Vol. 42 No. 2 Fall 2022

# CLAYTONIA

Newsletter of the Arkansas Native Plant Society

In this issue:

New & Life Members Page 3

Fall Meeting Details Page 4

Mini Meetings Recaps Page 5

The Atlas Goes Digital Page 11

Save the Date! Page 11

Member Obituary Page 12

Native Plants for Phytoremediation: Part III Page 13

OCANPS Field Trip Reports Page 18

Grant & Scholarship Recipients Page 20

Webinar Series Page 21

Treasurer's Report Page 21

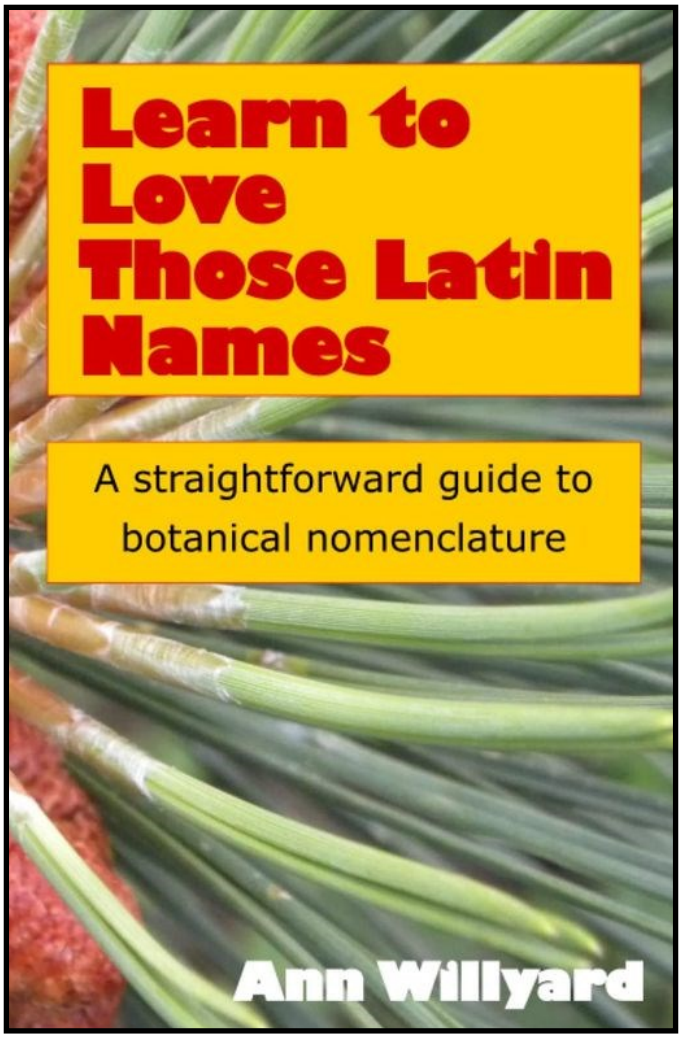
President's Message Page 22

A Bit of Poetry Page 23

## Learn to Love Those Latin Names: A straightforward guide to botanical nomenclature

By Ann Willyard

*Book Review by Eric Sundell*




If you're a crossword puzzler as well as a native plant lover, as addicted to Wordle, say, as you are to Wild Ones' walks, here's the book for you: *Learn to Love Those Latin Names: A straightforward guide to botanical nomenclature*. Not a guide to identifying plants, Dr. Ann Willyard confesses, but a resource that will help plant enthusiasts—those for whom botanizing is an avocation—to understand and use scientific names. The focus is on vascular plants, the ones most *Claytonia* readers love the most: ferns and fern allies, conifers and other gymnosperms, and flowering plants, the dicots and monocots.

"I think you will truly learn to love the botanical names once you get started," the author entices. And to back up her bold prediction, she's chosen for the book's logo, a sketch of two impassioned Latin dancers, who appear in the upper right corner of every right-hand page—"…a more recent symbol of love is a lot more fun than an image of a dead language for beginning botanists." Dr. Willyard is an evangelist with a sense of humor and a stylist with a breezy, colorful, entirely acces-

*(Continued on next page)*

*(Continued from previous page)*

sible prose. Her readers will find this book to be an interesting, informative visit with a botanist eager to share her love of plants—and especially their Latin names.

*Learn to Love Those Latin Names* offers a trove of diverse and detailed nomenclatural information, chock-full of examples and illustrations, in a compact 63 pages.

Here's the Table of Contents:

***Chapter 1. Why learn plant names?***
***Chapter 2. What's wrong with using only common names?***
***Chapter 3. Advantages of using scientific names***
***Chapter 4. Species names are binomials***
***Chapter 5. Genera (plural); Genus (singular)***
***Chapter 6. Epithets***
***Chapter 7. Infraspecific names***
***Chapter 8. Authors***
***Chapter 9. Abbreviations***
***Chapter 10. Pronunciation***
***Chapter 11. Naming hybrids***
***Chapter 12. History of botanical nomenclature***
***Chapter 13. Evolution, Systematics, and Phylogenetics***
***Chapter 14. Taxonomic groups above species***
***Chapter 15. Family names***
***Chapter 16. How is a new species name created?***
***Chapter 17. Why in the heck do they change species and family names?***
***Chapter 18. Cultivated Plant Code***
***Chapter 19. Weeds***
***Chapter 20. How many vascular plants are there?***

An appendix of Resources follows, comprising five pages of books and especially websites devoted to all kinds of nomenclatural matters:

**Resource A. Learning how to identify plants**
**Resource B. Identification tools**
**Resource C. Researching scientific names**
**Resource D. Finding the expected geographic distribution of a plant species**
**Resource E. Cultivated plant names**
**Resource F. Learning about plant evolutionary [biology]**
**Resource G. Citizen science**

So why learn scientific names? What is wrong with using only common names? Well, the author reveals that her book was inspired by the misunderstandings that using only common names of plants often causes. There is no standardization of plant common names like the bird watchers have for the birds. One species can have multiple common names. (The author's example: Wikipedia gives ten common names for *Viola tricolor* and, as it's a common European wildflower, it no doubt has countless additional names in dozens of languages other than English.) But maybe worse, one common name can apply to many different species. (When Shakespeare says "cowslips," he's talking about *Primula veris*, a primrose. In Vermont, our neighbor Ernie Appleton's "cowslips" were a kind of buttercup, *Caltha palustris.*) And of course, if you've ever tried to identify a panic grass or a caric sedge (Oops: a *Dichanthelium* or a *Carex* species), you know that many obscure species have no common name at all.

In Chapter 3, Advantages of using scientific names, Dr. Willyard offers two solid arguments. 1) Each species has one and only one valid scientific name the world around, a Latin binomial, regardless of local language and even local alphabet. 2) Latin binomials are hierarchical: closely related species share the same genus name, thereby revealing relationship.

However. "The most frustrating aspect for beginners is that some names have changed and some will continue to change, as we learn more about which plant species are unique and how they are related to each other." And as a retired botanist with a doctorate in plant taxonomy, I'll add that frequent name changes are frustrating not just for beginners. The onslaught of recent information provided by genome studies has accelerated the pace of taxonomic re-evaluations, which often lead to changes in nomenclature. Changes in position (a species is moved to a new genus) and changes in rank (a variety or subspecies is promoted to species status or vice versa) have perhaps never been so prevalent among the harmless drudges of taxonomy. And I've always remembered my dismay skimming through the introduction to a book on wildlife plants of the Southeast that a Forestry student brought to Regional Flora class. It said: Species are arranged alphabetically by common name because the scientific names change so frequently.

Having persuaded her readers of the theoretical advantages of using Latin names, Dr. Willyard delves into the ground rules of taxonomic nomenclature, as required by the International Code of Nomenclature: chapters on Binomials, Genera, Species epithets or modifiers, and Authors—the folks who describe new taxa and coin the Latin binomials (or at least the epithets). And there are the unanticipated sorties. A chapter on abbreviations: What's the difference between *Salix* sp. and *Salix* spp.? What does *Malus* cf. *ionensis* mean? And a chapter on pronunciation: How do you say that –aceae ending of the family names? Do you say the "i" as the long vowel sound like "eye" or as the Latin "ee" sound? (Dr. Willyard's twinkling answer here is memorable: "…those addressing an English-speaking audience rarely pronounce *Pinus* using the Latin "ee" sound for the "i" to avoid an unfortunate homonym.") Everything you always wanted to know about Latin names but didn't know who to ask!

An honest book review will present strengths and weaknesses both. But I don't have many quibbles. Dr. Willyard taught botany courses here in Arkansas at Hendrix College before she retired and moved back to her home biome in California, and I do wish she had chosen more of her examples from our local flora instead of that of the West; but of course that's her prerogative. I'd like to see the second edition in a larger format to enhance our appreciation of the illustrations. And a couple of chapters—Evolution, Systematics, and Phylogenetics as well as Taxonomic groups above species—are denser going and will be more rewarding for a beginner with rereading. Nevertheless, the 19th century shift from taxonomy to systematics, when Darwin put the classification of plants and animals onto an evolutionary framework (sending the concept of the species into permanent limbo), is the indispensable story of modern biology, and the author tells it with clarity and finesse.

So no need to give up your favorite common names. Dr. Willyard is not asking you to scrap Devil's Shoelaces or Toothache Tree for their Latin binomials. But she will happily be your guide into the intriguing, rewarding world of scientific nomenclature. Have fun!

***Virginia McDaniel calling a field-party foul after someone on the ANPS walk used the proper Latin pronunciation of the letter 'i' when saying the genus name of this sizable Loblolly Pine (Pinus taeda). Photo by Eric Hunt.***

# Welcome, New ANPS Members!

**These new members have joined ANPS since the last issue of *Claytonia*, from April 15 to August 15, 2022:**

Karen Bergh (North Little Rock, AR)
Meleah Bowles (Conway, AR)
Virginia Carr (Alma, AR)
Georgia Choate (Rogers, AR)
Patsy Conner (Little Rock, AR)
Bill and Kathie Dees (Camden, AR)
Emily Finley (Springdale, AR)
Megan Foll (Pleasant Grove, AR)
Heath Geister (Hot Springs, AR)
Lucinda and David Hansen (Clinton, AR)
Linda Heter (Rogers, AR)
Tina Huddleson (Conway, AR)
Shandle Kowalski (Bentonville, AR)
Morgan Meador (Jacksonville, AR)
Melody Moorehouse (Nashville, AR)
Douglas Myers (Huntsville, AR)
Scott Paul (Conway, AR)
Cathy Ross (Rogers, AR)
Joann Saraydarian (Hot Springs National Park, AR)
Paul Scott (Conway, AR)
Lora Shadwick (Fayetteville, AR)
Brenda Sharp (Harrison, AR)
Lisa Smith (Little Rock, AR)
Stuart & Helen Ruth Towns (Forrest City, AR)
Sharron Walter (Conway, AR)
Jami West (Jonesboro, AR)
George Wise (Heber Springs, AR)

**New Life Members**

Bob Alsobrook (Bentonville, AR)
Marilyn Bell (Springfield, MO)
Bob Pierce (Conway, AR)
Marie Simonds (Donaldson, AR)
Amy Sixbey (Roland, AR)
Caleb and Bethany Stovall (Little Rock, AR)
Janelle Stookey (Mountain Home, AR)

# ANPS Fall Meeting

## October 7-9, 2022 in Stuttgart, Arkansas

Everyone welcome! Registration is only $10 (no pre-registration) and begins at 5:00 p.m., Friday, October 7.

**MEETING LOCATION**
The Grand Prairie Center, Salon B
Philips Community College
2807 US-165, Stuttgart, AR 72160
Website: pccua.edu/community/gpc/

**LODGING LOCATION**
TRU by Hilton, 204 W 22nd St, Stuttgart, AR 72160
Website: hilton.com/en/hotels/sgtruru-tru-stuttgart
Phone: 870-672-7505 ext. 0

A block of 30 rooms, a mix of singles, doubles, and ADA-accessible rooms, has been reserved at the rate of $99.99 plus tax per night, guaranteed until September 30. Rates at this hotel vary based on the flexibility for cancellation. For this block, cancellations will be allowed until 48 hours before arrival. Provide the group code "ANP" if calling to make your reservation, or enter "ANP" in the group code field if booking online.

**DINING OPTIONS**
Potluck meal Friday and Saturday evenings at the Grand Prairie Center. Bring a dish or just come and eat! There are also several dining options near the hotel.

**EVENING PROGRAMS - Grand Prairie Center, Salon B**
**Friday, October 7**
7:00 p.m. – Annual NATIVE PLANT AUCTION! Bring your native plants, books, homemade jelly, jewelry, or plant art for the auction. Proceeds from the auction support ANPS scholarships, research grants, and small grants programs.

**Saturday, October 8**
6:00 p.m. – Membership Meeting
7:00-8:00 p.m. – Diana Soteropoulos, botanist at the Arkansas Natural Heritage Commission, PhD candidate at Arkansas State University, 2019 Delzie Demaree Research Grant recipient, and 2021 Aileen McWilliam Scholarship recipient will present "An exploration of the vascular flora of Pine City Natural Area, Monroe Co., Arkansas, U.S.A., in comparison to the Mississippi alluvial plain in eastern Arkansas".

**FIELD TRIPS**
Several field trips are scheduled for Saturday 8:30 a.m. – 5:00 p.m. and Sunday 8:30 a.m. – 12:00 p.m.
Saturday and Sunday morning field trips will leave from the hotel at 8:30 a.m. Saturday afternoon field trips will meet at trip locations at 2:00 p.m. You must sign up for field trips on Friday evening to allow for adequate logistical planning. Bring sunscreen, water, and bug spray!

Check out anps.org for up-to-date field trip information and CDC guidelines related to COVID-19 precautions!

Contact Joe Ledvina at joeledvina@gmail.com or Nate Weston at anps.president@gmail.com with any questions.

***Spring wildflowers blooming at Railroad Prairie Natural Area in the Grand Prairie. Photo by Eric Hunt.***

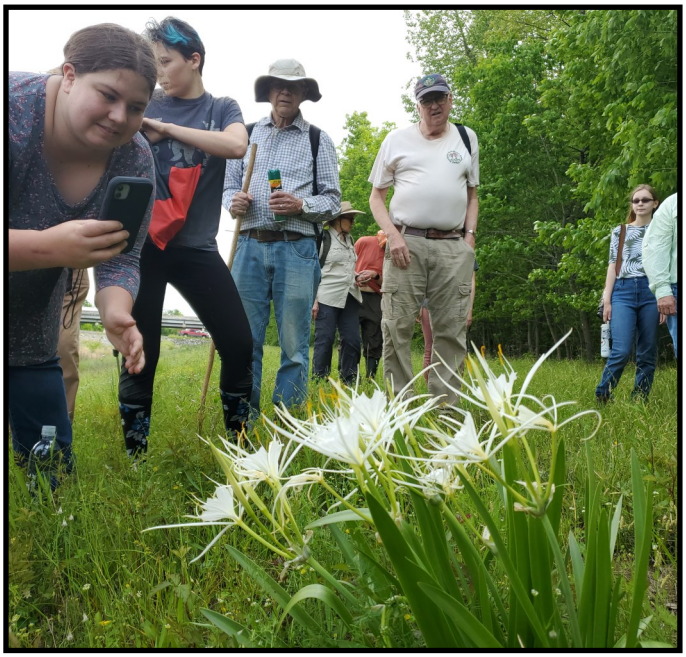
# Mini Meetings Make Members Merry!

Recaps of the Spring Mini Meetings around the state

## APRIL 30: LITTLE ROCK AREA

**by Joe Ledvina**

On Saturday, April 30th, Eric Hunt led the spring "mini-meeting" field trips in the Little Rock area. Fourteen members attended the first walk, at Fourche Bottoms. This is one of the largest urban wetland areas in the country, with extensive cypress and tupelo swamps bordering Fourche Creek. Eric gave us a little bit of history of the property before we embarked on a short, off-trail excursion to an area of mesic hardwood flatwoods on the fringe of the bottomlands. We got a highlight early on, with Spring (or Texas) Spiderlily (*Hymenocallis liriosme*) in full flower on the roadside.



***Spring Spiderlily in flower along the roadside. Photo by Eric Hunt.***

We then headed into the flatwoods, in search of elusive Copper Iris (*Iris fulva*), which we were not fortunate enough to find. Along the way, we saw plenty of Green Dragon (*Arisaema dracontium*) and Swamp Leatherflower (*Clematis crispa*).

For lunch, we caravanned across Little Rock and into the Ouachita Mountains ecoregion to Vista Park on Lake Maumelle. Some folks did not make the trip after the morning, but at least four additional attendees joined us for our lovely picnic lunch with great views of the lake.

***Field trip attendees enjoyed a potluck picnic at Vista Park, overlooking Lake Maumelle. Photo by Becky Hardin.***

After lunch, we had a short trail walk through a mesic oak-pine forest to see a grove of Bigleaf Snowbell (*Styrax grandiflora*). The small trees were in full bloom, and the tiny, bell-shaped flowers looked and smelled wonderful. We saw many other species along the way, including a blooming White Fringetree (*Chionanthus virginicus*). The forecast threat of rain never materialized, and we all enjoyed the temperate May sunshine.

***They found the Bigleaf Snowbell! Photo by Becky Hardin.***

*(Continued on next page)*

*(Continued from previous page)*

## MAY 7: NORTHEAST ARKANSAS

**by Travis Marsico**

We had a great time and, thanks to a visit from Richard Abbott on the Village Creek State Park trip, our small group of five people learned a TON! One attendee said our trip was the best ANPS hike she's ever been on!

Go us!

***Top: Travis and the group descending into the forest at Lake Village State Park. Bottom: Closeup of a Tulip-tree (Liriodendron tulipifera) flower. Photos by Brendan Kosnik.***

## MAY 14: PINE BLUFF AREA

**by Joe Ledvina**

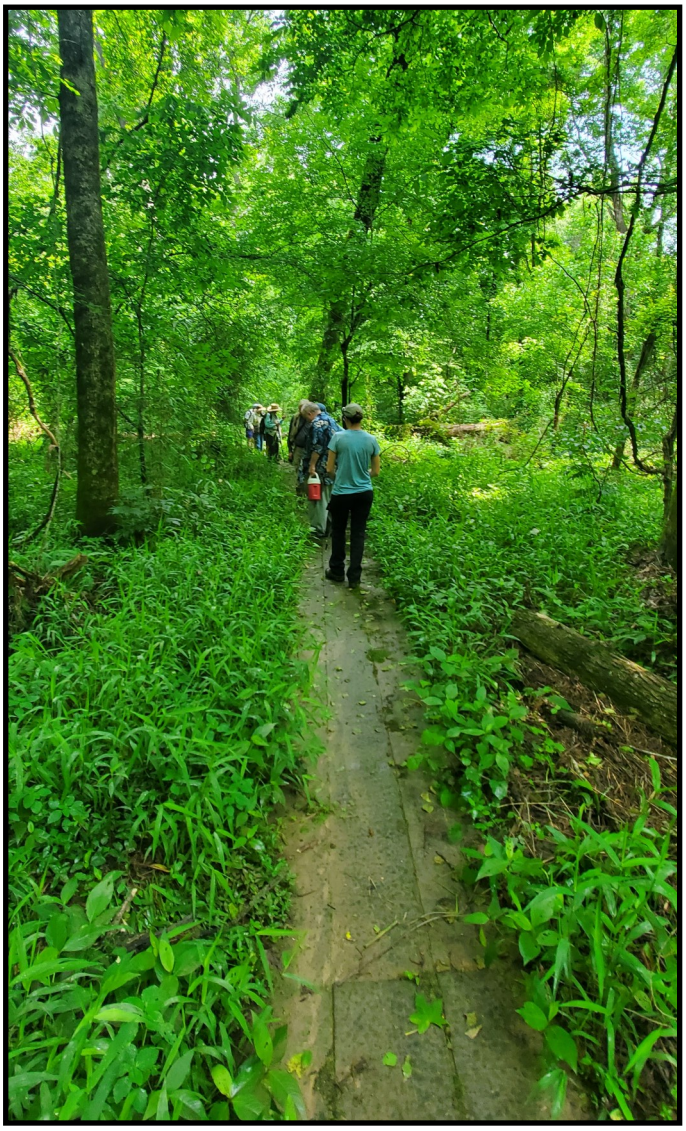
On Saturday, May 14th, Dr. J. Richard Abbott led ten ANPS members on the spring "mini-meeting" event in Southeast Arkansas, including plant walks on Arkansas Game and Fish's Cane Creek Lake Trail, east of Star City, and at Byrd Lake Natural Area in Pine Bluff.

Dr. Abbott and eight ANPS members caravanned from Star City to the Cane Creek Lake trailhead. As in his webinars for ANPS, Dr. Abbott spent much of his time highlighting the patterns that allow one to separate plants into broad groups, as a quick way to use objective features, rather than "this reminds me of…" gestalts to narrow the identification to the correct family or even genus. Like true botanists, we did not get far from the car during the first hour – there were dozens of species waiting to be identified along the forest edge! These included a large vine in the bean family, Boykin's Clusterpea (*Lackeya multiflora* ), which has distinctive large, trifoliate leaves with acuminate leaflets.

***Stopping to admire a Purple Meadow-rue in flower. Photo by Joe Ledvina.***

The flowering highlight of this trip also came early, a large Purple Meadow-rue (*Thalictrum dasycarpum*) in full bloom in the roadside ditch. We then headed through some upland pine forest before travelling over bridges and a short boardwalk through bottomland hardwoods of the Gulf Coastal Plain, less than half a mile west of the Mississippi Alluvial Plain.

After the morning walk, the caravan headed north, to picnic tables at the Bayou Bartholomew Water Trailhead,



***Top: On the boardwalk at Cane Creek. Bottom: Group photo on the Cane Creek trail. Photos by Joe Ledvina.***

for lunch. One couple did not make the trip, but one additional ANPS member joined us for lunch. The afternoon walk was at Byrd Lake Natural Area, also less than half a mile west of the Mississippi Alluvial Plain. During the short, paved walk, we saw typical upland species of the Gulf Coastal Plain, and we could look out over the oxbow lake ringed with mature Bald Cypress (*Taxodium distichum*). Dr. Abbott continued his lessons, focusing on the features -- opposite versus alternate leaves, entire versus serrated leaf margins – that quickly allow one to narrow down the options for plant ID.

***A lovely spot for a potluck picnic. Photo by Joe Ledvina.***

## MAY 21: WEST-CENTRAL ARKANSAS

**by Virginia McDaniel**

We walked along an old road through closed canopy forest. Leaf litter carpeted the forest floor. An occasional scraggly plant was eking out some semblance of existence in the shade. Then, off to the left, our eyes were drawn to an opening in the forest – light! With that light an explosion of colorful flowers, robust grasses, and charred cedar trees. We had found the glades and the beginning of a botanical bonanza.

Our group on May 21, 2022, included two leaders: former ANPS President and retired Ouachita National Forest Botanist Susan Hooks and me, ANPS Membership Officer and Forest Service science writer. Coming to join us were ANPS Internet and Social Media Officer Eric Hunt, Bette Kaufmann (all the way from Louisiana!), Ray McKinney, Shayna Sessler, and Gene Sparling. A perfect group to break the COVID-19 isolation.

A glade is an opening in the forest that is characterized by exposed bedrock and thin soils. Glades often have a hy-

*(Continued on next page)*

*(Continued from previous page)*

dro-xeric hydrology meaning they are very wet in the spring and bone dry in the summer when temperatures can exceed 140 degrees on the surface. These harsh environmental conditions have led to a diverse assemblage of hardy herbaceous plants, many of which are endemic to the Ouachita Mountains or restricted to glade habitats.

Historically glades and surrounding forests were kept open by repeated fire. When fire is absent glades are encroached by woody species like Eastern Red Cedar (*Juniperus virginiana*). The increased shade and leaf litter reduces an herbaceous plant's ability to grow and flower.

The 120-acre Little Fir Glade Restoration Project is located on the Caddo-Womble Ranger District of the Ouachita National Forest. They are using thinning and burning to restore the open structure of the glade and surrounding woodlands. In 2019, The Nature Conservancy oversaw a contract to thin the cedar trees and in 2021 the Forest Service accomplished the first prescribed burn in the area. The positive results were near instantaneous.

A sea of yellow Large-flower Tickseed (*Coreopsis grandiflora*) and tiny white Daisy Fleabane (*Erigeron stigosus*) blanketed the ground interspersed with spikes of blue Carolina Larkspur (*Delphinium carolinianum*) and purple Venus's Looking-glass (*Triodanis* sp.). Dense tufts of Little Bluestem (*Schizachyrium scoparium*) and other grasses provided a green backdrop.

***Little Fir glade with a nice mix of Large-flower Tickseed and Carolina Larkspur under the fallen Eastern Red Cedars on the Ouachita National Forest. Photo by Virginia McDaniel.***

As we approach the exposed bedrock, the soils thinned and the species composition changed. Introducing the gladophiles! (I just made that word up.) Purple racemes of Wild Hyacinth (*Camassia scilloides*), Umbrella-plant (*Eriogonum longifolium*), seed heads of the Ouachita endemic Nuttall's Cornsalad (*Valerianella nuttallii*), the delicate white blooms of Sandwort (*Minuartia patula*) and succulent leaves of Fameflower (*Phemeranthus* sp.) and Prickly-pear (*Opuntia* sp.) became abundant.

***Virginia McDaniel, Bette Kauffman and Susan Hooks look for species in the Little Fir Glade Restoration Project on the Ouachita National Forest. Photo by Eric Hunt.***

Our plant list topped 200 species in just a few hours of inventory so let me just hit some highlights. The milkweeds are always worth a mention [White Milkweed (*Asclepias variegata*) and Whorled Milkweed (*A. verticillata*)] as is the Pale Purple Coneflower (*Echinacea pallida*). The blueish-green leaves of Ouachita endemic Waterfall's Sedge *(Carex latebracteata*) were abundant. Let's not forget a shout out to the native Yellow Thistle (*Cirsium horridulum*)! Though it looks horridly mean, the pollinators love it! While I have visited this glade several times, this was my first sighting of Barbara's-buttons (*Marshallia caespitosa*). And the final high point of the trip was finding Open-ground Whitlow-grass (*Draba aprica*) with its stellate hairs covering the fruits.

All in all, it was a fun day in the glades and nice to see the good work the Ouachita National Forest is doing to restore biodiversity and wildlife habitat.

## MAY 28: NORTHWEST ARKANSAS

**Nate Weston (morning)**

**Jennifer Ogle (afternoon)**

***Nate*:** On May 28, about 15 people attended the morning field trip at Pea Ridge National Military Park, the site of the 1862 Battle of Pea Ridge. We started out at the visitor center and were greeted by park biologist Nolan Moore, who briefly described the grassland restoration work they have been doing on the property over the past several

years. Nolan and I led the combination driving and walking tour to see some of the restoration sites, and Nolan gave more detail about the park's efforts to remove invasive plants and restore its woodlands and prairies to their 1862 extents to make the park more reflective of the period.

Our first stop along the western loop was at a clearing, which would have been Cox's Field in 1862. Nolan described the management of this site - canopy removal and a rotation of prescribed burns to promote native flora.

***Looking at native plants that rebounded after management to improve grassland habitat. Photo by Sue Hubbard.***

Here we saw an abundance of Eastern Gama Grass (*Tripsacum dactyloides*), Little Bluestem (*Schizachyrium scoparium*), Purple-top Tridens (*Tridens flavus*), Narrowleaf Mountain-mint (*Pycnanthemum tenuifolium*), Pale-spike Lobelia (*Lobelia spicata*), Blazing-star (*Liatris* sp.), Black-eyed Susan (*Rudbeckia hirta*), rosette grasses (*Dichanthelium* spp.) Sandwort (*Minuartia patula*), Summer Bluet (*Houstonia purpurea*), and Arkansas Calamint (*Clinopodium arkansanum*). To the west of the road were tall various oaks (*Quercus* spp.) and dense stands of Sassafras (*Sassafras albidum*) regenerating from the previous burn.

Our second stop took us north along the loop, but we turned east onto a dirt road bisecting the park. We parked along the road to visit a glade-like area a short distance off the road to the south, nestled at the eastern base of a small hill. As we hiked along the road and woods edge we encountered Rusty Blackhaw (*Viburnum rufidulum*), Deciduous Holly (*Ilex decidua*), and Gum Bumelia (*Sideroxylon lanuginosum*), a common but oft-overlooked tree similar to deciduous holly but possessing blue-black

***Arkansas Calamint (Clinopodium arkansanum). Photo by Nate Weston.***

berries and stiff thorns. An open and lush woodland greeted us as we turned into the trees, making our way to the glade. Various grasses, including rosette grasses, River Oats (*Chasmanthium latifolium*), and Bottlebrush Rye (*Elymus hystrix*) enthusiastically grew atop soils made fertile by a recent burn, while scattered patches of Rose Vervain (*Glandularia canadensis*) and Narrow-leaf Sundrops (*Oenothera fruticosa*) contrasted beautifully in the dappled sunlight. Beyond the woodlands, we reached the glade-like area. Here, growing between the seams in the limestone, we saw several dense patches of pink Widow's -cross (*Sedum pulchellum*). Pale-spike Lobelia and Heartleaf Skullcaps (*Scutellaria ovata*) were abundant, while Calamint greeted every step with a pleasant fragrance. Old, bonsai-like Post Oaks (*Quercus stellata*) stood clustered in the glade's center, surrounded by scattered Prickly-pears (*Opuntia* sp.), Eastern False Aloe (*Manfreda virginica*), White Wand Beardtongue (*Penstemon tubaeflorus*), rattlesnake root (*Nabalus* sp.), and adder's tongue (*Ophioglossum* sp.). Just after this small glade-like area was a shallow depression, paradoxically populated with a mix of the glade's flora growing along the periphery and more wetland-type species, such as blunt spikerush (*Eleocharis obtusa*), growing in the center.

We soon realized we were pressing ourselves to meet our midday rendezvous, so we trekked back out of the woods, appreciating the purple and yellow flowers along the way, and made our way back to the cars.



*(Continued on next page)*

*(Continued from previous page)*

***Jennifer*:** Several from the morning group met up at a picnic area in the park to share a potluck lunch. More folks joined us for lunch and the afternoon walk and in no time we had another big crowd, along with a ton of delicious food. After about an hour we found ourselves still relaxing and mingling at the picnic spot, but the maples were calling so we finally roused ourselves and headed back to the visitors center, where we met up with more people who were there to join the afternoon trip.

On our way to the Black Maple (*Acer nigrum*) site, we stopped to see a population of Bowman's Root (*Gillenia trifoliata*). Bowman's Root is known from much of the eastern U.S. and is most common in the Appalachian region, but has disjunct populations in Arkansas, where it is critically imperiled with a state rank of S1. It was almost past flowering when we visited, but someone spotted a few flowers still in bloom up the slope.

We drove on to the maple site and then enjoyed a slow, easy walk down an old road-turned-trail, where we saw many native plants you would expect to see in a mesic Ozark forest. American Bladdernut (*Staphylea trifolia*), Great Waterleaf (*Hydrophyllum appendiculatum*), Spicebush (*Lindera benzoin*), Jacob's Ladder (*Polemonium reptans*), Solomon's Seal (*Polygonatum biflorum*), and American Hazelnut (*Corylus americana*) were a few favorites.

We walked down into the riparian forest along a creek and saw more cool stuff - several members of the group pointed out mushrooms, fossils, and of course, more native plants including Pawpaw (*Asimina triloba*), Ohio Buckeye (*Aesculus glabra*), Bloodroot (*Sanguinaria canadensis*) and Missouri Gooseberry (*Ribes missouriense*). The biggest maples were growing on the far side of the creek, swollen from recent rains, but we were able to see several smaller ones as we walked through the open forest before we reached the stream.

Black Maple is not uncommon in much of the midwestern and eastern U.S., but it's rare in Arkansas, known to occur only in Benton County. It is sometimes confused with Sugar Maple (*Acer saccharum*), but there are several key differences. The leaves of Black Maple are large, shallowly lobed, and hairy on the lower surface (not just the veins), and the leaf stalks often have stipules at the base. Also, the leaf lobes droop. The bark is dark gray to brown, and the bark of Sugar Maple is gray to grayish brown - not a huge difference, I realize, and to cause just a little more confusion, maple bark can turn completely black when it becomes infested with an insect known as gloomy scale. But this type of infestation more commonly occurs on Sugar Maple than on Black Maple.

Until recently, the only way to see Black Maples in Arkansas was by taking a long hike along a rugged creek through a steep ravine at Devil's Eyebrow Natural Area. It was well worth the effort to see them, but thankfully for our group, botanist Burnetta Hinterthuer discovered a more conveniently located population in 2003 while she was conducting a survey of the military park. This new-to-us population was recently made more widely known by ANPS member Samantha Heller, who spotted the trees while botanizing in the park in 2020 and posted photos of them to iNaturalist (obscuring the exact location).

***The Black Maple Group. Photo by Jennifer Ogle.***

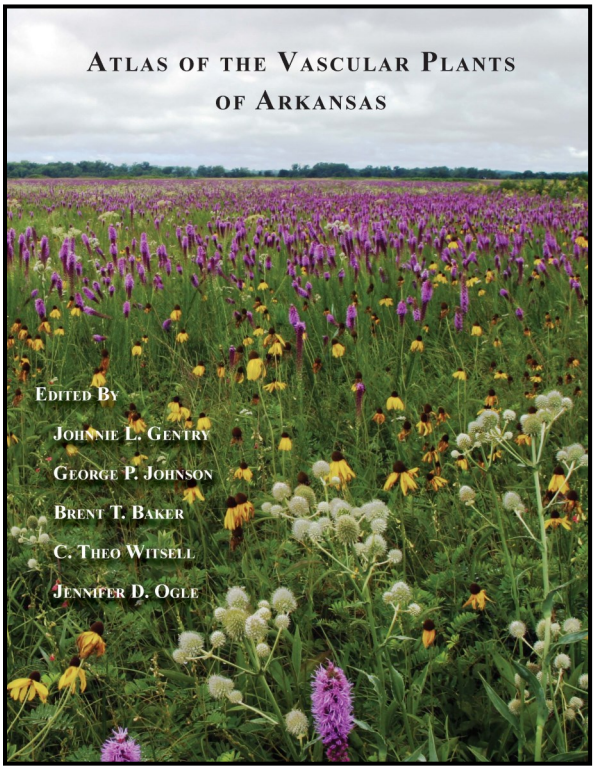
***Black Maple growing in a riparian forest at Pea Ridge National Military Park. Photo by Jennifer Ogle.***

These spring mini meetings were a big hit!!! It was great that we were able to find a way to get together while navigating an uncertain Covid landscape, to finally see our ANPS friends again and spend time looking at plants (and eat a lot of good food!).

# The Atlas Goes Digital

Jennifer Ogle and Theo Witsell

The *Atlas of the Vascular Plants of Arkansas*, published by the University of Arkansas Herbarium in 2013 as a 709-page softcover book, is now available for free in a new digital format.




The Atlas is the culmination of 13 years of work by the Arkansas Vascular Flora Committee. Though published nearly 10 years ago, it remains the most complete accounting of the county-level distribution of the state's native and non-native vascular plants. To determine each plant's distribution, members of the committee compiled data from nearly 200 years of study of the state's flora, examining hundreds of thousands of herbarium specimens, poring over peer-reviewed research papers, and reviewing accounts of early explorations of the state.

Some of the maps include information on the plant's special status, using numerical codes to indicate if it is non-native, non-native invasive, endemic, and/or of special conservation concern in the state. Maps without codes indicate the plant is native and common in the state. Introductory chapters include a general history of botanical exploration in Arkansas, an overview of the state's geology, information on how physical factors determine the distribution of Arkansas's native plants, and a summary of the state's known flora.

This important desk reference for the plants of Arkansas has been out of print for several years, yet the editors still receive requests for it. So, they recently decided to make it available online as a free, downloadable PDF. One of the benefits of providing the book in a digital format is the text is searchable using a simple find function, which makes locating information easier than leafing through such a large book. A digital version also fits into a backpack more readily than the printed one, as it can be downloaded to a smartphone or tablet for use in the field.

Two file sizes of the PDF are available: a full-size version (22.3 MB) printing or viewing on a desktop or laptop computer, and a reduced version (12.4 MB) for viewing on a smartphone or tablet. The editors of the Atlas have made both files available on the websites of the University of Arkansas Herbarium (fulbright.uark.edu/departments/biology/herbarium/publications.php) and the Arkansas Natural Heritage Commission (arkansasheritage.com/arkansas-natural-heritage/programs/staff-publications).

## SAVE THE DATE!

SPRING 2023 MEETING

MAY 19-21

NORTHWEST ARKANSAS

*Devil's Eyebrow Natural Area*
*Photo by Eric Hunt*

# Peggy Thomasson Ackerman, 1931-2022

Peggy Thomasson Ackerman died peacefully at her home in the woods west of Little Rock on August 9, at the age of 91. She was born in Pine Bluff on May 3, 1931, to V.O. Thomasson and Verda Sadler Thomasson, and spent her childhood surrounded by the Sadler clan in Rison.

She was preceded in death by her beloved husband, and fellow Risonian, George Link Ackerman, whom she married on November 2, 1957. She is survived by her two daughters, Susan, of Lebanon, NH, and Laura (Bruce Smoller), of Rochester, NY; two grandsons, Jason (Rachel Starr) and Gabriel (Sarah Cocuzzo); her great-grandson Benjamin Link Starr-Smoller; and a nephew, Tom.

She was the 1949 valedictorian of Rison High School. She attended Hendrix College, graduating in 1952, and remained a loyal supporter of her alma mater. Following Hendrix, she received a MA from George Peabody College in Nashville, TN, in 1953, and did additional graduate work at the University of Wisconsin in 1954-55. Returning to Arkansas, she began working in Roscoe Dykman's laboratory at UAMS and then at Arkansas Children's Hospital, as a research psychologist specializing in the study of reading disabilities, a position she retained until her retirement in 2000. With Dykman and associates, she published scores of papers in journals such as the Journal of Learning Disabilities; the Journal of Clinical and Experimental Neuropsychology; the Journal of Child Psychology and Psychiatry; and the Journal of Abnormal Child Psychology. She was first author on more than half of these papers and received the Pioneer Research Award from the Learning Disabilities Association in 1991.

Peggy was also a passionate nature lover, an avid birder, and an expert on the native plants of Arkansas. Few things made her happier than to be among wildflowers, whether the trout lilies, bloodroots, and jack in the pulpits near her home; the dogwoods, Dutchman's breeches, and lady slippers of the Ozark hills and valleys; or the columbines, paintbrush, and shooting stars of her favorite mountain meadow, Yankee Boy Basin in Colorado. She cherished the memories of trips to the Rocky Mountains with her husband and daughters, where mountain hikes provided the perfect opportunity for both her love of wildflowers and wildlife and husband George's zeal for nature photography. And this love was equally on view in the home they build together on ten acres of woods west of Little Rock, where wood ducks and geese nested on the pond they named Buckeye Lake, where Iris cristata that she carefully tended bloomed outside the front door, and where the walls were filled with photographs of wildflowers and critters.

Peggy was beloved by all who knew her and gave her own love as freely to the many people she cared about, including the caregivers who assisted her with daily chores in her final year. Her family and friends will cherish her memory.

The family requests donations to Hendrix College, 1600 Washington Avenue, Conway, Arkansas 72032 (hendrix.edu/makeagift/); the Arkansas Native Plant Society, care of Katherine Lincourt, Treasurer, 2625 Charter Oak Drive, Little Rock, AR 72227(anps.org/sponsors/); or the Cleveland County Historical Society, P.O. Box 192, Rison, Arkansas 71665.

***Editor's note: This is an excerpt from Peggy's obituary. The full tribute can be read at RuebelFuneralHome.com.***

# Arkansas Native Plants for Phytoremediation

## Part III: Improving Heavy Metal Contaminated Soil with Native Plants

Eric Fuselier

Without soil, life on land would be impossible. Soil is a medium for plant growth and a habitat for living organisms. Our society depends on soil to grow food and support the web of life upon which all living things depend. History has shown that civilizations that do not take care of the soil eventually suffer the consequences of their poor choices and collapse. Even today, we could easily suffer the same fate if we are not wise in our approach toward soil management.

One way that soils can become degraded is through the accumulation of toxic levels of heavy metals. Soil can become contaminated with heavy metals through a variety of means, from smelting operations, leaded gasolines and paints, wastewater irrigation, and by land application of fertilizers, pesticides, animal manures, and sewage sludge.

Soil is a major sink for heavy metals and can pose risks and hazards to both humans and the ecosystem through such means as physical contact or direct ingestion of contaminated soil, through the drinking of contaminated ground water, or through the food chain (soil-plant-human and soil-plant-animal-human). Exposure to toxic levels of heavy metals can have adverse effects on human health, such as decreasing our immunological defenses, impairing our mental faculties, and increasing our risk of upper gastrointestinal cancer.

Phytoremediation using native plants offers one potential solution for remediating soil contaminated with these heavy metals. While trying to avoid giving the implication that phytoremediation is the perfect solution in every case of heavy metal contamination, this article will examine how phytoremediation of heavy metals works, leaving it to engineers and environmental professionals to determine when this technique would be a feasible alternative for remediating heavy metal contaminated soil at a particular site.

**How it Works**

Unlike organic contaminants, heavy metals cannot be broken down to make them less toxic. Because of this, other methods than we have previously discussed (see Fall 2021 and Spring 2022 volumes of *Claytonia*) will need to be used to remove these elements from contaminated soil.

The first step is to identify native species that can colonize metalliferous soils. Heavy metals generally produce toxic effects on most plant species, making it difficult or impossible for them to survive in these soils. Adverse effects that heavy metals have on plants include low biomass accumulation, chlorosis of leaf tissue, inhibition of photosynthesis, altered water balance, or altered nutrient assimilation, all of which can ultimately cause the plant to die. However, some plant species have evolved physiological mechanisms that enable them to tolerate metal toxicity and allow them to grow in soil contaminated with heavy metals.

***Yarrow (Achillea millefolium). Photo by Eric Hunt.***

"Accumulator" species are those plant species that can absorb metals from the soil into their tissues. To do this, the metal must first be dissolved into a solution that plant roots can absorb. Once this has happened, the plant roots can then absorb the solution, along with the heavy metal. Once absorbed, the plant must then surround the heavy metal and bond it chemically to an organic compound (a process known as chelation) to both protect itself and make the metal more mobile. After the metal has been chelated, the plant can then transport the metal to a location where it can be stored safely. The transportation stage is the most critical, since the heavy metal is most likely to damage the plant during this process, and the plant must adapt to any damage the heavy metal causes. Once the heavy metal has been transported, it is then stored in a location where it cannot damage the plant, typically within the vacuoles of the plant cells.

"Hyperaccumulator" species are similar to accumulator species, but they can absorb extremely high levels of heavy metals into their tissues due to having overdeveloped metal transport systems. In hyperaccumulators, heavy metals are most often stored in the vacuoles of the



*(Continued on next page)*

*(Continued from previous page)*

cells within the leaves of the plant.

Other adaptations that have allowed some plant species to colonize metalliferous soils are those used by "excluder" species. Excluder species have adaptations that enable them to take up low levels of heavy metals, regardless of what the concentration levels are in the soil.

With these adaptations in mind, there are two main phytotechnological mechanisms that we can make use of when trying to improve the quality of soil contaminated with heavy metals:

- **Phytoextraction** refers to the absorption and uptake by plants of large amounts of inorganic contaminants such as heavy metals, and to the translocation of these contaminants into the aboveground parts of these plants. With this technique, consider using hyperaccumulator species, or accumulator species with a high growth rate and that produce a high quantity of biomass. For these species to effectively remediate soils contaminated with heavy metals, the plants must be harvested after an adequate period of growth that allows them to accumulate the metal contaminants in sufficient quantities, and then removed and disposed of in a manner that is in accordance with local, state, and/or federal environmental laws and regulations. For herbaceous species this means harvesting the plant at the most optimal time during the growing season to maximize the uptake of soil contaminants before the aboveground portion of these species begin to decompose and return the elements to the soil.

- **Phytometabolism** refers to the uptake of heavy metals by plants followed by the incorporation of these heavy metals into their tissue as nutrients. At low levels, some heavy metals such as copper, nickel, and zinc are nutrients that are essential for plants to carry out their physiological processes. Depending on the heavy metal (s) contaminating a soil, phytometabolism may be an effective technique for soil remediation.

  However, not all metals are equal in their ability to be extracted from soil. Some metals such as nickel can be extracted quite easily, while phytoextraction of other heavy metals such as cadmium can take decades or even centuries. For heavy metals that are difficult or impossible to extract, other techniques must be considered.

- **Phytostabilization** of heavy metals is the use of certain plant species to immobilize contaminants found in soil by sequestering them around the roots of the plant or within the plant's woody biomass. Woody perennial accumulator species, or a ground cover consisting of a heavy metal "excluder" species (known as a stabilization mat) can be an effective means to phytostabilizing soil contaminated with heavy metals. It should be noted that this technique does not remove heavy metals from the site, but effectively immobilizes or stabilizes them, making them unavailable for entry into the food chain or preventing them from coming into contact with humans or wildlife. The goal with this technique is for long-term stabilization and containment of the heavy metal.

***Bird's-foot Violet (Viola pedata). Photo by Eric Hunt.***

**Cadmium (Cd)**

Sources of cadmium (Cd) contamination in soil can include fertilizers, sewage sludge, and nickel-cadmium batteries. Phytoextraction can be effective for low levels of Cd contamination. If Cd concentrations are too high, plant growth is inhibited, making phytoextraction difficult. As mentioned above, phytoextraction of Cd is a very slow process that can take decades or centuries. However, due to the high bioavailability of Cd, phytoextraction can still be employed when it presents a danger to food chains, such contamination occurring in ecological sensitive areas.

Phytostabilization of Cd can be employed by using large woody accumulator species often used for biomass production, such as willows (*Salix* spp.) and poplars (*Populus* spp.), that are effective at sequestering Cd in their biomass (Table 1).

**Zinc (Zn)**

Sources of zinc (Zn) contamination in soil can include mining activities, smelting operations, steel production and galvanization, and tire dust and debris. Like Cd, phytoextraction can be effective for low levels of Zn contamina-

| Table 1: Native species for phytoremediation of Cadmium, Copper, Nickel, and/or Zinc. | | | | | | |
|---|---|---|---|---|---|---|
| **Common Name** | **Scientific Name** | **Veg. Type** | **Sunlight Requirements** | **Soil Moisture Requirements** | **Heavy Metal** | **Accumulation Quantity** |
| Yarrow | *Achillea millefolium* | Forb | FS | D to M | Cd | A |
| Indigo-bush | *Amorpha fruticosa* | Shrub | FS | M to W | Cu | A |
| Big Bluestem | *Andropogon gerardii* | Forb | FS | D to M | Cu | A |
| Sideoats Grama | *Bouteloua curtipendula* | Grass | FS | D to M | Cu, Zn | A |
| Fox sedge | *Carex vulpinoidea* | Sedge | FS to PS | W | Cd, Cu | A |
| Horseweed | *Conyza canadensis* | Forb | FS | D to M | Cd, Ni, Zn | A |
| Dog-fennel | *Eupatorium capillifolium* | Forb | FS to PS | M | Cd, Ni | A |
| Jerusalem Artichoke | *Helianthus tuberosus* | Forb | FS to PS | D to M | Cd | A |
| Deciduous Holly | *Ilex decidua* | Tree | FS to PS | M | Cd | A |
| American Holly | *Ilex opaca* | Tree | FS to PS | M | Cd | A |
| Balsam Groundsel | *Packera paupercula* | Forb | FS to PS | M | Ni | H |
| Switch Grass | *Panicum virgatum* | Grass | FS to PS | M to W | Cd | H |
| Pale Smartweed | *Persicaria lapathifolia* | Forb | FS to PS | M | Cu | H |
| Eastern Cottonwood | *Populus deltoides deltoides* | Tree | FS | M to W | Cd | A |
| Black Locust | *Robinia pseudoacacia* | Tree | FS | D to M | Ni | H |
| Carolina Willow | *Salix caroliniana* | Tree | FS to PS | M to W | All | A |
| Missouri Willow | *Salix eriocephala* | Tree | FS to PS | M to W | All | A |
| Upland Willow | *Salix humilis* | Tree | FS to PS | M | All | A |
| Sandbar Willow | *Salix interior* | Tree | FS to PS | M to W | All | A |
| Black Willow | *Salix nigra* | Tree | FS to PS | M to W | All | A |
| Little Bluestem | *Schizachyrium scoparium* | Grass | FS | D to M | Cu | A |
| Hairy Goldenrod | *Solidago hispida hispida* | Forb | FS | D to M | Ni | H |
| Eastern Gama Grass | *Tripsacum dactyloides* | Grass | FS to PS | M | Zn | A |
| Johnny-jump-up | *Viola bicolor* | Forb | FS to PS | D to M | Cd | A |
| Lance-leaf Violet | *Viola lanceolata* | Forb | FS | W | Cd | A |
| Missouri Violet | *Viola missouriensis* | Forb | FS to PS | M | Cd | A |
| Northern Bog Violet | *Viola nephrophylla* | Forb | PS to FS | W | Cd | A |
| Three-lobed Violet | *Viola palmata* | Forb | PS to FS | M | Cd | A |
| Bird's-foot Violet | *Viola pedata* | Forb | FS | D to M | Cd | A |
| Downy Yellow Violet | *Viola pubescens* | Forb | PS to FS | D | Cd | A |
| Arrow-leaf Violet | *Viola sagittata* | Forb | FS to PS | D to M | Cd | A |
| Common Blue Violet | *Viola sororia* | Forb | FS to PS | M | Cd | A |
| Cream Violet | *Viola striata* | Forb | PS | M to W | Cd | A |
| Palmate-leaved Violet | *Viola subsinuata** | Forb | PS | D to M | Cd | A |
| Carolina Violet | *Viola villosa* | Forb | PS | D | Cd | A |

**LEGEND**
Sunlight: **FS** = full sun; **PS** = part shade; **FS** = full shade
Soil Moisture: **D** = dry; **M** = medium; **W** = wet
Heavy Metal: **Cd** = Cadmium; **Zn** = Zinc; **Cu** = Copper; **Ni** = Nickel; **All** = Cd, Zn, Cu, and Ni
Accumulation Quantity: **A** = Accumulator; **H** = Hyperaccumulator
*North American native not known to occur in Arkansas.



*(Continued on next page)*

*(Continued from previous page)*

tion that don't inhibit the growth of the plants being used, but is a slow process that can take decades or centuries. But due to its high bioavailability, phytoextraction can still be employed when it presents a danger to food chains.

However, Zn is also a plant micronutrient, and phytometabolism can be feasible in situations where the concentration of Zn in the soil doesn't inhibit the plant's growth. And because it is a micronutrient, large woody accumulator species, especially willows (Salix spp.), used for biomass production can be used to sequester Zn as a form of phytostabilization (Table 1).

***Indigo-bush (Amorpha fruticosa). Photo by Eric Hunt.***

**Copper (Cu)**

Sources of copper (Cu) contamination in soil can include pesticide residues and smelting operations. Phytoextraction of Cu is moderately difficult and not a feasible option for field scale remediation projects. Like Zn, Cu is a plant micronutrient, and phytometabolism using accumulator or hyperaccumulator species (Table 1) can be feasible in situations where the concentration of Cu in the soil is not so high that it inhibits the ability of the plants to grow.

**Nickel (Ni)**

Sources of nickel (Ni) in the soil include battery production, stainless steel production, burning of fossil fuels, and wind-blown dusts from industrial areas. Phytoextraction is an effective means of removing Ni and an efficient technique for field scale remediation projects. Because Ni has high bioavailability, phytoextraction should be considered when it presents a danger to nearby food chains.

**Phytomining**

Phytomining is a technique that uses high-biomass plants that accumulate metals to be reclaimed for reuse. Once the accumulator species have had sufficient time to extract heavy metals from the soil, the plants are then harvested and burned into ash. This ash is then smelted to produce a metal. This exciting new field of research offers a potential alternative to existing, environmentally destructive, opencast mining practices, and holds potential for the extraction of ore bodies that are currently uneconomical to mine by conventional methods. With existing technology, research indicates that phytomining Ni shows the most promise for being an economical technique for reclamation because of the ease with which Ni can be extracted from soil. Perhaps with more research, other metals will become more economical to phytomine as well.

**Conclusion**

Improving soil quality, especially with regard to heavy metal contamination, is yet another application of phytoremediation in which native plants can help improve environment quality. By employing extraction plots, many types of heavy metals can be removed from the soil to reduce ecological harm and prevent adverse health effects to humans and wildlife. And using stabilization mats consisting of heavy metal excluder species can be an ideal technique for field scale remediation projects for those hard to extract heavy metals, such as chromium.

The emerging science of phytomining provides hope that perhaps we'll soon see a day when remediating soil contaminated with heavy metals has become an economically viable industry. Perhaps soon we'll see a day where certain Superfund sites are seen as a lucrative opportunity to improve the environment.

**References**


- Adesodun, J.K., Atayese, M.O., Agbaje, T., Osadiaye, B.A., Mafe, O., and Soretire, A.A. 2010. Phytoremediation potentials of sunflowers (Tithonia diversifolia and Helianthus annuus) for metals in soils contaminanted with zinc and lead nitrates. *Water, Air, and Soil Pollution* 207(1-4):195-201.
- lgreen, M., Trapp, S., and Rein, A. 2013. Phytoscreening and phytoextraction of heavy metals at Danish polluted sites using willow and poplar trees. *Environmental Science and Pollution Research* 21:8992–9001.
- Baker, A.J.M., and Brooks, R.R. 1989. Terrestrial higher plants which hyperaccumulate metal elements - a review of their distribution, ecology, and phytochemistry. *Biorecovery* 1:81-126.
- Baker, A.J.M. 2000. Metal-accumulating plants. In I. Raskin and B. Ensley (Eds.) *Phytoremediation of Toxic Metals*. New York: John Wiley and Sons, Inc. pp. 193-229.
- Blaylock, M.J., and Huang, J.W. 2000. Phytoextraction of metals. In I. Raskin and B. D. Ensley (Eds.) *Phytoremediation of Toxic Metals: Using Plants to Clean Up the Environment*, New York: John Wiley and Sons, Inc. pp. 53-70.
- Brooks, R.R. et al. 1977. Detection of nickeliferous rocks by analysis of herbarium specimens of indicator plants, *Journal of Geochemical Exploration* 7:49–57.
- Brooks, R.R., ed. 1998. *Plants that Hyperaccumulate*

*Heavy Metals*, CAB International.
- Chaney, R.L. 1983. Plant uptake of inorganic waste constituents, in *Land Treatment of Hazardous Wastes* (Parr, J.F. *et al*., eds), pp. 50–76, Noyes Data Corp.
- Chaney, R.L. et al. 1998. Method for phytomining of nickel, cobalt and other metals from soil, US Patent 5711784.
- Cutright, T., Gunda, N., and Kurt, F. 2010. Simultaneous hyperaccumulation of multiple heavy metals by Helianthus annuus grown in a contaminated sandy-loam soil. *International Journal of Phytoremediation* 12:562-573.
- Dickinson, N.M., Baker, A.J., Doronila, A., Laidlaw, S., and Reeves, R. 2009. Phytoremediation of inorganics: realism and synergies. *International Journal of Phytoremediation* 11:97-114.
- Evangelou, M.W., Robinson, B.H., Gunthardt-Goerg, M.S., and Schulin, R., 2013. Metal uptake and allocation in trees grown on contaminated land: implications for biomass production. *International Journal of Phytoremediation* 15(1):77-90.
- Gawronski, S., Greger, M., and Gawronska, H. 2011. Plant taxonomy and metal phytoremediation. In I. Sherameti and A. Varma (Eds.) *Detoxification of Heavy Metals, Soil Biology* 30, DOI, 10.1007/978-3-642-21408-0_5, Berlin, Heidelberg: Springer-Veriag.
- Hinchman, R.R., Negri, M.C., and Gatliff, E.G. 1997. Phytoremediation: Using Green Plants to Clean Up Contaminated Soil, Groundwater, and Wastewater. Submitted to the US Department of Energy, Assistant Secretary for Energy Efficient and Renewable Energy under Contract W-31-109-Eng-38.
- Iyaka, Y. 2011. Nickel in soils: A review of its distribution and impacts. *Scientific Research and Essays*. 6.
- Kennen, K. and Kirkwood, N. 2015. *Phyto: Principles and Resources for Site Remediation and Landscape Design*. Hoboken: Taylor and Francis.
- Kumar, P.B.A.N., Dushenkov, V., Motto, H., and Raskin, I. 1995. Phytoextraction: the use of plants to remove heavy metals from soils. *Environmental Science and Technology* 29:1232-1238.
- Kumari, P., & Kumar, T. 2019. An Overview of Phytomining: A Metal Extraction Process From Plant Species. *Journal of Emerging Technologies and Innovative Research* 6 1):1367-1376.
- Martin, H.W., Young, T.R., Kaplan, D.I., Simon, L., and Adriano, D.C. 1996. Evaluation of three herbaceous index plant species for bioavailability of soil cadmium, chromium, nickel, and vanadium. *Plant and Soil* 182:199 -207.
- McGrath, S.P. et al. 1993. The potential for the use of metal-accumulating plants for the *in situ* decontamination of metal-polluted soils, in *Integrated Soil and Sediment Research: a Basis for Proper Protection* (Eijsackers, H.J.P. and Hamers, T., eds), pp. 673–676, Kluwer.
- Nicks, L.J. and Chambers, M.F. 1994. Nickel farming, *Discover Magazine.* 19 September.
- Nicks, L.J. and Chambers, M.F. 1995. Farming for metals, *Mining Environmental Management* 15–18 September.
- Nicks, L.J. and Chambers, M.F. 1998. A pioneering study of the potential of phytomining for nickel, in *Plants that Hyperaccumulate Heavy Metals* (Brooks, R.R., ed.), pp. 313–326, CAB International.
- Padmavathiamma, P.K., and Li, L.Y. 2009. Phytoremediation of metal-contaminated soil in temperate humid regions of British Columbia, Canada. *International Journal of Phytoremediation* 6 (2):119-137.
- Reeves, R.D. and Brooks, R.R. 1983. Hyperaccumulation of lead and zinc by two metallophytes from a mining area of Central Europe, *Environmental Pollution. Series A: Ecological and Biological* 31(4):277–287.
- Reeves, R.D. et al. 1995. Abnormal accumulation of trace metals by plants, *Mining Environmental Management* 4–8 September.
- Ruttens, A., Boulet, J., Weyens, N., Smeets, K., Adriaensen, K., Meers, E., Van Slycken, S., Tack, F., Meiresonne, L., Thewys, T. et al. 2011. Short rotation coppice culture of willows and poplars as energy crops on metal contaminated agricultural soils. *International Journal of Phytoremediation* 13 (suppl), pp. 194-207.
- Salt, D.E., Blaylock, M., Kumar, P.B.A.N., Dushenkov, V., Ensley, B. D., Chet, I., and Raskin, I. 1995. Phytoremediation: a novel strategy for the removal of toxic metals from the environment using plants. *Biotechnology* 13:468-474.
- Singh S., Parihar P., Singh R., Singh V.P., and Prasad S.M. 2016. Heavy Metal Tolerance in Plants: Role of Transcriptomics, Proteomics, Metabolomics, and Ionomics. *Frontiers in Plant Science* 6:1143.
- Stritsis, C., Steingrobe, B., and Claassen, N. 2013. Cadmium dynamic in the rhizosphere and Cd uptake of different plant species evaluated by a mechanistic model. *International Journal of Phytoremediation* 16:1104-1118.
- Van Slycken, S., Witters, N., Meiresonne, L., Meers, E., Ruttens, A., Van Peteghem, P., Weyens, N., Tack, F. M., and Vangronsveld, J. 2013. Field evaluation of willow under short rotation coppice for phytomanagement of metal-polluted agricultural soils. *International Journal of Phytoremediation* 15(7):677-689.
- Wei, S., Zhou, Q., Wang, X., Cao, W., Ren, L., and Song, Y. 2004. Potential of weed species applied to remediation of soils contaminated with heavy metals. *Journal of Environmental Sciences* 16(5):868-873.
- Wuana, R.A., Okieimen, F.E. 2011. Heavy Metals in Contaminated Soils: A Review of Sources, Chemistry, Risks and Best Available Strategies for Remediation. *International Scholarly Research Notices.* 20 pages.

# OCANPS Spring Field Trip Reports

Article and photos by Burnetta Hinterthuer

## Mountain View
## April 29, 2022

It had been 20+ years since OCANPS had visited the Cole Fork of the Sylamore Creek in Stone County. In an area earlier designated as a state botanical reserve, the last known population of Showy Lady's-slipper (*Cypripedium reginae*) in Arkansas is found. Unfortunately, the heavy rains this spring had washed out a portion of the access road. After talking to Jackie Leatherman and Carol McCorkle, ANPS members from Mountain Home, I was encouraged to believe that we might be able to get there anyway. However, an interruption in cell service prevented our meeting up and so we were left with Barkshed and Gunner Pool to explore! On the road to Barkshed, we spotted Yellow Honeysuckle (*Lonicera flava*), growing at the wood's edge. This native honeysuckle is less common than the other native, Trumpet Honeysuckle (*Lonicera sempervirens*), and it was good seeing it in the wild. At Barkshed, we hiked the trail toward Gunner Pool for a while enjoying the Fire Pinks (*Silene virginica*), Orange Puccoon (*Lithospermum canescens*), Dwarf Crested Iris (*Iris cristata*), Lousewort (*Pedicularis canadensis*), Sessile Trillium (*Trillium sessile*), Downy Phlox (*Phlox pilosa*), and other common wildflowers. Leaving on to Gunner Pool, I was surprised to find Cross-vine (*Bignonia capreolata*) growing on an Eastern Cottonwood (*Populus deltoides* ssp. *deltoides*), and a population of Ozark Corn-salad (*Valerianella ozarkana*) on a bank, near the bridge.

***Ozark Corn-salad (Valerianella ozarkana).***

All in all, it was a wonderful day observing the bountiful wildflowers and beauty of the Sylamore Forest, even though we all missed the opportunity to see the Showy Lady's-slipper and the Mountain View contingent. The species is ranked S4, meaning that it is considered "uncommon, not rare. There is some cause for long-term concern due to declines or other factors." It is apparently secure in the state. This is probably due to its remote location. In 2002 when we last visited, a population had been relocated after a tornado had gone through the area and ripped out the known population; Earl Hendrix, who worked for the USFS, reported that he had found the relocated population and it appeared to be healthy. We can only hope it is still thriving. Certainly, there are other uncommon plants found in this rich fork of Sylamore Creek and it is always reassuring to find them again and know they are still there.

***Gunner Pool, Sylamore District, Ozark National Forest.***

Attending the hike were Sandy Tedder, Steve Holst, Amy Wilson, Susan Wilson, and Burnetta Hinterthuer from Fayetteville, Jim Dudley, Deana Vickers, Sue Hubbard from Eureka Springs, and Beth Logan and Kathy Clifton from Granite City, IL. It was a great weekend to be outdoors. Most of us stayed at the Ozark Folk Center State Park Lodge and found it to be a great place to stay. And, on Friday night, we went downtown on the square to hear local musicians perform on the courtyard lawn. Mountain View is always an interesting place to visit, especially in the spring when the wildflowers are blooming. Before leaving the next day, we drove to visit Blanchard Spring, always a beautiful stop. I had not been there since the parking area was redone.

***Above: OCANPS members (L-R) Sandy Tedder, President Sue Hubbard, and Amy Wilson.***
***Below: Enjoying live music in Mountain View.***

## Baker Prairie Natural Area
## June 4, 2022

Fourteen of us met on a beautiful June Saturday to walk through Baker Prairie. Of all the places I have visited with ANPS and OCANPS, this one has always held a special place in my heart. Teaching at North Arkansas Community College in 1975, I was first made aware of this special prairie remnant. Moving away from Harrison, I along with Sandy Tedder started taking college students to the prairie and Buffalo River each semester for 14 years; it was always a trip home in many respects. Seeing the prairie saved from development in 1994 was a huge relief. Named for the Baker family who lived here during early settlement, the Majors family who for so many years didn't plow it or change the sub-surface ensured its integrity as a tall grass prairie remnant. They simply didn't want to lose the meadow with the pretty wildflowers, and we are all so grateful. It is great to see local nature lovers who lived in the neighborhood and fought for the prairie are finally being acknowledged by plaques and trails named for them; a pavilion recently dedicated is a welcome addition, providing shade to visitors and biology students. It is a reminder that people can have a strong influence on how land is being preserved for years to come. Three people that I personally knew who introduced me to the prairie were Pat Wheeler, Joane Rife, and Martha Milburn, but there were many more who together helped make this possible.

The showstoppers that day were the Winecups (*Callirhoe digitata*), Trelease's Larkspur (*Delphinium treleasei*), and always, Scarlet Paintbrush (*Castilleja coccinea*); but there were many more plants blooming: Goat's-rue (*Tephrosia virginiana*), Green-eyes (*Berlandiera betonicifolia*), Cream Ground-plum (*Astragalus trichocalyx*), Eastern Gama Grass (*Tripsacum dactyloides*) (the ice cream of tall grass prairies for cows) Tube Beardtongue (*Penstemon tubaeflorus*); Pale Purple Coneflower (*Echinacea pallida*), Golden Alexanders (*Zizia aurea*), Daisy Fleabane (*Erigeron annuus*), Whiteleaf Mountain-mint (*Pycnanthemum albescens*) and Slender or Narrowleaf Mountain-mint (*P. tenuifolium*), Rattlesnake-master (*Eryngium yuccifolium*), and Ohio spiderwort (*Tradescantia ohiensis*), plus numerous grasses including Little Bluestem (*Schizachyrium scoparium*), Big Bluestem (*Andropogon gerardii*), and Switch Grass (*Panicum virgatum*). A former student, Joan Reynolds, helped with plant identifications, as did her children, Sam and Charles. But, there were many knowledgeable plant enthusiasts on this walk, including Suzie Liles, Sandy Tedder, Sue Hubbard, Daniel Knoll, Meghan Heller, Doug Myers, Debra Grim and Tim Johnson. It is always a treat to share Baker Prairie with interested plant lovers. It may be a dry, hot summer this year, but June 4th was a great time to visit.

***Enjoying a beautiful June day at Baker Prairie.***

# 2022 ANPS Research Grant and Scholarships

This year, ANPS awarded two Delzie Demaree Research Grants and two Aileen McWilliam Scholarships, for a total of $6,000 in awards. The recipients are (clockwise from top left) Benjamin Benton and Brendan Kosnik, both master's students of biology in Dr. Travis Marsico's lab at Arkansas State University; Marissa Drew, undergraduate student of biology at the NorthWest Arkansas Community College; and Sunny Jones, undergraduate student of landscape architecture at the University of Arkansas. Congratulations to these students!

# ANPS Monthly Webinar Series - Fall Schedule

If you would like to receive webinar announcements and Zoom links, contact Eric Fuselier to be added to the email list (anps.programs@gmail.com). Watch past webinars at youtube.com/channel/UCEIlEFuRaz0HbIgXxwRIHvw.

- **Saturday, September 3rd, 10 am - Biodiversity and the Role of Disturbance in Managing Natural Ecosystems with Nate Weston**
  Join ANPS President Nate Weston to learn about the role disturbance has in managing natural ecosystems, and its impact on biodiversity.

- **Saturday, October 22, 6 pm - Ecesis: the nature of Nature with Justin Thomas**
  In this webinar, Justin Thomas explores the maxim "Nature does not exist". That statement often startles nature lovers, but it is necessary in understanding that humans and nature are not separate things. In order to interact with nature in sustainable ways, we, even nature lovers, have to expand our understanding of this relationship. This presentation addresses ways we can directly measure and better communicate this relationship through our regional flora and share that understanding with others.

- **Saturday, December 10th, 10 am - Sedges Have Edges: Carex Species of Arkansas with Karen Willard**
  Join Karen Willard, field botanist and former herbarium manager at the University of Arkansas, to learn about the *Carex* genus of sedges.

# 2022 Fall Treasurer's Report

| | 2021 Actual | 2022 Budget | Jan - Aug 7, 2022 Start ➡ $26,154.93 | | **Proposed 2023 Budget** |
|---|---|---|---|---|---|
| | | | 2022 Actual as of Jul 12 | | |
| INCOME | | | | | |
| Membership Dues | $5,465.00 | $4,800.00 | $5,710.00 | | $5,500.00 |
| Meeting Registration | $0.00 | $1,200.00 | $0.00 | | $1,200.00 |
| Plant/Silent Auction | $1,126.78 | $2,500.00 | $0.00 | | $2,500.00 |
| T-Shirt, Hat, Book Sales | $818.44 | $800.00 | $179.32 | | $800.00 |
| Spring BioBlitz | $3,522.34 | N/A | N/A | | N/A |
| Contributions | $6,359.00 | $0.00 | $1,277.00 | | $0.00 |
| TOTAL | $17,291.56 | $9,300.00 | $7,166.32 | **$7,166.32** | $10,000.00 |
| EXPENDITURES | | | | | |
| ANPS.Org (website expenses) | -$99.00 | -$111.00 | -$99.00 | | -$111.00* |
| Claytonia (Print & Distribute 2 Issues) | -$2,075.90 | -$2,000.00 | -$1,170.42 | | -$2,200.00 |
| Directory (Print and Distribute) | $0.00 | -$1,150.00 | -$1,444.61 | | -$1,450.00 |
| Zoom (webinar series) | -$163.39 | -$164.00 | $0.00 | | -$164.00 |
| Memorial Awards (Awards/Scholarships) | -$8,475.00 | -$3,000.00 | -$6,000.00 | | -$3,000.00 |
| Grants/Support to Public Gardens | -$4,199.80 | -$1,000.00 | $0.00 | | -$1,000.00 |
| Meeting expenses (space, copies, speaker, etc.) | -$529.17 | -$1,000.00 | $0.00 | | -$1,000.00 |
| ASB Meeting | $0.00 | $0.00 | -$350.00 | | $0.00 |
| Ecology Camp | $0.00 | -$500.00 | $0.00 | | -$500.00 |
| Bulk Mail | -$245.00 | -$245.00 | -$265.00 | | -$265.00 |
| Supplies/postage/PayPal fees/misc | -$102.37 | -$130.00 | -$103.37 | | -$130.00 |
| T-shirts/Hats | $0.00 | $0.00 | $0.00 | | -$180.00 |
| TOTAL | -$15,889.63 | -$9,300.00 | -$9,432.40 | **-$9,432.40** | -$9,889.00 |
| | | **Total as of Aug 7, 2022** | | **$23,888.85** | |

*The website is budgeted at $111 to reflect the domain renewal (~12.80 per year every 5 years)

Respectfully submitted by Kate Lincourt, Treasurer

# President's Message

I, and the other officers of the Arkansas Native Plant Society, extend our heartfelt thanks to all our members. Throughout the challenges of the COVID-19 pandemic, our members have remained engaged and enthusiastic in promoting the Society's mission of the preservation, conservation, study, and enjoyment of the native plants of Arkansas, the education of the public regarding the value of native plants and their habitats, and the publication of related information.

The Society's officers have been exceptionally dedicated throughout this disruptive period, developing virtual content, organizing meetings, tabling at in-person events, and coordinating with partners to develop programs throughout the state. This year has been marked by a continuation of the COVID-19 pandemic and an exceptionally wet spring, followed by a drought-stricken summer. It's difficult to predict how the pandemic will affect our ability to interact with our members, but the health and safety of our members will always be our greatest priority. Unfortunately, the volatile and anomalous weather patterns we've experienced this year will likely become more common in the coming decades.

This year, we've also experienced the passing of two founding members: Dr. Jewel Moore and Steve Foster. Their contributions are too long to list in this brief letter - both Dr. Moore and Steve were enthusiastic native-plant advocates, and their passing has left a profound sense of loss in the community.

Despite these hardships, the Society's members have endured and had a very active and productive half of 2022! We decided to retool our traditional in-person spring meeting into a series of regional meetings to keep our members safe during the outbreak of the Omicron variant of COVID-19. These "mini-meetings" were a huge success and allowed members to meet and showcase their regional flora through smaller, in-person plant walks and meetings.

Once the outbreak subsided, we were able to enjoy plant walks at Ninestone Land Trust, Baker Prairie, Lake Leatherwood, the Fourche Bottoms Flatwoods, Devil's Eyebrow Natural Area, Osage Park, and many other picturesque locations! For many of us, these meetings and walks were much-needed chances to get out, see our state's incredible natural beauty, and regroup with friends we hadn't seen since the pandemic started. Our Ozark Chapter was especially active during this period, planning many of these outings and developing virtual content.

Please be sure to sign up for our virtual programs, continue reading the *Claytonia* newsletter, and we hope to see you at our in-person fall meeting on October 7th–9th in Stuttgart!

– Nate Weston, ANPS President

# Arkansas Native Plant Society Membership Application

**Membership Categories**

_____ $10 Student
_____ $15 Individual
_____ $20 Supporting
_____ $25 Family
_____ $30 Contributing
_____ $150 Lifetime (age 55+)
_____ $300 Lifetime (under age 55)

_____ New Member
_____ Renewal
_____ Address Change

_____ Opt out of receiving paper *Claytonia*

**Name(s)** _____

**Address** _____

**City** _____ **State** _____ **Zip** _____

**Phone** _____ **Email**_____

Mail this completed form with a check made payable to the Arkansas Native Plant Society to:

Katherine Lincourt, Treasurer
2625 Charter Oak Drive
Little Rock, Arkansas 72227

**JOIN OR RENEW ONLINE INSTEAD! Details at anps.org/join.**

# Claytonia

Jennifer Ogle | Interim Editor
anps.memorialawards@gmail.com


**Please check your mailing label!**

The calendar year is the membership year. If your mailing label says "21" or earlier it's time to renew. Life members have an "LF" on their label.

To renew your membership, fill out the application for membership on Page 24 and mail it to the address on the form.

Or renew online at **anps.org/join**.

## To a Botanist, Retiring "Young"

**By Jason Anders and Eric Sundell**

Smart man, to sleep betimes away
To fields where milkweeds flaunt their spray
And early though the Jessamine grows
It beckons quickly to the rose.

Blooms the shady night has shut
Cannot see the primrose, but
The silence of the students' cheers
Brings the moth wings to the ears.

Now you will not swell the rout
Of profs who toil on, health give out,
Teachers whom the day outplanned
And the joy died before the man.

So set, before the echoes fade,
The light foot in the moss and glade,
And hold to the opened plant press up
The just-collected buttercup.

And round that sweetbay-laureled head
Will swarm the butterflies instead-
He strolls amid the meadows there
To drink the sun and breathe the air.

**(written on the occasion of Prof. Sundell's 2006 retirement)**

## 2022 ANPS OFFICERS

**President**
Nate Weston
anps.president@gmail.com
479-879-7489

**President Elect**
Joe Ledvina
joeledvina@gmail.com

**Vice President & Nominating Committee Chair**
Eric Fuselier
anps.programs@gmail.com
501-231-7455

**Secretary**
Margaret Lincourt
Lincourt.margaret@gmail.com
501-786-3318

**Treasurer**
Katherine Lincourt
anps.treasurer@gmail.com
501-454-7790

**Internet and Social Media Officer**
Eric Hunt
anps.web@gmail.com

**Memorial Awards Officer & Interim Editor**
Jennifer Ogle
anps.memorialawards@gmail.com

**Membership Officer**
Virginia McDaniel
virginiamcd31@yahoo.com
828-545-2062

**Publisher**
Mike Burns
anps.publisher@gmail.com
479-229-2185

**ARKANSAS NATIVE PLANT SOCIETY**
Membership, Virginia McDaniel
833 Bellaire Drive
Hot Springs, AR 71901

Nonprofit Org
U.S. Postage Paid
Little Rock, AR
Permit No. 233

**Address Service Requested**