Welcome!

Friesner Herbarium 2023 Open House

Thank you to all faculty, staff, students, university administration, and community friends and partners for their support of the Friesner Herbarium!

https://herbarium.butler.edu/

March 30, 2023

Carrying the Torch:

The State of Indiana Botany in 2023

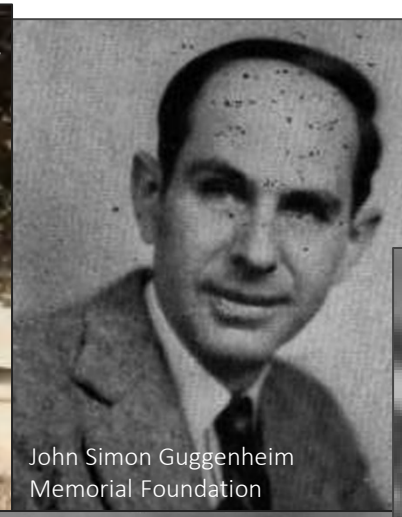
Indiana Department of Natural Resources

Scott Namestnik
Botanist
Indiana Natural Heritage Data Center
Division of Nature Preserves

DNR
Indiana Department of Natural Resources

DIVISION OF NATURE PRESERVES

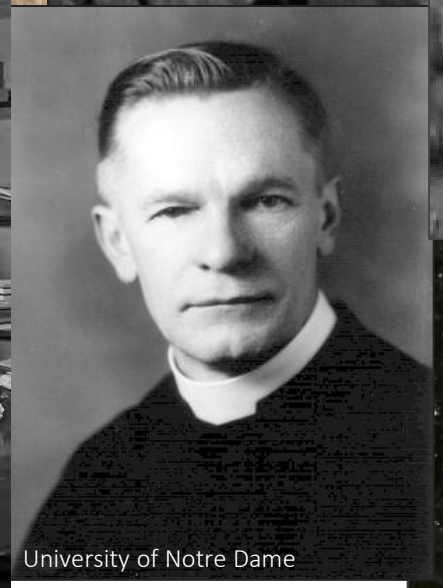

Friesner Herbarium
Butler University

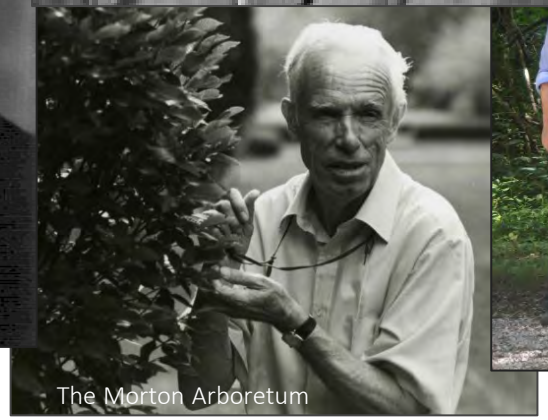

John Simon Guggenheim Memorial Foundation


Bedford Times-Mail


Ball State University


Indiana University


University of Notre Dame


The Morton Arboretum

Recent Retirements

- Roger Hangarter (Spring 2023)
- Roger Hedge
- Michael Homoya
- Ellen Jacquart
- Tom Post
- Paul Rothrock (second time!)
- Don Ruch

Recent Losses

- Victor Riemenschneider
  - Spicer Lake Nature Preserve
  - *Platanthera dilatata*
  - Specimens at Notre Dame

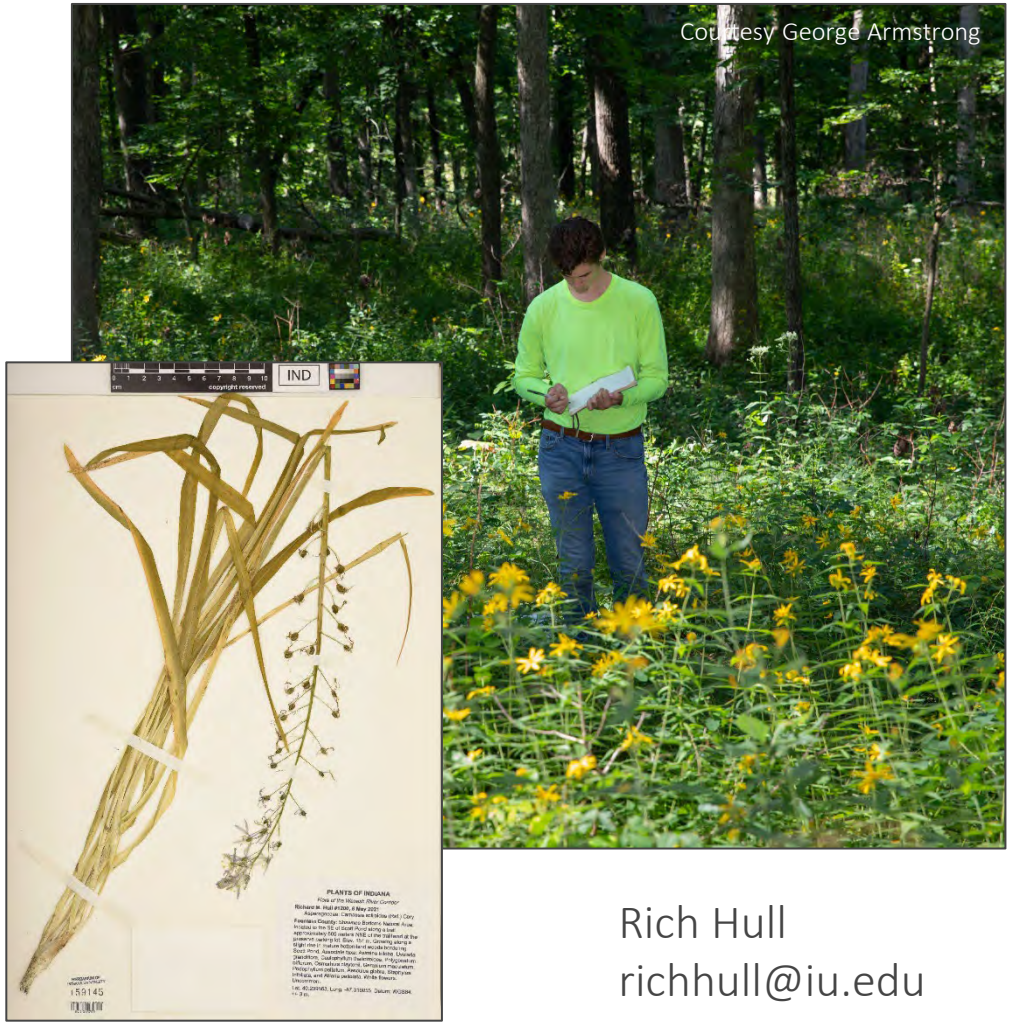
Recent Rare Plant Highlights

- Long-leaved Panic Grass (*Coleataenia longifolia* subsp. *longifolia*)
- Wavyleaf Purple Coneflower (*Echinacea simulata*)
- Purple Spikerush (*Eleocharis atropurpurea*)
- Few-nerved Cottongrass (*Eriophorum tenellum*)
- American Scheuchzeria (*Scheuchzeria palustris* subsp. *americana*)
- Rock Goldenrod (*Solidago rupestris*)

Scott Namestnik
snamestnik@dnr.IN.gov

Floristic Work along the Wabash River

- Rich Hull, Indiana University doctoral student
- Vascular plant inventories for 46 field sites (2021-2024)
  - Document changes in Wabash River corridor flora since Deam (1896-1952)
  - Determine factors impacting biodiversity trends in study area
  - Provide information for species redistribution models for rare species
- 2021-2022 – 4,743 voucher specimens representing 885 species
  - 55 rare species, 34 invasive species
- 2023-2024 – 10,000-12,000 additional specimens



Rich Hull
richhull@iu.edu

https://www.youtube.com/watch?v=OkhchoQ4wIc

Student Floristics/Ecological Work

- Jordan Marshall students
  - Tessa Aby-Kruger (2019) – Mills-Black Preserve (ACRES Land Trust) floristic inventory and ecological study on relationship between canopy cover and understory abundance, richness, and diversity
  - Joanna Stebing (2021-2023) – Garman Nature Preserve (ACRES Land Trust) floristic inventory and community structure analysis
  - Madison Beckstedt (2022) – Resample of 2007, 2017 plots in 40 forests in Indiana, Michigan, and Ohio studying changes in tree species composition in over, mid, and understory due to loss of ash
- Don Ruch and Kem Badger with students
  - Reber Woods – Floristic inventory (2021)


Courtesy Tessa Aby-Kruger

Student Floristics/Ecological Work

- Alice Heikens students
  - American Cancer-root (*Conopholis americana*) population ecology and fire effects (2018-2021)
- Ethan Iversen (IU undergraduate student)
  - Kentucky Coffeetree (*Gymnocladus dioicus*) seed collection and planting
  - American Yellowwood (*Cladrastis kentukea*) distribution
- Andrew Davies (Northwestern graduate student working with Chicago Botanic Garden)
  - Kittentails (*Besseya bullii*) fitness decline and genetic analysis

Other Floristic Inventory Work

- Adam Balzer – Beverly Shores Study Area, Grand Prairie Nature Preserve, Grass Lake Nature Preserve, Little Lake, Marshall County Memorial Forest and Mill Pond, Moraine Nature Preserve, Panico Property, Sundew Prairie Nature Preserve
- Nathanael Pilla – Creek Ridge County Park, Little Lake, Marquette Trail Natural Area, Moraine Nature Preserve, Ropchan Memorial Nature Preserve, Sauga Swamp Nature Preserve, Wesdorp Nature Preserve
- Kevin Tungesvick – Griffy Lake, Newfields Art and Nature Park

Other Floristic Inventory Work

- Tom Post – Bill Barnes Nature Preserve, Stoutsburg Savanna Nature Preserve, Coastal Plain Ponds Nature Preserve
- Bill Thomas – Ohio River weeds

Other Floristic Inventory Work

- David Mow – Brown County State Park
  - Started herbarium at park in 2013 after taking a class at the nature center on “Creating an Herbarium”
  - “I quickly learned that just identifying it as an ‘Aster’ was not good enough for an herbarium and had to do a lot of study to learn how to ID to species or even to variety”
  - To date 702 specimens from the park (some duplicates at Deam Herbarium), 681 taxa documented
  - Two species new to the state and nearly 100 species that are new reports for the county

Other Floristic Inventory Work

- Bioblitzes
  - Indiana Academy of Science
    - 2021 – Harrison County Glades
    - 2022 – Beanblossom Bottoms
    - 2023 – Kankakee Sands
  - Others at local level
- Wildflower Forays
  - Brown and Monroe Counties
    - 38th Annual Foray April 28-30
  - Spring Mill State Park
    - 1st Annual Wildflower Weekend April 15-16
  - McCormick's Creek State Park
    - Annual Wildflower Weekend April 7-9

Old Growth Forest Research

- Donaldson's Woods (Lawrence County)
  - Long term study, every 10 years (most recent 2022)
  - Measured all trees over 4" DBH in 18-acre plot
  - Ball State led the 2022 efforts with help from Indiana Parks Alliance, Indiana DNR, and Sam Shine Foundation
  - 1484 trees, 21 species
  - 11% over 2' DBH, 37 trees over 3' DBH, 4 trees over 4' DBH
  - Most big trees were White Oak (*Quercus alba*), other oaks (*Quercus* spp.), and hickories (*Carya* spp.)
  - No small oaks, but still oak dominated (for now)
  - 42% of trees sampled were sugar maple (*Acer saccharum*) and 25% were American Beach (*Fagus grandifolia*)


Courtesy Cheryl LeBlanc

John Bacone
jaguartango@gmail.com

Old Growth Forest Research

- Bendix Woods (St. Joseph County)
  - Long term study, 1960s, 1980s, 2021-2022
  - 1969 and 1982: American Beech (*Fagus grandifolia*) and Sugar Maple (*Acer saccharum*) 2021-2022: Sugar Maple and American Beech
  - Sugar Maple 25/ha in 1969, 73/ha 2021-2022
  - 40% increase in tree density for trees with 4 cm or greater DBH since 1982 (more light gaps due to windstorms)
  - Overall tree species diversity has remained similar between 1960s to 2022, but shifts in age structure and abundance of sub-dominant tree species
    - 1829 vegetation survey, white oak (*Quercus alba*) was listed as major sub-associate, few seedlings/young saplings present today

Deb Marr
dmarr@iusb.edu

Indiana University South Bend Student Botany Club

- Several projects to enhance native plant diversity on city, university, and private property in South Bend
- Using greenhouse to grow natives, which offers students a chance to see the whole process from seed to planting

Courtesy Deb Marr


Courtesy Andy Schnabel

Andy Schnabel
aschnabe@iusb.edu

Indiana Natural Heritage Data Center

- Floristic inventories at CILTI properties – Glacier's End Nature Preserve, Mossy Point Nature Preserve, Possum Hollow (private)
- Floristic inventories at numerous nature preserves
- Surveys on land owned by IDNR Division of Fish & Wildlife
- SRanks
- Hoosier National Forest Barrens Restoration Vegetation Monitoring
- Rare Plant Technical Advisory Committee

www.in.gov/dnr/nature-preserves/heritage-data-center/

Dawn Johnson
dajohnson@dnr.IN.gov

DNR Indiana Department of Natural Resources | DIVISION OF NATURE PRESERVES

Indiana DNR Division of Nature Preserves

- Stout Goldenrod (*Solidago squarrosa*) augmentation project
- Continuing to evaluate and acquire nature preserve quality properties
- Dedicating 300th nature preserve in 2023

www.in.gov/dnr/nature-preserves

Ron Hellmich
rhellmich@dnr.IN.gov

DNR Indiana Department of Natural Resources | DIVISION OF NATURE PRESERVES

Indiana DNR Division of Nature Preserves Recent Research Permits

- Lowland Bergamot (*Monarda 'serotina'*) collection
- Snow Trillium (*Trillium nivale*) vouchers in counties not currently known
- Mycorrhizae work at Kankakee Sands restored prairies
- Wild Leek (*Allium tricoccum* complex) taxonomy
- Deer impacts on Pawpaw (*Asimina triloba*) at Wesselman Woods Nature Preserve
- Clubmoss (*Lycopodiella* spp.) taxonomy

Wyatt Williams
wwilliams@dnr.IN.gov

DNR Indiana Department of Natural Resources | DIVISION OF NATURE PRESERVES

Indiana DNR Division of Nature Preserves Recent Research Permits

- Wild Lupine (*Lupinus perennis*) studies
- Phlox (*Phlox* spp.) genetic work
- White Pine (*Pinus strobus*) Indiana genetics work
- Swink's St. John's Wort (*Hypericum swinkianum*) genetics
- Violet (*Viola* spp.) monitoring at Kankakee Sands and Beaver Lake
- Pitcher's Thistle (*Cirsium pitcheri*) demography

Wyatt Williams
wwilliams@dnr.IN.gov

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Indiana Department of Natural Resources

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Indiana's State Wildlife Action Plan (SWAP)

440 vascular plants are now Species of Greatest Conservation Need (2022 Minor Revision)

Phlox amplifolia
State threatened

Streamside salamander
Special concern

Hooded warbler
Special concern

Viburnum molle
State threatened

Elizabeth Mabee
emabee@dnr.IN.gov

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Indiana Plant Conservation Alliance

INDIANA PLANT CONSERVATION ALLIANCE

Collaborating to conserve Indiana's rare plants and their natural habitats.

https://indiananativeplants.org/indiana-plant-conservation-alliance/

Scott Namestnik
snamestnik@dnr.IN.gov

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Indiana Plant Conservation Alliance

Virginia Bunchflower (*Veratrum virginicum*)

Photo by Gus Nyberg. Click to enlarge.

Virginia bunchflower is a member of the lily family and is found in consistently rich, moist soil conditions that are in full sun or partially shaded. The thick stems can reach 5' with a panicle of fragrant whitish flowers in June and July. In 1940, Charles Deam mapped the species to 5 counties in Indiana, and in 2021, the species is naturally known from just 2 sites, one near Muncie and the other near Monticello. Both sites are unprotected remnant natural areas.

In 2021, the *Veratrum* team collected seed from the remnants and kept the genetics separate. The seed will be used to grow out the plants in a greenhouse. Plugs produced will be used for outplanting at protected lands that have appropriate habitat conditions in the spring of 2022. Muncie genetics will be used for restoration in eastern Indiana, and Monticello genetics will be used for western Indiana projects.

The 10 year goal for the species is to have 6 stable wild locations in Indiana on protected land, 3 in the east and 3 in the west, that average at least 20+ blooms annually.

Submitted October 2021 by team lead Gus Nyberg, nyberggus@gmail.com

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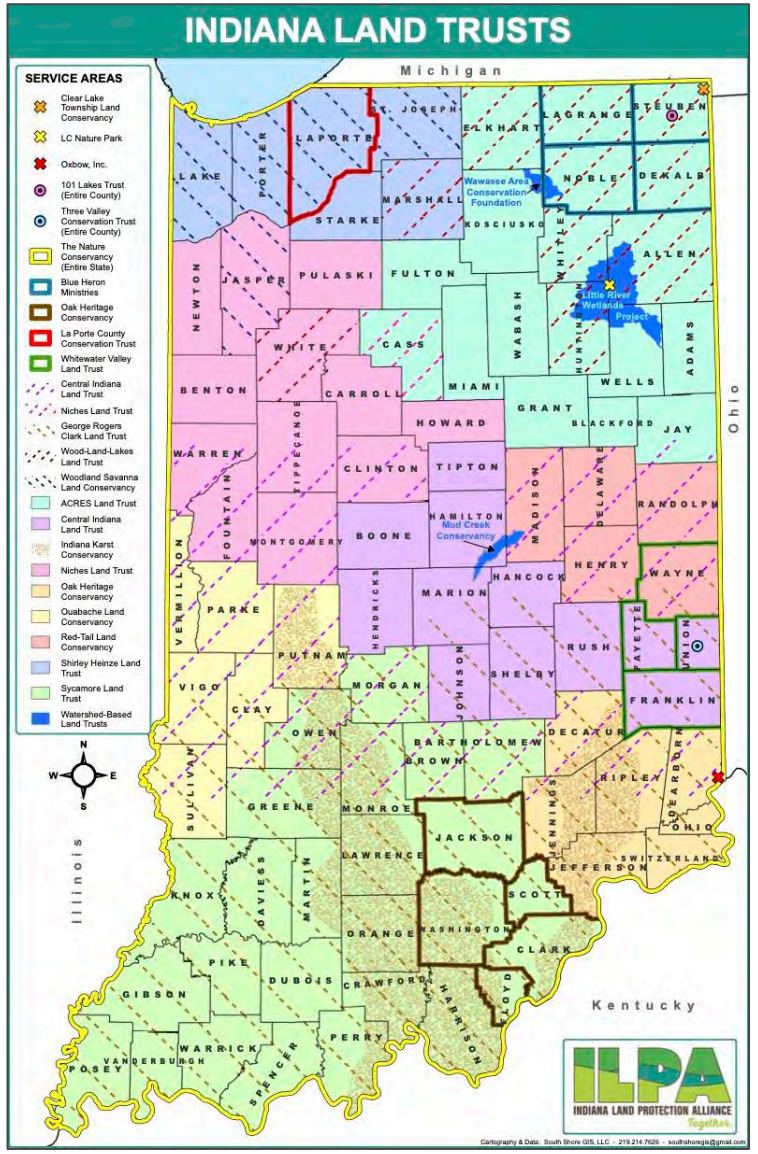
Land Trusts

- Over 20 land trusts in Indiana servicing every county in the state
  - >150,000 acres protected
  - Fee simple, conservation easement, deed restriction
  - >115 full time staff, >53 of which conduct stewardship
  - Protecting natural areas and rare plants
- Indiana Land Protection Alliance (ILPA) partnering with Indiana Academy of Science to provide funding for land trusts to contract out biological (including floristic) surveys



Andrea Huntington
ahuntington@protectindianaland.org

State of Indiana Cooperative Invasives Management (SICIM)

- State-wide Cooperative Invasive Species Management Area (CISMA)
- Regional CISMAs around the state
- Provide training on identification and management of invasive species
- Weed Wrangles and invasive species management teams that focus on partnering with local landowners with publicly accessible lands to manage invasive species
- Indiana Invasives Initiative


Courtesy Dawn Slack

Dawn Slack
dawn@sicim.info

Indiana Invasives Initiative (III)

- Mission: to engage people and partner in the restoration and protection of Indiana's natural resources by cultivating and coordinating efforts to manage invasive species
    1. Create county level CISMAs
    2. Provide free landowner surveys
    3. Conduct Weed Wrangles

Courtesy Dawn Slack

Dawn Slack
dawn@sicim.info

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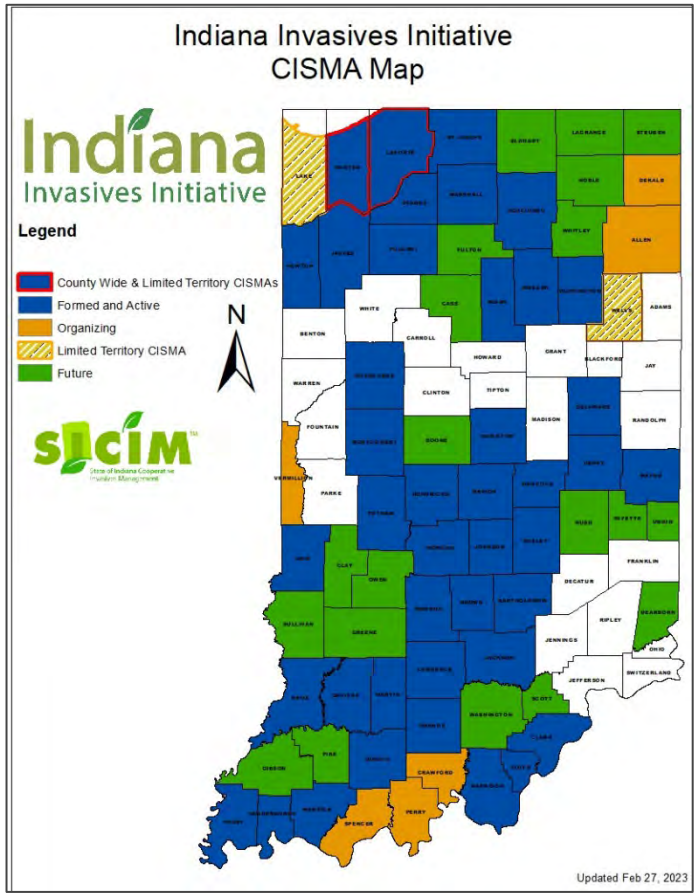
Indiana Invasives Initiative (III)

- 40 CISMAs representing about 50 counties
- 5 Regional Specialists, Executive Director, Project Coordinator
- Completed over 1200 landowner surveys or landowner assists that equals over 36,000 acres
- Completed well over 1000 outreach events
- Host annual conference
- Spoken to over 60,000 people over the past 5 years about invasive species and the need to celebrate our amazing native species and the systems they occupy



Dawn Slack
dawn@sicim.info

Global Center for Species Survival at the Indianapolis Zoo

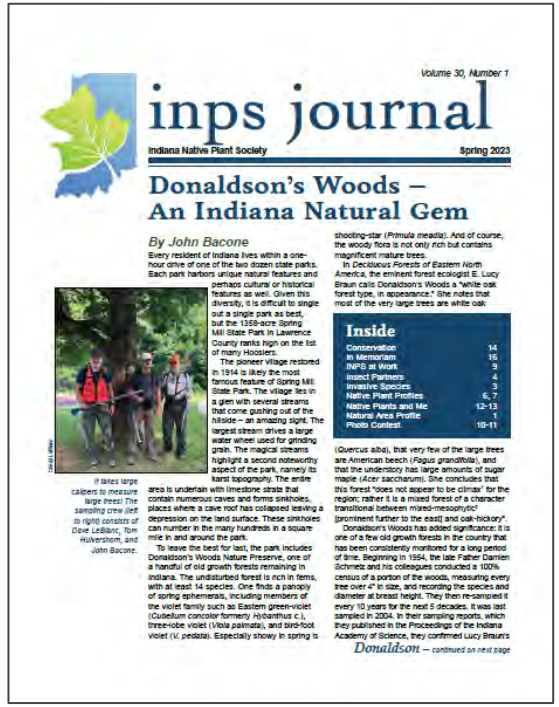
- Partnership with the International Union for Conservation of Nature's Species Survival Commission
- Supports and connects thousands of conservation experts working to secure a future for animals, fungi, and plants in more than 160 countries
- Supports plant conservation at a global level
- Engaging with guests to fight plant blindness
- Partnership with Indiana Plant Conservation Alliance (INPCA), growing *Penstemon deamii*

INDIANAPOLIS ZOO
GLOBAL CENTER for SPECIES SURVIVAL

Cátia Canteiro
ccanteiro@indyzoo.com

Indiana Native Plant Society

- Continuing efforts to reach broader audiences with education and outreach on native plants and invasive species
  - INPS Journal
  - Annual Florathon
  - Native Plant of the Year
    - T-shirts
    - Species ecology and how to use in landscaping
    - Raise awareness of native plants
  - Native Plant Finder Tool (https://finder.indiananativeplants.org/)
  - Biodiversity Grants



Volume 30, Number 1

inps journal

Indiana Native Plant Society — Spring 2023

Donaldson's Woods – An Indiana Natural Gem

By John Bacone

Every resident of Indiana lives within a one-hour drive of one of the two dozen state parks. Each park harbors unique natural features and perhaps cultural or historical features as well. Given this diversity, it is difficult to single out a single park as best, but the 1358-acre Spring Mill State Park in Lawrence County ranks high on the list of many Hoosiers.

The pioneer village restored in 1914 is likely the most famous feature of Spring Mill State Park. The village lies in a glen with several streams that come gushing out of the hillside – an amazing sight. The largest stream drives a large water wheel used for grinding grain. The magical streams highlight a second noteworthy aspect of the park, namely its karst topography. The entire area is underlain with limestone strata that contain numerous caves and forms sinkholes, places where a cave roof has collapsed leaving a depression on the land surface. These sinkholes can number in the many hundreds in a square mile in and around the park.

To leave the best for last, the park includes Donaldson's Woods Nature Preserve, one of a handful of old growth forests remaining in Indiana. The undisturbed forest is rich in ferns, with at least 14 species. One finds a panoply of spring ephemerals, including members of the violet family such as Eastern green-violet (Cubelium concolor formerly Hybanthus c.), three-lobe violet (Viola palmata), and bird-foot violet (V. pedata). Especially showy in spring is shooting-star (Primula meadia). And of course, the woody flora is not only rich but contains magnificent mature trees.

In Deciduous Forests of Eastern North America, the eminent forest ecologist E. Lucy Braun calls Donaldson's Woods a "white oak forest type, in appearance." She notes that most of the very large trees are white oak (Quercus alba), that very few of the large trees are American beech (Fagus grandifolia), and that the understory has large amounts of sugar maple (Acer saccharum). She concludes that this forest "does not appear to be climax" for the region; rather it is a mixed forest of a character transitional between mixed-mesophytic [prominent further to the east] and oak-hickory".

Donaldson's Woods has added significance: it is one of a few old growth forests in the country that has been consistently monitored for a long period of time. Beginning in 1954, the late Father Damien Schmelz and his colleagues conducted a 100% census of a portion of the woods, measuring every tree over 4" in size, and recording the species and diameter at breast height. They then re-sampled it every 10 years for the next 5 decades. It was last sampled in 2004. In their sampling reports, which they published in the Proceedings of the Indiana Academy of Science, they confirmed Lucy Braun's

Donaldson – continued on next page

Inside

If takes large calipers to measure large trees! The sampling crew (left to right) consists of Dave LeBlanc, Tom Hulvershorn, and John Bacone.

Coralie Palmer
president@indiananativeplants.org

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Indiana Native Plant Society

- Hosting the Indiana Plant Conservation Alliance (INPCA) website
- Providing some financial support for 14 land trusts and new CISMAs that are set up in Indiana to support their work on conservation and invasive species removal
- *Rubus* of Indiana funding 2021-2023

Coralie Palmer
president@indiananativeplants.org

www.indiananativeplants.org

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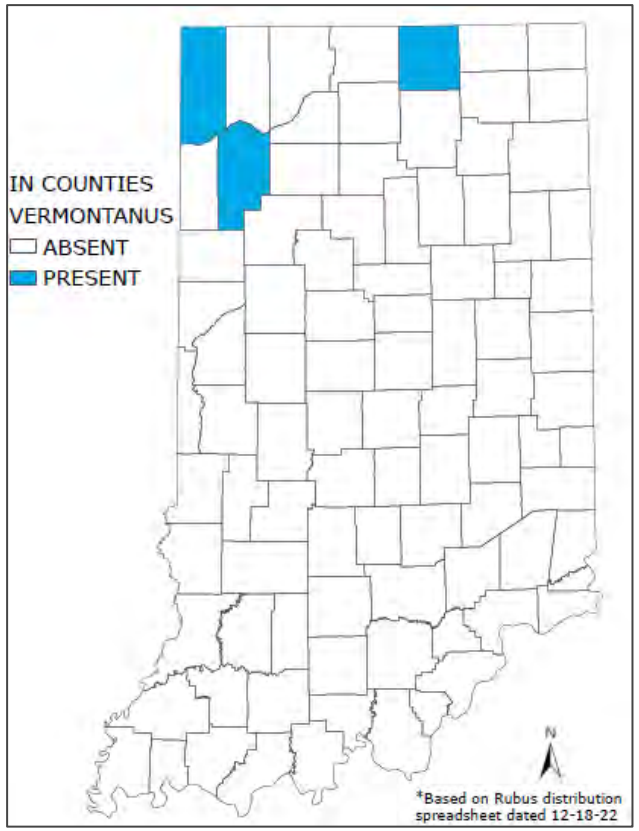
Rubus of Indiana project

Scott Namestnik
snamestnik@dnr.IN.gov

Most collections are historic



Courtesy Marcia Moore

Indiana Native Plant Society

Indiana Phenology

INDIANA PHENOLOGY

www.indianaphenology.org

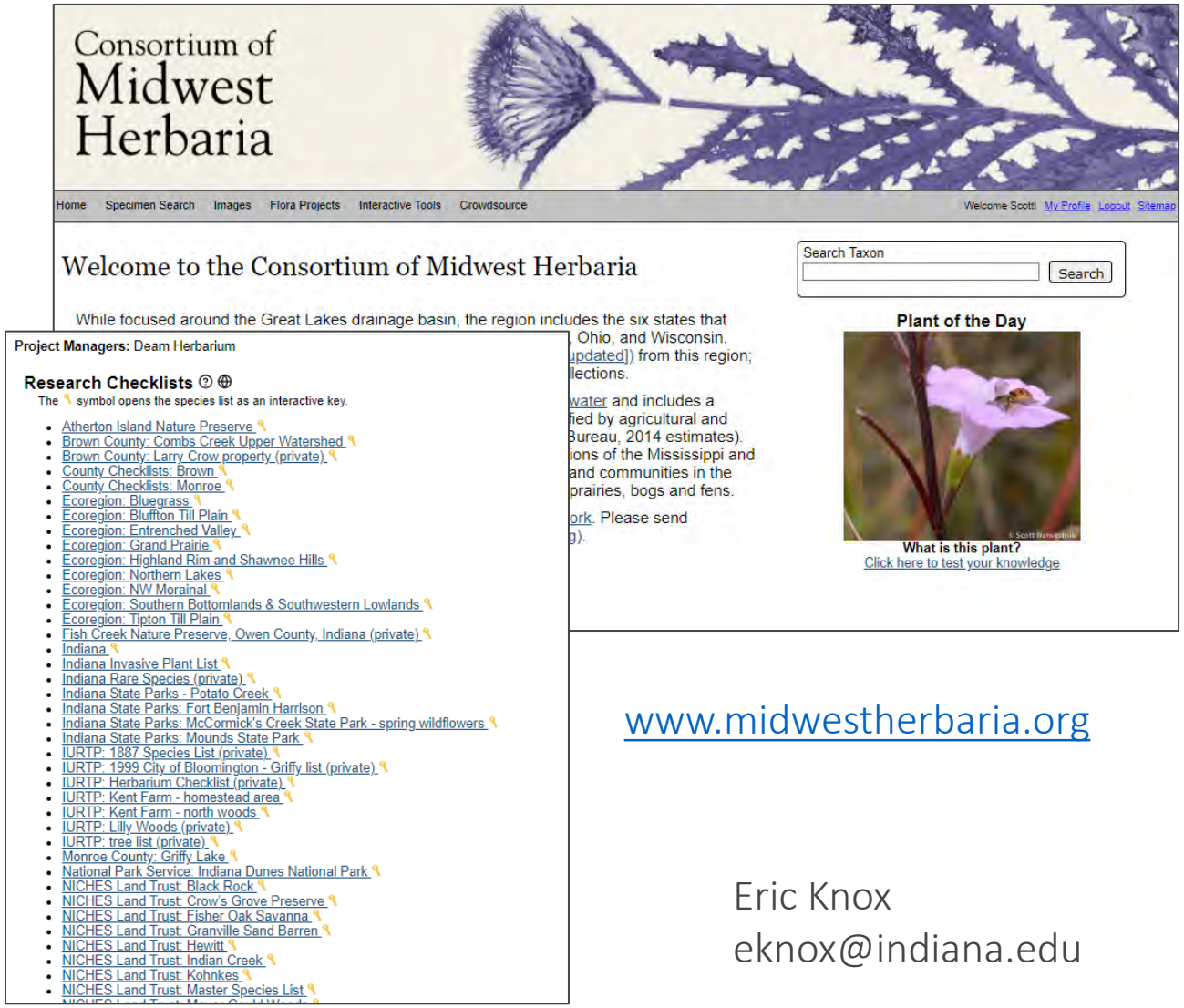
Amanda Wanlass
amanda@indianaphenology.org

- 501(c)(3) nonprofit organization dedicated to empowering Hoosiers of all ages to participate in citizen science
- Mission: Facilitate the long-term documentation of the phenology of plants in Indiana with the help of citizen scientists with the goal of having active observers in every county of Indiana
- Projects:
  - Backyard Observers (individuals and families in their neighborhoods)
  - Phenology Trails (observation sites on public or private land in partnership with other organizations),
  - Schoolyard Phenology (teachers engaging students in observation on school grounds)
- Make phenology data accessible to all Hoosiers

Consortium of Midwest Herbaria

- IU Herbarium Digitization
- “The Golden Key”
- Indiana Photographic Scavenger Hunt
  - Resulted in thousands of photos that are being added to photo gallery
- Species Checklists
  - Land Trusts
  - State Parks
  - Others
- Thank you, Paul Rothrock!

https://www.youtube.com/watch?v=z0Nh1RDj0Ag

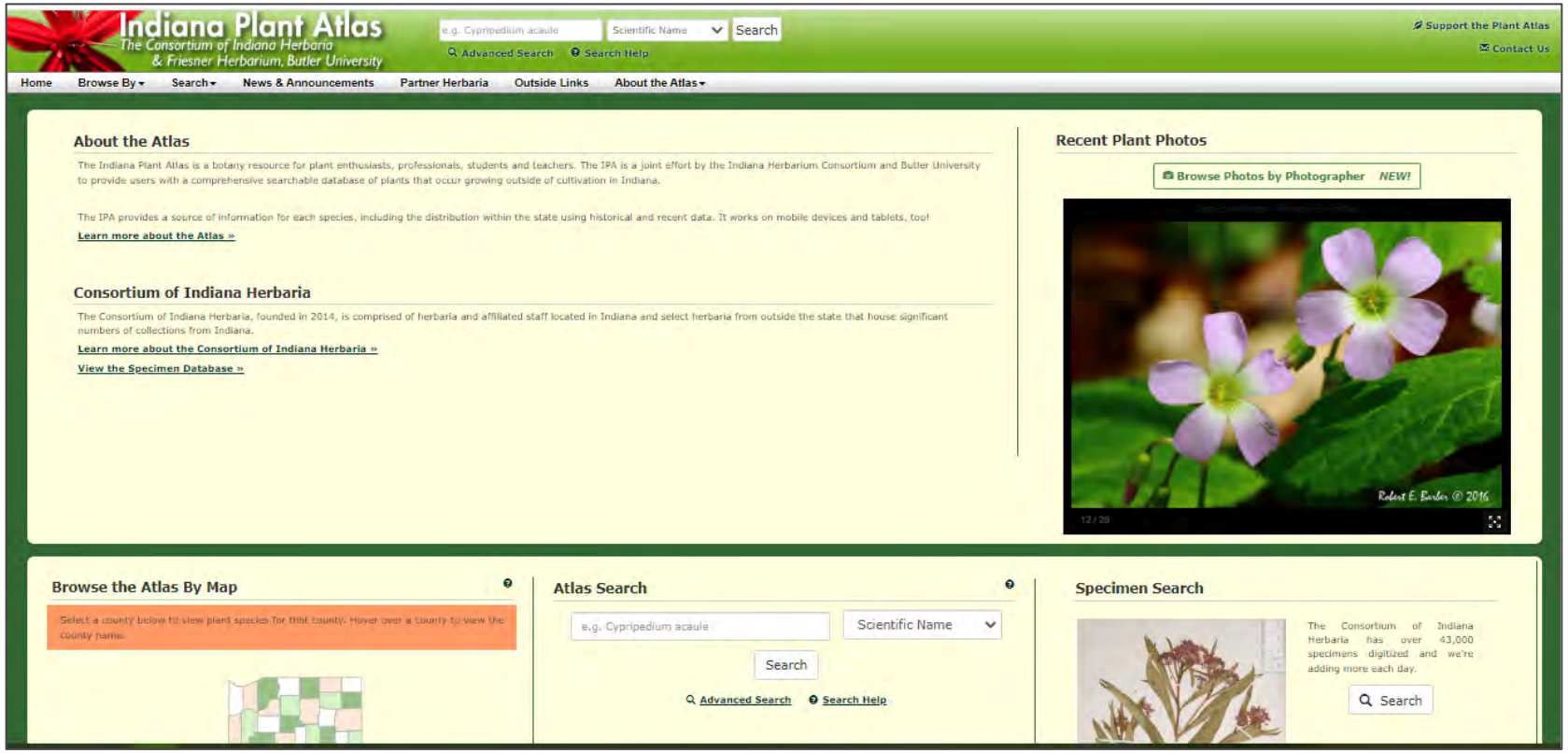


www.midwestherbaria.org

Eric Knox
eknox@indiana.edu

Indiana Plant Atlas

- Specimen images
- Species distributions
- Photographs

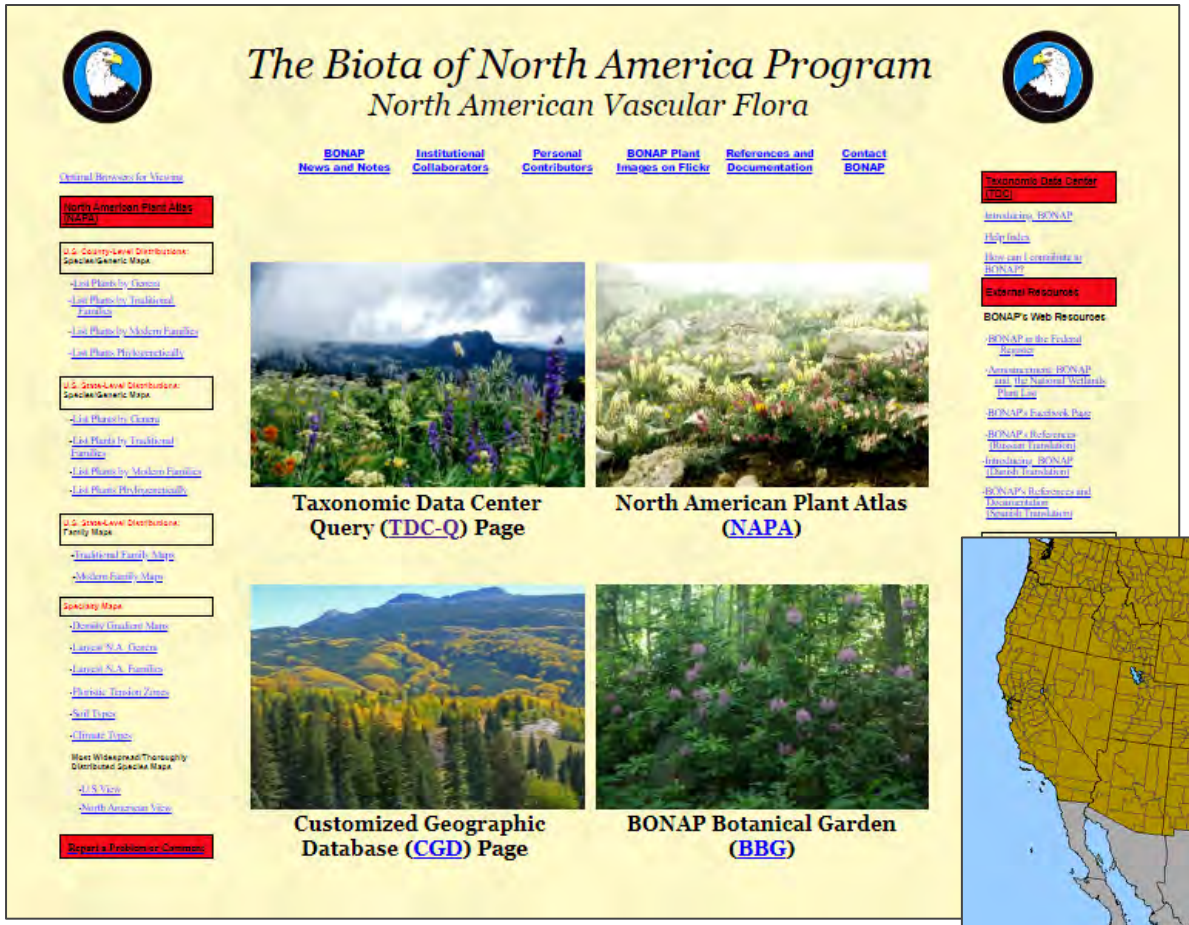


Marcia Moore
mmoore@butler.edu

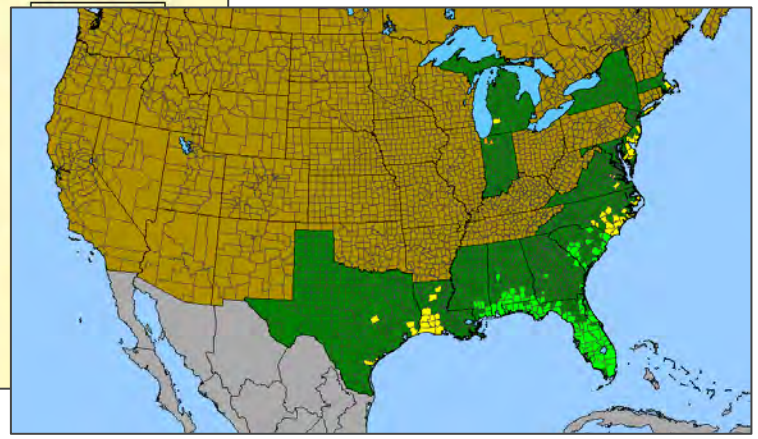
www.indiana.plantatlas.usf.edu/

Biota of North America Program (BONAP)

- County-level species distributions
- Watch for an update soon!

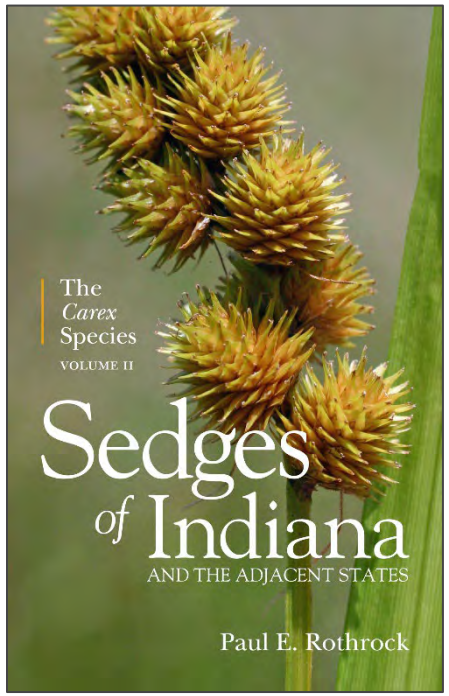


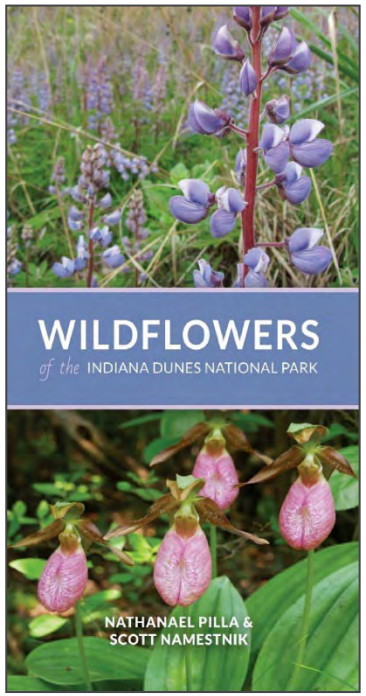
www.bonap.org

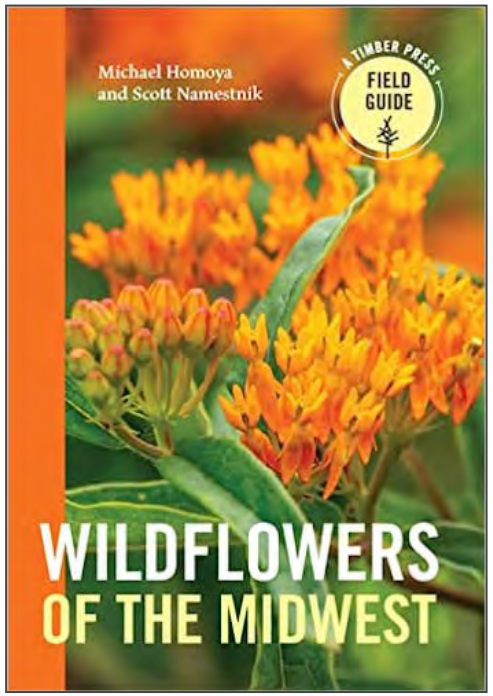


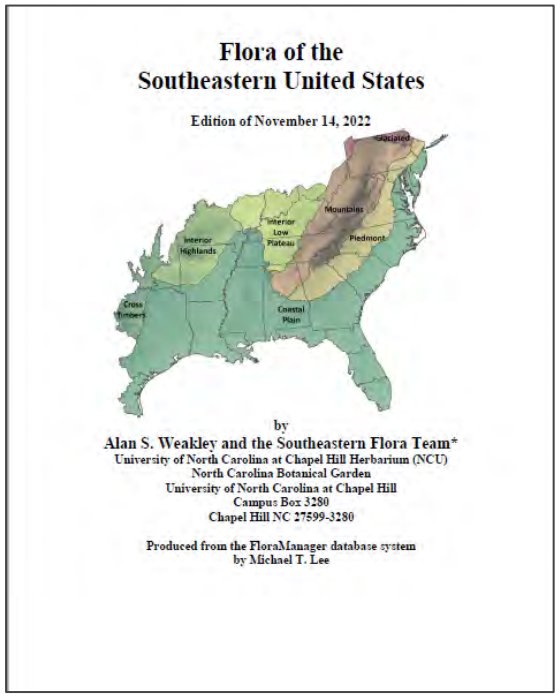
John Kartesz
jkartesz@bonap.org

Recently Published Books







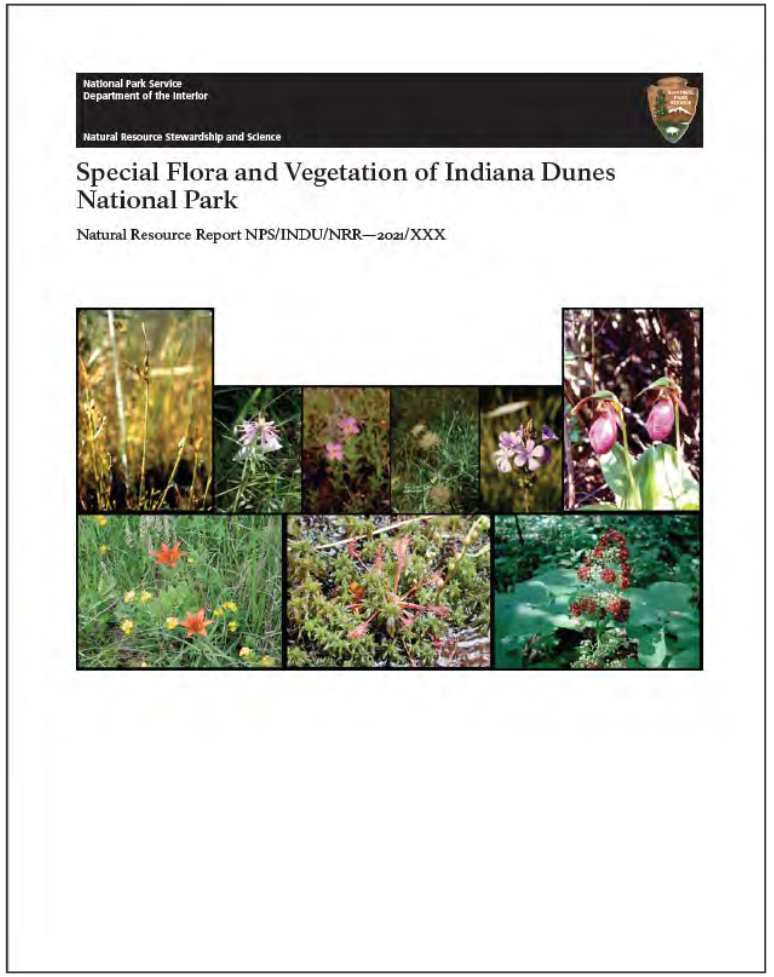


"We don't know Jack."

-Alan Weakley

Alan Weakley, © Alyssa LaFaro

In Publication



Expected publication 2023

Noel Pavlovic
npavlovic@usgs.gov

Indiana Vascular Plants Catalog

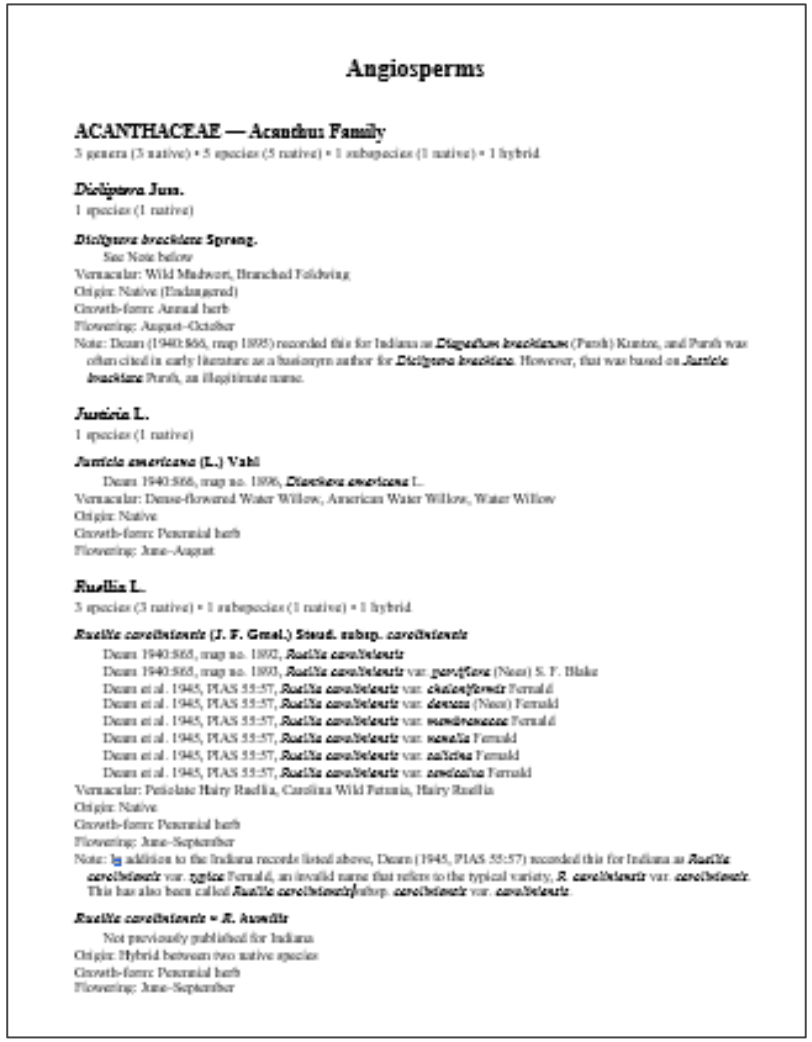
Kay Yatskievych hoping to get back at it soon

- All but 10 families completed

Indiana Flora (approximate)

- 185 total families
  - 164 native
  - 16 introduced
  - 5 excluded
- 2930 total species
  - 1950 native
  - 980 introduced

Kay Yatskievych
kay.yatskievych@mobot.org



Angiosperms

ACANTHACEAE — Acanthus Family
3 genera (3 native) • 5 species (5 native) • 1 subspecies (1 native) • 1 hybrid

***Dicliptera* Juss.**
1 species (1 native)

***Dicliptera brachiata* Spreng.**
See Note below
Vernacular: Wild Mudwort, Branched Foldwing
Origin: Native (Endangered)
Growth-form: Annual herb
Flowering: August–October
Note: Deam (1940:865, map 1895) recorded this for Indiana as *Diapedium brachiatum* (Pursh) Kuntze, and Pursh was often cited in early literature as a basionym author for *Dicliptera brachiata*. However, that was based on *Justicia brachiata* Pursh, an illegitimate name.

***Justicia* L.**
1 species (1 native)

***Justicia americana* (L.) Vahl**
Deam 1940:866, map no. 1898, *Dianthera americana* L.
Vernacular: Dense-flowered Water Willow, American Water Willow, Water Willow
Origin: Native
Growth-form: Perennial herb
Flowering: June–August

***Ruellia* L.**
3 species (3 native) • 1 subspecies (1 native) • 1 hybrid

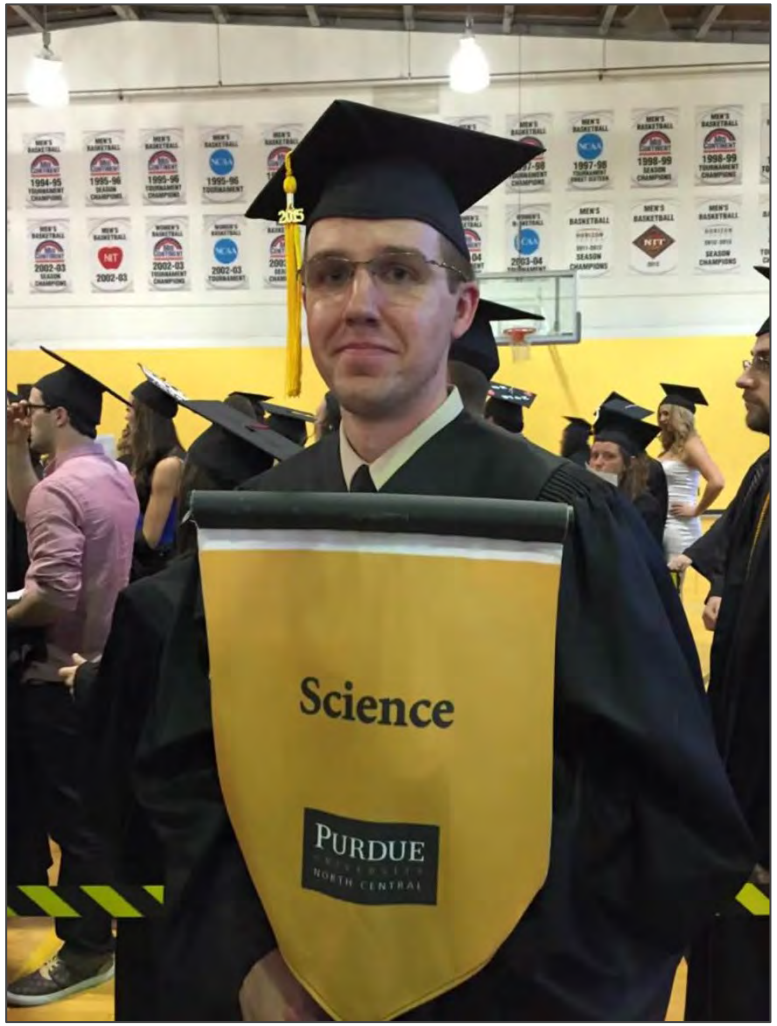
Ruellia caroliniensis* (J. F. Gmel.) Steud. subsp. *caroliniensis
Deam 1940:865, map no. 1892, *Ruellia caroliniensis*
Deam 1940:865, map no. 1893, *Ruellia caroliniensis* var. *parviflora* (Nees) S. F. Blake
Deam et al. 1945, PIAS 55:57, *Ruellia caroliniensis* var. *chalciflorella* Fernald
Deam et al. 1945, PIAS 55:57, *Ruellia caroliniensis* var. *derasa* (Nees) Fernald
Deam et al. 1945, PIAS 55:57, *Ruellia caroliniensis* var. *membranacea* Fernald
Deam et al. 1945, PIAS 55:57, *Ruellia caroliniensis* var. *nemalis* Fernald
Deam et al. 1945, PIAS 55:57, *Ruellia caroliniensis* var. *salicina* Fernald
Deam et al. 1945, PIAS 55:57, *Ruellia caroliniensis* var. *simulans* Fernald
Vernacular: Petiolate Hairy Ruellia, Carolina Wild Petunia, Hairy Ruellia
Origin: Native
Growth-form: Perennial herb
Flowering: June–September
Note: In addition to the Indiana records listed above, Deam (1945, PIAS 55:57) recorded this for Indiana as *Ruellia caroliniensis* var. *typica* Fernald, an invalid name that refers to the typical variety; *R. caroliniensis* var. *caroliniensis*. This has also been called *Ruellia caroliniensis* subsp. *caroliniensis* var. *caroliniensis*.

Ruellia caroliniensis* × *R. humilis
Not previously published for Indiana
Origin: Hybrid between two native species
Growth-form: Perennial herb
Flowering: June–September

BUT…

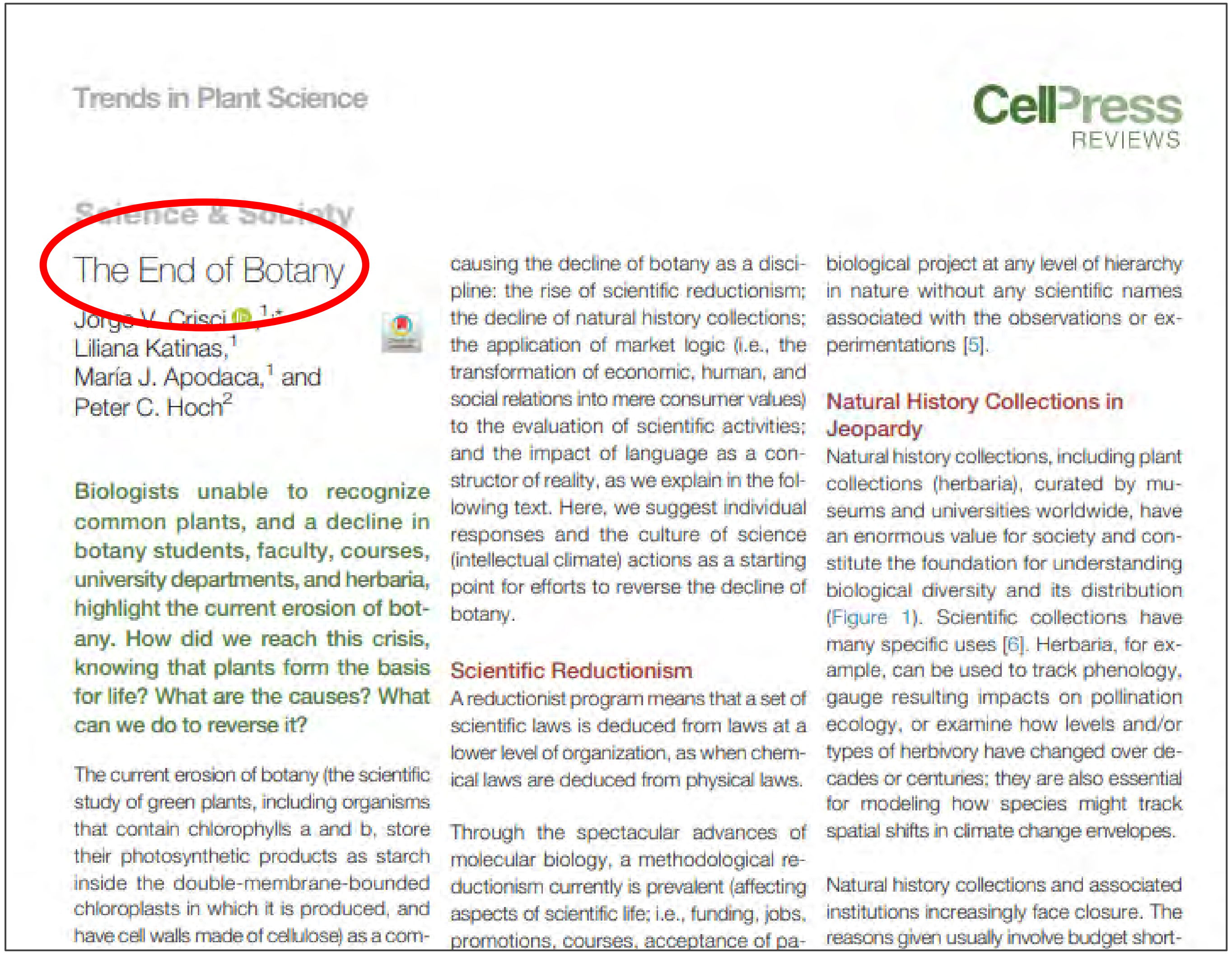
Botany Education Today

- 60 colleges/universities in Indiana
- 32 “offer” botany/plant science courses
- 12 “offer” field botany courses
- 6 “offer” “local flora” courses
- 0 offer a degree in botany
  (has been lumped into biology or environmental science)



Botany Education Today

- Number of research universities offering botany degrees has dropped by half since 1988 (NSF)
- Herbaria are closing or consolidating, making accessing physical specimens more difficult



Trends in Plant Science

CellPress REVIEWS

Science & Society

The End of Botany

Jorge V. Crisci,[1,*]
Liliana Katinas,[1]
María J. Apodaca,[1] and
Peter C. Hoch[2]

Biologists unable to recognize common plants, and a decline in botany students, faculty, courses, university departments, and herbaria, highlight the current erosion of botany. How did we reach this crisis, knowing that plants form the basis for life? What are the causes? What can we do to reverse it?

The current erosion of botany (the scientific study of green plants, including organisms that contain chlorophylls a and b, store their photosynthetic products as starch inside the double-membrane-bounded chloroplasts in which it is produced, and have cell walls made of cellulose) as a com- causing the decline of botany as a discipline: the rise of scientific reductionism; the decline of natural history collections; the application of market logic (i.e., the transformation of economic, human, and social relations into mere consumer values) to the evaluation of scientific activities; and the impact of language as a constructor of reality, as we explain in the following text. Here, we suggest individual responses and the culture of science (intellectual climate) actions as a starting point for efforts to reverse the decline of botany.

Scientific Reductionism

A reductionist program means that a set of scientific laws is deduced from laws at a lower level of organization, as when chemical laws are deduced from physical laws.

Through the spectacular advances of molecular biology, a methodological reductionism currently is prevalent (affecting aspects of scientific life; i.e., funding, jobs, promotions, courses, acceptance of pa- biological project at any level of hierarchy in nature without any scientific names associated with the observations or experimentations [5].

Natural History Collections in Jeopardy

Natural history collections, including plant collections (herbaria), curated by museums and universities worldwide, have an enormous value for society and constitute the foundation for understanding biological diversity and its distribution (Figure 1). Scientific collections have many specific uses [6]. Herbaria, for example, can be used to track phenology, gauge resulting impacts on pollination ecology, or examine how levels and/or types of herbivory have changed over decades or centuries; they are also essential for modeling how species might track spatial shifts in climate change envelopes.

Natural history collections and associated institutions increasingly face closure. The reasons given usually involve budget short-

Let me remind you…

"We don't know Jack."

-Alan Weakley

"Humanity doesn't need a moon base or a manned trip to Mars. We need an expedition to planet Earth, where probably fewer than 10 percent of the life forms are known to science, and fewer than 1 percent of those have been studied beyond a simple anatomical description and a few notes on natural history."

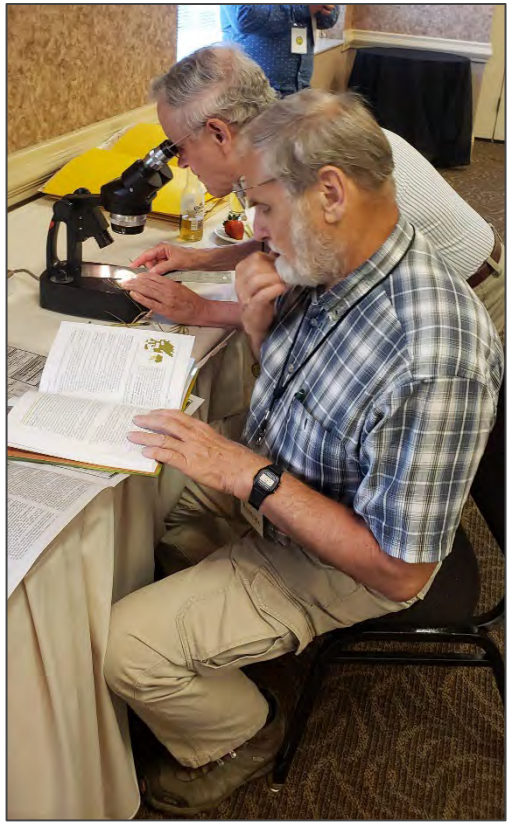
-E.O. Wilson, from The Creation (2006)

E.O. Wilson, © Rick Friedman

The Future of Botanical Education?

Efforts by The Mad Botanist

- 2022 conference honoring Paul Rothrock, focused on sedges
- 2024 conference honoring Gerould Wilhelm, focused on Floristic Quality Assessment
- History of the Chicago Region project (100-mile radius around the Loop)



Bill McKnight
bill.madbotanist@gmail.com

www.themadbotanist.com

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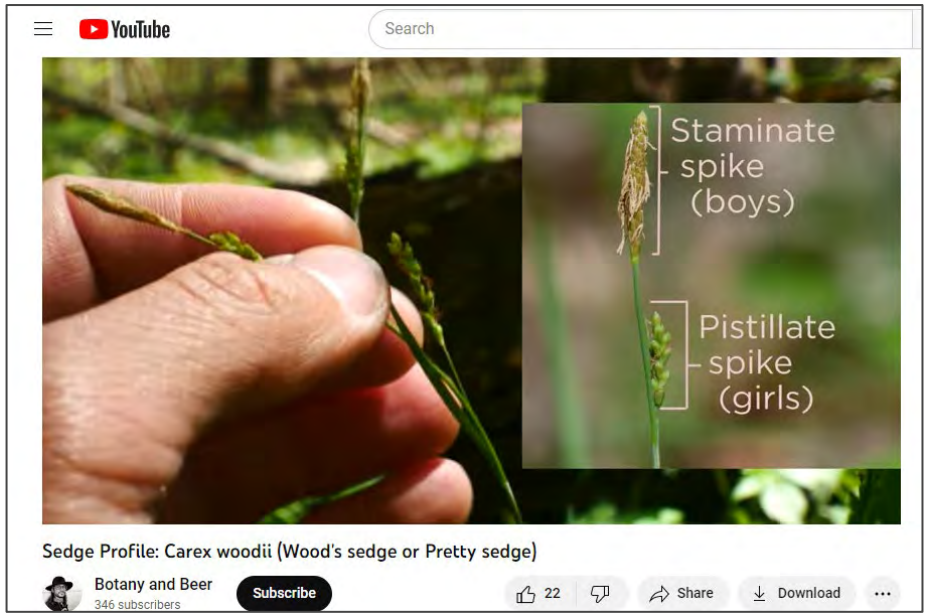
The Future of Botanical Education?



youtube.com/@botanyandbeer

Nathanael Pilla
npilla@midwestbiologicalsurvey.com

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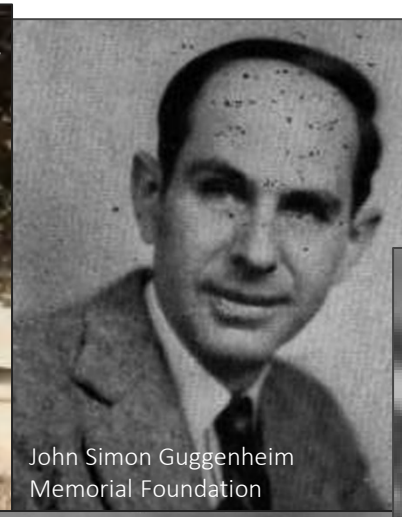
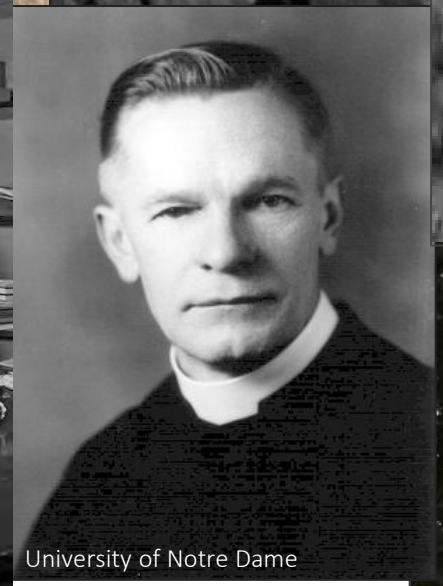
Friesner Herbarium
Butler University

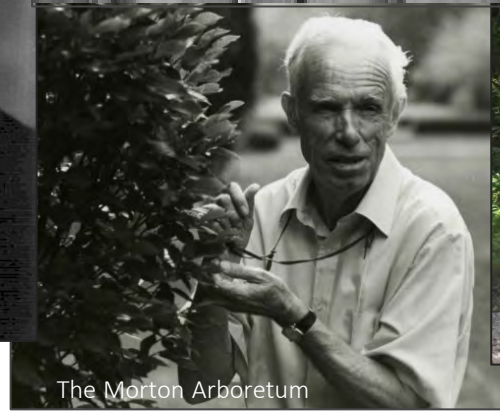

John Simon Guggenheim Memorial Foundation


Bedford Times-Mail


Ball State University


Indiana University


University of Notre Dame


The Morton Arboretum

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COMMUNITY
COLLABORATION
COMPASSION

Thank you!

STATE OF INDIANA
DEPARTMENT OF NATURAL RESOURCES
NATURE PRESERVES

Scott Namestnik
Botanist
DNR Natural Heritage Program

402 W. WASHINGTON ST., RM. W267
INDIANAPOLIS, IN 46204
https://www.in.gov/dnr/naturepreserve

PHONE: (317) 233-9244
CELL: (463) 203-7596
snamestnik@dnr.IN.gov

Courtesy Nathanael Pilla