



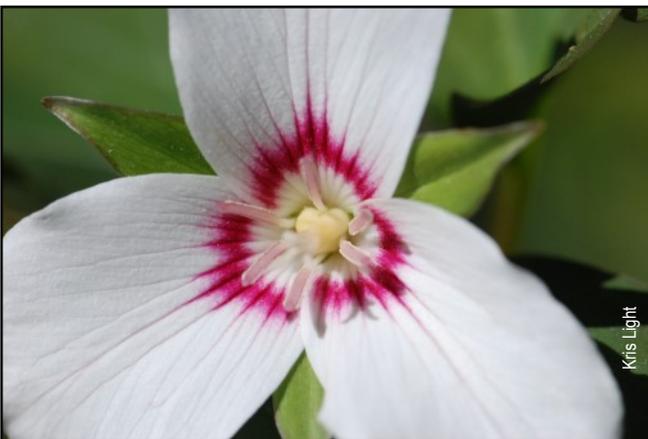
The Birds and Bees of Wildflowers

— Kris Light

The beautiful wildflowers we enjoy along woodland trails and in the meadows seem silent to us, but they call out loudly in a different language to gain the attention of bees, butterflies, some birds and other pollinators. All flowers must have their pollen spread from one individual to another of its kind in order to produce seeds. Some flowers are subtle and quiet in their attempt to carry on their genes, others scream loudly, "Hey, come to me!". The reward most flowers offer their pollinators is a sip of nutritious, sweet nectar; the pollinators carry a bit of pollen to the next flower fertilizing it in the process.

If a flower's petals are its cafe signs, the nectar guides are its road maps. The petals attract the pollinators to the flower, the nectar guides show the pollinators exactly where to find their sweet reward. Nectar guides can be a different color from the rest of the petals, stripes, or spots. All guide the pollinators to the base of the petals where the nectar is located.

Flowers attract their pollinators in many ways --- color, nectar guides, shape, and aroma. Flower color and shape can greatly influence the types of pollinators that will visit them. Bees are unable to see red and orange; they prefer white, yellow, purple, and blue flowers. Humans are unable to detect ultraviolet light, but a field of Daisies, Buttercups, and many other flowers would light up like neon signs for a honeybee. Hummingbirds are attracted to red and orange tube-shaped flowers to get nectar. Maroon, brown, and some green flowers often have a pungent odor (to humans!) that may smell like carrion, vinegar or animal droppings. These are not the flowers to put in a bouquet in your house! The insects that visit these flowers are flies and some beetles. A few types of flowers change color or close up to indicate they have been pollinated to save the pollinators an unnecessary trip.



Painted Trillium (*Trillium undulatum*)

The shapes of flowers can determine which insects are able to pollinate them. Beetles are "intellectually challenged", so they must visit flat or bowl-shaped flowers that they can walk around on drinking nectar and picking up pollen along the way. Flies can be seen on bowl-shaped flowers also. Flowers with petals that form tubes can only be accessed by hummingbirds or insects with long mouthparts, such as bumblebees, butterflies, and moths. Gullet-shaped flowers, such as snapdragons, some Gentians, and many members of the Pea family must be visited by more highly intelligent insects such as

bumblebees. These flowers must forced open to get to the nectar, pistils and pollen-bearing stamens.

Composites (sunflowers, daisies, dandelions, asters, etc.) are made up of many, to hundreds, of small individual flowers, each capable of making a single seed. Pollinators get a lot of "bang for their buck" visiting these flowers which offer a tiny sip of nectar in each one.

In the fall the goldenrod flowers often get accused of causing the sneezing and itchy eyes of allergies. Since

goldenrod is bright and showy people often assume it is this plant that is making them miserable. However, the true culprit is Ragweed which is wind-pollinated. The flowers must transport their pollen through the air from one plant to another and hit a very small pistil "target", by producing millions of pollen grains a few are likely to pollinate a nearby flower. In the spring many trees also dump pollen into the air, much of which lands on our cars, sidewalks, on the surface of ponds and lakes, and in our nose and eyes! Oak, Red Cedar, Pines and other trees can be thanked for making us miserable.

The next time you look at a flower, try to "listen" to it to how it is silently communicating.



Indian Pink
(*Spigelia marilandica* L.)

Kris Light

Kris Light is an outreach educator for the American Museum of Science and Energy in Oak Ridge, TN, with experience teaching science for elementary school students. She is a favorite leader of wildflower walks for parks around the state. Kris will present *The Birds and Bees of Wildflowers—Pollination Strategies of Flowers* on Friday, April 27th at 7:30 in the Conference Center of Roan Mountain State Park.



GIFTS & MEMORIALS

Friends of Roan Mountain gratefully acknowledges these charitable donations and gifts.

Donations:

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| Margaret Barrett-True | Norma Morrison |
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In Memory of Dr. John Wilson Moore

Mayra Ashton, Beth Orlando, Barbara Welch, Cecilia Conrad

In Memory of Debbie Neves

J.F. Neves
W. Mills Dyer, Jr.

A Unique Way to Give



One of our Friends, Norma Morrison, had a generous idea. For her birthday, she asked her friends on Facebook to make a donation to Friends of Roan Mountain through their partnership with [Network for Good](#), where we are registered as a non-profit organization.

Happy Birthday to Norma and *Many Thanks* for sharing your special day with us!

Norma would also like the Friends to know that if you are interested in lodging during our rallies or other times, they offer to rent a studio apartment with one bedroom, one bath, sauna, kitchen which sleeps 4 or 5. It is located about 20 minutes from both the Roan and from Watauga Lake. \$60 per night. You can contact Norma at njmorrison@milligan.edu.

ROAN MOUNTAIN STATE PARK GARLIC MUSTARD PULL

Saturday, April 21 from 9:30 am to 2 pm at Roan Mountain State Park

Southern Appalachian Highlands Conservancy is partnering with the Appalachian Trail Conservancy, US Forest Service, and Roan Mountain State Park to remove invasive garlic mustard from the park and heavily trafficked highways around Carver's Gap and SAHC conservation properties in the Highlands of Roan. Plucking out the pesky invaders when they're young and tender isn't hard work, but it does take a lot of hands!



More info at Appalachian.org/event/volunteer-work-day-invasive-garlic-mustard-pull-in-the-roan/. For questions, contact SAHC Roan Stewardship Director **Marquette Crockett** at marquette@appalachian.org or 828.253.0095 ext 210.

Herpetological Holy Ground

—Dr. Kevin Hamed

In his book *The Appalachians*, Maurice Brooks referred to Grandfather Mountain as “Herpetological Holy Ground” due to its amazing salamander diversity and since herpetologists first discovered three species of plethodontid salamanders on its slopes. The Great Smoky Mountains National Park has deemed itself as the “Salamander Capital of the World” due to the abundance and variety of salamanders within its boundaries. However, many more isolate Southern Appalachian peaks, such as Roan and Whitetop Mountains, are not always given their due credit for being salamander havens. Alternatively, I would argue that all Southern Appalachian peaks are “Herpetological Holy Ground” and collectively serve as the “Salamander Capital of the World”.

The Weller’s salamander (*Plethodon welleri*) is a great example of a Southern Appalachian endemic salamander. This salamander is found on approximately 20 peaks from Whitetop Mountain (Virginia) to Grandfather Mountain (North Carolina) including Roan Mountain. This small lungless salamander has a dark back with gold/bronze flecking. Weller’s salamanders are typically found in Spruce/Fir forest, but also inhabit Northern hardwood forest at lower elevations. Events leading to the discovery of the Weller’s salamander are tragic. In 1930, a 17-year-old herpetologist from Cincinnati journeyed to Grandfather Mountain. He found a salamander that he perceived to be new to science. A subsequent trip the next year to collect more salamanders resulted in a tragedy. The then 18-year old fell off a steep cliff to his death and was found days later at the bottom of a ravine still in possession of several of the “new” salamanders. Charles Walker, University of Michigan, later described and named the new salamander. He named the salamander after the young man, Worth Hamilton Weller, who perished during its discovery.



The Weller's Salamander is found on high elevation peaks from Whitetop Mountain, Virginia to Grandfather Mountain, North Carolina. This resident of Spruce/Fir Forest is one of many amazing amphibians residing on Roan Mountain. (Photo: Kevin Hamed)

The high diversity of plethodontid salamanders in the Southern Appalachians is due to allopatric speciation. Salamanders were distributed at much lower elevations when the planet was cooler. However, natural warming made lower elevations uninhabitable, forcing salamander populations higher on mountain peaks. Eventually populations became isolated on mountain peaks that functionally became “sky islands” and speciation occurred. As molecule analysis improved, researchers identified differences in allozymes and other molecular markers to distinguish new species of which many were “hidden species”. Roan Mountain is at the boundary between 2 members of a species complex. The

mountain dusky salamander ranged from Canada to Georgia, but in the mid-1990s, Dr. Steven Tilley found several molecular differences in Southern Appalachian populations. *Desmognathus carolinensis* (Carolina Mountain Dusky Salamander) inhabits Roan Mountain, but just slightly to the northeast *Desmognathus orestes* (Blue Ridge Dusky Salamander) inhabits high elevation peaks and ridges. Roan Mountain is also home to members of the *Plethodon jordani* and *P. glutinosus* complexes.

Unfortunately, the same high elevation peaks that lead to many salamander species are facilitating threats to salamander populations due to anthropogenic factors. Climate change and atmospheric deposition are impacting high elevation salamanders. Distribution models I constructed for Whitetop Mountain, Virginia predict Weller’s (*Plethodon welleri*) and Northern Pygmy salamanders (*Desmognathus organi*) will be extirpated within 50 years. Unfortunately, the models were constructed utilizing better climate scenarios than we are currently experiencing. Thus, the future for these salamanders appears to be worse than I originally modeled. Southern Appalachian peaks are also impact by deposition of heavy metals such as

mercury. This neurotoxin is carried in the atmosphere from sources hundreds of miles away and deposited on high elevation peaks. Some salamanders are so contaminated that, if their consumption was allowed, advisories would be issued for human exposure. Climate change and deposition are just a few of the many anthropogenic threats facing Southern Appalachian salamanders.

During my program I will introduce you to the many unique salamanders residing in the Southern Appalachian Mountains. Additionally, I will share research my students and I have conducted to shed light on the future of several Southern Appalachians salamander species. Following the program, our hike should provide up-close salamander encounters. I hope you are able to join us as we explore our Herpetological Holy Ground.

Dr. Kevin Hamed , Professor of Biology At Virginia Highlands Community College, is recognized as an expert on salamanders of the southern Appalachians. Kevin will present *The Future of Appalachian Salamanders: What the Past Tells Us* on Saturday, April 28th at 7:30 in the Conference Center of Roan Mountain State Park.

What's New in the Park?



New Park Ranger Staff and Park Manager

Roan Mountain State Park has experienced a recent staff-shake up! Following the promotion of Park Manager JR Tinch to the role of Assistant Chief Ranger for the entire Tennessee State Parks system, RMSP Ranger Meg Guy has now officially stepped into the management role for the park. Also, newly hired Park Ranger Jesse Sexton joined the RMSP Ranger staff in November and recently graduated from 12 weeks at the Tennessee Law Enforcement Training Academy. Stay tuned... the Park Ranger staff will be complete by Memorial Day weekend, following the transfer

of a successful candidate into the park's vacant Ranger position.

Mark Your Calendars for Spring Events

The weather is warming, flowers are blooming... and park events will soon be in full-swing. Please join RMSP for upcoming special events and volunteer workdays such as the Garlic Mustard Pull on April 21st, the Junior Trout Tournament on May 12th, and National Trails Day on June 2nd. The annual Summer Concert Series gets underway Memorial Day weekend, and will include performances by local talents most Friday and Saturday nights throughout the summer at the Park Amphitheater. Please visit the Roan Mountain State Park website at <http://tnstateparks.com/parks/about/roan-mountain> for more information.



Bridge Closures as of Nov. 17:

Due to damage sustained during a recent flood event on the Doe River, there are two trail bridges in the park that are no longer available. The bridge connecting the wetland boardwalk trail to Picnic Shelter 2 is gone, as is the bridge connecting the Group Camp area to the Riverside Trail. Walking access along the western bank of the Doe River is still available via the Riverside Trail access point from Picnic Shelter 2 or via the Fred Behrend Trail access behind the Camp Store in the Campground. Thank you for your patience as we work to replace these bridges.

Mesmerizing Myriapods

— Cade Campbell



(*Narceus americanus-annularis*, the North American Giant Millipede, a very large and common millipede in the Southern Appalachians, climbing a several feet in a birch tree on a moist day. This species can grow up to four inches long, and they behave very differently than other millipedes in the Southern Appalachian mountains.)

Mountain forests are often prized for their peaceful, soothing atmosphere, but what's happening secretly, under the carpet of soil and leaf litter, below our feet? Many small creatures live their entire lives unseen by humans; and among the most formidable of these creatures are the centipedes and millipedes. Some millipedes are flat, feather-shaped fungus eaters, while some are colorful, poison-filled and subterranean behemoths.

The subphylum Myriapoda consists of four classes, all of which have representatives in the Appalachian Mountains. The Millipedes (*Diplopoda*) are characterized by a calcareous, segmented body. They possess many legs, but most species are relatively slow. Millipedes are relatively harmless to humans, rarely feeding on anything other than decomposing matter. The Southern Appalachian region possesses a millipede biodiversity equal to or greater than any other area in the world, including tropical regions. Centipedes (*Chilopoda*) are the other most well-known group of the subphylum Myriapoda. These animals also have segmented bodies and many legs, but are generally extremely quick to attack and escape. They have flexible bodies and painful venomous fangs used both for offensive and defensive behavior. Confusion often arises around distinguishing centipedes from millipedes. A certain identification may be

made by looking at the individual segments of the body. Centipedes only have one pair of legs per segments, and millipedes have two. The two other classes of Myriapoda, Pauropoda and Symphyla, are less frequently seen, as they are extremely small. They are respectively mostly herbivorous and carnivorous; spending most of their lives buried in leaf litter.

All orders of millipedes found in North America have representatives in the Southern Appalachians. This is by no means a coincidence. The diversity of trees within the region, as well as the abundant humidity found in the high elevation temperate rainforests of the tallest peaks of the Appalachians, provide plenty of ecological niches for millipedes. This allows a wide variety of species to coexist without competing. Varying by region, flat-backed millipedes of the family Xystodesmidae make up the greatest biodiversity of region-specific millipedes. These are large and colorful millipedes, feeding on very old leaves and detritus between the soil and leaf litter. Many species are masters of converting common chemicals in the decomposing forest floor into somewhat dangerous concentrations of hydrogen cyanide, making all species repulsive to predators. Flat-backed millipedes range from being only distasteful, to possessing enough poison to harm small predators such as toads and birds. With such a great diversity and unique shape and behavior, these millipedes are truly a jewel of the Southern Appalachians.

Unlike our dazzling array of millipedes, Southern Appalachian centipedes aren't quite as famed as the giant centipedes of South America and Asia. However, we do have some very unique centipedes which deserve more attention than they receive. Many of the native centipedes have broad ranges, except for a few unique species. *Theatops spinicaudus*, known sometimes as the Spiny-tailed Forceps Centipede, lives only in the Appalachian and Ozark mountain chains and their foothills, with an allopatric range similar to the range of the Hellbender salamander. Like millipedes, centipedes are known for being smaller in colder regions. This species is an exception. Growing over three inches in length, this species is among the largest of all species of native centipedes found in the Eastern United States. *Theatops* has forcipules (modified legs that act as fangs) on its head, but also modified rear legs which act as fangs as well. It can deliver a painful pinch from either pair, and is mildly venomous. The Southern Appalachians also provide an opportunity for a great biodiversity of centipedes, and though many are small and inconspicuous, quite a few species of large, strange or otherwise important centipedes have ranges restricted to the Appalachians.



Appalachioria eutypa ethotela is one of the many beautiful flat-backed millipedes that may only be found in the Southern Appalachians

With all the millipedes and centipedes that call the Southern Appalachians home, it is safe to say that they are vital to the health and preservation of fragile ecosystems such as Roan Mountain. Many species of millipedes are responsible for decomposing the hordes of seasonally accumulating leaves characteristic of deciduous mixed forest, as well as the equally implied deadfall. Some species of millipedes can spread saprotrophic fungus; species of fungus that decompose organic matter, on which the millipedes feed. Centipedes, on the other hand, ensure that the organic matter is regulated. All centipede



Left: The Spiny-tailed Forceps Centipede, *Theatops spinicaudus*, driven out by the rain.

Right: *Apheloria montana* is a common, fossorial millipede that can ooze hydrogen cyanide from pores along its body. This causes the millipede to release a not altogether unpleasant fruity smell, which resembles the scent of cherries, as many fruits also contain a small quantity of this poison. Harmless unless eaten, these millipedes are sometimes known as "Cherry Millipedes"

species in the Southern Appalachians are exceptional predators of soil microfauna and macrofauna. These are groups of small soil creatures, the former ranging up to only a few millimeters, to the latter, which can be as large as *Narceus* giant millipedes. With their excellent burrowing skills and venomous bite, centipedes are aggressive and territorial, amongst fellow centipedes and other organisms alike. They ensure that detritivores don't proliferate to numbers that exceed the food supply, and that only the healthiest individuals of a prey species can survive. Whether you're terrified by the thought of these many-legged animals, or are curious and appreciative of their *unique behavior, millipedes and centipedes still deserve our respect amongst their fellow endemic creatures.*

Sources:

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WINTER RALLY REVIEW

The 2018 Winter Rally at Roan Mountain State Park on February 17th welcomed more than 70 attendees to the indoor presentations and post-lunch hikes. The three morning lectures focused on efforts to restore the once abundant American chestnut and the native grasslands and shortleaf pine ecosystems of the eastern United States, while the lunchtime presentation concerned efforts to track historical grassy bald management activities on Roan Mountain.

The cloudy and drizzly morning skies brightened after lunch, and attendees enjoyed a variety of fun hikes in the state park, on Roan Mountain and at the nearby Hampton Creek Cove Natural Area.

Details of the lectures and presenters can be found below, and PDF copies of the PowerPoint presentations can be downloaded at the following link:

<https://tinyurl.com/ychdhv45>

Ben Jarrett (Southern Regional Science Coordinator, The American Chestnut Foundation): *Restoration of American Chestnut: A Marriage of Breeding and Biotechnology*

Lisa Huff (Stewardship Ecologist, Tennessee State Natural Areas Program): *The Mystery of the Missing Shortleaf Pine*

Dwayne Estes (Professor of Biology, Austin Peay State University): *The Southeastern Grasslands Initiative: Charting a New Course for Conservation in the 21st Century*

Sarah Sanford (Master's of Environmental Management candidate, Duke University): *Grassy Balds Management in the Roan Highlands*

TWIN SPRINGS

The Friends of Roan Mountain Board of Directors has voted to enable the FORM to partner with the US Forest Service to adopt the Twin Springs Recreation Area on Roan Mountain. Several years ago the Forest Service closed Twin Springs. This site is used as a picnic area and is considered by naturalists as an excellent location to view wildflowers, birds and salamanders. Many naturalists rally trips have taken place at Twin Springs, which is located on the left of Hwy 143 as you travel from the park to Carver's Gap. Our adoption of the area will help keep it available for public use.

The Friends of Roan Mountain will periodically remove litter, remove weeds from the parking lot, trails and picnic sites and do minor maintenance. The forest Service has agreed to make new signage, remove damaged tables and grills and remove downed and dead trees.

The Friends of Roan Mountain will hold a hold a work day on Saturday, April 14th at Twin Springs Picnic Area to remove litter, using weed trimmer, loppers, rakes, leaf blowers, etc., to clear around the sign, parking lot, picnic sites and trails. We will meet at 10 am at Twin Springs. Bring any appropriate tools. This work should only take a couple of hours. We hope you can make it.





What will be their fondest childhood memories?

Think of your childhood memories. Do you have memories of playing in the creek? Of hiking with our family? Or do you have memories of a close encounter with wildlife?

Information from the Nature Conservancy reveals an alarming trend. "In a typical week only 6 percent of children ages 9 to 13 play outside on their own." And "kids ages 8 to 18 spend an overwhelming 53 hours per week on entertainment media."

What will be their fondest childhood memories? Will a video game be their childhood memory? Will a fleeting Facebook post be their most memorable summer event?

Make your plans to change those memories today. Get your kids outdoors.

The Xtreme Roan Adventures (July 28, 2018) offers a full day of outdoor exploration for the whole family. There are more than a dozen Adventures to choose from. Creek Adventures, Wildlife Adventures, Butterfly Adventures, and many, many more. There are Adventures for all ages and abilities.

Yes. It may take a little more effort to get the kids outdoors today. And the rewards may not be realized for years to come. But they will have better memories than the latest video score.

Break out of the video cycle and make real memories at the Xtreme Roan Adventures (July 28, 2018).

Ken Turner — Co-Director of the Xtreme Roan Adventures
A kid's nature exploration day
Ken@XtremeRoanAdventures.org, (423) 538-3419



GREAT MEMORIES OF XRA 2017





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Between Friends



Deadline for Rally Meal Orders – Payment for rally dinners and lunches must be received by **Tuesday, April 24**. The reservation form can be found in the brochure or on our website. Mail your check and reservation form to Nancy Barrigar, 708 Allen Avenue, Elizabethton, TN 37643.

New! You can now register online. Follow the link on our website's homepage.



Door Prizes -- We gladly accept items donated for door prizes. These will be given away on Friday and Saturday prior to the evening programs. Ideas: nature-related books, photos or art, outdoor gear, plants, homemade goodies . . .



Get the latest updates on FORM events and listen to interviews with Rally presenters and leaders on Roan Mountain Radio with Ken Turner.
<http://www.roanmountainradio.com/>

There is something infinitely healing in the repeated refrains of nature -- the assurance that dawn comes after night, and spring after winter."
 — Rachel Carson

MARK YOUR CALENDAR			
	Spring Rally	Last Friday - Sunday in April	April 27 - 29, 2018
	Youth - XRA	Last Friday—Saturday in July	July 27 - 28, 2018
	Fall Rally	Friday - Sunday in September after Labor Day	Sept. 7 - 9, 2018
	Winter Rally	Saturday in February near Valentine's Day	Feb. 9, 2019

If you prefer to read your FoRM newsletters online (color version) email nbarrigar@friendsofroanmtn.org with your request.