

Digitized Data and Research

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Components of iDigBio:

Digitization of Biodiversity Collections
Interactive, Integrative, Innovative

- Digitization
- Cyberinfrastructure
- Research
 - *Access to specimen data: Provide **portal access** to biodiversity data in a cloud-computing environment*
 - *Develop a **computational environment** to facilitate specimen-based integrative biodiversity research*
 - *Develop **research workflows** to anticipate computational needs and linkages*
- Education and Outreach

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10 Thematic Collections Networks (TCNs)

InvertNet – An Integrative Platform for Research on Environmental Change, Species Discovery and Identification (University of Illinois)

Plants, Herbivores, and Parasitoids: A Model System for the Study of Tri-Trophic Associations (American Museum of Natural History)

North American Lichens and Bryophytes: Sensitive Indicators of Environmental Quality and Change (University of Wisconsin – Madison)

Digitizing Fossils to Enable New Syntheses in Biogeography-Creating a PALEONICHES TCN(University of Kansas)

The Macrofungi Collection Consortium: Unlocking a Biodiversity Resource for Understanding Biotic Interactions, Nutrient Cycling and Human Affairs (NYBG)

Mobilizing New England Vascular Plant Specimen Data to Track Environmental Change (Yale)

Southwest Collections of Arthropods Network (SCAN): A Model for Collections Digitization to Promote Taxonomic and Ecological Research (Northern Arizona University)

Fossil Insect Collaborative: A Deep-Time Approach to Studying Diversification and Response to Environmental Change (University of Colorado)

Developing a Centralized Digital Archive of Vouchered Animal Communication Signals (Cornell)

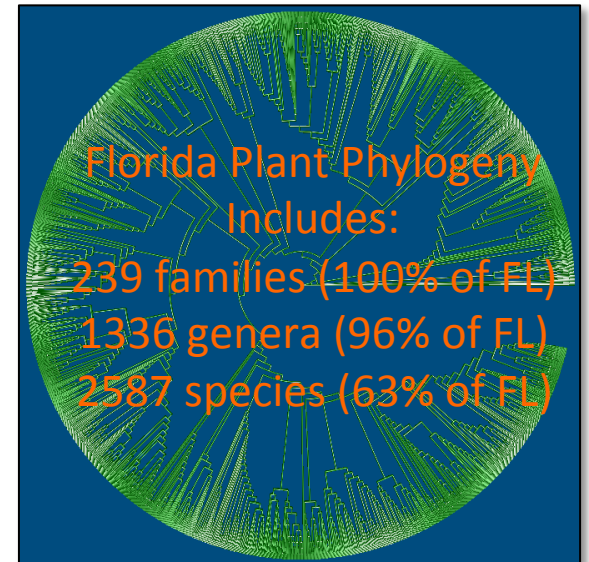
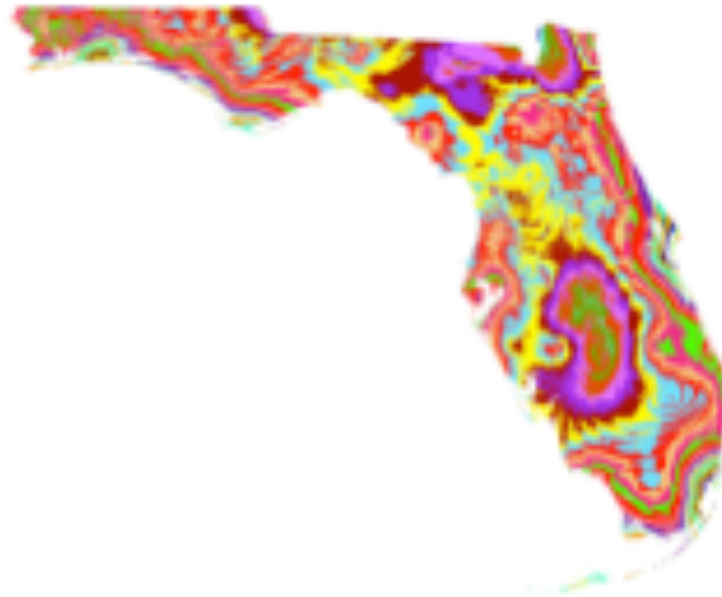
The Macroalgal Herbarium Consortium: Accessing 150 Years of Specimen Data to Understand Changes in the Marine/Aquatic Environment (University of New Hampshire)

Research Applications

- Monitoring shifts in biodiversity
- Tracking phenological shifts
- Ecological Niche Modeling
- Integration of ENM with phylogeny
 - Role for tissue/DNA collection
- Tracking invasive species
- Distributions of polyploids vs. diploid progenitors
- Past movements and climate change
- Landscape genetics

Florida Plant Diversity in a Changing Climate

Integrating herbarium specimen data,
climate change models, and phylogeny



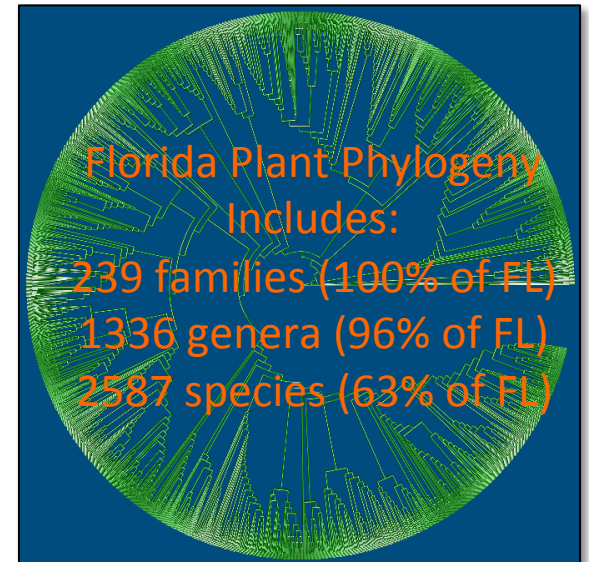
Today, 2050, 2080

C. Germain-Aubrey, J. Allen,

K. Neubig, L. Majure, R. Abbott, R. Guralnick, J. M. Ponciano, D. Soltis, P. Soltis

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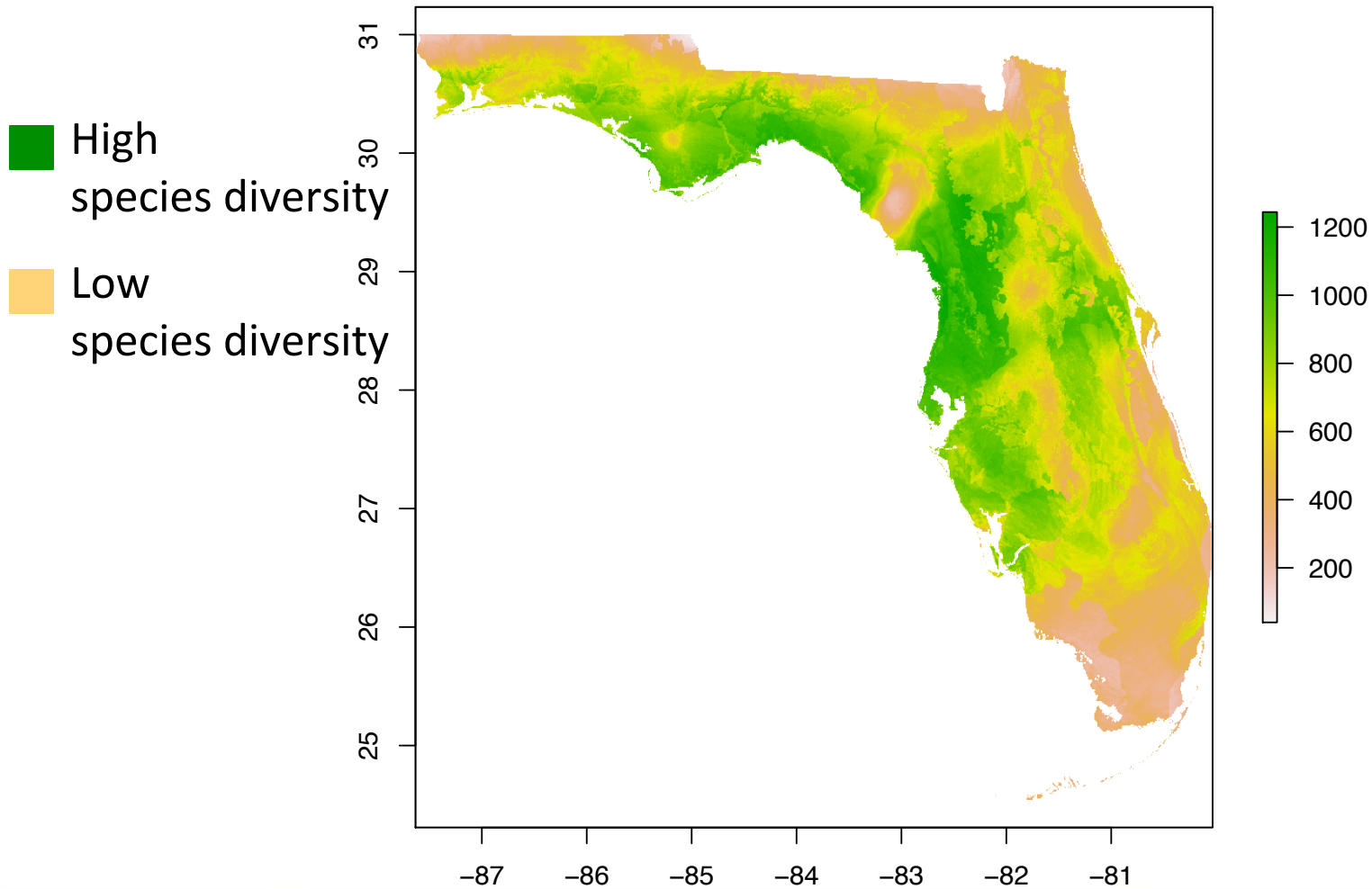


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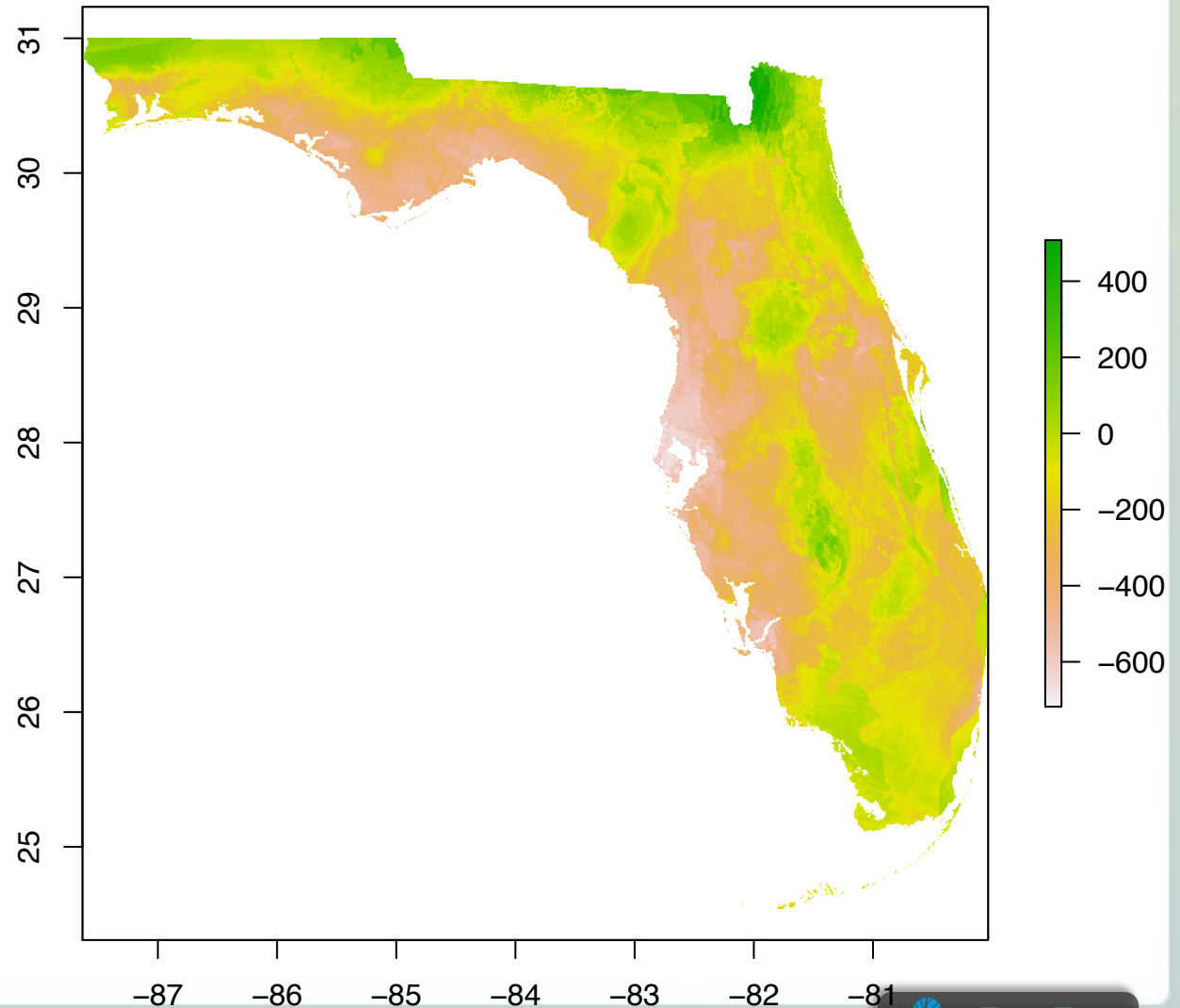
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Florida plant diversity heat map: now



Between now and 2050...

- Panhandle species moving NORTH!
- Peninsula species moving SOUTH!

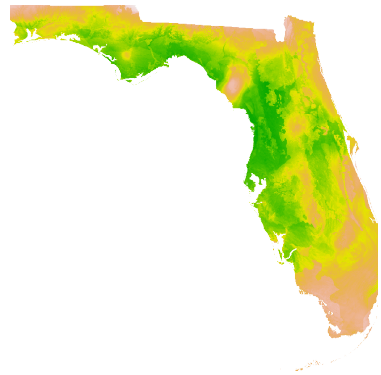


spp 2050 - #spp now

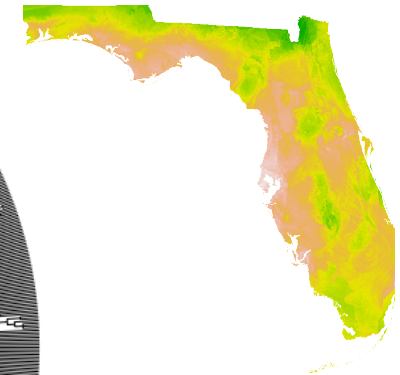
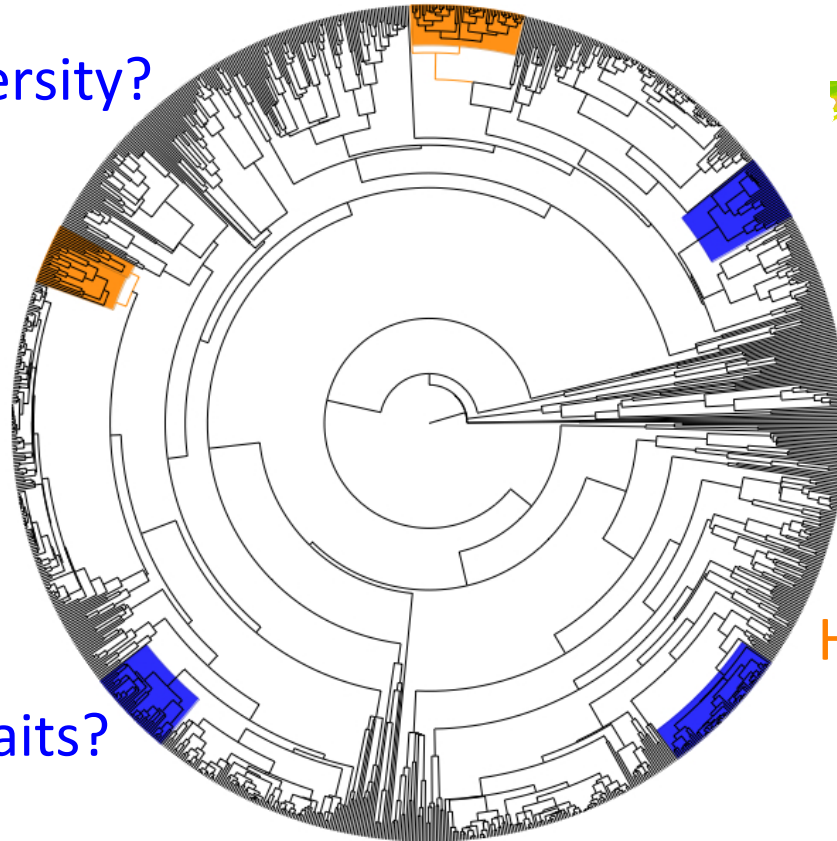
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Phylogenetic diversity?

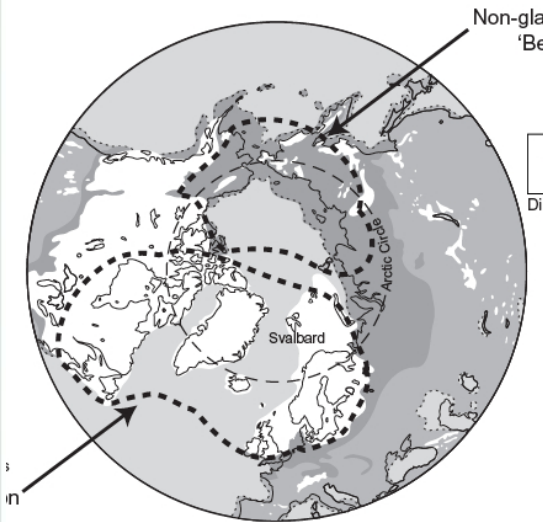


Clustering of traits?



Habitat response?

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 displays the OneZoom website interface. At the top, a dark navigation bar contains the OneZoom logo and menu items: Home, Embed, Software, Impacts, News, About, Gallery, and Future. The main content area features a stylized phylogenetic tree of seed plants. The tree is rooted in a thick green stem labeled "Seed Plants". It branches into three main groups: "Gymnosperms" (represented by brown branches), "Flowering Plants" (represented by a thick green arch), and "Mesangiosperms" (represented by green branches). Further sub-branches include "Water-lilies, Water-shields and more" (green), "Star Anise, Lemon Wood and more" (brown), and "Mesangiosperms" (green). A dark grey bar at the bottom of the content area contains the text "Click to see how OneZoom works".

OneZoom Home Embed Software Impacts News About Gallery Future

Water-lilies, Water-shields and more

Star Anise, Lemon Wood and more

Gymnosperms

Flowering Plants

Mesangiosperms

Seed Plants

Click to see how OneZoom works

PhyloJIVE - Miller & Jolley-Rogers (2014)

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: Macdonald, C.

PhyloJIVE - Miller & Jolley-Rogers (2014)

[Research](#)[Portal Home](#)[Search Records](#)[Tutorial](#)[Publishers](#)[Research Tools](#)

Community Research Tools

To facilitate the study of biodiversity, a number of research tools are being developed to take advantage of the data being digitized at US institutions and made available by iDigBio through [web services](#). You can find below, some of these online tools developed by the community. If you would like your tool to be included in this list, please use the [feedback form](#) to tell us about your work.

Researchers

[Browse our specimen portal](#)



Collections Staff

[Learn how your collection can benefit from our work](#)

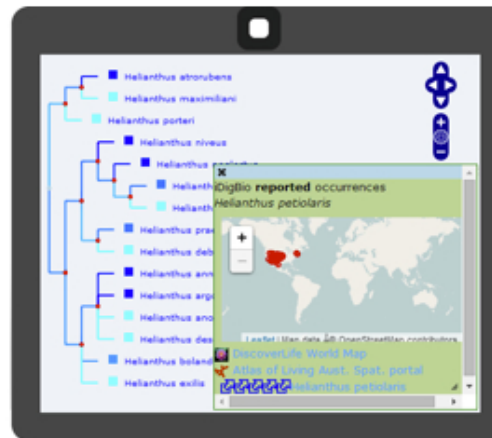


Teachers & Students

[Learning resources & opportunities to engage](#)



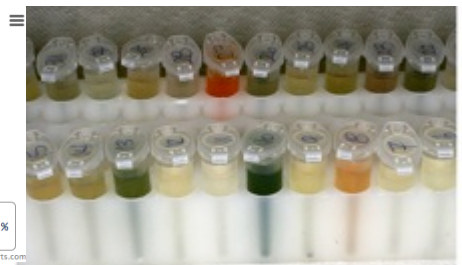
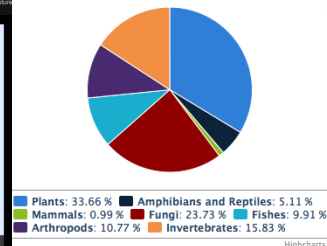
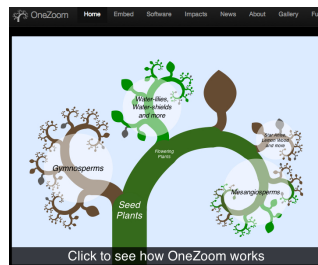
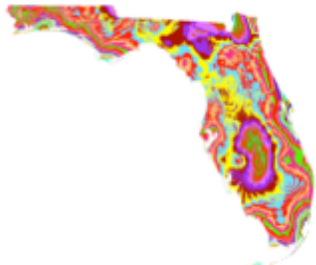
List of Tools Integrating iDigBio Web Services



Solutions to fundamental questions about biodiversity require a new approach that integrates across phylogeny, biogeography, geology, and paleobiology. [PhyloJIVE](#), developed by Garry Jolley-Rogers, Joe Miller, and Temi Varghese, integrates biodiversity data with phylogeny. Through [PhyloJIVE](#), occurrence records can be viewed in a phylogenetic context, and user-supplied character data can be visualized on the phylogeny. Exploration of the linkages between phylogeny, distributions, and character states can lead to new understanding of biodiversity.

Biodiversity Data & the Big Data Challenge

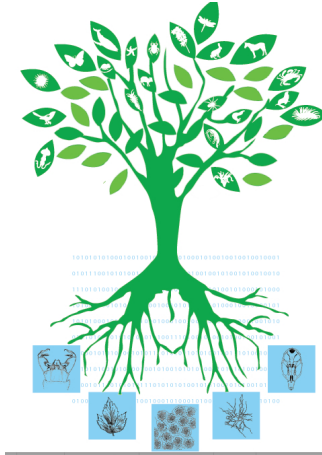
- Not just volume of data
- But integration of diverse data types
- For novel applications



Connecting Trees, Specimens, Tools



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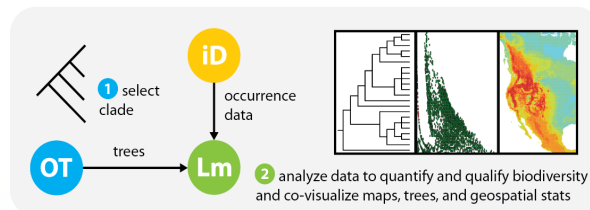
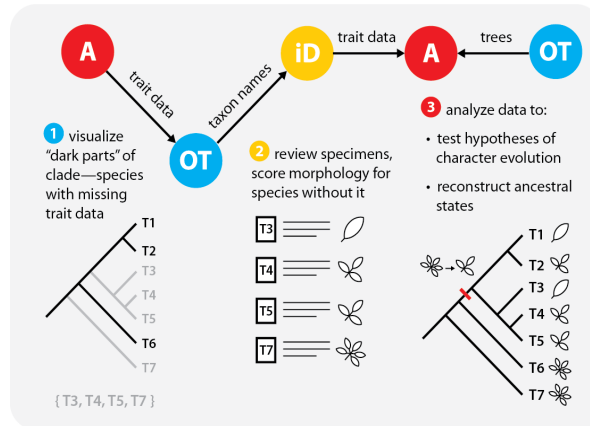
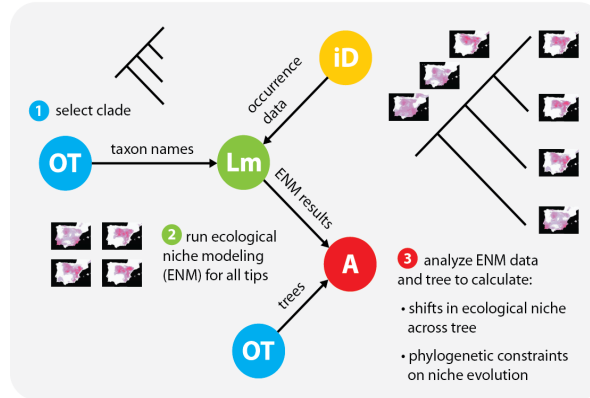


Summary

- Specimens continue as foundation for systematics
- Many applications for digitized data in research
- Emerging tools and infrastructure to link phylogenies with specimens – multitude of applications for diverse research questions
- Exciting time **now** – integrating phylogenetic, genetic, and ecological data in basic and applied research – and into the **future!**

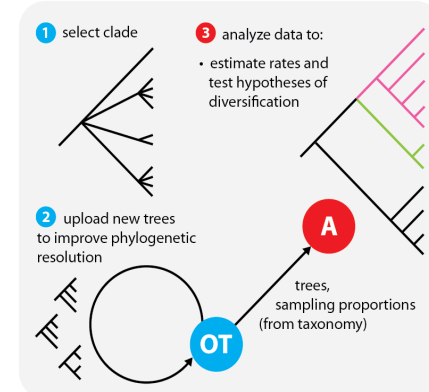
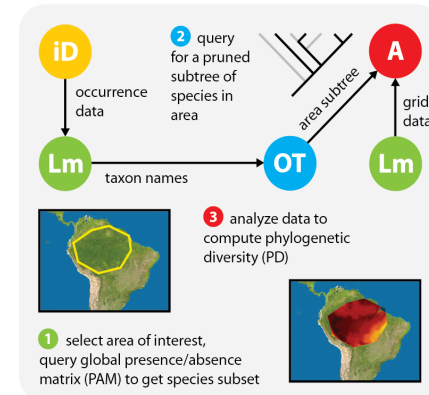
Connecting Trees, Specimens, Tools

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



C. Hinchliff

Connecting Trees, Specimens, Tools

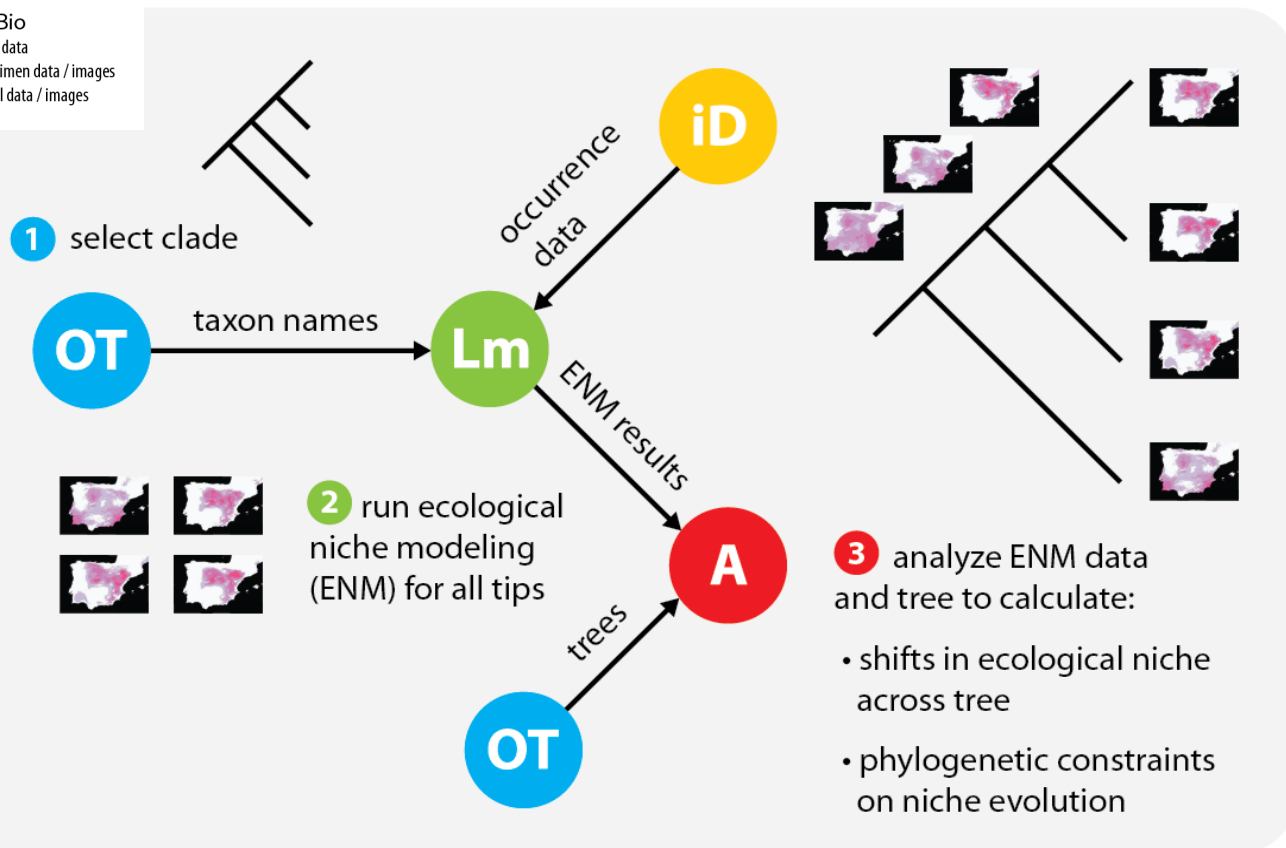
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