

Research Coordination & Scientific Community Outreach: *Summit 2014*

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University of Florida



iDigBio is funded by a grant from the National Science Foundation's Advancing Digitization of Biodiversity Collections Program (Cooperative Agreement EF-1115210). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation. All images used with permission or are free from copyright.



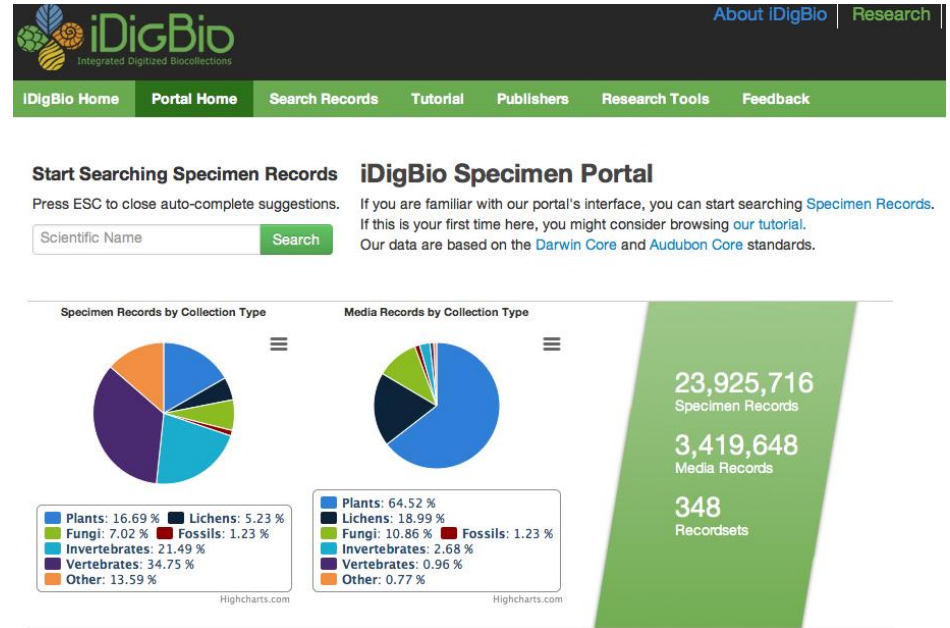
Collections: The Library of Life

>1600 natural history
collections
in the US alone
1-2 billion specimens
in the US
3-4 billion specimens
worldwide



Research @ iDigBio

- Specimen portal



The screenshot shows the iDigBio Specimen Portal interface. At the top, there is a navigation bar with links for 'iDigBio Home', 'Portal Home', 'Search Records', 'Tutorial', 'Publishers', 'Research Tools', and 'Feedback'. Below the navigation bar, there is a search section with a text input field for 'Scientific Name' and a 'Search' button. To the right of the search bar, there is a message: 'Start Searching Specimen Records iDigBio Specimen Portal. Press ESC to close auto-complete suggestions. If you are familiar with our portal's interface, you can start searching Specimen Records. If this is your first time here, you might consider browsing our tutorial. Our data are based on the Darwin Core and Audubon Core standards.'

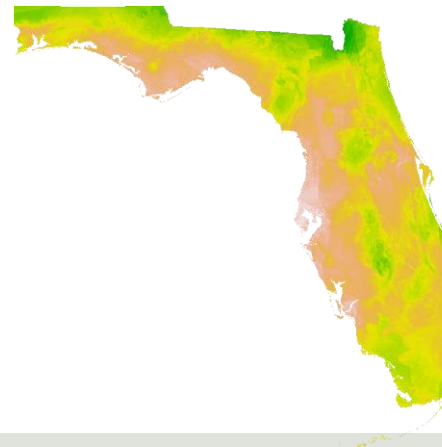
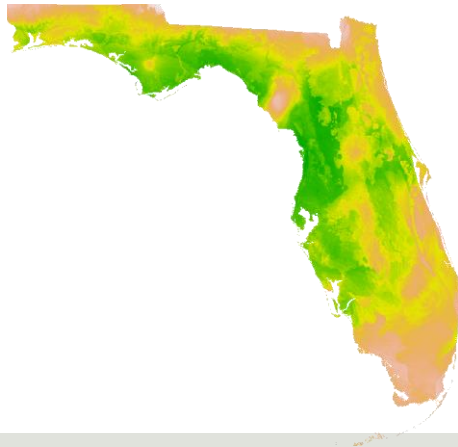
Below the search bar, there are two pie charts showing the distribution of records by collection type. The first chart is titled 'Specimen Records by Collection Type' and the second is titled 'Media Records by Collection Type'. Both charts have a legend below them.

Collection Type	Specimen Records (%)	Media Records (%)
Plants	16.69 %	64.52 %
Fungi	7.02 %	10.86 %
Invertebrates	21.49 %	2.68 %
Vertebrates	34.75 %	0.96 %
Other	13.59 %	0.77 %
Lichens	5.23 %	18.99 %
Fossils	1.23 %	1.23 %

On the right side of the interface, there is a green vertical bar with the following statistics:

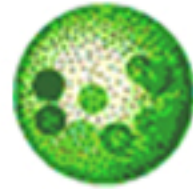
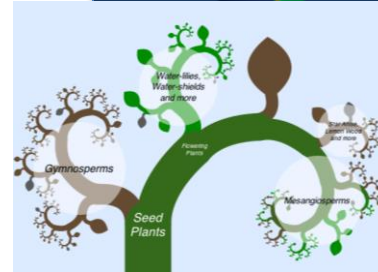
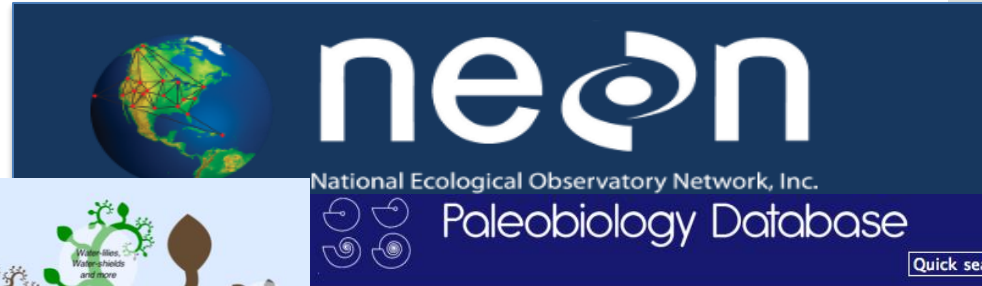
- 23,925,716 Specimen Records
- 3,419,648 Media Records
- 348 Recordsets

- Computational workflows

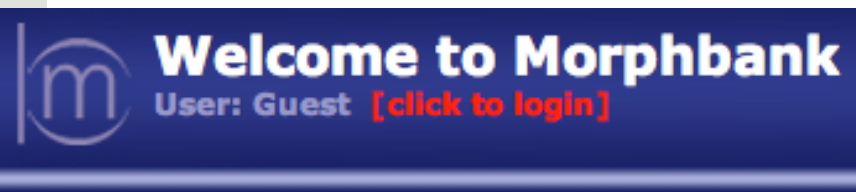
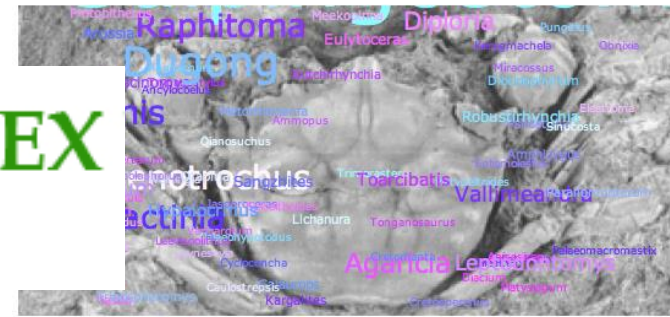


Linking Collections to...

- Phylogeny
- Ecology
- Paleontology
- Living Collections
- Genomics
- Other Repositories



UTEX




Linking to GenBank



Welcome to NCBI

The National Center for Biotechnology Information advances science and health by providing access to biomedical and genomic information.

[About the NCBI](#) | [Mission](#) | [Organization](#) | [Research](#) | [NCBI News](#)

- **Examples of the /specimen_voucher information:**

```
/specimen_voucher="UAM:Mamm:52179"
```

```
/specimen_voucher="AMCC:101706"
```

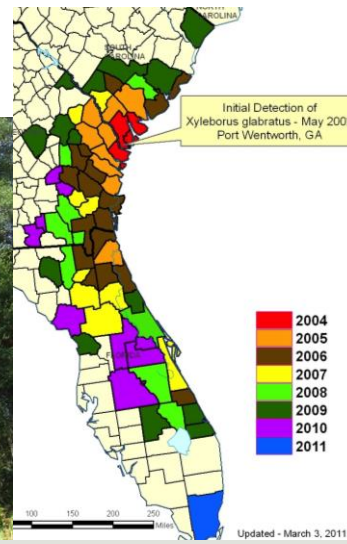
```
/specimen_voucher="USNM:field series 8798"
```

```
/specimen_voucher="personal:Dan Janzen:99-SRNP-2003"
```

```
/specimen_voucher="99-SRNP-2003"
```

Tracking the Movement of Invasive Species

- Where have invasives been introduced, and how quickly are they spreading?
- What is the pattern of spread, and do patterns covary with other species?
- How does climate change affect the spread of invasives?
- Can we predict future invasions?



Ecological Niche Modeling: locality information

Callisia graminea
grassleaf roseling



Herbarium of the University of Florida
PLANTS OF FLORIDA
Callisia graminea Small
Lakeland campus: Ritzke Simmons State Forest. About 5 miles
SE of Ft. Meigs, Georgia. Plant collected on the Florida
panhandle near north end of I-10. Good quality photo
made at original point of collection for herbarium analysis.
Det. Daniel C. Carr 2041 500081
U.S.F.P.
© 2011 University of Florida

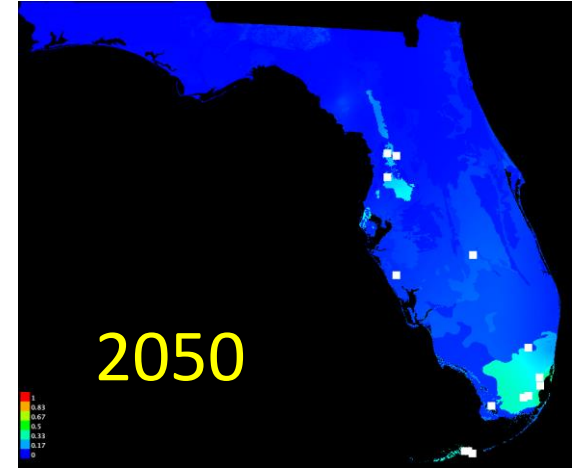
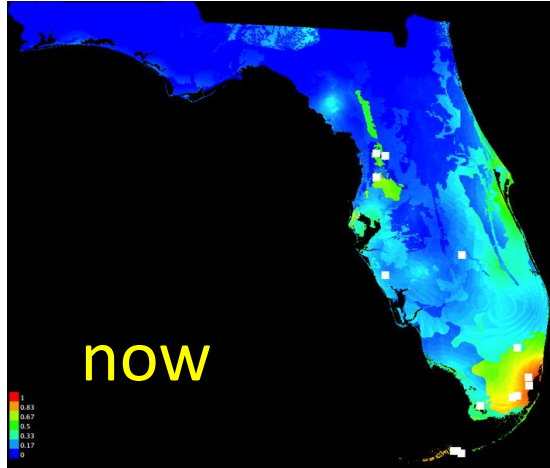


29.65, -82.32

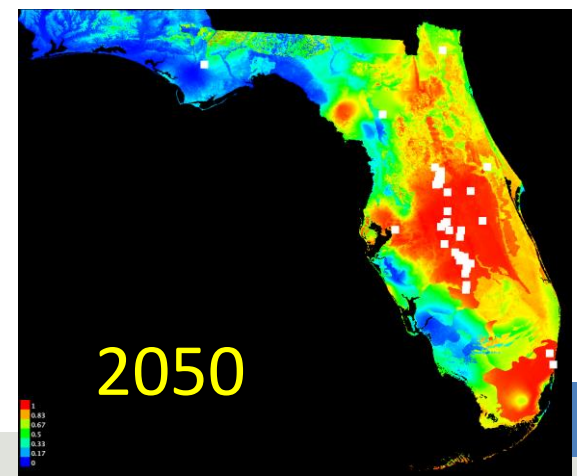
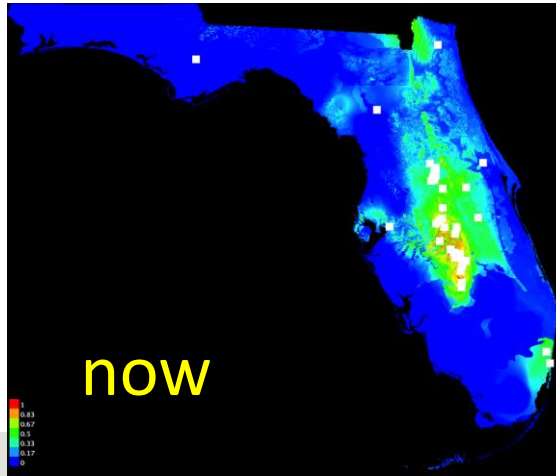
number,dwc:preparations,dwc:identificationVerificationStatus,idigbio:subfamily,idigbio:preparationCount,fcc:pickedBy,dwc:eventRemarks,dwc:VerbatimEventDate,dwc:associatedReferences,idigbio:endangeredStatus,dwc:locationAccordingTo,dwc:georeferenceSources,dwc:associatedSequences,dwc:formation,dwc:higherClassification,dwc:catalogNumber,dwc:verbatimSRS,dwc:higherGeography,dwc:individualCount,dwc:decimalLongitude,dwc:datasetName,dwc:month,dwc:georeferencedBy,dwc:eventTime,dwc:identificationQualifier,idigbio:

Responses to Climate Change: past, present, future

Abildgaardia ovata (flatspike sedge)

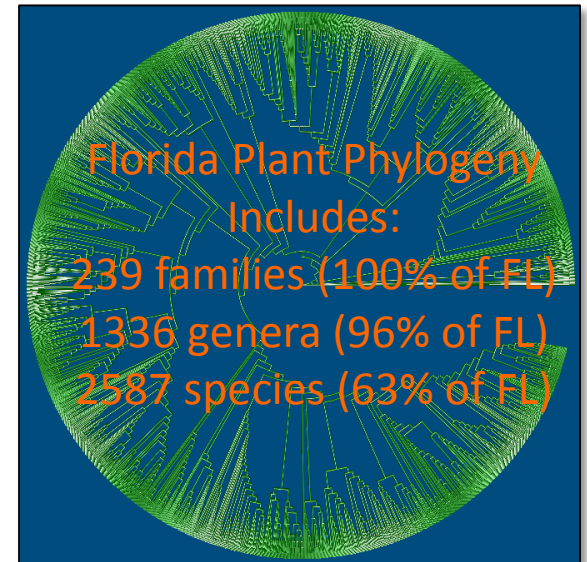


Prunus geniculata (scrub plum)



Florida Plant Diversity in a Changing Climate

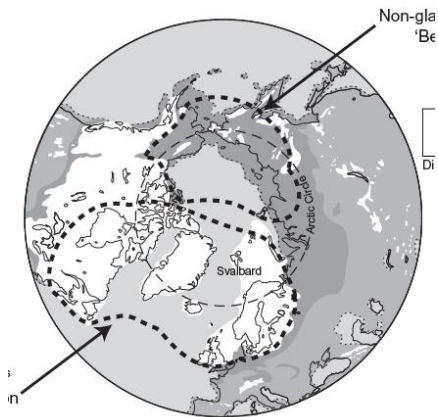
Integrating herbarium specimen data, ENM, climate change models, and phylogeny



Florida Plant Phylogeny
Includes:
239 families (100% of FL)
1336 genera (96% of FL)
2587 species (63% of FL)

Charlotte Germain-Aubrey

Distributions of Polyploids and their Diploid Progenitors



- Do polyploids have broader 'ecological amplitude' and/or ranges than diploid parents?
- ENM for polyploids and parents
- Predicted distributions under models of climate change
 - Will polyploids and diploids respond in similar ways?



Blaine Marchant

Linking to Phylogeny

The screenshot shows the OneZoom website interface. At the top is a navigation bar with the following links: OneZoom, Home, Embed, Software, Impacts, News, About, Gallery, and Future. The main content area features a stylized phylogenetic tree of plants. The tree is rooted in a thick green stem labeled "Seed Plants". From this stem, three main branches emerge: a brown branch on the left labeled "Gymnosperms", a central green branch labeled "Flowering Plants", and a brown branch on the right labeled "Mesangiosperms". The "Flowering Plants" branch further divides into two sub-branches: a green one labeled "Water-lilies, Water-shields and more" and a brown one labeled "Star Anise, Lemon Wood and more". The "Mesangiosperms" branch also divides into two sub-branches: a green one labeled "Water-lilies, Water-shields and more" and a brown one labeled "Star Anise, Lemon Wood and more". At the bottom of the page, a dark grey banner contains the text "Click to see how OneZoom works".

PhyloJIVE

Links biodiversity data to trees
Joe Miller & Garry Jolley-Rogers
phylojive.ala.org.au/



Species Locations Collections Mapping & analysis Data sets Blogs Get Involved

[Home](#) → [Phylojive](#)

Phylojive

PhyloJive ([Phy](#)logeny [J](#)avascript [I](#)nformation [V](#)isualiser and [E](#)xplorer) is a web based application that places biodiversity information aggregated from many sources onto compact phylogenetic trees.

The project is the brainchild of [Garry Jolley-Rogers](#) and [Joe Miller](#) and was developed by Temi Varghese and [Garry Jolley-Rogers](#) as part of the [Taxonomy Research & Information Network \(TRIN\)](#) – see the [original project page](#), [original code repository](#) and [ALA code repository](#). The ALA has contributed to the PhyloJive codebase to integrate a number of web services: occurrence data, maps and character data from Identify Life. This work has been undertaken with help and advice from [Joe Miller](#).

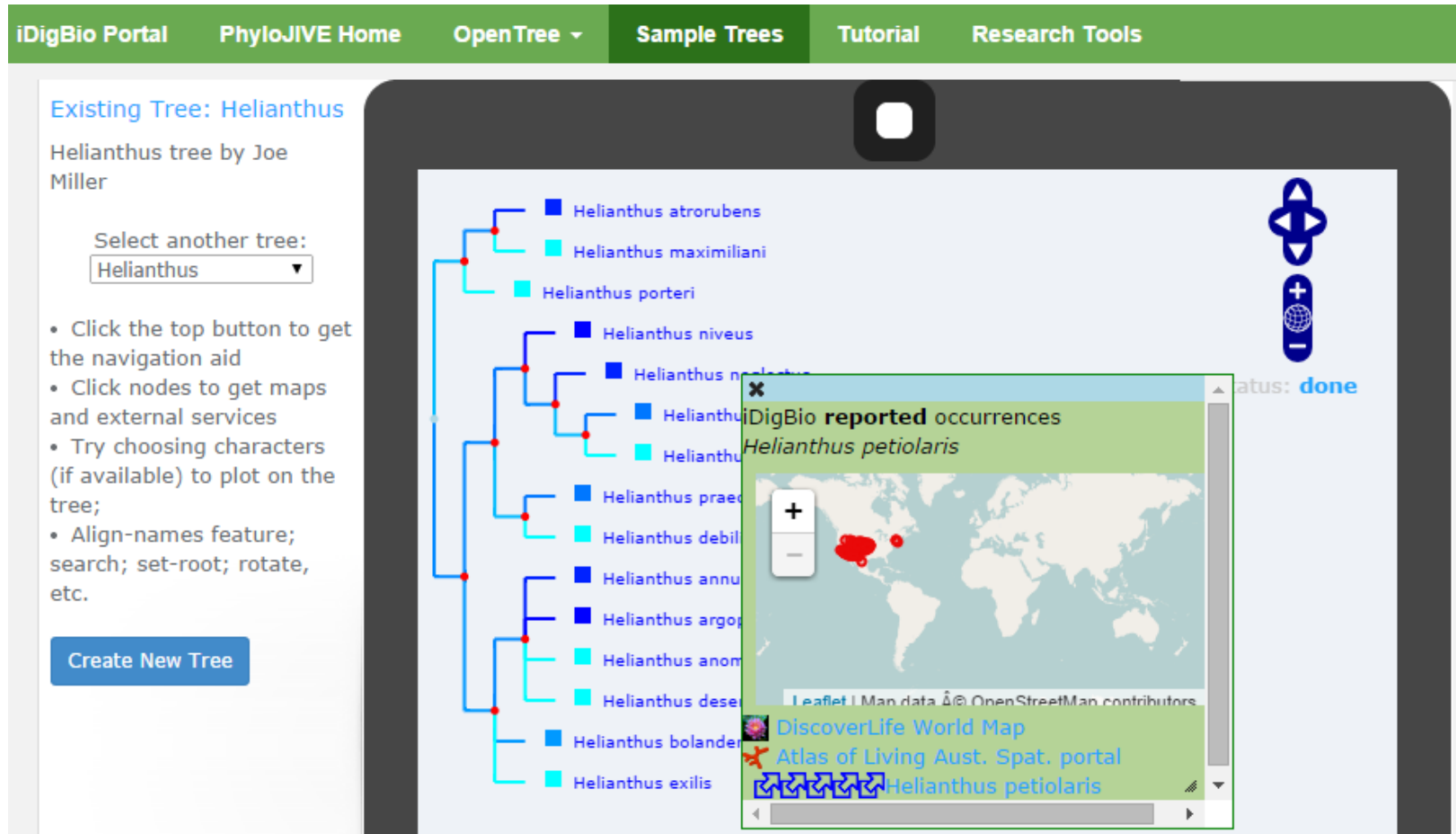
The [getting started](#) page outlines the steps for creating a new phylogenetic tree and contains demo data sets that can be used to get up and running.



A. buxifolia

Source: Australian Plant
Image Index Image by: Macd

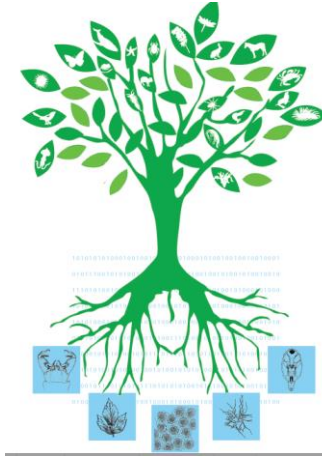
PhyloJIVE instance in iDigBio



The screenshot displays the iDigBio Portal interface for the PhyloJIVE instance. The navigation bar includes links for iDigBio Portal, PhyloJIVE Home, OpenTree, Sample Trees, Tutorial, and Research Tools. The main content area shows an existing tree titled "Existing Tree: Helianthus" by Joe Miller. A dropdown menu allows selecting another tree from the "Helianthus" genus. A list of species is shown on the right, including Helianthus atrorubens, Helianthus maximiliani, Helianthus porteri, Helianthus niveus, Helianthus mollis, Helianthus scaberrimus, Helianthus debilis, Helianthus annuus, Helianthus argophyllus, Helianthus anomus, Helianthus desertorum, Helianthus bolanderi, and Helianthus exilis. A map window is open, showing "iDigBio reported occurrences" for Helianthus petiolaris, with red dots indicating locations in the western United States. The map includes a search bar, zoom controls, and a status bar that says "Status: done".

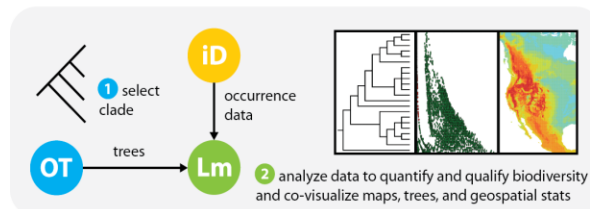
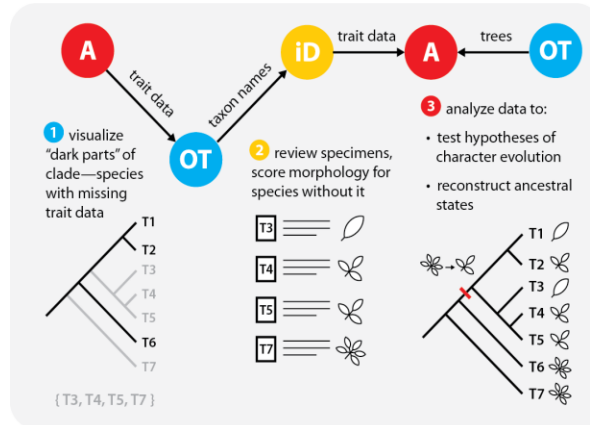
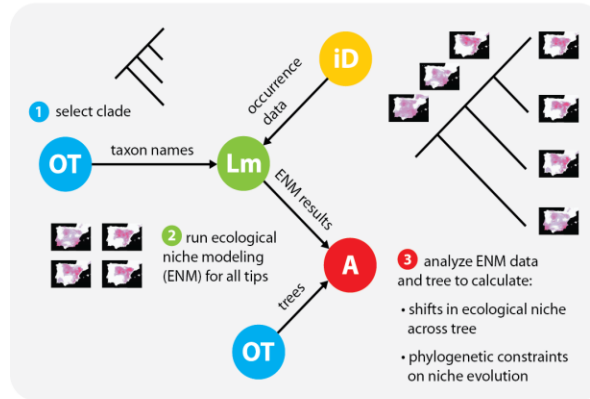
- Developed by Garry Jolley-Rogers, Joe Miller, and Temi Varghese
 - Integrates biodiversity data with phylogeny
 - <http://phylojive.acis.ufl.edu/>
- A. Matsunaga

Connecting Trees, Specimens, Tools, Data



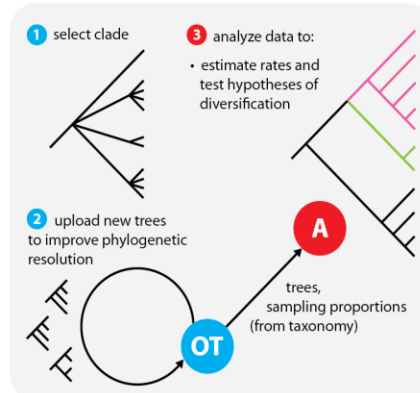
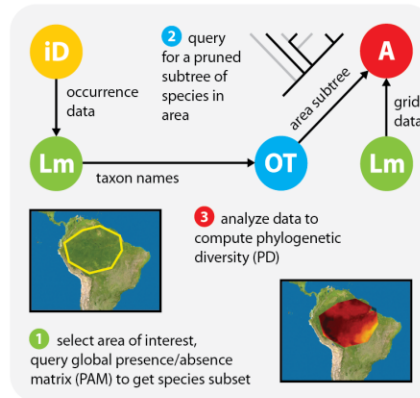
Connecting Trees, Specimens, Tools, Data

EXAMPLE WORKFLOWS:



RESOURCES:

- Lm** Lifemapper
 - ecological niche modeling
 - biodiversity and range analysis
 - visualization
- A** Arbor
 - evolutionary models
 - comparative methods
 - visualization
- OT** Open Tree of Life
 - phylogenies
 - taxonomy / names
 - visualization
- iD** iDigBio
 - trait data
 - specimen data / images
 - fossil data / images



Connecting Trees, Specimens, Tools, Data

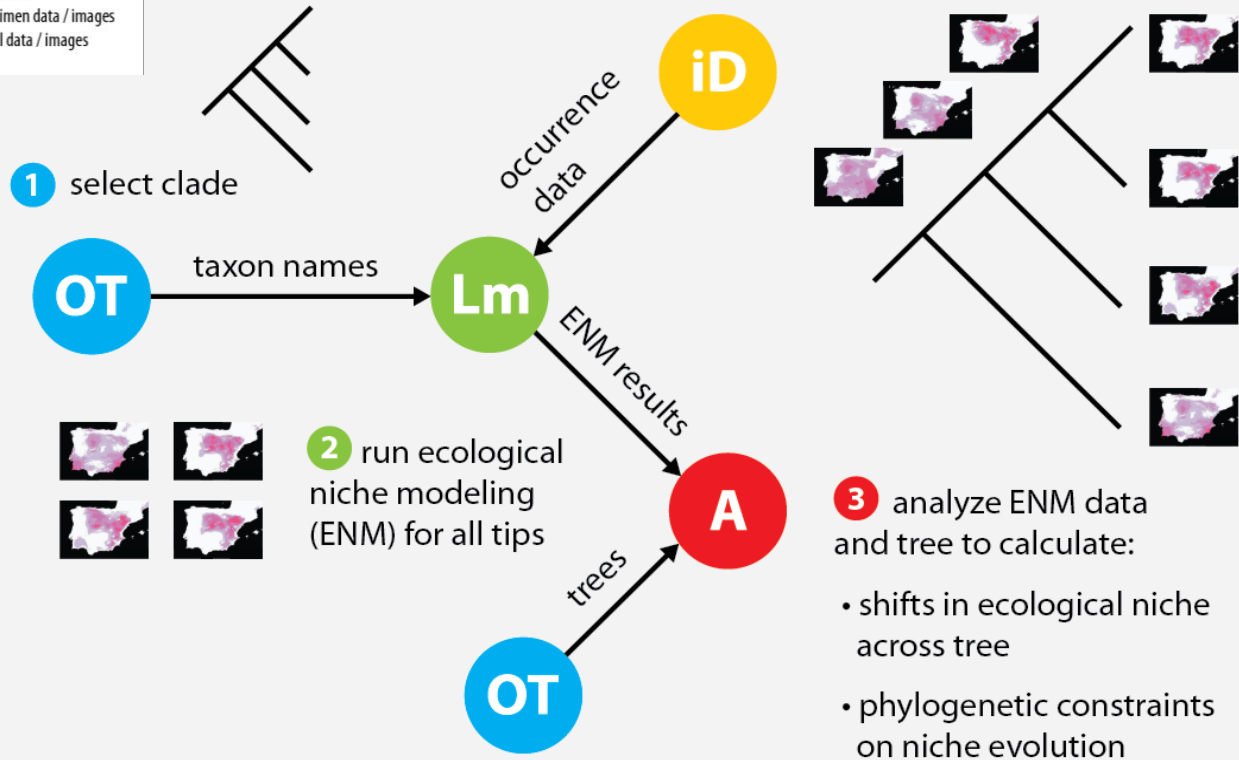
RESOURCES:

Lm Lifemapper
 • ecological niche modeling
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A Arbor
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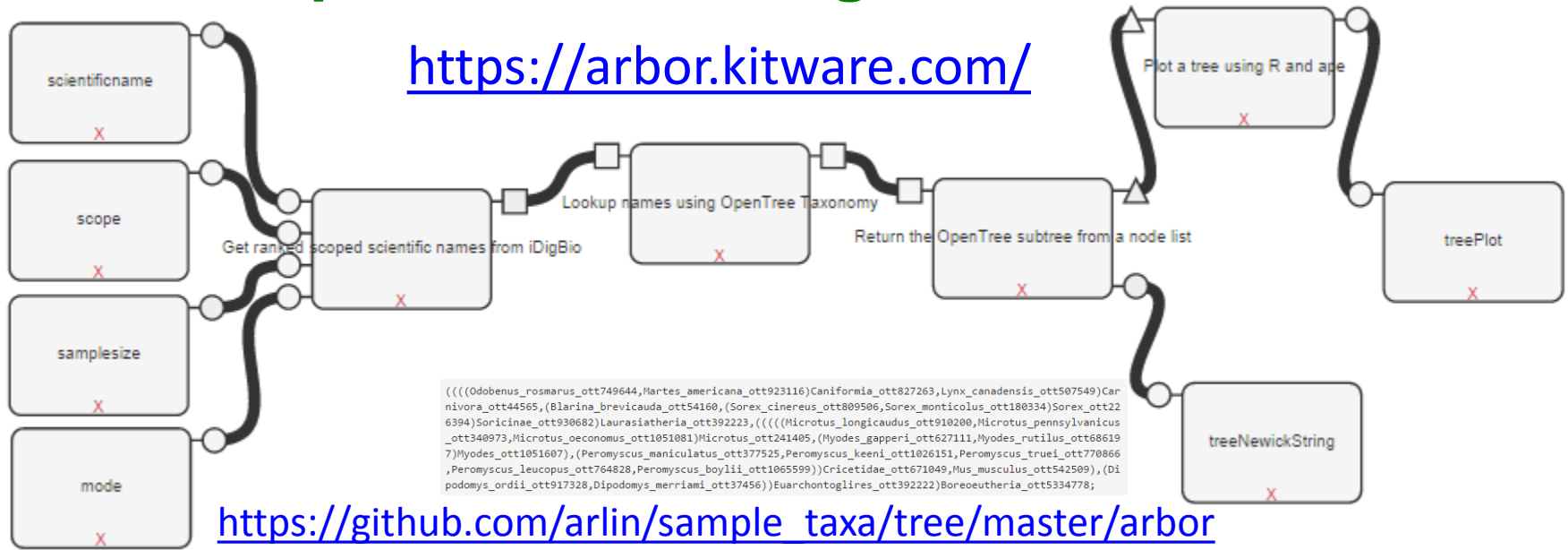
OT Open Tree of Life
 • phylogenies
 • taxonomy / names
 • visualization

iD iDigBio
 • trait data
 • specimen data / images
 • fossil data / images



Arbor, OpenTree, and iDigBio

<https://arbor.kitware.com/>



https://github.com/arlin/sample_taxa/tree/master/arbor

Workflow to get an induced tree from a configurable iDigBio query

scientificname:

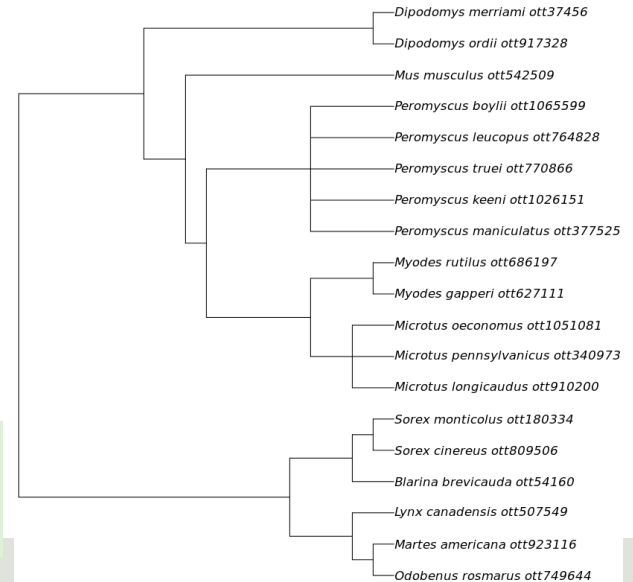
scope:

samplesize:

mode:

```

1 {
2   "query": {
3     "query_string": {
4       "default_field": "order",
5       "query": "rodentia"
6     }
7   },
8   "aggregations": {
9     "my_agg": {
10      "terms": {
11        "field": "scientificname",
12        "size": 100
13      }
14    }
15  }
16 }
  
```



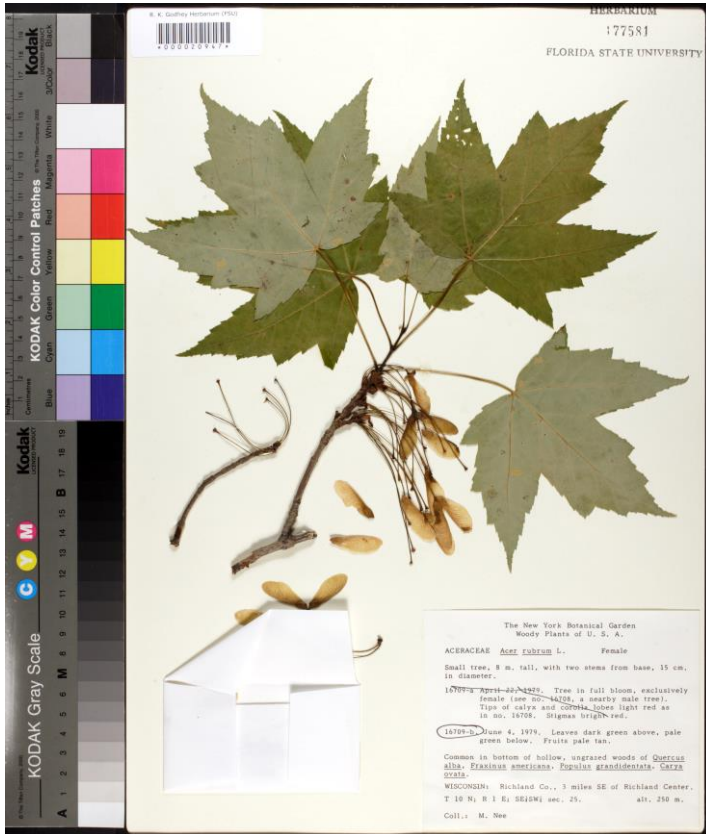
- Success! Produced the following outputs:
- Workflow to get an induced tree from a configurable iDigBio query treeNewickString [string]
 - Workflow to get an induced tree from a configurable iDigBio query treePlot [image]

TRY

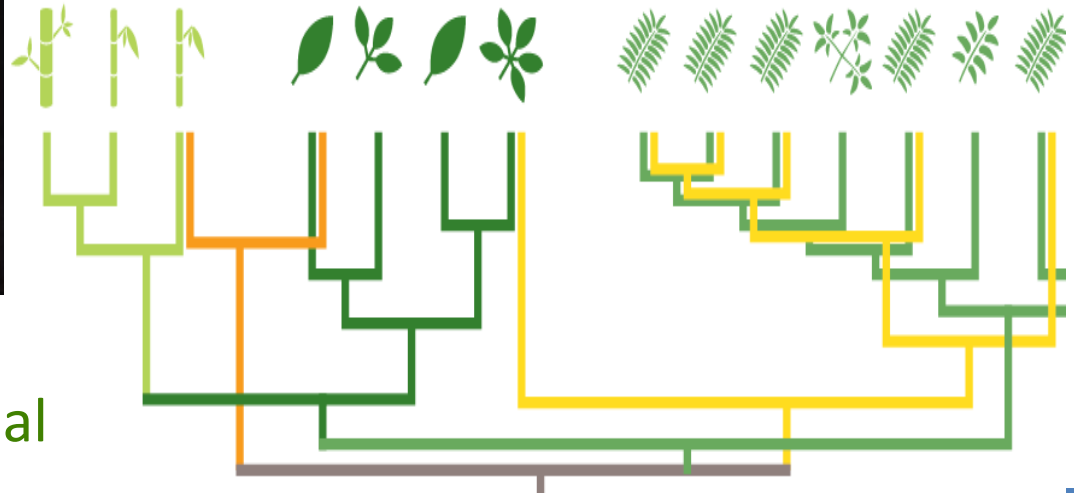
Plant Trait Database

PhotosyntheticPathway
Respiration LeafArea NfixationCapacity
SLA RegenerationCapacity PlantLifespan
WoodDensity GrowthForm
PhenologyType LeafN
LeafP LeafLongevity PhotosyntheticCapacity
MaxPlantHeight SeedMass

Using Images to Infer Functional Traits

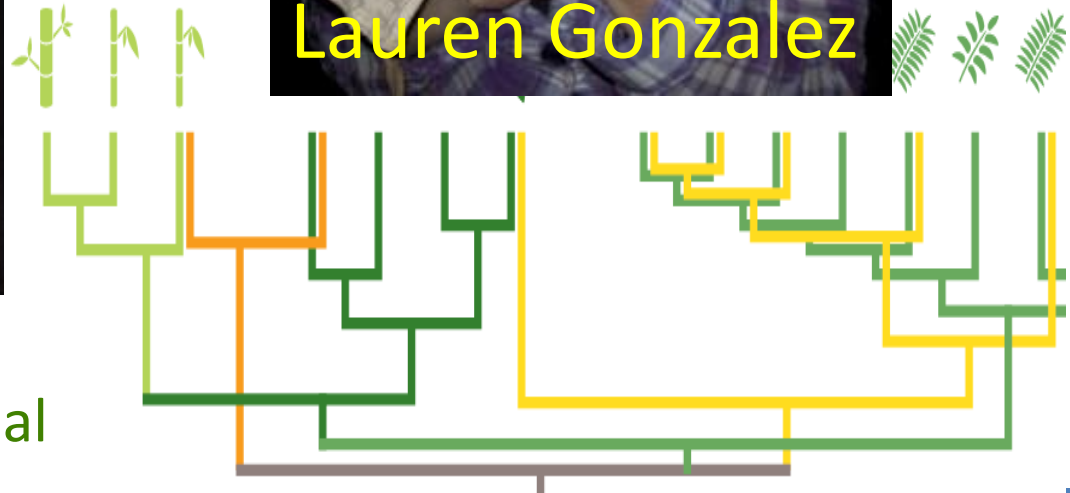


Photosynthetic Pathway
 Respiration Leaf Area Nfixation Capacity
 SLA Regeneration Capacity Plant Lifespan
 Wood Density Growth Form
 Phenology Type Leaf N
 Leaf P Leaf Longevity Photosynthetic Capacity
 Max Plant Height Seed Mass



Connect to ecology
 Evolution of plant functional
 traits

Using Images to Infer Functional Traits



Connect to ecology
Evolution of plant functional
traits

Many Uses for Specimen Data in Research

- Connections to other resources, e.g. GenBank
- Ecological Niche Modeling
- Integration with phylogeny, e.g. PhyloJIVE
- Complex integration of phylogeny, specimens, ENM, other heterogeneous data
- Images as sources of traits for ecological studies
- Others???

- *Discussion: Future Uses of Data in Research*
- *Research Applications Working Group*

Thank you!



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<webcal://www.idigbio.org/events-calendar/export.ics>