored her in the birds and natural history of North America. Rosemary eventually taught bird biology and

identification, botany and natural history at Sheridan College, Oakville. She volunteered as president of the Toronto Field Naturalists and was a board member for the former Federation of Ontario Naturalists, now Ontario Nature.

Rosemary's legacy is one of passion and love for Creation. She generously shared that love with everyone around her.

A traveller should be a botanist, for in all views plants form the chief embellishment.

*Charles Darwin,
September 28, 1836*

Jim Hodgins, co-founder of the North American Native Plant Society

Continued from page 1 – **Hooded Ladies' Tresses**

and typically denotes a plait or braid often associated with women's hair.

The western North American people known as the Gosiute apparently used a preparation from this species as a treatment for venereal disease.

In our botanical excursions we discovered *S. romanzoffiana* only once. In southeastern Iowa we found a single and rather diminutive specimen in a county park. We looked for more plants there but only found the more frequently occurring *Spirantes ovalis*. Subsequent autumnal searches failed to reveal Romanzoff's orchid to us once again.

Readers may wish to grow this orchid but without special laboratory equipment the likelihood of successful seed germination is very low. Orchid seeds are the smallest in the plant kingdom and require a fungus to penetrate the seed coat in order to germinate. Tropical orchids have been germinated in microbial free culture

but species such as hooded ladies' tresses probably also need a period of cold stratification.

Plants of hooded ladies' tresses are, as far as we know, not available in the horticultural trade. We and NANPS do not support transplanting orchids from the wild. However, if an orchid population is about to go under the bulldozer we see a need to move the plants to a suitable location. If anyone wishing to grow the orchid already has a suitable habitat then we suggest collecting ripened fruits and sprinkling seeds into that habitat.

Stephen Johnson has always had a fondness for overlooked orchids. Mary Stark is interested in plants in society and literature.



PHOTOGRAPH BY STEPHEN JOHNSON

Spiranthes romanzoffiana, south shore of Manitoulin Island, August, 1985.



FALL 2014

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