

A publication of the VIRGINIA NATIVE PLANT SOCIETY
Conserving wild flowers and wild places

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The Potomac Gorge

Unmatched diversity at Annual Meeting

Gary Fleming, the vegetation ecologist with Virginia's Natural Heritage Program, stood on a rocky ledge high above the Great Falls of the Potomac River explaining the globally imperiled riverside prairie, one of over 30 plant communities of the Potomac Gorge. Not far away a National Park Service interpretive sign quoted Gary about the gorge: "In more than 25 years of fieldwork I have not seen another site of this size with comparable diversity of land forms, plants, and natural communities."

The Potomac Gorge encompasses a 15-mile stretch from the piedmont province above Great Falls to the coastal plain at Georgetown, where the Potomac River

drops down through the bedrock. It was created when the sea level dropped during the Pleistocene period, between 1.8 million and 11,000 years ago. As the

river cut lower and lower, it left numerous bedrock terraces along the sides. The river has also migrated to the south over geological time and continually carved away at the Virginia side, creating an almost continuous line of steep bluffs and cliffs. Unlike most eastern rivers its size, the Potomac has no high dams and it is powerful enough to completely obliterate and then recreate floodplain habitats. It has fostered the dispersal and migration of plants over several physiographic provinces creating rich and diverse plant communities. Furthermore, much of the gorge has been protected on both sides of the river by federal and lo-



Great Falls is a geologic highlight of the Potomac Gorge (Photo by Nancy Sorrells)

(See Potomac Gorge, page 6)

Spiderworts: Not just another pretty face for science

Species of *Tradescantia*, or spiderworts, are handsome plants. Several wild species, including the VNPS wildflower of the Year for 2008 (*T. virginiana*), can be found in eastern North America and additional species grace gardens, and hothouse

conservatories. Spiderworts are not, however, just a bunch of pretty faces. Spiderworts have a long history of service to science, both in terms of teaching and pure research.

Several hothouse species of spiderwort have a creeping habit, for ex-

ample, *T. fluminensis*, *T. sillamontana*, *T. pallida* (formerly *Setcreasia pallida*), and *T. zebrina* (formerly *Zebrina pendula*). Each of these frost-sensitive species is commonly grown in hanging pots. They also

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INSIDE: VNPS Annual meeting information and registration form

From the president

Learn to observe native habitats and changes around you

Hello VNPSers,

This has really been a beautiful spring, even if a little cool, and an exciting time for native plants. We have another new registry site, the newly dedicated Merrimac Farm Wildlife Management Area in Prince William County. Prince William Chapter president Charles Smith and chapter member Nancy Vehrs worked hard to produce the documents needed in time for a dedication ceremony that took place on April 10. The dedication was followed by a tour of the gorgeous bluebells along Cedar Run. The site also contains a diverse upland forest. On May 1, Phase I of Crow's Nest in Stafford County was dedicated in a ceremony that included our governor and other dignitaries. A tour of the area following the dedication featured showy orchis. Negotiations are under



Red elderberry at the summit of Reddish Knob. (Photo by Sally Anderson)

way for the purchase of Phase II, in order to protect the whole peninsula.

*Closer to home, my home anyway, was the dedication of the wildflower trail at the G. Richard Thompson Wildlife Management Area to Marjorie Arundel, conservationist and mother of our long time member Jocelyn Sladen. This site was the first to be registered under our program, in 1990. The beautiful Sunday afternoon ceremony featured millions of **Trillium grandiflorum** for which the site is known.*

Just recently, the first state field trip to Reddish Knob took place. This high mountain west of Harrisonburg has a 360-degree view and a great diversity of plants along the way to the top. Thanks much to the members of the Shenandoah Chapter for hosting this trip and

showing us a brilliant array that included mountain fetterbush in profusion, birds foot violets, wild lupine, gay wings, painted trillium and much more. In the midst of a very rainy week the weather was perfect.

So, what more could there be? Well, by the time you read this we will have taken the VNPS 2008 trip to see the tallgrass prairies in Kansas. Then on June 28 there will be a state tour to Blackwater Ecological Preserve. The fall annual meeting hosted by the Potowmack Chapter should be another great opportunity to see lots of beautiful habitat - yes even in Northern Virginia we have lots of very special places and plants, and I know the chapter will put on a fun meeting. I hope to see YOU there.

Your President, Sally Anderson

Saving Crow's Nest

The special Virginia habitat known as Crow's Nest is now Virginia's newest Natural Area Preserve. The dedication of Phase I of the preserve took place on May 1. Virginia Governor Tim Kaine spoke at the ceremony. The second phase of the Crow's Nest project will preserve the remainder of the peninsula, and the purchase of that tract of land is currently being negotiated. The photo at right shows Hal Wiggins, right, member of Fredericksburg Area Chapter, being presented with an award for his work to save Crow's Nest. Standing with him is Johnny Mitchell. The new Natural Area Preserve will be under the control of Virginia's Natural Heritage Program.



Bluebells usher in Merrimac Farm dedication

Merrimac Farm, a more than 300-acre property in Prince William County near Nokesville, is the newest addition to the Virginia Department of Game and Inland Fisheries' (VDGIF) statewide network of wildlife management areas. The land features diverse wildlife habitats - wetlands, hardwood forest and upland meadows - as well as access to Cedar Run.

Merrimac Farm was formally dedicated on April 10 amidst the dazzling spring display of Virginia bluebells. The site boasts one of the largest single patches of Virginia bluebells in northern Virginia. With Merrimac Farm WMA, the VDGIF expands its statewide network of WMAs to 37 with well over 200,000 acres statewide. During the ceremony, the farm also became the newest Registry listing for the Virginia Native Plant Society. With Merrimac Farm there are now 19 VNPS Registry sites. The primary requirement for eligibility is that the site have regional or state significance because of its native plants. Significant sites may exhibit an exemplary occurrence of a habitat, a plant community, or a plant species. Sites may include an unusual, persisting variation of a plant species, or an assemblage of species. Or the site may exhibit some quality with the unique potential to inspire community awareness.

The property was recently acquired by the VDGIF with support from the Prince William Conservation Alliance, Marine Corps Base Quantico, and the McDowell family (who owned the property). Virginia Secretary of Natural Resources L. Preston Bryant, Jr. said of the acquisition, "Merrimac Farm is an excellent example of how partnering organizations can use the Virginia Land Conservation Foundation grants to protect important habitat. This project contributes to Governor Kaine's goal of conserving 400,000 acres by the time he leaves office. Achieving that goal will not only protect our land and water for wild-

life but also improve the quality of life for all Virginians."

The acquisition of Merrimac Farm presented a unique opportunity to protect forested wetlands and vernal pools, some of the most threatened habitat in the United States, in one of the fastest growing communities in the country. The proximity to highly urban populations makes Merrimac Farm an ideal place for the more than 2 million northern Virginia residents to participate in wildlife-related recreation and education. Plans for the site include special managed hunts, fishing, wildlife viewing areas, and environmental education programs. VDGIF will use this site to demonstrate wildlife management principles and practices in an urban/suburban setting which will hopefully serve as a model for other public lands in northern Virginia. To protect the integrity of the property as well as to minimize user conflicts and negative impact on habitat, Merrimac Farm WMA will have some restrictions. Horseback and bicycle riding, use of all-terrain vehicles, dog walking and jogging will be prohibited.

In addition to protecting wildlife habitat for such species as bobwhite quail, songbirds, waterfowl, deer, fox, rabbits, frogs and salamanders, the establishment of Merrimac Farm WMA - with its one

mile of frontage on Cedar Run - will protect this important watershed and enhance restoration of the Chesapeake Bay. Cedar Run flows into Occoquan River, a tributary of the Potomac River. Protecting the wetlands along Cedar Run will also



VNPS 2nd vice-president Nicky Staunton (left) and VNPS president Sally Anderson, present VDGIF Executive Director Bob Duncan with a registry plaque on April 10, 2008, at the Merrimac Farms WMA dedication. (Photo courtesy Lee Walker, Virginia Wildlife Magazine)

promote better water quality for northern Virginia. Occoquan Reservoir provides drinking water to more than 1.2 million people who reside in Prince William, Fairfax, Fauquier, Loudoun and Stafford counties.

Previously the property had been managed as part of a shooting preserve, resulting in excellent wildlife habitat. Merrimac Farm WMA is adjacent to 59,000-acre Marine Corps Base Quantico, forming an impressive contiguous tract of wildlife habitat. The U.S. Marine Corps' involvement in the acquisition is part of a federal program to work with state and local agencies, conservation organizations, and willing landowners to protect the mission integrity of military installations by establishing an easement that will act as a buffer area

(See Merrimac Farm, page 8)

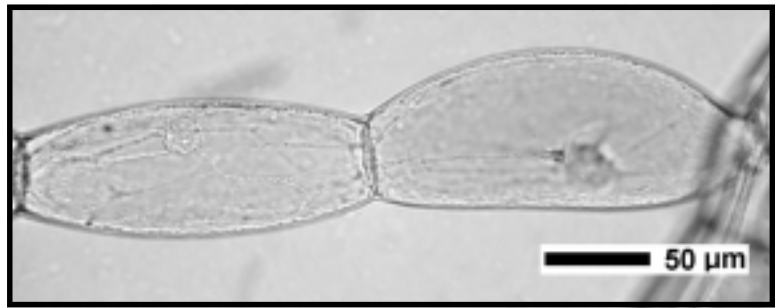
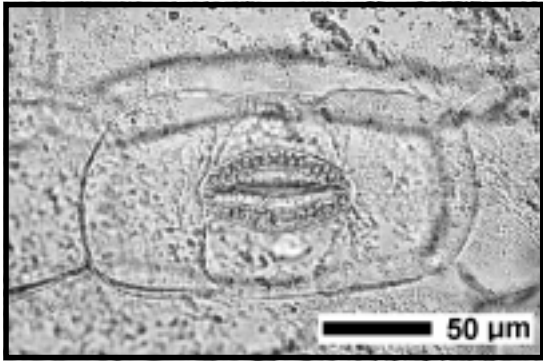


Figure 1 (left) shows the lower epidermis of a *Tradescantia pallida* leaf with stoma. Figure 2 shows two *Tradescantia pallida* cells at the base of stamen hair. When this photographic was taken, granules in the cytoplasm strands were moving in a streaming circulation throughout the cell; most of the volume of these cells is occupied by a watery bag, the vacuole.

• Spiderwort science

(Continued from page 1)

readily form adventitious roots at each node and, as a result, they constitute excellent material with which to demonstrate vegetative propagation (asexual reproduction). Stem tip cuttings about three or four inches in length, with a few lower leaves removed, will in a matter of a week or two, strike root in moist sand, in perlite, or even in a glass of water. For students new to botany, cloning one's own plants for the first time can be a valuable and motivating lesson in the ways of plants.

For more advanced classes, spiderworts are good subjects for microscopic study. Leaves are often somewhat succulent, so they can be torn to yield thin sheets of epidermal cells that, when mounted in a drop of water on a glass slide, reveal basic aspects of plant cell structure, including cell walls, the nucleus, and large watery vacuoles. And scattered among the ordinary epidermal cells, one can easily find stomates, the adjustable pores that control both photosynthesis and water loss (figure 1). Flowering spiderworts allow for even easier microscopic preparations: a wet mount of a single stamen, plucked from any open flower with fine forceps, yields hundreds cells linked together, much like a string of pearls; these chains of cells are the stamen hairs characteristic of all *Tradescantia* species. With high power, the living cytoplasm of stamen hair cells can usually be seen in motion,

streaming vigorously through the cell (figure 2). Few subjects convey dynamic aspects of cell structure better.

Of course, the same characteristics that make spiderworts useful teaching tools are also beneficial in the research lab. *Tradescantia* stamen hairs have frequently been used in experimental studies of cell division. The stamen hairs grow in buds before the flowers open by a series of successive cell divisions, which form the chains up to 30 cells long. Most dividing cells will be found at the tip of the growing hair. Unlike other plant tissues with many dividing cells (for example stem or root tips), stamen hair cells are easily exposed as nearly isolated cells, not buried among a three dimensional mass of non-dividing cells. Consequently, both observation and manipulation are facilitated. The dividing cells can easily be bathed in chemical solutions or, with the right equipment, experimental molecules can be micro-injected directly into the cell to test their impact on the division process.

Spiderworts also have an extensive history of use in monitoring the effects of mutagens, substances that cause changes in the structure of DNA. For these studies, one particular spiderwort hybrid, a cross between smooth spiderwort (*T. ohiensis*) and prairie spiderwort (*T. occidentalis*), has been used most often. One particular clone resulting from this cross contains two forms of a gene that controls flower color. One (dominant) form of the gene results in blue pig-

mentation whereas the other (recessive) form yields pink. The value of these plants is that mutation in the blue form of the gene generally results in loss of ability to make that color. So, when this blue-flowered plant is exposed to a mutagen, any cell that suddenly makes pink pigment rather than blue indicates that at least one mutation event happened in that cell. In essence, the scientists simply count pink spots in petals or count the presence of pink stamen hair cells among the blue ones as a means of quantifying the effects of the mutagenic substance being tested. This spiderwort mutation monitoring system has been used to study the effects of radiation, and many different chemicals, including air pollution. In fact, decades ago these spiderwort hybrids were intentionally exposed to atomic bomb blasts as part of the government's efforts to understand the power unleashed in nuclear reactions.

Our last example of spiderwort science relates to kinder and gentler themes. In the 1930s many scientists were engaged in an effort to unite the basic framework of evolutionary theory expounded by Darwin with newer developments in population genetics and ecology. The result came to be known as the "modern synthesis." One key development brought out in this era was clarification of the role of natural hybridization in evolution and speciation. Natural hybrids of spiderworts, especially hybrids involving *T. virginiana*, *T.*

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• Potomac Gorge

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cal public ownership. As a result the National Park Service and the Nature Conservancy consider it one of the most biologically significant natural areas in the East.

A drive along the George Washington Memorial Parkway on the Virginia side along the Potomac from below Great Falls Park to Georgetown overlooks the river through pleasant scenic woodlands, much of which has not been cut since the Civil War or even longer. But these are not just any woodlands overlooking a river. Scientists, including Gary Fleming, have identified over 30 distinct plant communities in the Potomac Gorge, ranging from typical mixed hardwood forests, to boulderfield forests and woodlands, to unique and rare riverside barrens and prairies. The gorge has more than 1,400 different plant species, including 400 occurrences of 200 rare plants and natural communities. Three of its plant communities can be found nowhere else in the world.

Areas up and down the gorge are an attraction for botanists. From season to season an amazing variety of plants is on display. This article will focus on those areas mostly on the Virginia side, which will be featured during this fall's VNPS annual meeting.

Within the calm floodplains of the Piedmont in Fairfax County's **Riverbend Park** above the Great Falls, springtime visitors can see harbinger of spring (*Erigenia bulbosa*), ramps (*Allium tricoccum*), white trout lily (*Erythronium americanum*), sessile trillium (*Trillium sessile*), and numerous other ephemerals under an abundance of paw-paw (*Asimina triloba*). In summer they can find among others: Deptford pink (*Dianthus armeria*), butterfly weed (*Asclepias tuberosa*), fringed loosestrife (*Lysimachia ciliata*), American germander (*Teucrium canadense*), and sweet-scented Indian plantain (*Cacalia suaveolens*), which is rare in Virginia.

Great Falls National Park has not only the powerful 60-foot waterfall vista, but several distinct plant communities within its 800 acres including several

forest communities in the uplands and bottomlands, a swamp, rocky bluffs and cliffs, bedrock terraces, and the rugged ravine at **Difficult Run**.

The plant communities nearer the river below Great Falls are of significant conservation concern. On flats

along the rocky rim of the terrace are two rare forest communities that are scoured periodically by catastrophic floods. First is the Riverside Bedrock Terrace Pine Woodland, which is known only from the Potomac Gorge in Virginia and Maryland and the New River Gorge in West Virginia. It is dominated by the Virginia or scrub pine (*Pinus virginiana*) with Eastern red cedar (*Juniperus virginiana* var. *virginiana*), stunted oaks, and various shrubs. Second, the Potomac River Bedrock Terrace Oak-Hickory Forest is endemic to the Potomac Gorge. Nowhere else in the world can be found this combination of post oaks (*Quercus stellata*), fringetrees (*Chionanthus virginicus*), hop trees (*Ptelea trifoliata*), and downy arrow-wood (*Viburnum rafinesquianum*) as well as characteristic grasses and sedges such as Eastern needlegrass (*Piptochaetium avenaceum*), Bosc's panic grass (*Dichanthelium boscii*), Pennsylvania sedge (*Carex pensylvanica*), and soft panic grass (*Dichanthelium laxiflorum*).

On the exposed rocks in the lower portions of the bedrock terrace, the gorge rim, and the river channel shelf are two other plant communities that both rank G1 and S1. One is the Central Appalachian/Piedmont Riverside Prairie. This plant community contains prairie species such as big bluestem (*Andropogon gerardii*), narrowleaf mountain-mint (*Pycnanthemum tenuifolium*), and dense blazing-star (*Liatris spicata*). The wild blue indigo (*Baptisia australis*) and Indian-grass



Gary Fleming botanizes in the Potomac Gorge

(*Sorghastrum nutans*) are two other diagnostic species of this community type.

The other community is the Potomac Gorge riverside outcrop barren, which is very xeric, exposed and frequently scoured. This community contains sparse vegetation, with a few low shrubs and herbs occupying crevices and small soil or moss mats. A dwarfed form of the fetterbush (*Leucothoe racemosa*) is the most characteristic shrub. The two most numerous and characteristic herbs in this type are the little bluestem (*Schizachyrium scoparium*), stiff aster (*Ionactis linariifolius*) and the sticky goldenrod (*Solidago racemosa*), which is not known outside the Potomac Gorge in either Virginia or Maryland. This community type is considered globally rare and is endemic to the Potomac.

In the middle section of the Potomac Gorge, the north-facing river bluffs in **Scotts Run Nature Preserve** and **Turkey Run Park** contain large intrusions of basic igneous rocks that weather into soils with a higher silt content and higher calcium and magnesium levels than other upland soils in the gorge. The highly mesic and fertile ravines and lower slopes of these bluffs support a Basic Mesic Forest. This community has an herb layer dominated largely by spring ephemerals. Two of the most abundant herbs are blue cohosh (*Caulophyllum thalictroides*) and harbinger-of-spring (*Erigenia bulbosa*). This community has a mixed overstory of sugar maple (*Acer saccharum*), beech (See Annual Meeting, page 7)

• Annual Meeting

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(*Fagus grandifolia*), tulip poplar (*Liriodendron tulipifera*), basswood (*Tilia americana* var. *americana*), white ash (*Fraxinus americana*), and bitternut hickory (*Carya cordiformis*), with abundant paw-paw and spicebush (*Lindera benzoin*) in the understory. The community has a distinctive herbaceous layer containing many species not found in other upland forests of the area. Two of the locally abundant, and most diagnostic, are twinleaf (*Jeffersonia diphylla*) and toadshade trillium (*Trillium sessile*). In spring Turkey Run Park also has a wonderful show of Virginia bluebells (*Mertensia virginica*), Dutchman's breeches, and squirrel corn.

Turkey Run Park also contains very steep riverfront areas with huge boulders and other rocks that have broken off from bedrock outcroppings. They support a distinctive forest community (Central Appalachian/Piedmont Rich Boulderfield Forest) of plants able to root deeply in the soils between the rocks. Sugar maple, basswood and white ash are the principal trees, usually forming open stands that are subject to frequent windthrows because of difficult rooting conditions. Bladdernut (*Staphylea trifolia*) is usually the most abundant and diagnostic shrub. Pale jewelweed (*Impatiens pallida*) is especially well

adapted to these habitats and covers some boulderfields in the late summer.

Scott's Run itself has such a variety of soils and conditions that it supports a great diversity of plant life. One survey found 175 species of plants in bloom from March to June as well as 20 species of fern.

One floristically diverse plant community is found especially on **Chain Bridge Flats**. It is the Central Appalachian/Piedmont Bedrock Floodplain Woodland, a mixed deciduous woodland of several floodplain trees that occupies the active channel shelf in areas dominated by bedrock outcrops. It has pockets of deep soil deposition, depressed channels, and small pools. The trees in this community are very susceptible to uprooting and mechanical damage, which keeps it open. The combination of variable microhabitats, good light, and very fertile soils fosters incredible species richness, which may be endemic to the Potomac Gorge drainage. Chain Bridge Flats also contains examples of the rare riverside prairie mentioned above.

Down river closer to Georgetown are Arlington County's **Gulf Branch Nature Area** and **Potomac Overlook Regional Park** both of which have trails down to the Potomac and both of which have protected a wide variety of native flora which can be seen through all the

seasons. Access to these parks is through local streets.

Lastly, the Potomac Gorge ends on the coastal plain with **Theodore Roosevelt Island**, a memorial to one of our great conservation presidents. The island contains an upland forest, swamp forest/floodplain, and tidal marsh. Nearly 50 tree species have been identified on the island, including tulip poplar, beech, hickory, and several species of oak with willow, ash, and sycamore in the wetter areas. In addition to the trees, other woody vegetation includes spicebush and poison ivy. Approximately 275 herbaceous plant species have been identified on the island. Teddy Roosevelt Island is close to Memorial Bridge and the Lincoln Memorial and has bicycle access all the way down to Mount Vernon at the end of the George Washington Memorial Parkway. Access to the park is from the northbound lanes of the parkway.

While it is impossible to provide a full length discussion of all the plant communities and species of the Potomac Gorge flora, we hope that these descriptions whet your appetite enough for you to come to the annual meeting and see for yourself the botanical richness the area has to offer, in spite of its very urban setting.

Note from Mary Ann Lawler: Much of this article is based on Gary Fleming's narrative accompanying his presentation on the Vegetative Ecology of the Potomac Gorge.

Thanks, Gary

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• Merrimac Farm

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outside the installation's existing border to protect against incompatible development that could impact current or future military operations occurring within the current installation boundaries, as well as to support local land conservation efforts. Merrimac Farm is the first acquisition of its kind in the Commonwealth of Virginia.

"This partnership not only allows us to continue our mission of training Marines, but also lets the local community enjoy important Virginia habitat

in its natural state," said Quantico Base Commander Colonel Charles Dallachie. "We are happy to partner with the Commonwealth of Virginia and the Prince William Conservation Alliance to honor the wishes of the McDowell family and protect this land from development. I look forward to other opportunities with willing partners for compatible land use efforts on all sides of the base."

Merrimac Farm was originally owned by Col. Dean McDowell, who purchased the property after World War II and whose untimely death in

2002 put his property at risk of development. The continued support of Col. McDowell's heirs and their commitment to the preservation of Merrimac Farm for public uses has been instrumental to the success of this five-year effort. Gail McDowell said, "Our family is committed to conservation. We are delighted that the property will be protected and available to the public."

For the complete list of state-owned WMAs, visit the WMA section of the VDGIF website at <http://www.dgif.virginia.gov/wmas/>.

• Spiderworts

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ohiensis, and *T. subaspera*, were studied at this time by Edgar Anderson and Robert Woodson of the Missouri Botanical Garden. Anderson, in particular, working with spiderwort hybrids, developed something called the hybrid index, a method to quantify the relative contribution of different parents in the genetic makeup of hybrid offspring. Building on these early studies with spiderworts, Anderson extended his observations

to other groups of naturally hybridizing plants (e.g., *Iris* species) and, eventually, he published his most famous work, *Introgressive Hybridization* in 1949; this book includes a thorough analysis of how genes can flow from populations of one species through hybrids into populations of another species. Anderson's work with spiderwort hybrids is commemorated in the name *Tradescantia x andersoniana*, the name applied to what is now a common group of gar-

den hybrids combining the genetic characters of Virginia spiderwort (*T. virginiana*), smooth spiderwort (*T. ohiensis*), and wide-leaf spiderwort (*T. subaspera*).

Spiderworts may appear to be among the most delicate and fleeting of our native wildflowers but they and their relatives have had a profound and lasting impact on the science of botany.

---W. John Hayden, VNPS Botany Chair