On The Fringe
Journal of the Native Plant Society of Northeastern Ohio

The Native Plant Society of Northeastern Ohio Awards
Fred Losi
The Gentian Award for 2014

The Native Plant Society created the Gentian Award in 2012 to honor those who made a significant contribution to our Society's mission of promoting the study, appreciation, and conservation of Ohio's native plants and plant communities. This year's recipient has exemplified the spirit of the Gentian Award by generously sharing his time, knowledge, and curiosity about nature through his many community services. We are proud that this year's Gentian Award goes to Mr. Fred Losi. Fred's interest in nature is his avocation not his vocation. Fred graduated from Case Western Reserve University with a Bachelor of Science degree in Electrical Engineering. But his technical training and background has never diminished his love for the outdoors.

In addition to his volunteering as a naturalist with the Cleveland Metroparks, Fred has given his time and enthusiasm to many other conservation organizations and has led many other nature walks. Fred's community service is an outstanding example of the spirit of the Gentian Award.

Please join us in thanking Fred for all his selfless contributions that have brought joy and understanding of our natural world to so many. It is with great delight that we present Mr. Fred Losi with this year's Gentian Award for 2014.

The plaque has a picture of a Fringed Gentian and says:

Gentian Award
For Dedication to the Native Plants of Ohio
Fred Losi
2014

Congratulations Fred!

This is an excerpt of remarks prepared Lisa Schlag, our Treasurer, and given by Kathy Hanratty, our President, upon the presentation of the Gentian Award to Fred Losi at the Native Plant Society Annual Dinner on November 1, 2014. A complete copy of the remarks will be included in our next issue of *OTF. ~ The Editors*

2015 Membership Renewal

You should have already received your 2015 renewal form. Please renew at the highest level you can. If you wish a printed copy of the *On The Fringe* mailed to you, simply check the box to receive the printed journal and add $10 to your total.

Please also consider making a contribution to our endowment fund. This is the source of our Annual Grant, and with the low interest rates, we need to increase the principal.

~ PLEASE RENEW NOW ~

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On The Fringe

The Journal of the Native Plant Society of Northeastern Ohio is published four times a year at Novelty, Ohio. ISSN 8756-6087. Questions or comments are welcome and may be addressed to chief editor, Diane B. Christensen, 8400 Top Rail Lane, Novelty, OH 44072; 440-666-4870, dbpolice@roadrunner.com; or co-editors Bill Oberdick, 986 Bushwood Ln., Columbus, OH 43235-5016; 216-392-7027, bandbober@wowway.com or Jane McCullam, 9880 Fairmount Blvd., Newbury, OH; 44065, cattermole@windstream.net, 440-338-3253.

The Mission of the Native Plant Society of Northeastern Ohio is to promote the study, appreciation and conservation of the native plants and plant communities of Ohio.

Program Schedule – Winter 2015

Saturday, January 10, 1:00 – 3:00 pm. How Climate Change May Affect Mid-Western Ecosystems – Cuyahoga County Public Library, Chagrin Falls Branch. Dr. Jeffrey Corney, Executive Director of The Wilderness Center, will address the consequences of climate change on the unique biomes of the three major Midwestern ecosystems: eastern deciduous forests, northern coniferous forests, and western grasslands. Major shifts in climate will likely result in a corresponding, and potentially radical, shifts in the composition of ecosystems throughout the region. 100 E Orange St, Chagrin Falls, OH 44022. No registration required.

Sunday, February 22, 2:00 – 3:00 pm. A Journey to the Mississippi Headwaters – The West Woods Nature Center, Geauga County. The mighty Mississippi originates in northwestern Minnesota within the boundaries of the large Lake Itaska State Park. Join Tom Sampliner, photographer and past president of the Native Plant Society of Northeastern Ohio, to learn something about the Mississippi and to share Tom's travels there to photograph flowers of the lake, state park, and surrounding scenery as a scout at the Native Orchid Conference. Presented in conjunction with Geauga Park District. Directions: take St. Rt. 87 east from Rt. 306 in Russell Township approx. 2 miles to the park entrance on south side of the road. 9465 Kinsman Road, Novelty, Ohio 44072.

Friday, March 27, 2015 – Ohio Botanical Symposium – Villa Milano Banquet and Conference Center, 1630 Schrock Road, Columbus, Ohio, 43229. The Native Plant Society of Northeastern Ohio will be a sponsor of the Ohio Botanical Symposium, which brings botanists, naturalists, and other nature enthusiasts together to network, provide professional enrichment, and view posters and displays on Ohio's native flora, natural areas, and rare plants. Dr Robbin Moran, curator of ferns and lycophytes at the New York Botanical Garden, will present the keynote speech on the extraordinary biology of some of Ohio's ferns. For registration information go to http://naturepreserves.ohiodnr.gov/stay-informed/2015-ohio-botanical-symposium.

Novel Ecosystems, Invasion and the Forgotten Food Web

By Marilyn J. Jordan

What are novel ecosystems?

You probably are familiar with novel ecosystems even though you don't know them by the name recently bestowed on them by scientists. Think about successional woodlands that have grown up on abandoned farm fields, forests draped with Oriental bittersweet and thick with Japanese barberry, grasslands covered by exotic grass species, and streams and impoundments lined with *Phragmites* and covered with floating invasive plants (Figure 1).

What do these novel ecosystems have in common? They resulted from human actions that degraded "wild" areas or from abandonment of intensively cultivated or grazed lands. Human ecosystem degradation includes introduction of new (sometimes invasive) species and loss of original species; pollution of air, water and soil; nitrogen deposition from the atmosphere; application of fertilizers; altered hydrology; dispersal barriers including roads and dams; overharvesting; global changes in climate and ocean acidification. These ecosystems are also called "emerging ecosystems" and "no-analog ecosystems."

Lands with ongoing human management such as cultivated agricultural fields, managed gardens and landscapes, and active tree plantations are not considered novel ecosystems by most ecologists but it is not always easy to draw the line.

Novelty can be measured as the degree of change from a carefully defined "unaltered" reference historical condition which does raise some questions. How far back in time? What aspects of history are important? How do we know past conditions? Do any truly unaltered ecosystems remain today? How might today's ecosystems change in the future? Historical knowledge helps us

Figure 1. Examples of novel ecosystems.



a. Successional woodland on an old potato field, Froelich Farms County Park, Huntington NY.



b. Invasive plants, *Phragmites australis*, *Cabomba caroliniana*) on the Peconic River, Calverton, NY.



c. California grasslands dominated by nonnative grasses.



d. Impoundment on the Carmans River (Hard Lake in Southaven Co. Park, Yaphank, NY).

understand how systems work and provides guidance for management, though the reference condition is not a rigid template or end goal. Spoiler alert—Yes, ecosystems often do need management for conservation purposes and/or human needs.

How abundant are novel ecosystems?

Using the definition "unused lands embedded within agricultural and urban regions," novel ecosystems were mapped as occupying about 50% of the terrestrial ice-free globe 100 years ago (Figure 2) and wildlands 20–30% (mostly barren or sparsely tree covered). The remainder was land used by people for settlements, cropland, and rangeland. Unused fragments of land are likely to develop in novel ways due to invasion by new species and altered microclimate around the edges as well as by transient human uses. Due to recent increased conversion of both wild and novel ecosystems into human-used lands, novel ecosystems today may only occupy about 32% of the earth (Perring and Ellis 2013).

Novel ecosystems of comparable extent also exist in freshwater, estuarine, and marine ecosystems, but my focus in this article is on terrestrial ecosystems and the impacts of invasive plant species.

The Anthropocene

Humans dominate the earth and have transformed the earth's land cover, climate, biogeochemical cycles, and species distributions and abundance. This geological epoch is commonly known as the Anthropocene—the age of man—in which biomes are "human systems, with natural ecosystems embedded within them" (Ellis and Ramankutty 2008).

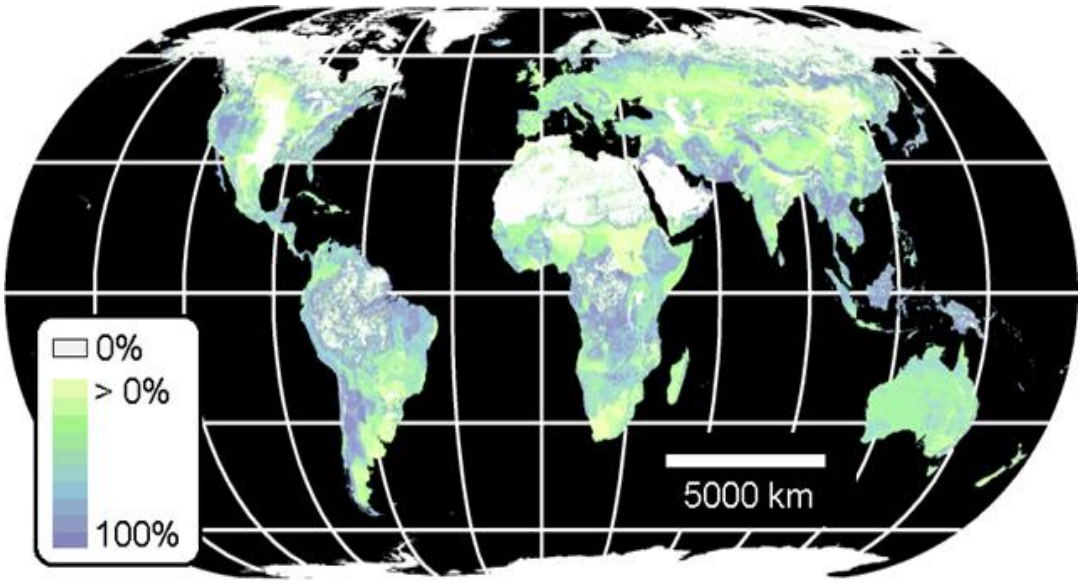


Figure 2. Extent of Novel Ecosystems AD 2000 (Ellis et al. 2010) White areas are wild (arctic tundra or deserts) or extensively altered by people (e.g. Midwestern USA). From: http://ecotope.org/blogs/image.axd?picture=potential_novel_ecosystems.png

Proponents of the "Anthropocene" think there is essentially no nature untouched by humans, and that ecosystems have been changing for millennia and will continue to change. From their point of view the term "novel ecosystems" applies to the whole planet, but might be useful as a rebranding effort and propaganda tool (i.e., novel ecosystems should be valued). They hope that the novel ecosystems concept "can help embolden restoration ecologists to use new tools and new goals, and shake off the yoke of history" (Marris et al. 2013).

On the other hand many ecologists think that the rapid and extreme changes in land use, biogeochemical cycling, and climate brought about by humans push us into a new and altered world where the concept of novel ecosystems is useful. Both groups make some good points, but I agree with the latter group that the concept of novel ecosystems has practical value. I also share their recognition that between completely novel ecosystems on one extreme and totally wild ecosystems (if they still exist) on the other extreme, lie hybrid ecosystems falling along a continuum of varying degrees of novelty.

I strongly recommend that one approach novel

ecosystems with an open mind unconstrained by preconceptions or ideology. However, having an open mind does not mean we should accept all novel ecosystems with open arms. We need to fully understand the deficiencies as well as the benefits of novel ecosystems and their implications for conserving nature and supporting people.

Biodiversity and Ecosystem Function

We need definitions of some basic terms in ecology because they are important for the discussion that follows:

- Ecosystem processes regulate the amount and movement of energy and matter such as photosynthesis and biomass production by plants; prey consumption by animals; cycling of nutrients in soil; creation of soil; decomposition; and disturbance cycles (e.g., fire regimes, flooding).
- Ecosystem function includes ecosystem processes but also refers to how all the species and processes interact and work together in the whole ecosystem. Examples include carbon storage, availability of light, production of reefs and burrows, and temperature maintenance.
- Ecosystem services are ecosystem processes or functions that benefit human welfare. Ecosystem services can be regulatory (e.g., climate stability, flood control), provisioning (e.g., food, timber, water), supporting (e.g., pollination), and cultural (e.g., recreation, esthetics, tradition, community).
- Biodiversity is the variation of life and can refer to the number and variety of species of plants, animals, insects and microorganisms; the genetic diversity of species; the diversity of the ecosystem functions the species carry out; and the diversity of ecosystems within an area, biome or planet.

High biodiversity is good. Ecosystems composed of a diverse assemblage of species and a diverse mosaic of habitat patches across the landscape are the most efficient in taking up nutrients, recycling nutrients and carbon through decomposition, and producing new biomass. Many of the functions carried out by diverse ecosystems provide valuable and irreplaceable ecosystem services for people.

Increasing functional diversity (i.e., more specialist species) increases the likelihood of having species that respond differentially to widely varying conditions (e.g., droughts, floods, severe weather, disease outbreaks). Functional diversity stabilizes ecosystem processes in response to change and supports ecosystem resilience, stability and ecosystem services. This functional redundancy is also known as the "insurance hypothesis." No matter what happens there are some species that can respond and damp down wild fluctuations.

Invasive species

Non-native (introduced; alien; exotic) species are nearly ubiquitous in ecosystems today. Fortunately, only a relatively small percentage becomes invasive, i.e., they establish, spread widely, and in a policy/regulatory sense "harm" by significantly changing ecosystem species composition, diversity, structure, and/or processes. Up to 12% of non-native vascular plants are thought to become invasive in the United States. In New York State 4.8% of the 1,300 persistent non-native plants were assessed as invasive but this number may rise as the number of plant species categorized as persistent falls (Jordan unpublished data; NY Flora Atlas; D. Werier pers. comm.).

It is well known that invasion by non-native species of all kinds (plants, vertebrates, invertebrates, microbes) may cause large changes to many functions in all kinds of ecosystems. Invasive plants in particular are considered as builders and shapers of novel ecosystems. On average the abundance, growth, diversity, nutrient uptake, and biomass of resident plant species decrease substantially as the proportion of non-native plant species increases. Thus the greater the abundance and impacts of invasive plants the greater is the likelihood that ecosystems—and food webs—will be greatly affected.

The forgotten food web unravels

The impact of non-native plants on higher trophic (food web) levels is one of the least-studied areas of invasion biology. Plants obviously are the essential sustaining center of food webs. Through the process of photosynthesis plants use energy captured from sunlight to transform carbon dioxide, nutrients, and water into plant biomass and produce oxygen as a by-product. Next in line are phytophagous (plant eating) insects, the largest taxon of primary consumers. Herbivorous insects convert plant material of low caloric density into nutritious packages high in proteins, healthy fats and nutrients that are essential for the growth and reproduction of many species of animals, including carnivorous insects, birds, and mammals (Figure 3). Bugs—lots of bugs—are the real "paleo diet" eaten by early humans for 2.5 million years prior to development of agriculture.

Evolutionarily speaking, plants needed to protect themselves from being eaten. Thus, it isn't surprising that plants have evolved an array of toxic defense chemicals such as glycosides, phenols, terpenes, and alkaloids (Tallamy 2007). More than 90% of phytophagous insect species are specialists, defined as feeding on plants in fewer than three different plant families with which they share an evolutionary history. This evolved specialization is likely due to the insect's ability to tolerate only the specific chemical compound(s) and physical defenses of their host plants. Even generalist species can use only a small number of plant species.

Short term adaptation of plants and animals that lessen impacts of invasive species are known. However, for evolution to fully restore functional ecosystem diversity from the bottom up could take millennia. For example, after 300 years in North America *Phragmites australis* hosts just 5 species of herbivores versus 170 at home. As species become increasingly rare, dispersed, or extirpated, the diverse genetic material needed for evolution and adaptation to change is lost.

Thus, "when we build novel ecosystems—a hodgepodge of plants from around the world that have no evolutionary history with our local insects—we risk losing 90% of our insect herbivores!" (Tallamy 2013). The many other animal species that depend on insects for food and pollination would also be at risk. Complex food webs could become simplified and collapse. Those of us old enough to remember the high "bug splat" density on vehicle windshields 40 years ago can confirm that insect abundance appears much reduced today, though increases in non-native plants are probably not the only cause.

Disappearing specialist insects are not the only underappreciated aspect of novel ecosystems. Interrelationships of below-ground organisms with above-ground organisms and ecosystem function are also poorly known. Microbial diversity and functions are known to be very important, but only recently has the idea that human health is linked to environmental and microbial biodiversity been recognized (Jordan 2013). If confirmed by continued research we may learn that the high incidence of asthma and other immune diseases in cities is in part due to the limited distribution of, and low plant and microbial biodiversity in, urban (novel) green spaces.

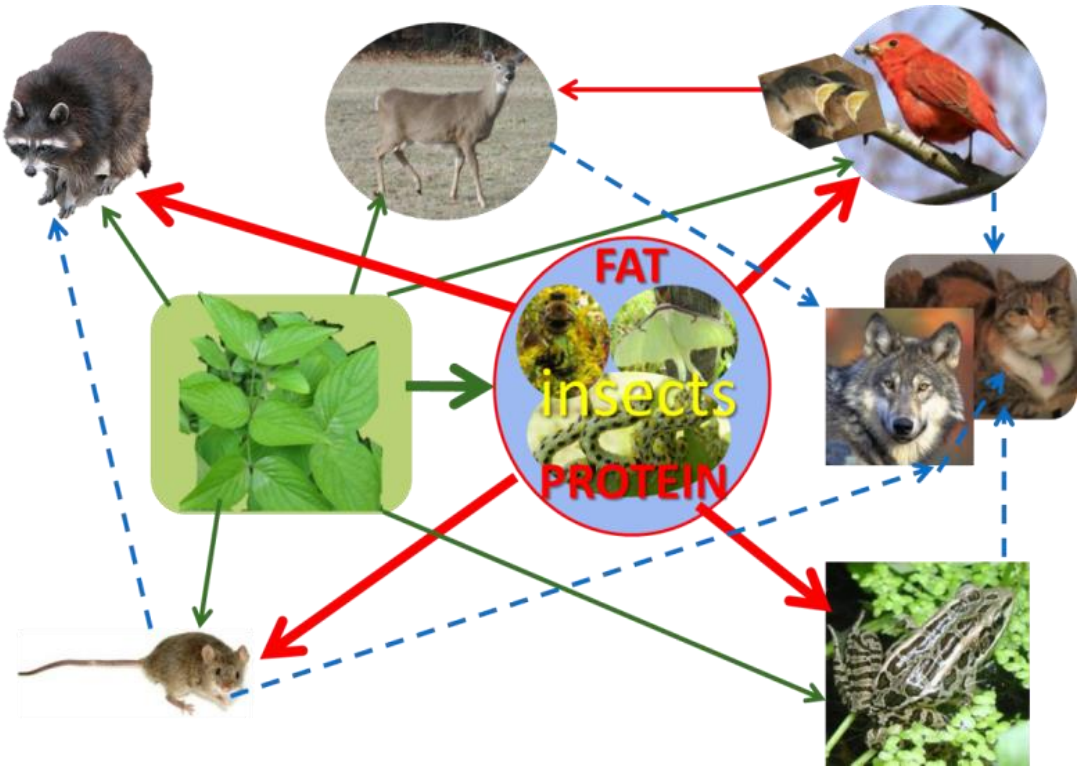


Figure 3. A simple food web showing the importance of insects in transforming plant material into food for many other animals.

Different attitudes about novel ecosystems

A friend of mine told me that once he was happy to see nature surviving in vacant lots covered with dense, vigorous vegetation. Now—thanks to me—he knows they are just a bunch of weeds! This anecdote gets to the heart of an ongoing controversy about novel ecosystems: Are they scrubby, untended, feral, worthless weed patches? Or are they valuable functional habitats that rival their "pristine" counterparts and produce ecosystem services for people? In other words, should we love these novel creations of man as is, or try to "fix" them to better suit our desires and perceived needs?

The "all ecosystems are novel" camp thinks that altered ecosystems are worthy and beautiful and that camp welcomes all species into their ecosystems, regardless of nativity as long as these species are useful and do no obvious harm. In the other camp are many traditional conservation biologists and restoration ecologists who fear the loss of biodiversity and treasured species in novel ecosystems and champion aggressive eradication and control of weedy invasive plants and animals. So which camp is right? I take the middle ground and hope that the extreme positions I described are an exaggeration.

Yes, we need to adjust to a "new normal" in which we recognize that novel/hybrid ecosystems do have value and make the best lemonade out of these lemons that we can. What choice do we really have? Novel ecosystems are everywhere, and as we now know, they occupy about one third of the ice-free earth's surface. Novel ecosystems certainly are better for preserving nature than the alternative, which increasingly appears to be conversion to "used" lands.

However, I have some serious concerns. Very few studies have investigated the importance of specialist insect species in food webs, whether these insects really are disappearing in novel ecosystems and what the consequences may be. We should not leap to premature and sweeping conclusions about the value of novel ecosystems, as novel ecosystem science is still a young "work in progress."

I think we do need to manage some novel ecosystems to maintain biodiversity of native species and functional food webs where we can, but we need to be realistic about what goals and management approaches are appropriate and likely to succeed.

So what do we do about novel ecosystems?

On the local site scale our options are limited. Attempting classic restoration to undo extensive novelty and recreate a historical ecosystem has been likened to trying to put toothpaste back into the tube. Environmental conditions and species compositions have changed so radically that return to the past is impossible or would be exorbitantly expensive and require maintenance in perpetuity. A good example is the weedy shrubland/woodland on former potato fields in Wicks and Froelich Farms County Parks in Huntington, Long Island, which could never be returned to historic native forest.

The best approach may be large scale strategies for managing the landscape matrix in which conservation sites and "unused" lands are embedded. Strategies should be directed towards reducing the human impacts that are driving the replacement of native species with non-native species. Prevention should always be the first priority.

- Allow sale of only non-invasive plant species and cultivars. Laws regulating the introduction of new potentially invasive species, as well as laws reducing the sale and spread of non-native species that are already present, are in place in Nassau and Suffolk Counties and also at the national level. Final regulations for New York State will be released later in 2014.
- Encourage use of more native horticultural plants in landscaping, especially woody species that support the most native insects. Most horticultural plant species used today are non-native, and half of these are invasive (Figure 4).

Remove or reduce human-caused degradation. Nature can be resilient if given a chance.

- Limit land clearing; redevelop brownfields instead of clearing established vegetation.
- Encourage/legislate reduced use of fertilizers.
- Reduce nitrogen deposition in rainfall from fossil fuel burning.
- Upgrade sewage treatment plants and septic systems to reduce the amount of nitrogen discharged into groundwater, streams, bays and estuaries.
- Manage for connectivity so species can spread and migrate.
- Level the playing field so native plants can be more competitive with non-native plants.

- Reduce white-tailed deer populations. The single greatest threat to eastern forests today is excessive browse by overly abundant deer. Deer preferentially browse native plants and tree seedlings and saplings. Heavy browse allows invasive plant species and a few unpalatable species such as sedges, black huckleberry and hay scented fern to dominate. In the absence of excessive browse trees can regenerate and native wildflowers are much more competitive with invasive plants.
- Use biocontrol agents but only if they have been rigorously tested for non-target impacts. Many invasive plants can aggressively spread because they have left behind the herbivores and diseases that kept them in check in their homeland. Thus introduction of thoroughly tested specialist insects and pathogens from their homeland can restore some balance and reduce invasive plants to tolerable levels. Then native plants should recover in the absence of other problems (e.g. too many deer). If some native species have been eliminated or drastically reduced reintroduction may be necessary.



Figure 4. Foreign origin of popular landscape plants.Used with permission from Dr. Douglas Tallamy, University of Delaware.

Conservation in the Anthropocene

I have been reading, learning, thinking and talking about novel ecosystems for four years now, and experiencing them (though unknowingly) for far longer than that. Novel ecosystems intersect so many different areas that it has been a challenge to integrate them in my mind and develop a coherent overview to share with others.

Dearly held human values, ethics and norms about nature underlie and shape peoples' attitudes and how they respond to change, including novelty and novel ecosystems. Positions have become quite polarized over the future of conservation in the Anthropocene (Marris et al. 2011; Lalasz 2012).

I am still uncertain of my opinions about some aspects and claims about novel ecosystems in the Anthropocene. The science is so heavily fraught with emotion and passion and the antagonists have far greater experience than I do. However, I am sure that we humans have a responsibility as a species to care for and protect the earth and all of the life it supports.

In closing I will share a quote from Marris et al. (2011). Although I don't necessarily agree with every detail of what she and her compatriots claim, I do appreciate their message of hope—and hope they are right.

"Yes, we live in the Anthropocene—but that does not mean we inhabit an ecological hell…. The Anthropocene does not represent the failure of environmentalism. It is the stage on which a new, more positive and forward-looking environmentalism can be built. This is the Earth we have created, and we have a duty, as a species, to protect it and manage it with love and intelligence. It is not ruined. It is beautiful still, and can be even more beautiful, if we work together and care for it."

Marilyn Jordan, Ph.D. is a Senior Conservation Scientist at The Nature Conservancy on Long Island, Cold Spring Harbor, NY 11724.
Reprinted from the Long Island Botanical Society Quarterly Newsletter, Vol 24, No 2, Spring 2014 [revised July 4, 2014].
Photos a., b., c. by M. Jordan; d. from Google Earth.

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Native Cultivars—Good, Bad and Ugly

Excerpts from *Native Plants & Wildlife Gardens*

Native plant cultivars are a vexing topic. My experience has been that gardeners who are increasing their use of native plants are likely to find the topic of native plant cultivars to be confusing, and for good reason. There is a tremendous amount of variation in the traits for which cultivars are maintained, how the cultivars originated, and how cultivars are propagated. The author closes with this personal note:

"So, what is a native plant gardener to do? I have planted, and will probably continue to plant, cultivars of locally native plants. However, my first choice will always be a locally-sourced open-pollinated seed-grown plant. My second choice will be a cultivar that maintains the flower shape, berry size, and leaf color of the species. My goal is to never buy cultivars that exhibit radically different flower shape or color, but I will knowingly buy dwarf varieties which are otherwise similar to the species. And when I see a cultivar touted as resistant to insect damage, that one gets an automatic rejection. I also pay extra attention to observing my cultivars in the garden: if I don't see pollinators on the flowers, or insect damage on the leaves, or birds eating the fruit, then I am quite likely to rip out the cultivar and try the species. This is my policy because my primary motivation for using natives in the first place is that I want to support my local ecology. If I can't see evidence that a cultivar is helping me accomplish that goal, I fire it and hire a plant that will."

See the complete article by Vincent Vizachero on www.nativeplantwildlifegarden.com for details about cultivars of native plants.

Also listed at the same webpage are 53 books which might be of interest to the native plant gardener. http:// nativeplantwildlifegarden.com/books/

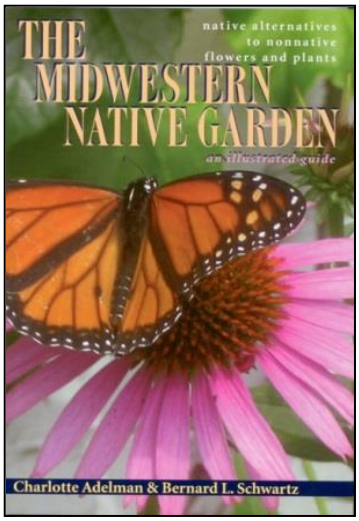
Vincent Vizachero is a native plant advocate and social media coordinator in Baltimore, MD. He manages Herring Run Nursery, a native plant nursery operated by the non-profit watershed protection group Blue Water Baltimore.

Reprinted from the *The Turk's Cap*, The Newsletter of the Delaware Native Plant Society, Fall 2013, Vol 16, No 3.

Book Review:

The Midwestern Native Garden: Native Alternatives to Nonnative Flowers and Plants

By Charlotte Adelman & Bernard L. Schwartz



Publisher: Ohio University Press (September 20, 2011)
Pages: 272pages
ISBN-10: 0821419374
ISBN-13: 978-0821419373
Paperback and Kindle
Price: $17.04, Kindle: $13.19

Reviewed by Nancy Hill

Our INPAWS book sales offer scores of books on native plants. I have many of them on my own bookshelves, since the only thing I like to buy as much as plants is books. So when I saw this title, it was hard for me to imagine what ground had not already been covered. Adelman and Schwartz have found a niche, however, and give us a treasure of information that is a treat as both science and art.

The authors list nonnative garden plants under the categories of spring, summer, and fall. A typical entry has origin, height, cultivation, ornamental attributes, and often a reason not to plant it. For example, the nonnative butterfly bush is acknowledged as a nectar plant, but "not one species of butterfly in North America can use buddleias as larval host plants."

For each nonnative, they list native alternatives, based on height, appearance, and growth conditions. The native Joe Pye weed, they say, is an excellent nectar source and in addition hosts "over three dozen species of Lepidoptera." They also suggest planting dogbane, Indian hemp, meadowsweet, buttonbush, false indigo, New Jersey tea, elderberry, or leadplant, and tell us what butterflies, moths, bees, wasps, beetles, and birds use them for reproduction, food, or cover.

The visual presentation of this book is superb. For example, the authors tell us that fragrant sumac, *Rhus aromatica,* is a good ground cover alternative to the invasive, nonnative English ivy. There is a nice picture of both. *R. aromatica* is a host plant for the red-banded hairstreak. Further, the sumac's fruits "provide eastern bluebirds and other bird species with emergency food during the winter," and there is a gorgeous early 1900's illustration of the eastern bluebird by Louis Agassiz Fuertes, a noted Cornell ornithologist and illustrator.

More than a dozen of Fuertes' richly colored illustrations enrich the book, along with eighty-two photographs of butterflies and moths, caterpillars, and hundreds of photos of plants, including many beautiful old illustrations. Kudos to the authors for mixing useful, accurate photos with lush vintage illustrations.

Every plant is listed with its scientific name. This is often critical. The authors present the nonnative "sweet autumn virgin's bower" and say its native alternative is "virgin's bower clematis. "Avoid the former, *Clematis terniflora,* and plant the latter, *Clematis virginiana.* Great information when reading plant tags.

I am a Doug Tallamy convert. I love knowing that the New Jersey tea I bought at the INPAWS plant sale last spring will be host to spring and summer azures, can attract at least thirteen butterfly species, will feed birds with their seeds, and gather in small insects that hummingbirds feed to their young. Thus I totally agree with the premise of this book—that to promote biodiversity we need to plant more natives in our home gardens.

So how far do we take this premise? I have hundreds of native plants, but I am NEVER giving up my variegated Solomon's seal or my ‘Tiger Eyes’ sumac or ‘Matrona’ sedum. Therefore, I was a bit bothered by the absolutism of the book. The overall tone of the book is Good Plant/Bad Plant, with an assumption that every gardener's goal should be 100 percent native plants.

Europe and Asia are nearly dirty words, and most nonnative plants are described as "naturalized or invasive in the Midwest," leading me to feel that Jacob's ladder, wormwood, *Artemisia vulgaris,* and wisteria are going to

take over the world. Okay, maybe the *Artemisia* would. But the authors, in so aggressively prosecuting all nonnatives, sacrifice the opportunity to educate us on what is truly invasive (to be avoided at all costs) and what is just nonnative.

Further, what is native? A plant native to one area of this book's large geographic area (Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, Wisconsin, and Ontario, Canada) is not necessarily native to another. The authors helpfully suggest accessing the USDA PLANTS database for a specific plant's distribution.

Another quibble: I'm not sold on the organization of the book. When I'm thinking about changes or additions to my gardens, I don't say, "I think I'll rip out that hosta and replace it with seersucker sedge or bottlebrush grass or northern sea oats." I take a more direct line. If I need a plant for a dry, shady spot, I pull out a native plant book and look at all natives that grow in those conditions, then choose based on leaf color, texture, and other design considerations.

Many nonnatives listed are the old-fashioned garden favorites—foxglove, hollyhock, peony, tulip, daylily, hosta, lavender, pinks, poppies, salvia, phlox, and roses. Every now and then, however, the format seems forced, as if the authors want to present a wonderful native plant and have to scrounge around for some nonnative to be its evil twin. Who plants the nonnative bishop's goutweed? I've been trying to get it out of my garden for twenty years! Or crown vetch? Or star of Bethlehem, which is that detestable wild-onion-like weed that needs to be dug out eight inches deep? I don't need an alternative for that one, native or not.

I am glad to own this book, even though I won't use it as the authors presumably intend. I will take pleasure in perusing the wealth of information on native plants that I now grow or want to grow, and I'll enjoy the insects and birds with which I can now get acquainted thanks to the book's lovely pictures.

This book was the winner of the 2012 Helen Hull Award, presented by the National Garden Clubs. ~ The *OTF* Editors.

Nancy Hill is an avid gardener and past INPAWS president, who gardens in urban Indianapolis as well as rural Owen County.

Reprinted from *INPAWS*, the Journal of the Indiana Native and Wildflower Plant Society, Winter 2011-12, Vol 18, No 4.

Invasive:

China Expedition 2013: A Tale of Typhoon-Tossed Kudzu

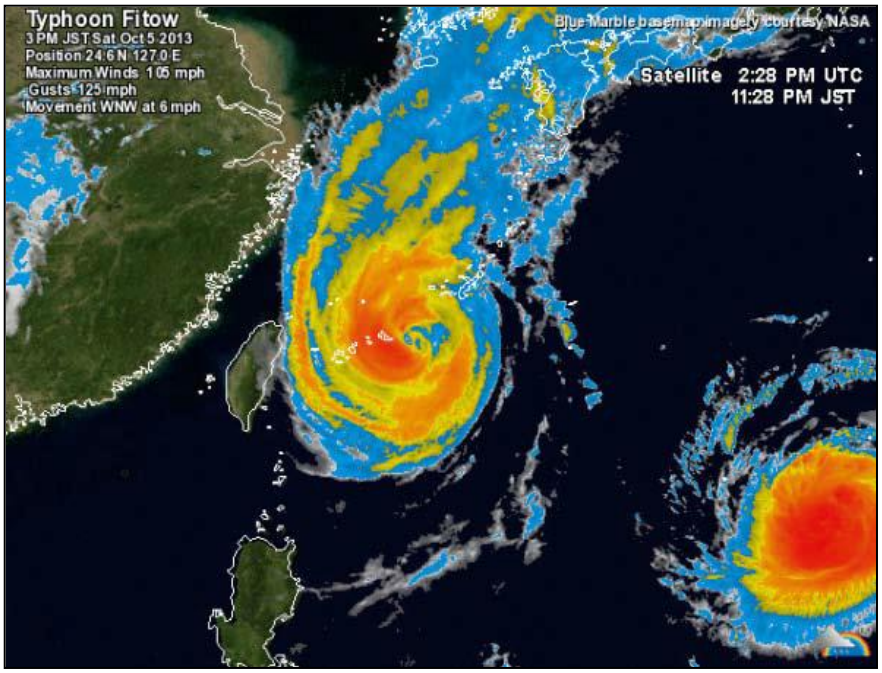
By Ashley N. Egan

Plants can eat things—large things! Well—figuratively anyway. One of the hungriest plants in the United States is kudzu (*Pueraria montana* (Lour.) Merr. var. *lobata* (Willd.) Maesen & Almeida), a large leguminous vine that can grow up to 60 feet in a growing season, and is often seen engulfing whole structures and damaging forest margins. I first became interested in kudzu while working as a postdoctoral fellow at Cornell University studying the phylogenetics and systematics of Phaseoloid legumes, a group of nearly 2,000 species mostly comprised of vines. During a phylogenetic investigation of subtribe Glycininae, we confirmed massive polyphyly [1] within *Pueraria*. It was then that I determined to study the genus.

Kudzu was introduced into the United States in the late 1800s and touted by the U.S. government as an



Kudzu engulfs a house. Photo by Jon Van Buren, 2006



Satellite radar image of Typhoon Fitow (center) and Typhoon Danas (lower right).

excellent forage crop and soil erosion solution. However, after escaping cultivation, efforts soon turned from advocacy to eradication, but with little success. Even today, kudzu continues to make headway across the American landscape, now occupying more than 15,000 square miles, costing the U.S. government hundreds of millions of dollars annually in control measures.

This invasive species, along with 20 or so congeners, is native to Southeast Asia where it grows from sea level to around 2000 m in elevation in temperate and (sub) tropical climes. To investigate the introduction history and genetic diversity of kudzu in the U.S. as compared to native ranges, and to decipher the extent of polyphyly in the genus, I set out on my second Asian expedition to collect *Pueraria*.

On 1 September 2013, just two weeks after starting as an Assistant Curator at the Smithsonian Institution, I and my Ph.D. student, Matthew Hansen, flew to Beijing, China—the first stop on a three month expedition that would cover three countries. In Beijing, we met up with Liu Luxian, a first-year Ph.D. student from Zhejiang University studying in Chengxian Fu's lab. After two days of preparations, we boarded a train towards Anshan, Liaoning Province, one of the most industrial cities of China, at the northern edge of kudzu's native range. There, we collected our first kudzu population of the season in the Qianshan Mountains. After returning to Beijing by train and preparing our specimens for travel, we flew to Xi'an, Shaanxi province, for the second leg of the expedition.

Our expedition team usually consisted of at least four people, with a driver, translator, and a various number of field assistants in tow. In Xi'an, we were met and assisted by a crew from Northwest University, including Ni-Shifeng, who was indispensable in helping us prepare for our next foray that would include over 750 miles of collecting sites spread across the province. Kudzu grows quickly both clonally and through seed, spreading over the landscape in large patches that can be miles long. To ensure that we were collecting separate individuals and not clones, we sampled 'by car'—collecting one individual every 1-2 km. Over the next five days, we collected 150 individuals from seven roughly-defined populations with individuals at least 1 km from each other and each population about 100 km apart.

From Xi'an, we flew to Changsha where the next leg of our journey took us nearly 1000 miles across the lush landscape of Hunan province. Along the way, we encountered ancient temples, floating mountains, and quaint villages. In one locality, we collected a variety of kudzu that had most likely been cultivated for hundreds of years within the ancient village of Au Tau, south of Wugang, Hunan, China. On several occasions during the expedition, we were approached by curious villagers who, learning of our interest in kudzu, would launch into the virtues and uses of the plant.

The economic significance of *Pueraria* species has been documented since ancient times, with kudzu mentioned in Chinese literature dating as far back as 500 B.C. (*Econ. Bot.* 28: 391-410; 1974) and Japanese literature around 600 A.D.,where kudzu was said to be a source of fibers for paper, clothing, cordage, and construction materials. Various species have been heavily tapped as starch sources anciently and in present day cultures across Indo-China and Southeast Asia (*The Book of Kudzu, a culinary and healing guide*, 1977). *Pueraria* species have long been used in traditional Chinese herbal medicine

(Pueraria*: The Genus* Pueraria, pg. 59-69; 2002) for treating numerous complaints, including skin rashes, dysentery, alcoholism, and hypertension. For thousands of years, Chinese herbalists have prescribed flower and root concoctions of kudzu as a means of curing alcoholism. Preclinical studies showed extracts to significantly decrease free-will consumption of alcohol by the golden hamster, an alcohol-craving rodent, via the action of daidzin, an isoflavone (*PNAS* 92: 8990-8993; 1995), as well as to decrease the effects of alcohol hangovers (Alcohol Clin. Exp. Res. 18: 1443-1447; 1994). Human trials of kudzu preparations have been conducted (Pueraria*: The Genus* Pueraria, pg 159-179; 2002).

From Changsha in Hunan province, we were to fly to Guangzhou, the economic center of Guangdong province in the South of China. Enter Super-Typhoon Usagi, the first of five typhoons that would in some way impact my three-month expedition. Just hours before we were to land in Guangzhou, Super-Typhoon Usagi was bearing down on Hong Kong. Because of the intensity of this storm (equivalent to our category 5 hurricane) and the potential for widespread flooding, road washouts, and disruptions, we decided to reroute and spend our remaining time in southeastern provinces. From Changsha we flew to Hangzhou where we were met by our collaborator Fu.

Over the next two weeks, we made three forays into neighboring provinces, taking a number of Fu's students with us for the ride. Our first foray was near the Huangshan Mountain range in Anhui province, which includes the famed Yellow Mountain, one of China's most important heritage sites and now designated as a UNESCO world natural and cultural heritage site. This area provides protection to a number of threatened plant and animal species. We were hoping to collect *Pueraria stricta* based on historical localities from the Hangzhou herbarium. This would represent a disjunct population from a species I had tried and failed to collect in the wild in 2012. Alas, we failed yet again.

Most of our collections in China were *Pueraria*, with the hope of collecting samples of every species in the genus. Perhaps the most interesting *Pueraria* we found in China was on our second foray out from Hangzhou, a loop that included collecting in three provinces over the course of over 1000 miles. After four weeks in the car, the endless movement as the landscape skimmed by became monotonous. So much so, that at one point I began to see ghosts—phantom images of what I swore was a white kudzu. We were moving fast along the national highway where we couldn't stop to collect so I didn't think anything of it. I had never heard of a white kudzu. I was seeing things, surely. But after the fourth such encounter, I realized I was in an area where I was allowed to collect—I loudly yelled "Ting!" *Ting* means 'park the car' in Chinese and was the universal signal for the driver to pull over as soon as possible. I or my student had yelled *Ting* over 500 times on this trip. I jumped out of the car and —sure enough—a white variant of kudzu was staring me in the face. We had likely found a white form of *Pueraria tonkinensis* Gagnep, a synonym of *P. montana* (Lour.) Merr. described from Jiangxi province.

Our third and final foray was to Zhoushan, a collection of islands off the east coast of China in the East China Sea. These islands were an important collection locality as they are the closest to Japan, where kudzu is also native and widespread. This foray was threatened yet again by not one—but two typhoons—Fitow and Danas. We ended up cutting our trip short by a day as we raced back to the mainland to avoid the storm surge from Fitow. Danas had pushed Fitow inland towards Hangzhou, just before turning towards Japan, where it would



Pueraria montana var. *thomsonii (Benth.) Wiersema ex. D.B. Ward.* (photo by Ashley N. Egan)

eventually slam into Fukuoka, my next destination. The next three days were spent inside as rains pummeled the city, causing localized flooding and road closures. After a successful five weeks in China in which we had collected nearly 500 samples, each separated by no less than 1 km, our journey was coming to an end. The next morning I was to put my student on a plane back to the U.S. while I was to continue on to Japan to collect kudzu across the three largest islands. I went to sleep wondering if my flight was going to be canceled, dreaming of collecting kudzu in gale force winds and torrential downpours. Little did I know how soon that nightmare would become reality…but that's a story for another time.



Map showing *Pueraria* collections across Southeast Asia (Japan not shown). Red tear drops represents 2012 expedition, yellow pushpins are 2013 expedition.

[1] There is polyphyly in a classification when organisms in that classification came from different ancestors. ~ *The Editors.*

Reprinted from the Smithsonian National Museum of Natural History, Department of Botany & the U.S. National Herbarium newsletter, *The Plant Press*, April-June 2014, Vol 17, No 2.

Folklore:

Natural History of Maple Syrup

By Stephen G. Saupe

According to an Anishinabe legend, the Great Spirit made life easy by providing abundant game and crops, and even filling a maple tree with a thick sweet syrup which could be drunk by simply breaking off a branch and allowing it to drip into your mouth. Manabohzo was concerned that the people were spending too much time drinking syrup, so he collected some water from the river in a birch basket and poured it into the tops of the trees to thin out the syrup. He also decreed that the trees would only flow for a short time in the spring.

There are many truths in this tale. First, we learn that maple syrup is an ancient crop; in fact, it is one of the relatively few uniquely North American crops. The legend also rightfully attributes the discovery of syrup-making to the Native Americans and emphasizes that maple sap is dilute (about 2 percent sugar) and flows in the springtime when the day and night temperatures fluctuate above and below freezing, respectively.

The mechanism by which sap flows from a maple is not fully understood, but is related to temperature.



Two taps in a maple tree, using plastic tubing for sap collection. Photo from wikipedia.com

During the cool night, gases contract in the stem. This reduces the pressure, sucking water from the roots. The water freezes inside hollow fiber cells, trapping gases in ice bubbles. The following day, as the temperature warms, the ice melts and the gases expand, which along with the gravitational pull of water in the stem, provides the pressure that pushes sap out of the taphole.

One flaw with this physical explanation for sap flow is that sucrose in the vessel sap shouldn't be required for sap flow—but it is! Recent research suggests that fibers, which surround the vessels, act like a membrane to allow for osmotic uptake of water and the concomitant development of pressure that further contributes to the stem pressures forcing sap out of the tree. Stay tuned for more advances in our understanding of sap flow physiology.

To make syrup, a hole (7/16th inch or preferably 5/16th inch) is drilled about two inches into the sap wood. Maples, *Acer*, including *A. saccharum, A. nigrum, A. negundo, A. saccharinum*, and *A. ginnala*, are among the few trees that produce sap in the spring. Apparently this is due to their perfect combination of air-filled fibers and fluid-filled vessels. Once the hole is tapped, a spile is inserted and a bucket, bag, or vacuum tube is attached to collect the sap. The dilute sap must then be concentrated into syrup.

The Native Americans originally dropped hot rocks into hollowed logs containing sap. Allowing sap to freeze and then removing the ice was a method likely also used, since when the water freezes it leaves behind a more concentrated sugar solution. These techniques gave way to boiling sap in batches in metal kettles or flatbottom pans, and ultimately to the continuous-flow evaporators now in use by larger operations. Because cooking sap is so energy-intensive, various improvements, including blowers in the fire chamber, sap preheaters, and reverse osmosis, have evolved to conserve fuel and save time.

To determine when the syrup is ready to bottle, producers measure its density with a hydrometer or its sugar concentration with a refractometer. The temperature of the boiling syrup can also be used, since finished syrup boils at 7 degrees F above the boiling point of water. If the syrup is cooked too long, it tends to crystallize, but if it's not cooked long enough, then it may develop mold in storage. The syrup must be filtered before it is bottled, because during cooking a precipitate called sugar sand, or nitre, forms. This material is the result of the interaction of various trace components of the sap and is largely comprised of calcium salts, including calcium malate.

As the Native Americans have long known, maple sap is relatively dilute, approximately 2 percent sugar, whereas finished syrup is 66 percent. The Rule of 86 expresses the relationship of sugar concentration between maple syrup and sap. To determine how much sap is required to make a gallon of syrup, divide 86 by the sugar concentration of the sap.

Thus, it will take 43 gallons of sap with 2 percent sugar (= 86/2) to make a gallon of syrup. Or in other words, a producer must boil off 42 gallons of water to produce one gallon of syrup. This is the source of the commonly cited statistic that it takes approximately 40 gallons of sap to make one gallon of syrup.

Although most maple sap is now used to make syrup, the Native Americans and early settlers continued cooking the syrup to produce maple sugar because it was easier to transport and store.



A traditional bucket tap and a plastic-bag tap. Photo from wikipedia.com

The syrup grading system is currently in flux but will soon include four main grades available for sale to consumers: Golden, Amber, Dark, and Very Dark.

They differ in color and flavor; a consumer should taste the various grades to see which he/she prefers. The quality of the syrup is a function of any microbial contamination of the sap before it was cooked, the biochemical constituents of the sap, and the length of time the sap was cooked.

No matter which grade of syrup you prefer, Robert Boyle was certainly correct when he wrote in 1663, the "juice that weeps out its incision, if it be permitted slowly to exhale away the excess moisture, doth congeal into a sweet and saccharine substance."

Stephen G. Saupe is with the Biology Department, College of St. Benedict/ St. John's University, and is a MNNPS board member. This is a summary of his March 1, 2012, presentation for the Society.

Reprinted from the *Minnesota Plant Press,* The Minnesota Native Plant Society Newsletter *Spring 2012,* Vol 31, No 2.

Robert A. Whipple State Nature Preserve
The Arc of Appalachia Preserve System



Whipple State Nature Preserve contains a narrow wooded ridgetop, pocketed with small, symmetrical sinkholes. The ridgetop and head of the valley is bordered by dolomite cliffs of 10-30 feet in height. The Preserve is a beautiful example of an oak hickory forest overlooking a ravine that is lush with spring flowers. The preserve's dolomite cliffs, slump blocks and sinkholes, as well as its many specimens of tall and stately trees, provides stunning scenery for hikers. During late fall after the leaves are gone, hikers can view the Ohio River valley and the hills of Kentucky.

There is an abundance of ferns and spring wildflowers throughout the wooded preserve. The Ohio River Bluffs Preserve has an outstanding wildflower display, especially in early spring when lower and mid-elevations of the steep hillside are wall to wall flowers. At the base of the hill there are over ten acres of nearly solid bluebells. At the top of the ridge you can also see dwarf larkspur, wild hyacinths and twinleaf plant.

This area is dedicated in honor of Robert A. Whipple, who generously gave this land to the Division in 1989 for future generations of Ohioans to enjoy.

Whipple State Nature Preserve has 187 acres and a modest 2-mile loop trail. It is located in Adams County on the east side of SR 247, approximately 1 mile north of U.S. Route 52. The address is 1194 State Rte. 247 Manchester, Ohio 45144. There is very limited pull-off parking.



Content for this article was taken from www.naturepreserves.ohiodnr.gov and arcofappalachia.org.

WINTER GREENS

By Edward MacArthur

When the dreary days of winter settle upon us, we might tend to neglect our botanizing excursions and choose instead to remain indoors by a cozy fire. We yearn for spring and the return of the wildflowers.

But winter walks can be rewarding for the botanist. Delicate though they may seem to be, there are a number of our native ferns that can withstand the rigors of winter, and their fronds remain fresh and green throughout the winter season. For winter botanizing, why not take up the study of ferns?

The most conspicuous of our evergreen ferns is the Christmas Fern: a very tolerant fern that can withstand a variety of habitats—moist woodlands or even brushy second growth areas—a pioneer fern in a sense. This fern is well-fitted to serve as a decoration in winter. The fronds are deep green and polished, and each pinna (leaflet) is serrated and has a triangular projection on the upper side at the base—presenting the illusion of a stocking or sock. Some imaginative mind no doubt associated this resemblance to the "stocking that hung by the chimney with care", and the fern was dubbed the Christmas fern. Because the fronds are so enduring, they were extensively used in floral decorations. Perhaps the name Christmas fern was given because of its use during the winter holidays.

The Marginal Wood Fern has thick, almost leathery, fronds that are dark blue-green above and lighter beneath. The fruit dots (sori) are arranged in rows close to the edge (margin) of the pinnules. This fern was used extensively by the florist trade, and also by butcher shops to decorate the display cases for various cuts of meat.

Another group of evergreen ferns includes ferns we call spleenworts. The most common spleenwort in our area is the Ebony Spleenwort, so-called because its rachis (stem) is a very dark, shiny brown. It delights to grow in thin, stony soil, and grows at its best in half-wooded areas in tangles of small bushes and brambles.

The Common Grape Fern may be overlooked because of its retiring habits. It favors abandoned farm lands, a brushy pasture or a second growth woodlot. It may be half hidden among fallen leaves. The frond is much divided and triangular in shape. At the approach of cold weather, the frond takes on a rich bronze hue and braves the frost and snow.

So winter walks need not be unrewarding. There are always the ferns to perk up our spirits. Even if we do not know their names, we can take delight in the fact that nature has provided a green freshness for an otherwise drab winter landscape.



Ebony Spleenwort

"The green and graceful fern,
How beautiful it is,
There's not a leaf in all the land,
so wonderful."
–Twamley

Ed MacArthur was a biology teacher and charter member of the Mohican Native Plant Society. He died in 2009.

This article was excerpted from the December 1993 Mohican Native Plant Society Newsletter and reprinted in the Mohican Native Plant Society Newsletter, Winter 2012, Vol 12, No 1, from which the OFT editors obtained it.

Interesting Factoid:

How Did Ohio Become Associated With A Nut-Bearing Tree?

The Ohio buckeye is the state tree of Ohio, and its name is an original term of endearment for the pioneers on the Ohio frontier. Capt. Daniel Davis of the Ohio Company of Associates, under Gen. Rufus Putnam, traversed the wilderness in the spring of 1788, and began the settlement of Ohio. Davis was said to be the second man ashore at Point Harmar, 7 April 1788, and he declared later that he cut the first tree felled by a settler west of the Ohio River, a "buckeye" tree. Point Hamar was in the area at the confluence of the Ohio and Muskingum rivers, where Marietta, the first city of the Northwest territory, was founded.

In addition, Colonel Ebenezer Sproat, one of the founders, along with Rufus Putnam, of that pioneer city of Marietta, had a tall and commanding presence. He greatly impressed the local Indians, who in admiration dubbed him "Hetuck," which has been translated to mean "eye of the buck" deer, or "Big Buckeye." Subsequently, "Buckeye" came to be used as the nickname and colloquial term for people from the state of Ohio and The Ohio State University's sports teams. The Ohio State University adopted "Buckeyes" officially as its nickname in 1950, and it came to be applied to any student or graduate of the university.

Ohioans have referred to themselves as Buckeyes since at least the presidential campaign of General William Henry Harrison. At the Whig convention in 1842, President Martin Van Buren fought for re-election during a time of great economic depression against a Whig Party unified for the first time behind war hero William Henry Harrison and his "log cabin campaign." Rallying under the slogan "Tippecanoe and Tyler Too," the Whigs easily defeated Van Buren.

Harrison's supporters carved campaign souvenirs out of buckeye wood to illustrate their support for the fellow Ohioan. A log cabin decorated with raccoon skins and a string of buckeyes became the symbol of Harrison's campaign. The following became his campaign song:



Oh where, tell me where was your buckeye cabin made?
Twas built among the merry boys who wield the plough and spade,
Where the log cabins stand, in the bonnie buckeye shade.
Oh what, tell me what is to be your cabin's fate?
We'll wheel it to the capital and place it there elate,
for a token and a sign of the bonnie Buckeye state.

Interesting Factoids:

- Harrison delegates carried buckeye canes, decorated with strings of buckeye bead. The buckeye nut was the precursor to today's campaign buttons.
- An early botanist found a Buckeye tree on the banks of the Ohio River, and added "Ohio" to the common name in order to distinguish this species from the related Yellow Buckeye. Another common name is the Fetid or Stinking Buckeye, reflecting the aroma of its flowers, broken twigs, and bruised bark.
- The tallest example in Ohio today is in Hamilton County. It is 82 feet tall with a diameter of more than 4 feet.
- It grows where others cannot, is difficult to kill, and adapts to its circumstances. The tree characteristically grows on bottomlands and on the banks of small streams and rivers. It is widely distributed in Ohio, but less frequently in the eastern part of the state.
- On October 2, 1953 the Buckeye tree officially became the state tree of Ohio.

This article is based on material taken from www. wikipedia.org, ohio-nature.com, ohiohistorycentral.org, scenicsciotoheritagetrail.com and oplin.org. Picture taken from ohio-nature.com.

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Volume 32, No. 4 December 2014