Creating a 21st Century Virtual Herbarium at the University of Maryland

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University of Maryland

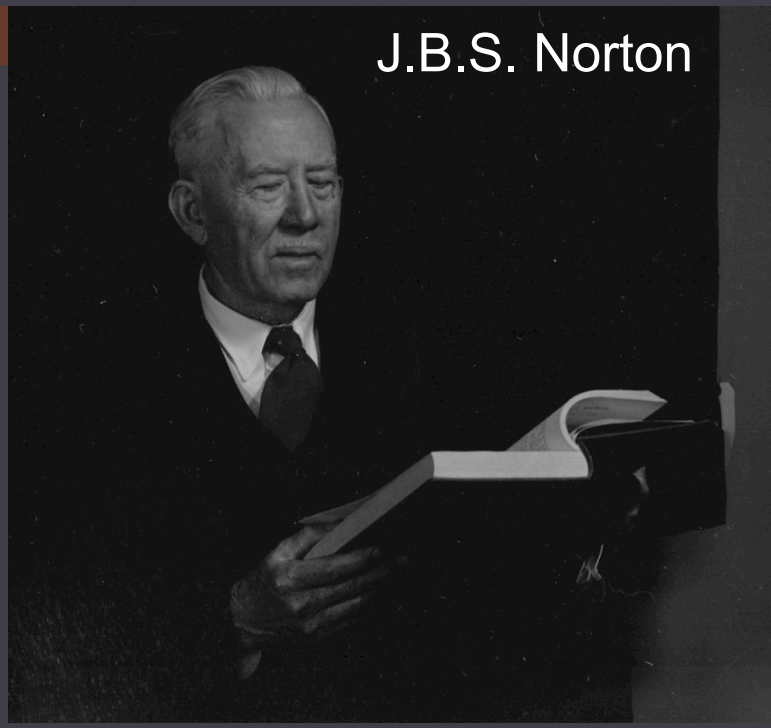
COLLEGE OF
AGRICULTURE &
NATURAL RESOURCES

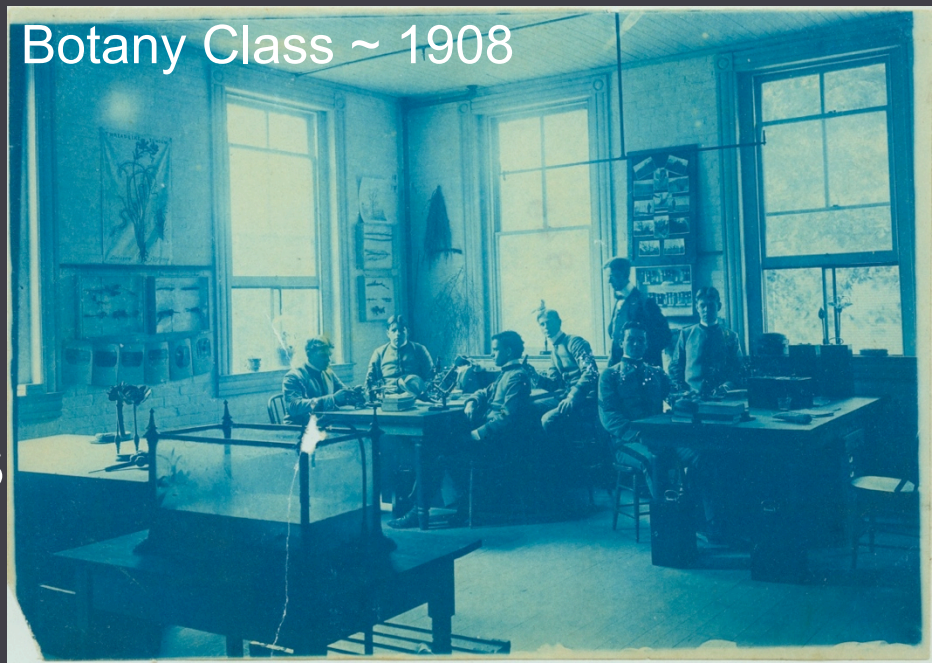
Outline

- Background MARY
- Virtual Herbarium
- Collaborations
- Future Goals

MARY - History

- Norton-Brown Herbarium (MARY) founded 1901 by J.B.S. Norton
- Collections basis for Brown & Brown floras
- J. Reveal, S. Hill etc. build diverse collections





MARY - Current Team

- Director: Maile Neel
- Curator: Tanja Schuster
- Database Assistant: Niko Anderson
- Graduate RA (1)
- FWS Students (3)

Maile Neel

Niko Anderson

Shanie Gal-Edd

Casey Barry

Kyra Sciaudone

Haiyang Li

MARY - Stats

- ~ 87,000 specimens
- ~ 22,000! unmounted
- Most representative collection for MD
- Organization: Mod. Engler & Prantl

MARY - Specimen Stats

Group	~Total #	~ # MD	# Mid-Atlantic	# U.S.	# International
Fungi and lichen	**500**	200	200	100	0
Algae	**850**	300	200	300	50
Bryophytes	**1700**	700	500	300	200
Ferns/fern allies	**1200**	500	300	200	200
Gymnosperms	**750**	300	200	100	150
Angiosperms	**82000**	28000	28600	19000	6400
Totals	**87000**	30000	30000	20000	7000

Strengths:

1. Polygonaceae
2. Malvaceae
3. Marcgraviaceae

1. *Persicaria longiseta*

2. *Hibiscus coccineus*

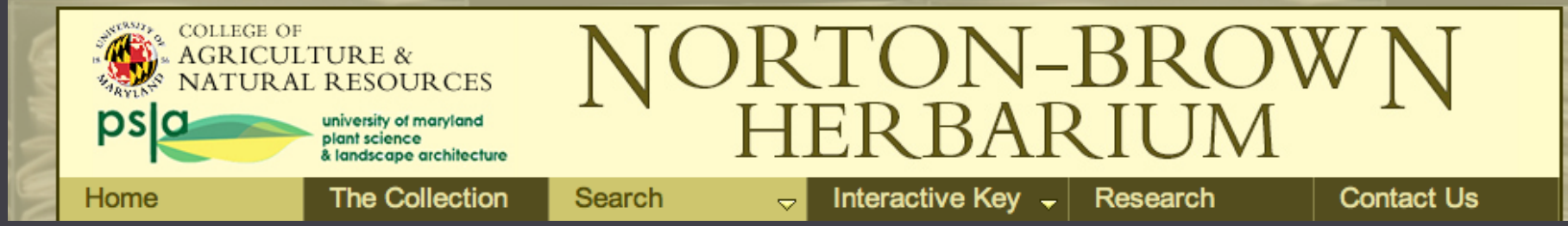
3. *Marcgravia nepenthoides*

Importance of Herbaria

- Plant Identification
- Understanding Evolution
- Documenting research
- Conservation

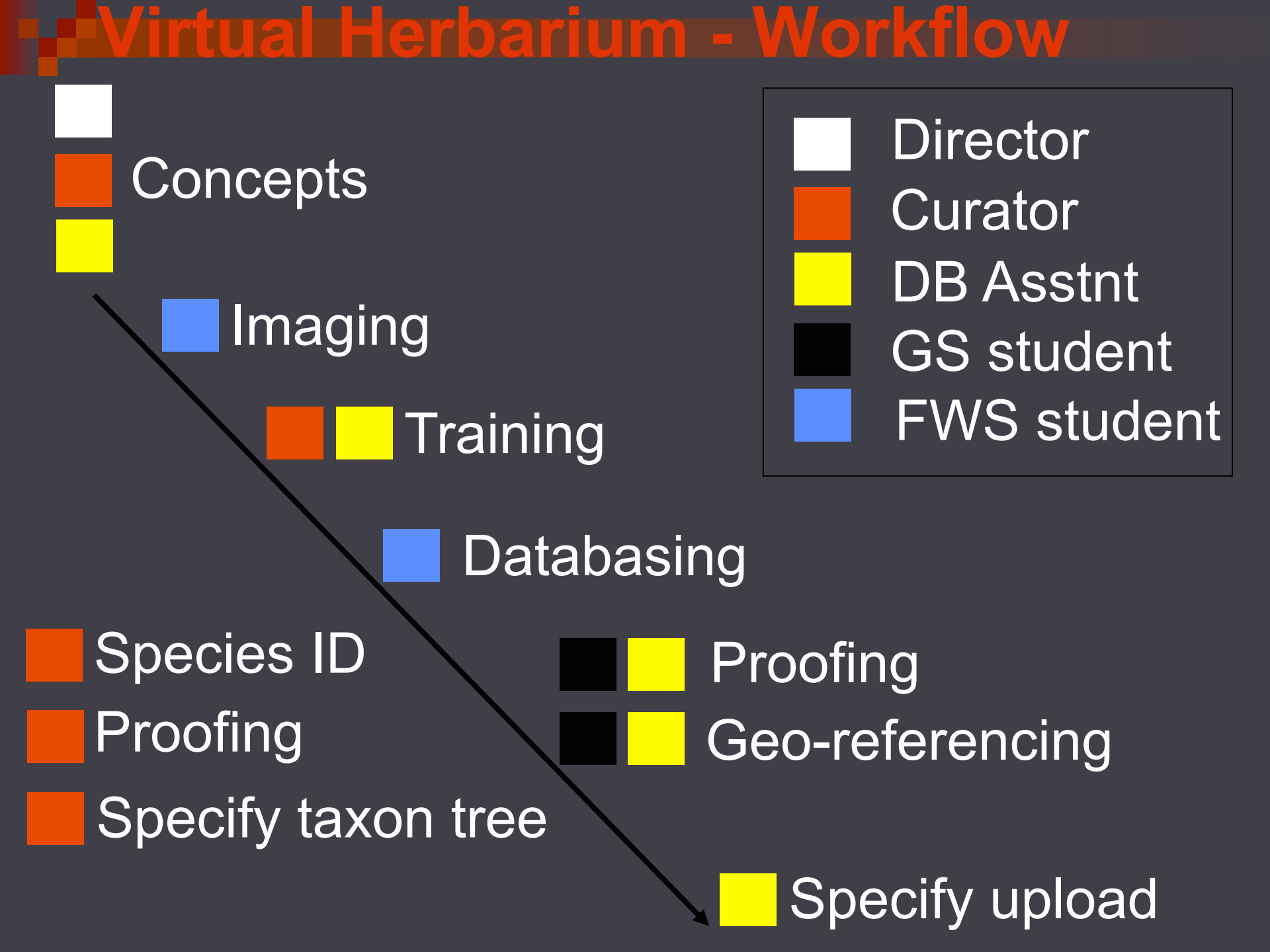
Medicinally important black cohosh

Virtual Herbarium - Product



- Vetted species ID
- Morphological data via high-res images
- Geo-referenced locality data → export
- Label data databased → export

Virtual Herbarium - Workflow

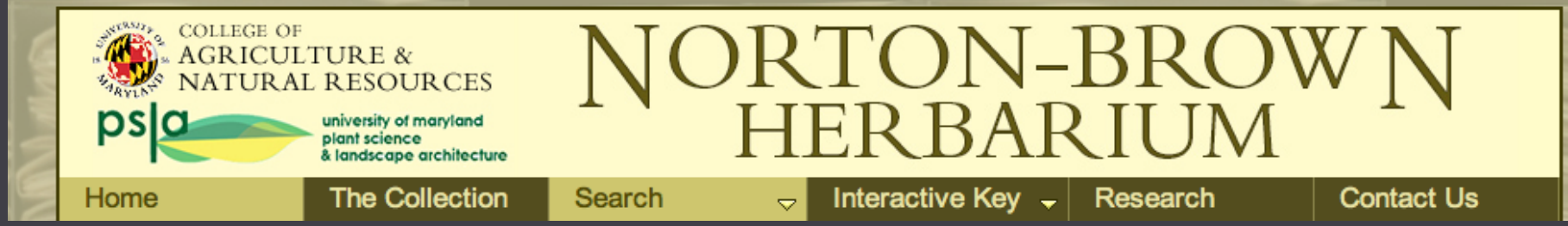


VH - Tools & Software

- IrfanView (batch rotate images)
- Specify v6 (database)
- Taxon tree imported from SC Herbarium
- MySQL database management system
- Custom PHP scripts (serve digitized data online)
- Geo-referenced data using Google Earth
- Google API (map search)
- ImageCutter (displays image search)
- NaviKey (using Delta) for interactive key
- Google Analytics

VH so far …

www.nbh.psla.umd.edu



- We have a webpage, dedicated server, IT support …
- ~ 21,000 MD specimens imaged
- ~ 5,600+ specimens served online
- Invasive species up 1st

MARY - Webpage

www.
nbh.
psla.
umd.
edu

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NORTON-BROWN HERBARIUM

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***Viola pedata* L.** - Bird's-foot violet flowers

Welcome to the Norton-Brown Herbarium (MARY)

The Norton-Brown Herbarium (Herbarium code MARY) is administered by the Department of Plant Science and Landscape Architecture in the College of Agricultural and Natural Resources at the University of Maryland College Park. MARY is home to a natural heritage collection that includes ~87,000 specimens of flowering plants, cone-bearing plants, algae, mosses, liverworts, lichen, and fungi. Established in 1901, the Norton-Brown Herbarium holds the largest number of specimens from Maryland, and the mid-Atlantic and also has a diverse collection of preserved plants from all over the world. The collections housed here were instrumental in developing the flora treatments Woody Plants of Maryland (Brown & Brown 1972) and Herbaceous Plants of Maryland (Brown & Brown 1984).

State Botanist Chris Frye and the herbarium staff doing field work.

The herbarium is used by professionals, students, citizen scientists, and volunteers who represent academic institutions, conservation groups and federal and state agencies. We host in-house and visiting researchers working on treatments of particular plant groups or on regional floras, and undergraduate and graduate students doing research on plants and plant communities. The specimens are also used by arborists, horticulturists, members of garden clubs, conservation groups and consultants. The collections are an irreplaceable source of data on where species occurred at different

What's New

The Digital Herbarium is Online!

Search the Herbarium

Bioscience Research and Technology Day 2012

VH - Collection Page

- Stats
- History
- Collectors

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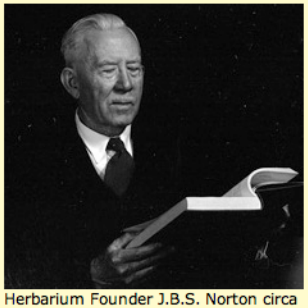
Taxonomic and Geographic Breadth of the Collection

Based on an August 2011 audit of the Norton-Brown Herbarium, the collection has ~87,000 specimens, most of which are angiosperms from Maryland or other Mid-Atlantic states.

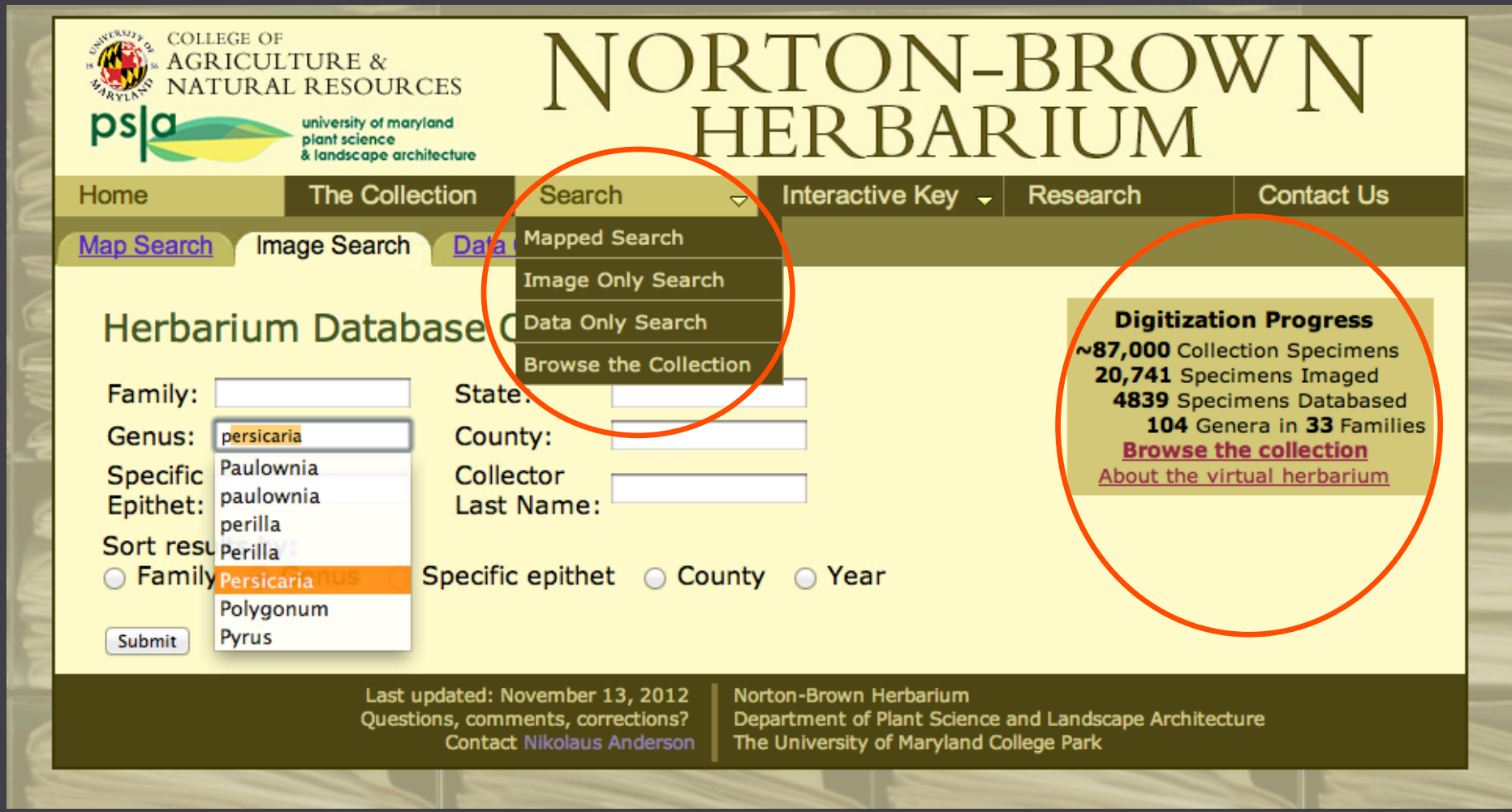
Group	~Total Number of Specimens	~Number of Maryland Specimens	Number of Mid-Atlantic Specimens	Number of U.S. Specimens	Number of International. Specimens
Fungi and lichens	500	200	200	100	0
Algae	850	300	200	300	50
Bryophytes	1700	700	500	300	200
Ferns/fern allies	1200	500	300	200	200
Gymnosperms	750	300	200	100	150
Angiosperms	82000	28000	28600	19000	6400
Totals	87000	30000	30000	20000	7000



Herbarium Founder J.B.S. Norton circa 1951.[1]

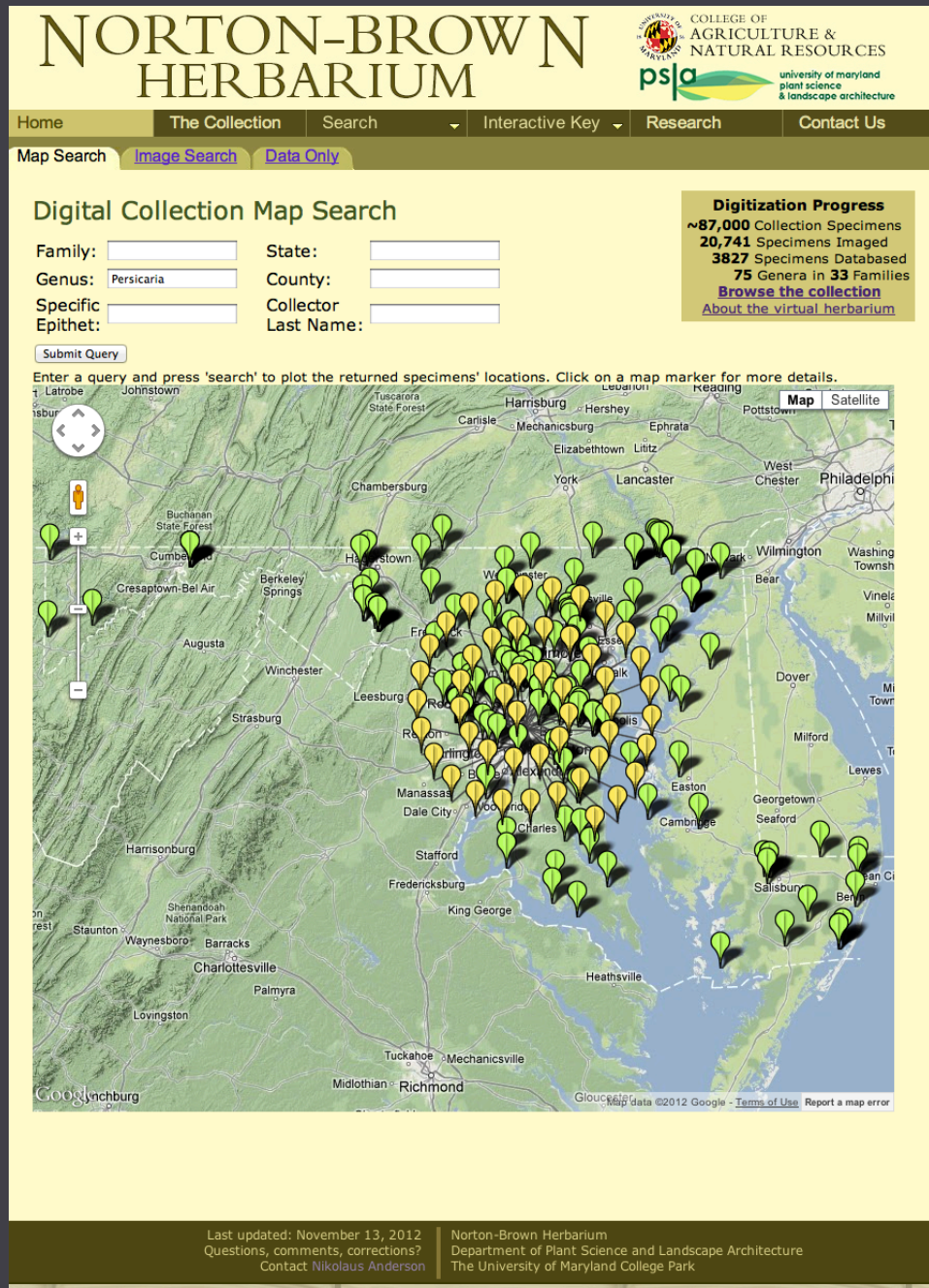
Despite the relative inactivity over the last two decades, the Norton-Brown Herbarium remains the most representative collection of Maryland plants and one of the largest in the state with ~28,000 specimens compared to Towson University (BALT) with ~20,000 Maryland plants in their collection of ~60,000 specimens, Salisbury University (SUHC) with ~6,200 specimens, and MD-DNR (TAWES) with ~4,300 specimens focused on species of conservation concern. MARY is on par with the Smithsonian's (US) Flora of the Greater DC region collection which has ~30,000 specimens.

VH - Search Pages



VH - Search Pages - Map

- Georeferenced locality data
- Export data to spread sheet
- Excludes threatened species



VH - Search Pages - Image

Accession # 000037302

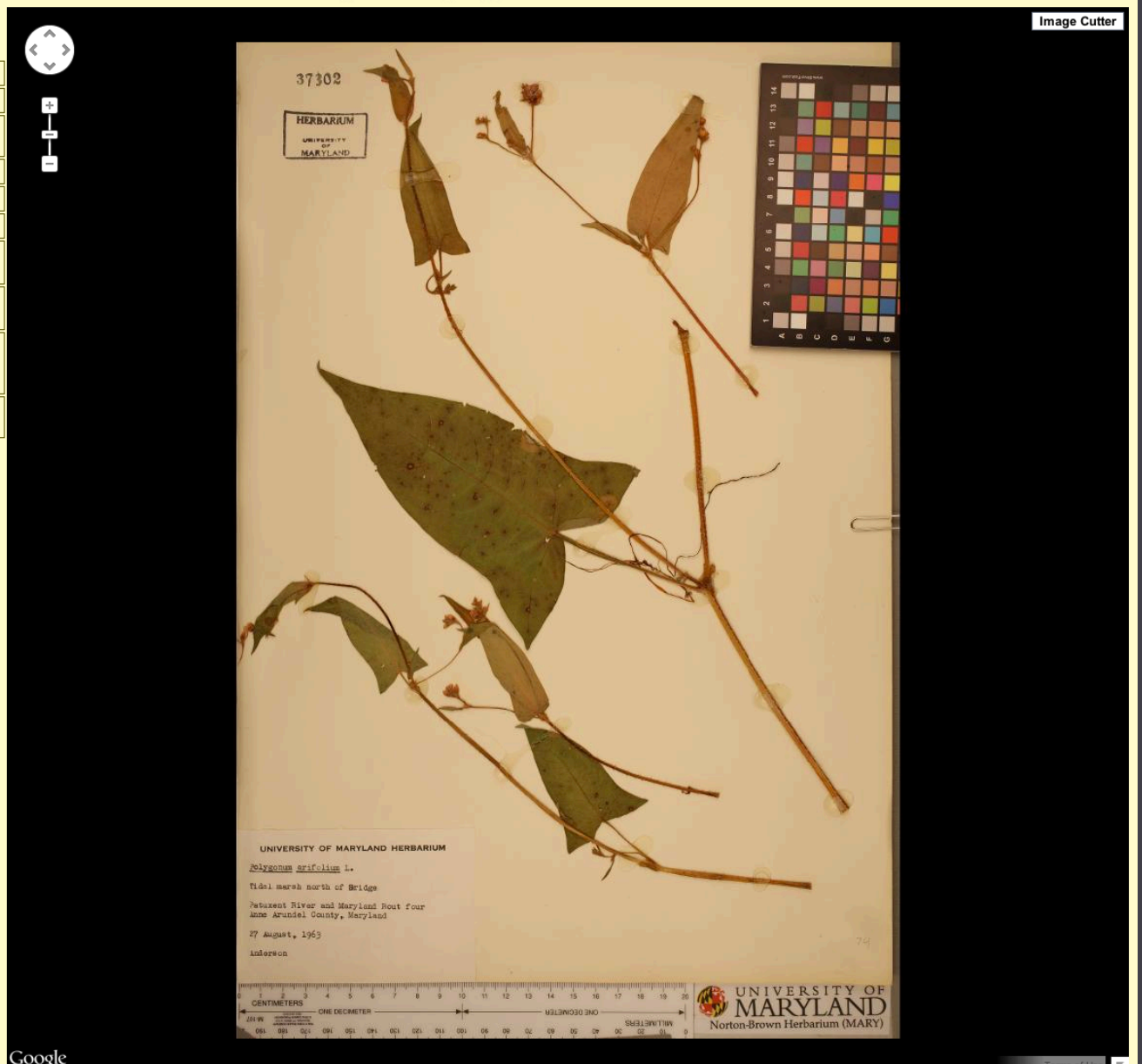
NORTON-BROWN HERBARIUM

Right Click Here -> Save link As...

Persicaria arifolia (L.) Haraldson

Family	Polygonaceae
Collecter	Anderson
Date Collected	8/27/1963
Country	United States
State	Maryland
County	Anne Arundel County
Locality	Patuxent River and Maryland Route four
GPS Coordinates	38.8116500000 , -76.7106000000
GPS Source	*Estimated from locale information using google maps*
Estimate Precision	1/25th to 1 square mile

Application:
GMap 'ImageCutter'
Bartlett Centre of Advanced Spatial Analysis



VH - Search Pages - Data

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Map Search | Image Search | Data Only

Database Query

Family: | State:
Genus: Persicaria | County:
Specific Epithet: | Collector Last Name:

Sort results by:
○ Family ◉ Genus ○ Specific epithet ○ County ○ Year

Submit

Digitization Progress
~87,000 Collection Specimens
20,741 Specimens Imaged
4839 Specimens Databased
104 Genera in **33** Families
Browse the collection
About the virtual herbarium

Accession Number	Genus	Specific Epithet	Common Name(s)	Collector	Date Collected	State	County	Locale
5482	Persicaria	maculosa	ladys-thumb	Oliver H. Thompson	9/10/1973	Maryland	Calvert	Patuxent River brackish marsh, Broomes Isl.
5485	Persicaria	maculosa	ladys-thumb	Oliver H. Thompson	8/27/1972	Maryland	Queen Annes	Brackish marsh 10 miles south of Chestertown and 1 mile northeast of the confluence of the Chester River and Langford Creek
28558	Persicaria	maculosa	ladys-thumb	P. Gladu	7/30/1965	Maryland	Kent	Delario Bay, Worton Creek Spit
28907	Persicaria	arifolia		E. H. Walker	6/28/1930	District of Columbia		Shaw Lily Ponds
5487	Persicaria	maculosa	ladys-thumb	Robert M. Downs	9/1/1969	Maryland	Garrett	Along Potomac River within 1 mile northeast of Kitzmiller.
30098	Persicaria	sagittata	arrow-leaf tearthumb	P. Worthington	7/24/1908	Maryland	Prince Georges	College Park
5488	Persicaria	maculosa	ladys-thumb	L. L. Stuart	10/12/1940	Maryland	Baltimore	Catonsville
30099	Persicaria	sagittata	arrow-leaf tearthumb	P. Worthington	7/16/1968	Maryland	Prince Georges	College Park
32287	Persicaria	maculosa	ladys-thumb	J. E. Bruechet	9/25/1909	Maryland	Montgomery	Montgomery County
5495	Persicaria	maculosa	ladys-thumb	E. G. Worthley	10/13/1949	Maryland	Anne Arundel	Patuxent Refuge
32289	Persicaria	sagittata	arrow-leaf tearthumb	J. E. Benedict, Jr.	8/2/1909	Maryland	Montgomery	Montgomery County
5496	Persicaria	maculosa	ladys-thumb	C. S. Ridgeway	7/21/1903	Maryland	Anne Arundel	Bay Ridge
5497	Persicaria	maculosa	ladys-thumb	Norton	8/16/1904	Maryland	Washington	Along Canal, Antietam
5498	Persicaria	maculosa	ladys-thumb	Jane Engh	8/1/1964	Maryland	Howard	Woodbine
5499	Persicaria	maculosa	ladys-thumb	Jane Engh	8/9/1964	Maryland	Howard	University Farm on Folly Qtr Rd.

Total 209; Pages:14; Page :1Next

Export results

VH - Search Pages - Browse

- Genera databased
- Families listed

VH - Interactive Key

NORTON-BROWN HERBARIUM

Woody Plant Interactive Key

Herbarium home
Key user's guide
Plant ID guides

- Please visit our guides for more information on using this key.
- **Popups must be enabled** to view the reference images on the left menu
- ***RIGHT CLICK*** on a species to view its description and image gallery

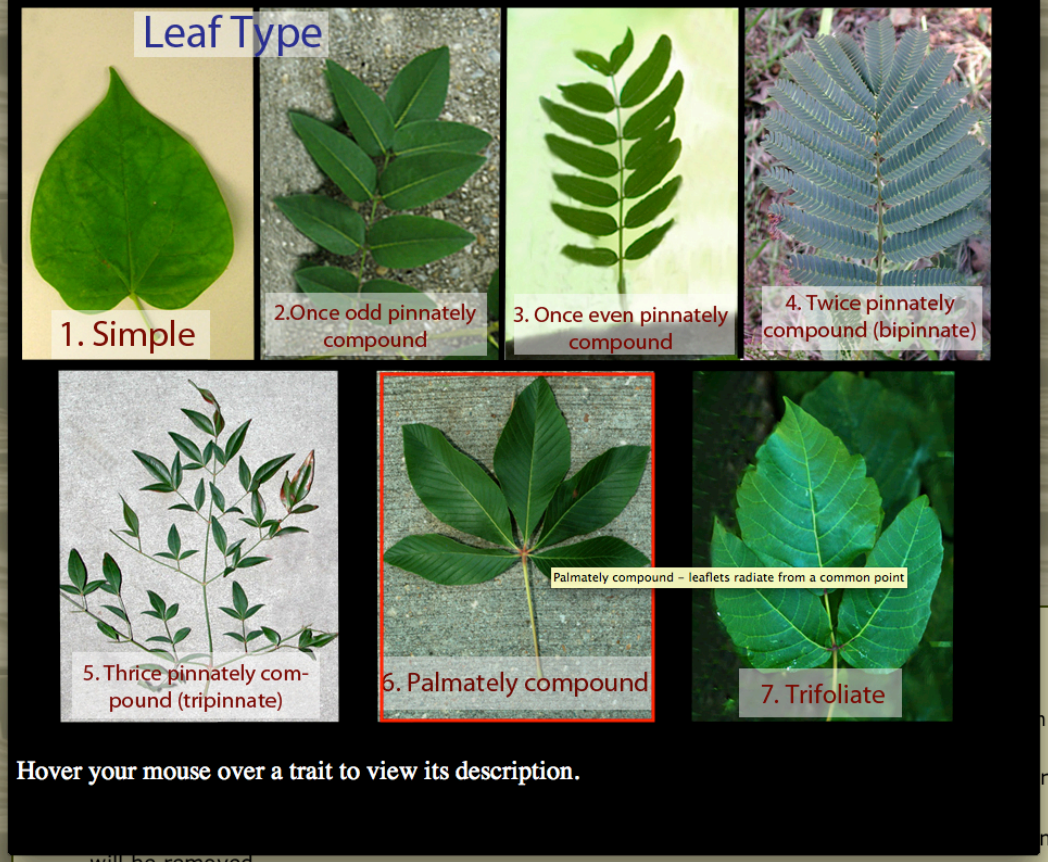
Quick Trait Reference

- Growth habit
- Leaf type
- *Leaf shape*
- Leaf arrangement
- *Leaf margin*
- Leaf base shape
- Leaf apex shape
- Fruit type
- Flower Corolla shape
- Inflorescence type
- Bud scale type
- Cone texture
- Cone detail

Characteristic Index

Taxon Index

jQuery maphilight documentation



a characteristic in the left

rical value and press the

matching the descriptions

will be removed.

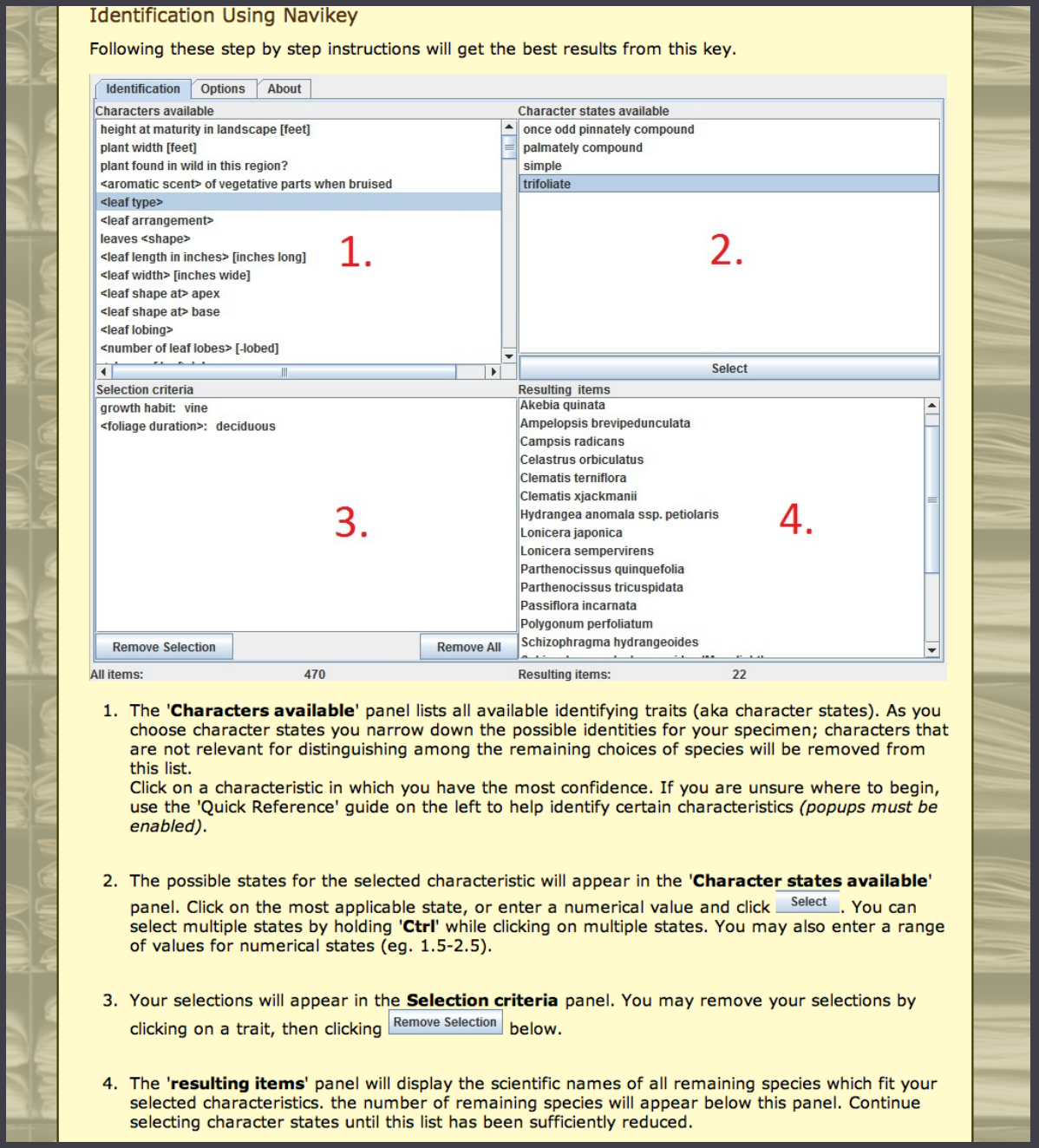
- You can remove a characteristic by clicking 'remove selection ' below, or start over with the ' remove all ' button

- Continue to select characteristics until enough plants have been eliminated
- **Right click** on a resulting plant and select [Description] to view a full description or [Images] to view it's gallery (popups must be enabled)

VH - Interactive Key Guide

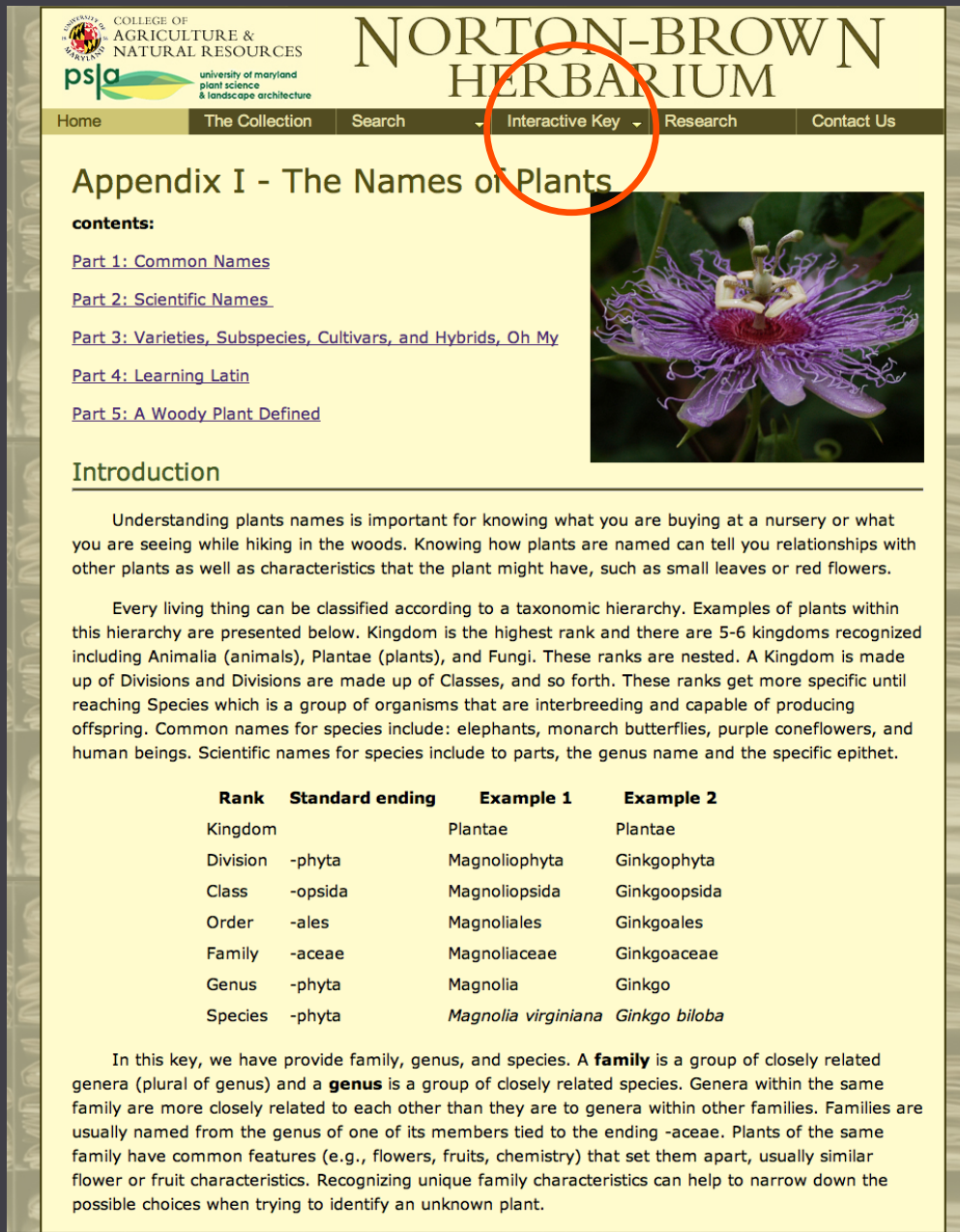
- Key usage explained
- In Interactive Key tab

Application: ‘NaviKey’



VH - Interactive Key & ID Guides

- Key Guide
- The Names of Plants
- Leaves
- Twigs and Stems
- Flowers and Fruits



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Appendix I - The Names of Plants

contents:

Part 1: Common Names

Part 2: Scientific Names

Part 3: Varieties, Subspecies, Cultivars, and Hybrids, Oh My

Part 4: Learning Latin

Part 5: A Woody Plant Defined

Introduction

Understanding plants names is important for knowing what you are buying at a nursery or what you are seeing while hiking in the woods. Knowing how plants are named can tell you relationships with other plants as well as characteristics that the plant might have, such as small leaves or red flowers.

Every living thing can be classified according to a taxonomic hierarchy. Examples of plants within this hierarchy are presented below. Kingdom is the highest rank and there are 5-6 kingdoms recognized including Animalia (animals), Plantae (plants), and Fungi. These ranks are nested. A Kingdom is made up of Divisions and Divisions are made up of Classes, and so forth. These ranks get more specific until reaching Species which is a group of organisms that are interbreeding and capable of producing offspring. Common names for species include: elephants, monarch butterflies, purple coneflowers, and human beings. Scientific names for species include to parts, the genus name and the specific epithet.

Rank	Standard ending	Example 1	Example 2
Kingdom		Plantae	Plantae
Division	-phyta	Magnoliophyta	Ginkgophyta
Class	-opsida	Magnoliopsida	Ginkgoopsida
Order	-ales	Magnoliales	Ginkgoales
Family	-aceae	Magnoliaceae	Ginkgoaceae
Genus	-phyta	Magnolia	Ginkgo
Species	-phyta	*Magnolia virginiana*	*Ginkgo biloba*

In this key, we have provide family, genus, and species. A **family** is a group of closely related genera (plural of genus) and a **genus** is a group of closely related species. Genera within the same family are more closely related to each other than they are to genera within other families. Families are usually named from the genus of one of its members tied to the ending -aceae. Plants of the same family have common features (e.g., flowers, fruits, chemistry) that set them apart, usually similar flower or fruit characteristics. Recognizing unique family characteristics can help to narrow down the possible choices when trying to identify an unknown plant.

VH - Research Page

- Forms:
  - Rules & Regs
  - Destructive sampling
  - Requesting loans
- Directions

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Part of our mission at the Norton-Brown Herbarium (MARY) is to support botanical research by granting access to our collections. We also endeavor to preserve and safeguard the valuable natural heritage collections in our charge. Visitors must read and agree to abide by our general rules and regulations as well as destructive sampling policies. Please refer to the document on loans if you are interested in requesting a loan from MARY.

Visiting the Herbarium:

The Norton-Brown Herbarium welcomes any visitor with a legitimate reason to consult the collections. Please make arrangements before you visit by contacting the Curator of the Herbarium, Dr. Tanja M. Schuster (tschuste@umd.edu).

Herbarium Hours:

Regular working hours at the Herbarium are Monday - Friday, 9:00 AM to 5:30 PM. On special occasions, arrangements can be made to access the Herbarium outside of these hours.

Address:

The Norton-Brown Herbarium
Research Greenhouse Complex (RGC)
University of Maryland
College Park, MD 20742-4452

GPS coordinates: 38.998225,-76.942985

Getting to the Herbarium:

The latitude and longitude coordinates given in the address section above can be used to find your way to us with any GPS navigation system or GIS mapping tool.

We are also accessible from throughout the DC metropolitan area including two of the major airports via public transportation using the WMATA Metro system and campus shuttles. The closest Metro stop is 'College Park - U of MD' on the Green Line.

From National Airport (DCA), take the Yellow Line WMATA Metro train towards Fort Totten or Mt. Vernon Square. Some Yellow Line trains go all the way to College Park. If you are on one that stops before College Park, you will need to switch to the Green Line towards Greenbelt anywhere between the 'L'Enfant Plaza' station and the final Yellow Line stop. You will get off the train at the 'College Park - U of Md' station.

Collaborations

- *Asclepias* spp. phenophase data for monarch migration study
- Flora of MD

Palomedes butterflies on *Asclepias tuberosa*

MARY - Future Goals

- Transition to APG III
- New imaging system
- Database/geo-reference >>>
- Serve all 87,000 specimens online

Persicaria perfoliata

Thanks go to…

- Bill Kenworthy
- Dept. of PSLA
- You for listening

Questions?

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plant science & landscape architecture