Sempervirens
Summer 2019 | The Quarterly of the Virginia Native Plant Society

Register now for the Front Royal gathering

Article by Karen Hendershot, President, Piedmont Chapter

Piedmont Chapter members are delighted to be hosting the Virginia Native Plant Society's Annual Meeting on the weekend of September 27–29 in Front Royal. It will give us the opportunity to share with you the diverse natural and scientific resources of our region. We will be staying at the Holiday Inn Blue Ridge Shadows, five miles from Front Royal. Situated with a view of the Blue Ridge and close to the gently flowing Shenandoah River, it is well located for our many native plant activities.

All of us who have an appreciation for native plants recognize that they are part of a system, vital to the survival of our environment. Natives are most successful in supporting the insect life that has many functions, including acting as pollinators in agriculture. We are therefore pleased to have as our speaker on Friday night T'ai Roulston, entomologist with Blandy Experimental Farm and curator of the State Arboretum of Virginia. T'ai's extensive research on the ecology and evolution of plant–insect interactions has focused on the contributions of native pollinators to agriculture and how human activity influences insect populations. Among his interests are the role of parasites and resource availability on bumblebee survival, the effects of ozone pollution in disrupting scent cues of pollinators, and the effect of landscape management on wild bee populations.

The work of Professor Woodward Bousquet and his students at the Abrams Creek Wetlands will be discussed at the Annual Meeting in Front Royal. (Woodward Bousquet)

Sadly, much of human activity has been detrimental to native plants. But our Saturday night speaker will tell of a successful rescue effort of native plants from the ongoing march of urban development. Woodward Bousquet, professor of environmental studies and biology at Shenandoah University in Winchester, will describe the work he and his students undertook to make Winchester's Abrams Creek Wetlands the city's first nature preserve. It was an area already long known as a beloved site for birders. Woody's work with his students also documented the creek's rich store of plants. Cataloging more than 300 plant species, of which 20 are considered rare in Virginia, he and his students worked with developers, residents, and the local government to protect the area from the damage of human activity and rescue many of the rare plants. For their efforts, they were awarded the Joe Penfold Memorial Award for Grassroots Conservation Effort by the Mason-Dixon Outdoor Writers Association.

The rest of our weekend will be devoted to a range of events—34 in all, including two tours of the Abrams Creek Wetlands and several activities at Blandy Experimental Farm. We have arranged numerous hikes and tours, including a visit to the Smithsonian Conservation Biology Institute. Opportunities to learn about large-scale plant restoration efforts may be had at the Jones Preserve, Clifton Institute, and Oxbow Farm. We are also offering a number of workshops.

Complete details and registration information are available at vnps.org. For a breath of fresh mountain air and an enjoyable and enlightening weekend, come join us in September. We look forward to welcoming you to Front Royal. ❖

From the President

'Botany Bill' speaks up for the plants

Many years ago I remember Nicky Staunton, VNPS President at the time, asking, "Who will speak for the plants?" That question has haunted me ever since. Do you believe that botany gets short shrift in research and conservation? Are you concerned that there are no longer any U.S. colleges and universities offering botany as a major? Many of us in the native plant conservation realm are very concerned—so much so that there is a movement to encourage Congress to pass a "Botany Bill." Such a bill was introduced in the last Congress with bipartisan support, but it died when that Congress adjourned in 2018. It was reintroduced this year as H.R. 1572, the Botanical Sciences and Native Plant Materials Research, Restoration, and Promotion Act. The goals of this bipartisan bill are to 1) **employ and train botanists in the federal government; 2) fund research; and 3) promote the use of native plants rather than nonnatives.**

In June I joined national native plant leaders and traveled to Capitol Hill to meet with members of Congress to persuade them to support and cosponsor this bill. Led by Emily Brin Roberson, director of the Native Plant Conservation Campaign, and staff of the Chicago Botanic Garden, this effort was organized to coincide with the annual conference of the American Public Gardens Association being held in Arlington. I joined Emily, Marnie Bruce and Kerrie Kyde of the Maryland Native Plant Society, and Corrie Westbrook of the Endangered Species Coalition, for a meeting with an aide to Sen. Ben Cardin, D-Md. But while we were waiting for our appointment, we had the opportunity to chat with Sen. Cardin himself as he entered the hall on his way to another meeting. He is very interested in issues that affect the health of the Chesapeake Bay, so he listened politely to our request to reintroduce the bill in the Senate and had a picture taken with us. Our formal meeting with his aide went well, but no action has come of these meetings to date.

Later that afternoon I joined with Sean O'Brien, president of NatureServe, and Anne Frances, its lead botanist, to meet with an aide to my congressman, Rob Wittman, (VA 01-R). Rep. Wittman serves on the House Committee on Natural Resources, so his support would facilitate a bipartisan effort. We tried to stress that the bill would bolster efforts to improve the health of the Chesapeake Bay and provide opportunities for positive economic impacts and jobs. Unfortunately, again, no action has been seen yet. As timely opportunities arise for constituent efforts, I will keep you informed through e-mails, such as our *Leaf Letter*. Congress takes a long time to enact legislation, but we are in this for the long haul.

This issue of *Sempervirens* includes articles on our field trips to the Texas Hill Country in March and Ontario's Bruce Peninsula in June. I feel fortunate that I could participate in both. For so many years I had heard so much about "The Bruce" that it was almost mythical to me. The VNPS led field trips there almost every June from the early '90s until about 12 years ago, but my employment did not afford me the opportunity to take leave at that time of year. Many thanks to Sally Anderson and Emily Southgate for arranging and leading the trip this year. Thanks also go to Peggy Troyer and Janet Pawlukiewicz for their efforts in organizing the fantastic trip to Texas. With those two trips, as well as time at home, I experienced *three* springs this year!

Field trips are filling up fast for our Annual Meeting in September, but our Piedmont Chapter members have outdone themselves in the number of choices. Please join us for a wonderful time in Front Royal September 27–29. ❖

Marney Bruce, Kerrie Kyde, and Nancy Vehrs take time for a photo op with U.S. Senator Ben Cardin while they were on Capitol Hill lobbying for native plants. (Corry Westbrook)

Howe joins VNPS leadership team as 1st vice president

Kevin Howe enjoying time in his "natural habitat."

I am pleased to report that we have a candidate for the position of First Vice President for the upcoming term. Our incumbent, Janet Pawlukiewicz, is stepping down at the end of her term this year after having helped plan the field trip to Texas and chairing efforts to make our organization more diverse and inclusive. Thank you, Janet! The nominee to succeed her is Kevin Howe, immediate past president of the Northern Neck Chapter. He shared the following bio:

"My wife and I retired to the Northern Neck from Northern Virginia about five years ago. I grew up in northern California, spending all the time I could hiking, backpacking, skiing, climbing, kayaking, hugging redwoods—anything outdoors. After pursuing biology in college in California (University of California, Berkeley), teaching high school biology for two years and graduate school in California then Oregon (Oregon State University), I taught and did research in ichthyology and aquatic ecology at various universities in the Northwest and the South before ending up at the Smithsonian Institution working in environmental education. After some time, I left the Smithsonian to continue a family construction company from which I retired five years ago. I have been a member of native plant societies since 1969 (California, Oregon, Washington, Virginia) and have held various board positions in all, including president of the Potowmack (1980s) and Northern Neck (2016–2017) chapters of VNPS. In retirement I have kept quite active in environmental groups including VNPS, Virginia Master Naturalists, Audubon, and Northern Neck Land Conservancy."

—Nancy Vehrs, President

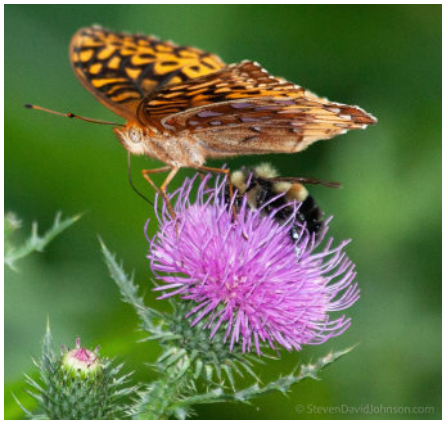
Native bumblebee slows down pipeline

In early August, the Fourth U.S. Circuit Court of Appeals threw out a U.S. Fish and Wildlife Service (USFWS) permit for the Atlantic Coast Pipeline (ACP) citing what it termed a flawed biological opinion and incidental take statement regarding endangered or threatened animals.

Calling the USFWS permit for the 605-mile pipeline proposed to carry natural gas from drilling sites in West Virginia, through Virginia, and deep in North Carolina, "arbitrary and capricious," the court's 50-page opinion suggested that the federal agency had "lost sight of its mandate under the [Endangered Species Act] to protect and conserve endangered and threatened species and their habitats." The specific four species cited in the case are the Rusty-patched Bumblebee; the Madison Cave isopod (a tiny water crustacean found in caves), the Clubshell Mussel, and the Indiana Bat.

Society members can help search for and document the federally endangered Rusty-patched Bumblebee (*Bombus affinis*) along the path of the Atlantic Coast and Mountain Valley pipelines. So far this important native plant pollinator has been documented in Bath County, however, there is a high likelihood that this ground nesting bumblebee lives in Augusta and Highland counties as well as some places in southwestern Virginia.

Help is needed to document this bee in other places along the pipeline paths. Searchers should look in grassland areas filled with blooming pollinator plants until late fall. If you find a bee you suspect to be a Rusty-patched Bumblebee, PLEASE DO NOT ATTEMPT TO CAPTURE IT. Take a photo, then contact Steve Tanguay (stanguay@fs.fed.us) for bees found in the national forest or T'ai Roulston (tai.roulston@virginia.edu) for bees on private land.



Conservation photographer Steven David Johnson captured this photo of a Rusty-patched bumblebee (behind butterfly) along the ACP route in Bath County. (Steven David Johnson)

The Odd Story of Bayard's Adder's-mouth Orchid

From Your Natural Heritage Program
By Zach Bradford

On September 11, 1935, Harvard botanist Merritt Lyndon Fernald and his collecting companion Bayard Long spent a half-day looking for interesting plants in Kilby, just west of downtown Suffolk, in what was then Nansemond County. The two, as they had done the previous year and would continue to do for another decade, spent many days in Southeast Virginia in search of species to add to the 8th edition of *Gray's Manual of Botany*, of which Fernald was editor.

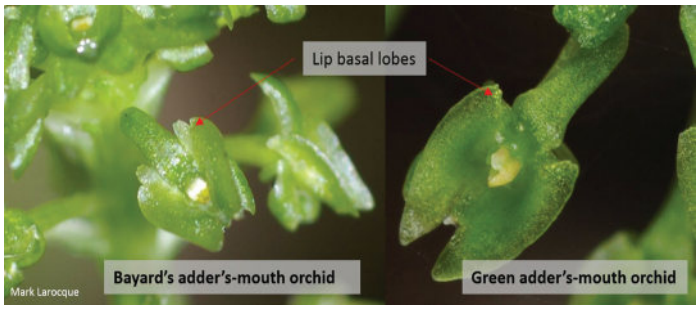
While on the edge of a dry shortleaf pine and oak forest in Kilby, Long reached under a thicket and collected an anomalous specimen of an adder's-mouth orchid (*Malaxis*) that didn't quite fit the much more common and widespread Green Adder's-mouth Orchid (*Malaxis unifolia*). "My own enthusiasm to help was promptly diminished through an attack by ants upon my bare arms," Fernald later wrote of the moment of discovery. Convinced of its distinctness, Fernald used the specimens collected in Virginia to describe a new species and named it after his companion. The so-called Bayard's Adder's-mouth Orchid (*Malaxis bayardii*) differs from Green Adder's-mouth Orchid by its shorter flower pedicels (and thus much narrower flowering raceme) and by having much larger lip basal lobes where pedicel meets flower.

Several years later, on July 14, 1938, Fernald and Long again found Bayard's Adder's-mouth Orchid, this time in nearly identical habitat near Skippers, in Greensville County (near Emporia). The duo continued their botanical explorations of Southeast Virginia until 1945, but they never again found the species. Other botanists in Virginia's mountains had slightly better luck. On July 18, 1946, botanist and World War II veteran Carroll Wood found it along the "summit of ridge" on Poor Mountain in Roanoke County, an area now possibly within the Virginia Department of Conservation and Recreation's Poor Mountain Natural Area Preserve. The following year, on August 19, early shale barren expert Lena Artz collected the species from Reddish Knob in Augusta County. This date marks the last time the species was knowingly observed in Virginia, and these three observations, along with the original discovery, are the only times the species has been seen in Virginia.

In the decades following its discovery, review of older herbarium specimens as well as new field exploration have resulted in Bayard's Adders'-mouth Orchid being purportedly found in an additional 10 eastern states. Across its entire range Bayard's Adder's-mouth Orchid maintains a fascinating mountain–coastal plain bimodal distribution. No matter where it is found geographically, it prefers dry sites: ridgetops and shale barrens in the mountains and dry pine and oak woodlands in the coastal plain. Interestingly, though, Bayard's Adder's-mouth Orchid has nearly gone extinct in the past several decades, with only a single population known to be extant and that only barely so, on Cape Cod. Across its range, Bayard's Adder's-mouth Orchid occurred in places that experienced frequent natural fire. Perhaps fire suppression is the cause of the precipitous decline.

Your Natural Heritage Program is dedicated to incorporating fire back into naturally fire-maintained communities across the commonwealth, and prescribed fire has proven to benefit many rare species, some on the brink of loss from Virginia. For example, Pale Grass Pink (*Calopogon pallidus*) and Kidney Sedge (*Carex reniformis*) were both ranked as state historic, not having been seen in more than 30 years until their rediscovery in areas of Natural Area Preserves treated with prescribed fire. This story of Bayard's Adder's-mouth Orchid could share a similar new chapter. While inventory and stewardship biologists with Natural Heritage continue to search for this species, the Virginia Native Plant Society, through its educational outreach and citizen science, could greatly increase odds of rediscovery as well ensure its future protection and management.

—Zach Bradford is the Chesapeake Bay region stewardship biologist with the Virginia Natural Heritage Program.



This close-up photograph shows the differences betwee the lip basal lobes of the Green Adder's-mouth Orchid and the Bayard's Adder's-mouth Orchid. (Mark Larocque)

Annual Meeting Sampler of Events

Five hikes & two car safaris in Shenandoah National Park
Abrams Creek Wetlands Preserve
Bear Wallow-Massanutten Trail
Bull Run Mountains
The Clifton Institute
Jones Nature Preserve
Ogden Cave Natural Area Preserve
Thompson Wildlife Management Area
Sky Meadows State Park
Smithsonian Conservation Biology Institute
Shenandoah River State Park
Virginia Working Landscapes at Oxbow Farm
Wildcat Mountain Natural Area
Workshops on Nature Journaling, Monarchs, Mushrooms, and More

Go to VNPS.ORG for a comprehensive list and registration information.



Those who attend the Annual Meeting in Front Royal will have the opportunity to see Pixie Cup Lichen (left), learn about plant-insect relationships from Friday night's speaker, entomologist T'ai Roulston, or see Calico Aster in bloom. (Plant photos Diane Krumme, bee photo T'ai Roulston)

Professor Woodward Bousquet, second from right, and his students conduct field research at Abrams Creek Wetlands. Bousquet is the keynote speaker at the Annual Meeting. Participants will have the opportunity to tour the wetlands. (Woodward Bousquet)

VIRGINIA NATIVE PLANT SOCIETY

Sempervirens (ISSN 1085-9632) is the quarterly newsletter of the Virginia Native Plant Society, Blandy Experimental Farm, 400 Blandy Farm Lane, Unit 2, Boyce, Va. 22620, 540-837-1600, info@vnps.org. Nancy Vehrs, President; Nancy Sorrells, Editor; Karen York, Office Manager. Original material in *Sempervirens* may be reprinted if credit is given to the Virginia Native Plant Society, to *Sempervirens*, and to the author of the material, if named. Readers are invited to send letters, news items, and queries for consideration. E-mail items to Nancy Sorrells at lotswife@comcast.net.

Next submission deadline: Oct. 15, 2019

Nitrogen Fixation in Roots of *Ceanothus*

Article by W. John Hayden, Botany Chair

Roots are usually out of sight and, therefore, out of mind. But as any good gardener will tell you, it is of utmost importance to understand those unique plant organs, even if their essential functions occur hidden from cursory observation. The red roots of the 2019 VNPS Wildflower of the Year, *Ceanothus americanus*, are particularly important because they host symbiotic bacteria that perform the essential function of nitrogen fixation. These prominent, knobby, distinctively pigmented roots are also the inspiration for the common name Redroot, applied to many species in the genus.

Nitrogen is important. Nitrogen-containing molecules are diverse and absolutely essential for life. It is no exaggeration to say that proteins make up much of the physical structure of cells; proteins are also responsible—as enzymes—for mediating the majority of biochemical reactions that constitute life at the chemical level. Proteins are built from chains of amino acids, and every amino acid includes at least one atom of nitrogen (a few amino acids have two nitrogen atoms). Nitrogen is also present in DNA and RNA, so, through these molecules, nitrogen contributes substantially to the storage, expression, and inheritance of genetic information. Then there is ATP, a relatively small molecule that functions as a little packet of usable energy that fuels all sorts of activity at the molecular level. And let's not forget the hugely diverse category of molecules called alkaloids, synthesized by many different plants, largely to deter herbivory, but also having impact on people as poisons or, beneficially, as medications. It is impossible to imagine life on Earth without nitrogen-containing compounds.

But there is a paradox about nitrogen and life. You, me, the chickens in my backyard, and the Pawpaw tree that shades them are all constantly bathed in atmospheric nitrogen gas, yet that form of nitrogen is completely unavailable to our cells, or the cells of my chickens, or my Pawpaw. Every breath I take brings a quantity of fresh air into my lungs, 78 percent of which is nitrogen gas, yet despite the importance of nitrogen-containing compounds for life, all that inhaled nitrogen is exhaled, unused and unmodified. For most life forms, nitrogen gas is inert, despite its importance in the biochemistry of life.

Critically, there are exceptions to the picture painted above. A few different kinds of bacteria can take atmospheric nitrogen gas, rip apart the triple bond that holds its two atoms of nitrogen together, and add enough hydrogen to form two molecules of ammonia. This process, known as biological nitrogen fixation, consumes considerable amounts of energy (provided by ATP, referenced briefly above). Also, nitrogen fixation must be performed in the absence of oxygen, because oxygen disables the nitrogenase enzyme responsible for this essential reaction. Unlike the nitrogen gas from which it is produced, ammonia is much more readily used by cells. Some plants can use the ammonia directly to synthesize the nitrogen-containing organic molecules listed above; of course, the bacterial cells can do this too. The important point is that once the relatively inert nitrogen gas has been converted to ammonia, the chemistry of moving that form of nitrogen into proteins, DNA, RNA, ATP, etc., is relatively easy.

Figure 1. New Jersey Tea or Redroot (*Ceanothus americanus*); the bustle of biological activity evident here is possible thanks to the nitrogen-fixing activity of actinomycete bacteria living inside this plant's roots. (Photo by Betty Truax)

This is the importance of symbiotic biological nitrogen fixation; bacteria convert relatively inert nitrogen gas into ammonia, the host plant gobbles up the fixed nitrogen and converts it into diverse nitrogen-containing organic molecules. As we all know, plants feed the rest of the biosphere. Animals get the nitrogen-containing molecules they need by eating plants or other animals that have eaten plants. (The Bible has it right: "All flesh is grass" [Isaiah 40:6].) Finally, as plants and animals die and decompose, microbes recycle their large nitrogen-containing organic molecules into simpler forms that can be taken up by plants—any kind of plant, not just the special ones that host nitrogen-fixing bacteria. There is a bit more complexity to the nitrogen cycle in its entirety: lightning converts some atmospheric nitrogen gas into oxidized forms that plants can assimilate, and there are other types of bacteria that take oxidized forms of nitrogen and convert it back to relatively inert

(See Ceanothus, *next page)*

Botanical art exhibit reflects journey across America

The Botanical Art Society of the National Capital Region cordially invites members of the Virginia Native Plant Society to the opening reception of "All in a Garden Green" at Green Spring Gardens Park on Sunday, September 8, from 1-3 p.m.

The exhibit is inspired by English writer Frances Trollope who, in 1828, began a four-year journey around the United States. In her book, *Domestic Manners of the Americans* (1832), she noted with delight the plants she encountered. Trollope spent most of 1830 in houses in Washington, Potomac, and Alexandria. Green Spring is an ideal venue to display pictures of the kinds of plants that she might have encountered on her American adventure. Subjects will include plants native to the eastern U.S., as well as those that were cultivated on early American estates such as Green Spring.

The exhibit will be held at the Horticultural Center (4603 Green Spring Rd., Alexandria, VA 22312) and runs from August 27 to October 27.

—*Elena Maza Borkland*

Illustrations such as this Flame Azalea by Elena Maza Borkland will be on display at Green Spring Gardens until late October as part of the "All in a Garden Green" exhibit sponsored by the Botanical Art Society of the National Capital Region.

Ceanothus continued

atmospheric nitrogen gas. The point is that nitrogen fixation and subsequent recycling of fixed nitrogen accounts for the majority of the ways in which nitrogen sustains life on this good Earth.

The most well known examples of symbiosis-based biological nitrogen fixation involve *Rhizobium* and closely related bacteria that inhabit the root nodules of legumes. In essence, the legume plant feeds the bacterium energy-rich molecules derived from photosynthesis from which the *Rhizobium* bacteria generate ATP that fuels the production of ammonia from nitrogen gas; a portion of the ammonia produced is released to the plant for its diverse biochemical needs. Vast amounts of nitrogen enter the biosphere by means of legumes and their nitrogen-fixing bacterial symbionts.

But the legume–*Rhizobium* partnership is not the only nitrogen-fixing symbiotic system. Cycads have special roots that grow near the soil surface, and, internally, these roots harbor cyanobacteria (blue-green algae) that perform nitrogen fixation. The peculiar floating aquatic fern *Azolla* hosts cyanobacteria inside its leaves that serve the same purpose. And free-living (i.e., nonsymbiotic) cyanobacteria also perform nitrogen fixation.

The roster of bacteria that can perform symbiotic nitrogen fixation includes one additional group known as actinomycetes. These are minute, filamentous, bacteria that, decades ago, were thought to be fungi, hence the "-mycetes" suffix in their name. When present symbiotically, actinomycete bacteria inhabit plant roots, which alters their morphology; generally, actinomycete-inhabited roots are enlarged and knobby, compared with uninfected roots. Host plants of nitrogen-fixing actinomycetes are diverse, including Alders (*Alnus*.), Sweetfern (*Comptonia*), Wax Myrtle (*Morella*, *Myrica*), She-oaks (*Casuarina*), Oleasters (*Elaeagnus*), and Redroots (*Ceanothus*).

In *Ceanothus,* the symbiotic actinomycete has been identified as *Frankia ceanothi,* colonies of which develop inside cortex cells of its nodulated (enlarged, knobby) roots. Compared with intensively studied legume crops, there is little published material on nitrogen fixation in *Ceanothus*; the few studies that have been published focus on species from the western United States, where *Ceanothus* is diverse and, in at least some plant communities, abundant. Our local Redroot, *Ceanothus americanus,* shares with its western relatives a tendency to inhabit nutrient-poor, arid, rocky soils—the sort of environment in which having a built-in nitrogen fertilizer factory would provide an obvious adaptive advantage.

Next time you encounter a specimen of our 2019 Wildflower of the Year and admire its handsome foliage, its intricate small flowers, and the diverse pollinators attracted thereto (Figure 1), take a moment to acknowledge also the hardworking actinomycete cells, sight unseen, collaborating with *Ceanothus* root cells in the task of converting atmospheric nitrogen into the nitrogen-containing organic molecules essential to all the life forms that surround us ... and that, indeed, are essential to us too. ❖

The Bruce once again beckons to plant enthusiasts

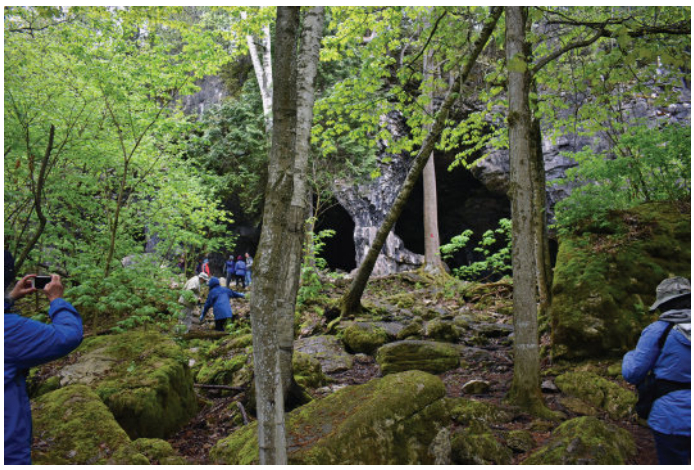
Article and photos by Elena Maza Borkland, Piedmont Chapter

A strip of land lying between the northern shores of Lake Huron on the west and Georgian Bay to the east, called the Bruce Peninsula or just "The Bruce," is home to some very unusual plant communities, with some endemic species found nowhere else in the world. Led by botanists Sally Anderson and Dr. Emily Southgate, 20 VNPS members gathered at the Evergreen Resort during the first week in June to explore The Bruce. Society groups have visited this special place many times, but this was my first visit. I looked forward to seeing many rare plants that I'd only read about, and I'd never even seen the Great Lakes up close.

We arrived on a Sunday afternoon; the wind was whipping whitecaps on the surface of the lake, and Evergreen greeted us with a roaring fire to ward off the chill. Once the company had assembled, we introduced ourselves and formulated a plan on how to reach our sites each day: we would carpool in five vehicles, alternating drivers every couple of days.

The next morning the wind was still blowing as we explored Walker Woods, a sheltered forest of mixed conifers, ash, white cedar, and maples near Sauble Beach. Paper Birch, Buckthorn Alder, Balsam Fir, Black Spruce, Hemlock, and Canada Yew shaded Marsh Marigolds and Buckbean in pools beneath; mosses and ferns, sedges, Starry False Solomon's Seal, Starflower and Twinflower carpeted the ground. Spring was late and there weren't many flowers open, but we came across a few blooms of Fly-Honeysuckle, Wake-Robin, Dwarf Lake Iris, and Wild Sarsaparilla. On the way back to our hotel we stopped at a sandy clearing along the gravel road to find a lovely patch of Gaywings, their magenta flowers in full bloom.

In the afternoon we visited Oliphant Fen—the difference between a fen and a bog is that water flows through a fen, whereas a bog has standing water. Typical here were Red Pitcher Plants, Sundews, Shrubby Cinquefoil, Tall Meadow Rue, Primroses, and Tamaracks. There was little in bloom, except for some lovely pale, nearly white Primroses and ground-hugging Sand Cherries. A few yellow-green leaves of Butterwort peeked from the watery ground. A strip by the road contained Bastard Toadflax, Grass-of-Parnassus leaves, and Silverweed.



Society members explore Bruce's Cave in Canada.

The elusive Calypso Orchid

The climate in The Bruce varies a great deal depending on exposure, with temperatures dropping as one travels north but becoming milder toward the western side. On our second day, we drove through the town of Wiarton to see the rich woods of Kemble Rock. The fields along the way were covered with flowering trees. We stopped at the foot of a giant Beech growing on a huge rock covered with ferns and Herb Robert. The forest beyond consisted of Sugar Maple, Basswood, Red Elderberry, New England Serviceberry, Beech, and Hop-hornbeam. Underneath this lush forest several species of violets, ferns, Trout Lilies, Blue Cohosh, Ramps, Dolls'-eyes, Large-flowered Trillium, and Downy Solomon's Seal grew.

We took the Edmonston side trail that ran along the edge of the Niagrara Escarpment—an amazing garden in the wilderness. There we found rare Hart's Tongue Fern and Holly Fern, Long-spurred and Canada Violets, Foamflower, Miterwort, Ebony Spleenwort, and my favorite—a gorgeous clump of Yellow Lady's-slipper orchids! The

site was so absorbing I didn't notice that it had started to rain until I saw others putting on their rain gear. As we were leaving the woods, we came across a few morels, and I collected three to enjoy my first taste. The chef at Evergreen later cooked these for me—delicious! The sighting of a loon in breeding plumage enlivened our lunch at a picnic area, another first for me. A plaque at the trailhead to Bruce Caves tells the story of eccentric Robert Bruce, the original landowner after whom the peninsula is named. The woods here were similar, but as we were hiking toward the cave we came across some new plants: Large-flowered Bellwort, Rose Moss, Sharp-lobed Hepatica, Mountain Maple, Wild Ginger, and Walking Fern. Bruce's cave was quite large—carved by the lake waters eons ago, its entrance divided by a large pillar—it's amazing that he could have survived in this rocky shelter for several years.

The following day we explored the *alvars*, flat expanses of calcareous *dolostone* formations broken by cracks called *grykes*, where soil collects and can support unusual plant communities. These unique geological formations are found in only a few places of the globe, primarily in Scandinavia. Here we saw Jack Pines, with tiny Maidenhair Spleenwort growing in the shelter of the *grykes*. In places the Yellow Lady's-slippers were so thick, we had to be careful not to step on their buds. At Bruce Alvar Nature Preserve we found another rare endemic, the Lakeside Daisy, a low-growing member of the aster family with deep yellow flowers.

Canada's Bruce Peninsula, on Lake Huron, is seen here in red.

On Thursday we boarded the Blue Heron VIII at the village of Tobermory, on the northern tip of the peninsula, for a tour of Tub Harbor, where one of the many wrecks of Fathom Five National Park can be seen through the crystal-clear water. During the chilly morning ride we passed several small islands before sighting our destination: Flowerpot Island. The resemblance of two oddly-shaped rock formations to actual flowerpots lends the island its name.

Only two flowers of the Calypso Orchid were spotted in the woods—I had not expected it to be so tiny, no larger than a violet—the sepals and petals were a delicate mauve shade, with a bright yellow fringed spot on the white lip of its slipper that makes it look like a fisherman's fly. Another orchid, Striped Coralroot, showed a few blooming spikes; the leaves of the Western Rattlesnake Plantain were visible with other rare natives such as Naked Miterwort, and Gold Thread, named for the yellow color of its stringy roots.

By Friday the weather had warmed, and we stopped at Crane River Park to see a patch of Nodding Trilliums growing among Tall Meadowrue and Ostrich Ferns, before driving to Singing Sands at Dorcas Bay. Here we spotted another rare native: the Ram's Head Orchid. A few of these exquisite flowers were open, hiding among the low-growing junipers and cedars. Their maroon-marked slippers come to a point in front, which could be said to resemble a beard, giving the flower's profile the look of a tiny goat's head. On the drive back, the Yellow Lady's-slipper blooms dotted the roadsides, glowing among patches of bright red Indian Paintbrush.


Yellow Lady's-slippers were abundant at The Bruce.

On our last morning, we visited a lake behind Sauble Beach Recreation Center where Red-osier Dogwood, Horsetails, Boneset, Water Horehound, and Tufted Loosestrife abound. Cattails and waterlilies were growing on the shores. In the afternoon we visited Petrel Point, where we found many of the same plants as at Oliphant Fen. The following morning we bid farewell to The Bruce, hoping for a next time.

—Elena Maza Borkland is a botanical artist and illustrator. For a more detailed account of The Bruce and photos, visit her blog: https://mazastudio.blogspot.com, and her website: https://elenamaza.com.

Texas Hill Country wildflowers wow visitors

Article by Cathy Mayes, Director at Large; photos by Nancy Vehrs, President

Twenty lucky Society members traveled the Texas Hill Country in late March and saw spring wildflowers galore. The trip, arranged by former Texans Janet Pawlukiewicz and Peggy Troyer, was stunning from the beginning, starting with the taxi ride from the airport along highways lined with wildflowers.

Besides wildflowers, there was an unusual tree blooming along the highways, called Huisache (Fabaceae: *Acacia farnesiana*). It is a lovely, fragrant, vase-shaped tree whose many flowers are small, bright gold balls.

Posing in a field of bluebonnets at the Lady Bird Johnson Wildflower Center are, left to right, Arlene FitzGerald, Karen Lee, Roger Holtman, Joanne Hutton, Ben FitzGerald, Paula Boundy, Powell Hutton, Sally Lindfors, and David Keegan. Nancy Vehrs and Cathy Mayes are kneeling.

Texas has 10 ecoregions. The region we toured is the Edwards Plateau. This is the temperate part of the state, most like our Virginia home in terms of topography and climate. North and west of the Edwards Plateau, it is much drier; east of there is it warmer and wetter.

Our first destination was the Lady Bird Johnson Wildflower Center in Austin. Lady Bird was everything to wildflowers in Texas. (The center's website, at wildflower.org, has photos of all the most common wildflowers in Texas, so this article doesn't need to recite the dozens we saw.) It was the perfect place to learn the plants we were going to see. We then traveled sites around Fredericksburg, a town that is reminiscent of 1950s America, and finally to sites in the San Antonio area. We enjoyed eight guided walks and a nice mix of gardens, preserves, and areas undergoing restoration.

A massive Live Oak at the Alamo in San Antonio.

One amusing fact is that the state flower of Texas, the Bluebonnet, is actually a composite of different species. Because of the wide range of ecoregions in Texas, no one specie is present statewide. We saw two species on our visit, the more common Texas Bluebonnet (*Lupinus texensis*), and the delicate Sandyland Bluebonnet (*L. subcarnosis*) mostly found further west. Initially, the Texas legislature named the Sandyland Bluebonnet the state flower, which annoyed people who live in parts of the state with different species (there are five different bluebonnet species). So, it lumped all the species together and designated a generic bluebonnet, an imaginary plant, as the state flower.

A large number of the wildflowers were sort of like, but not exactly like, flowers we see in Virginia—primroses, yellow daisies, ragwort, even dandelions. But there were many fascinating flowers that are nothing like what we see here. A list of the plants we saw blooming would be pages

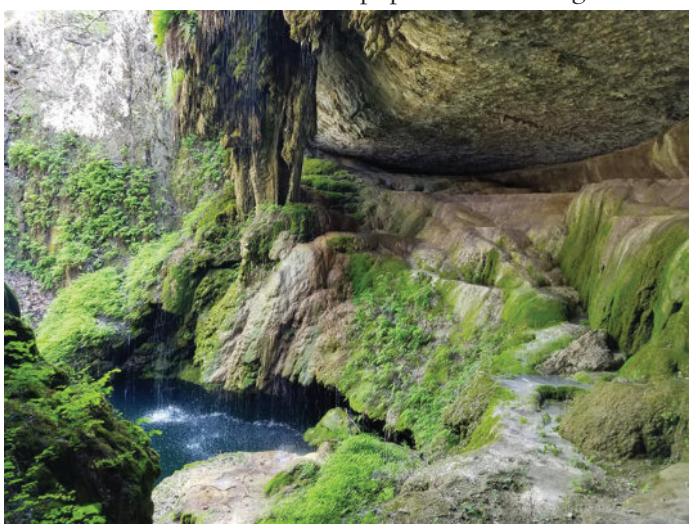
Native plants seen on the Texas trip included the Texas Bluebonnet, left, and a massive prickly pear, *Opuntia sp.*

long. The one rare plant we saw was Soft-hair Marbleseed (*Onosmodium bejariense*) that was blooming at the Friedrich Wilderness Park, outside San Antonio. Friedrich Park is best known as a breeding area for the rare Golden-cheeked Warbler. We were too early to see or hear the bird, but we saw many mature Ashe Junipers (*Juniperus ashei*), the tree whose stringy bark is used for warbler nest building. Our guides called this tree Texas cedar like we call *J. virginiana* red cedar.

The wildest site we visited was the Westcave Preserve in Travis County near the town of Round Mountain. We walked through hundreds of thousands of years of geologic formations as we hiked to the bottom of the canyon. And at the head of our canyon is a lush, wet grotto. The canyon is lined with absolutely enormous cypress trees. These were Montezuma Baldcypress (*Taxodium mucronatum*), a cypress tree without knees. The grotto itself was overhung with a huge stand of Maidenhair Fern (*Adiantum capillus-veneris*).

As on any wildflower outing, there were also a host of weird bugs—colonies of ants like we never see, the black-and-white Ironclad Beetle (*Zopherus nodulosus*), and new moths and butterflies.

Our final stop was the San Antonio Botanical Garden, an extremely ambitious garden. Not only did we see native plants, but we also walked through representative habitats of each of the state's ecoregions, the establishment of which of course meant hauling in soils from other parts of the state and constructing elaborate water management systems. We also listened to squeals of delight from the popular children's garden. ❖

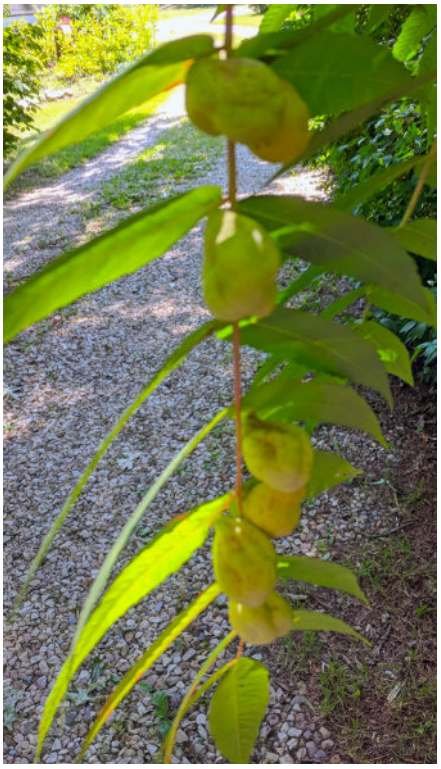


Society members explore geologic wonders at Westcave Preserve.

Sumac Galls!

Recently a row of Staghorn Sumac (*Rhus typhina*) in the upper Shenandoah Valley provided an interesting glimpse into the weird world of insect-plant relationships. To the casual observer it looked like the sumacs had produced some sort of fruit, but in reality the bulbous protrusions were galls caused by the tiny Staghorn Sumac Aphid (*Melaphis rhois*). The galls are the result of a female aphid laying a single egg on the underside of the sumac leaf. The leaf then forms a sac over the egg to protect it. Inside the gall, a process called parthenogenesis is occurring. This is an asexual type of reproduction that results in there being many aphids inside that gall all from that single egg. Eventually winged female aphids leave the gall in late summer and fly to moss where they establish asexually reproducing colonies. These fall colonies produce males and sexual females who can recolonize the sumac the next spring. The formation of galls does not harm the sumacs.

—Nancy Sorrells, Editor



Sumac galls hang like fruit underneath the leaves of Staghorn Sumacs (*Rhus typhina*). (Nancy Sorrells)

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