

www.ala.org.au

A phylogenetic view on aggregated biodiversity data

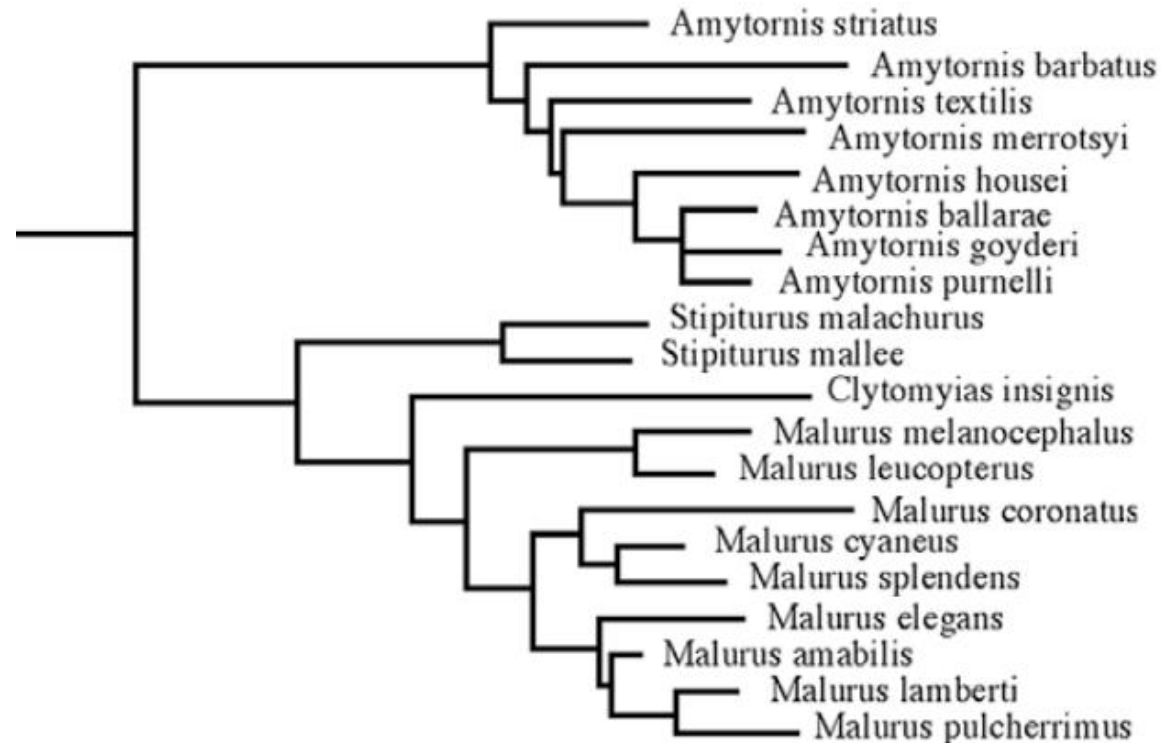


Rebecca Pirzl¹, Dan Rosauer², Joe Miller³, Garry Jolley-Rogers⁴, Temi Varghese¹

¹Atlas of Living Australia CSIRO, ²Australian National University, ³National Science Foundation, ⁴CSIRO Taxonomic Research Network

Phylogenies

- hypotheses about the evolutionary relationships between organisms



Gardner et al 2010

Evolutionary context can provide a deeper understanding of biodiversity

- Acquire insights into the evolution of diversity
- Make predictions about poorly studied species
- Expose data below species level
- Assist conservation decisions

Home → Phylojive

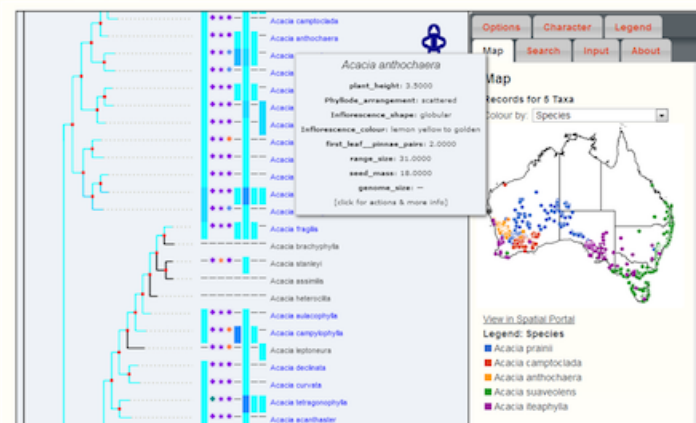
Phylojive

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.

Create a new tree



Trees with character data

- quantitative characters
- kimberley land snails3
- Joe's acacia
- Damien

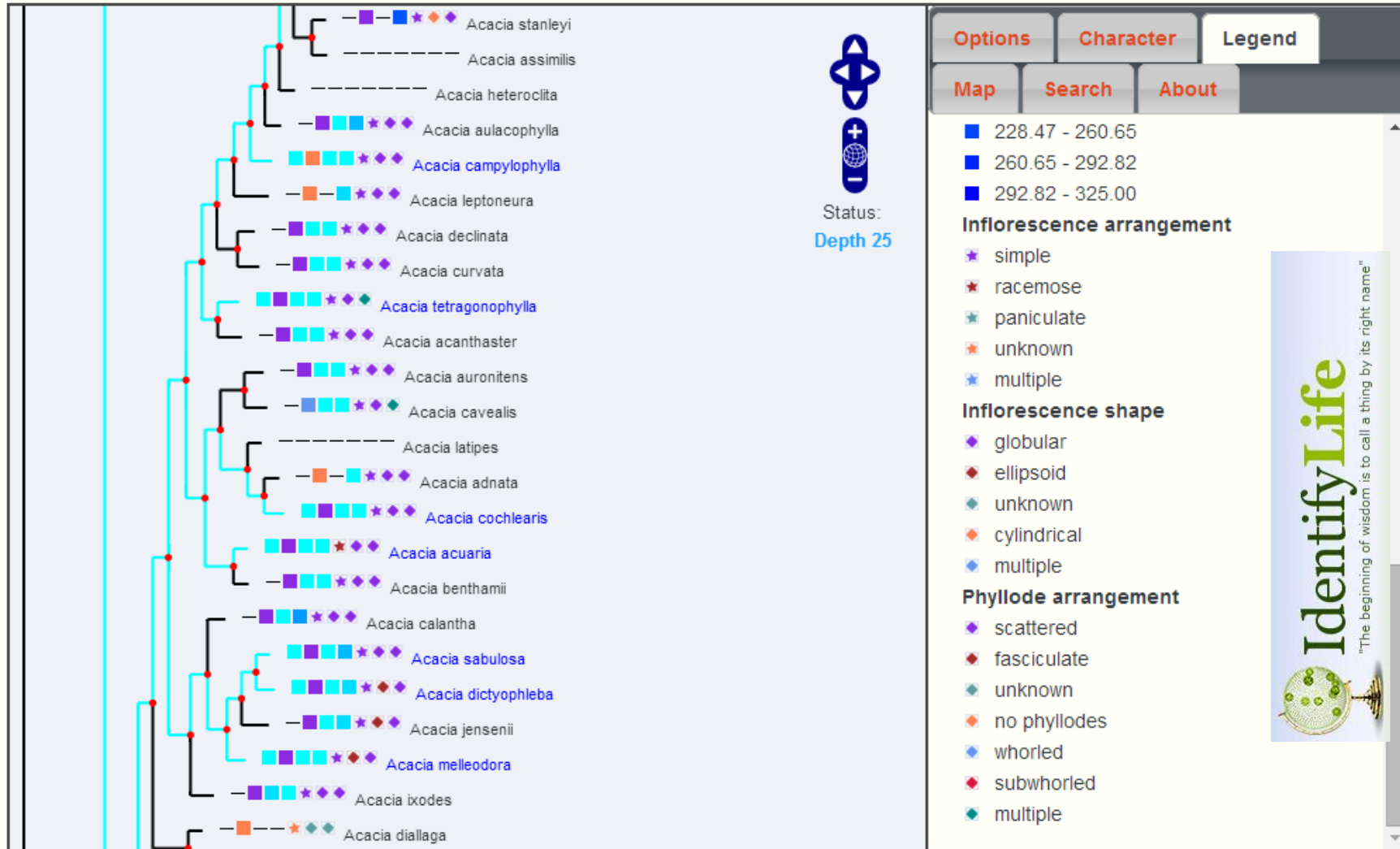
"Bare" Trees

- Molluscsa-tree of life
- amphibia - frogs, salamanders and caecilians
- Damien
- Bird super tree

phylojive.ala.org.au

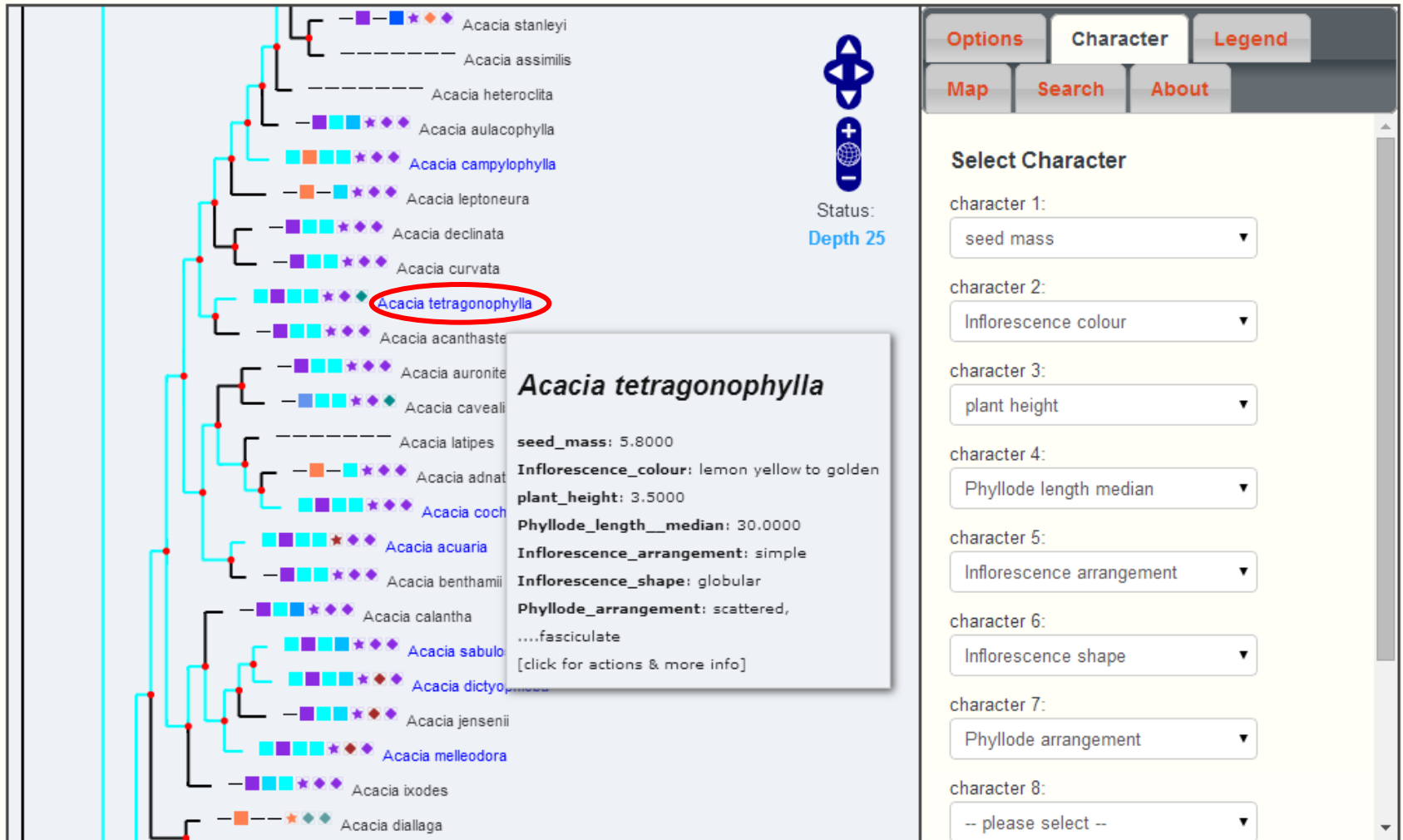
Map characters

Tree: Case Study 1: Acacia



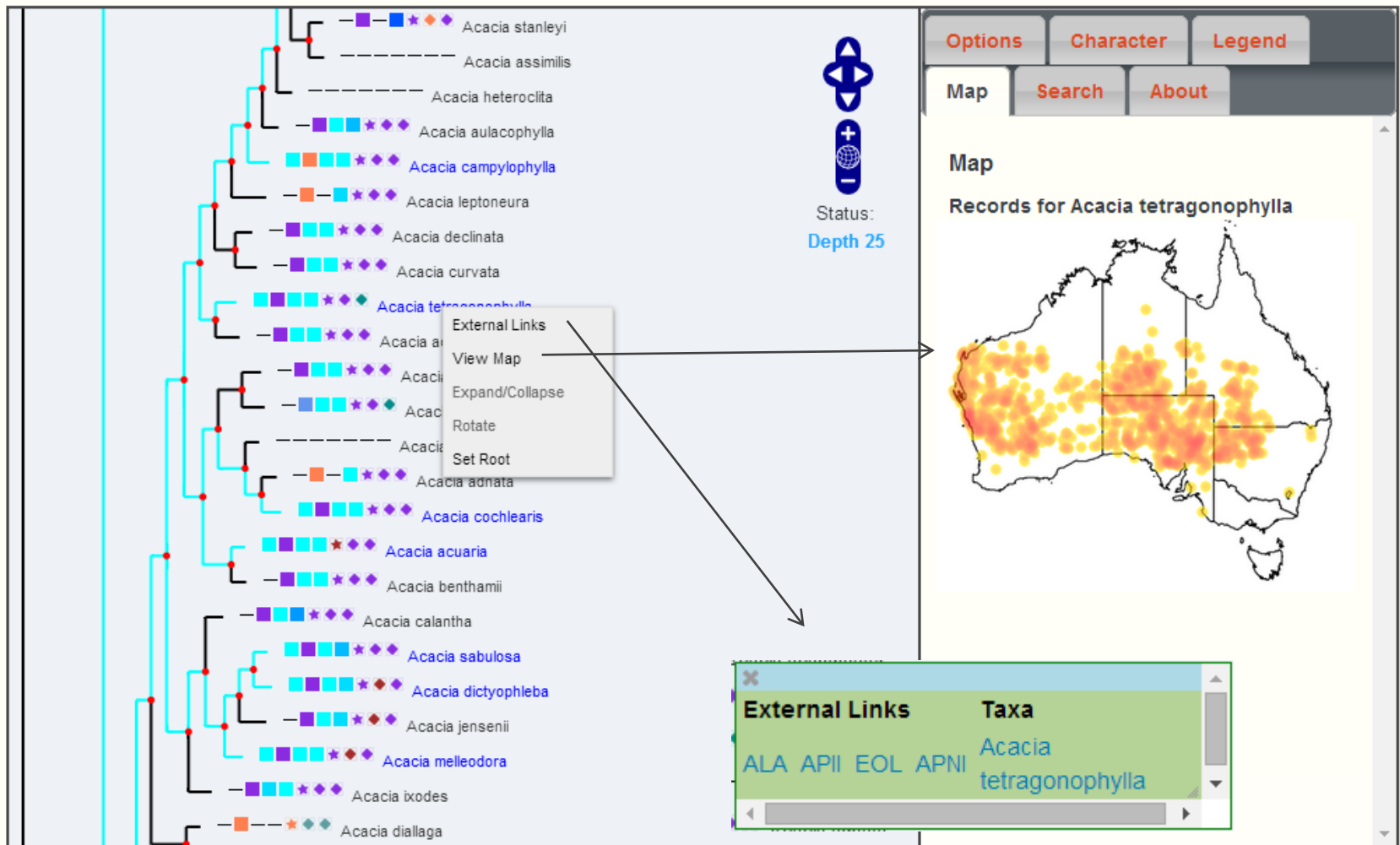
Map characters

Tree: Case Study 1: Acacia



View maps and link externally

Tree: Case Study 1: Acacia

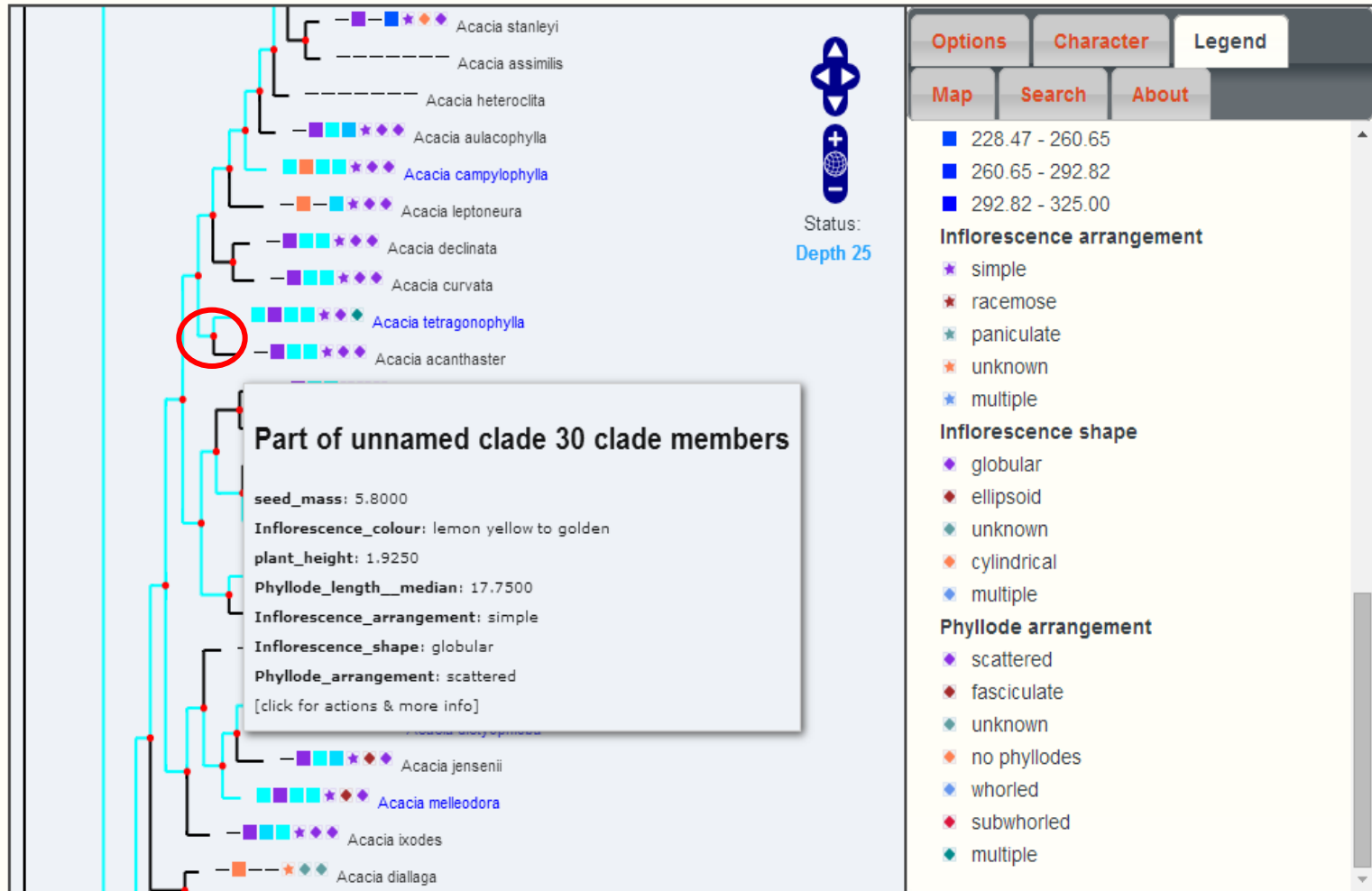


The screenshot displays the Atlas of Living Australia interface for a phylogenetic tree of Acacia species. The tree is shown on the left, with species names listed on the right. A context menu is open over the tree, showing options: External Links, View Map, Expand/Collapse, Rotate, and Set Root. The 'View Map' option is selected, and an arrow points to a map of Australia on the right. The map shows the distribution of *Acacia tetragonophylla* records, with yellow and orange dots indicating the locations. The map is titled 'Records for Acacia tetragonophylla'. Below the map, a table shows the 'External Links' and 'Taxa' for the selected species.

External Links	Taxa
ALA APII EOL APNI	Acacia tetragonophylla

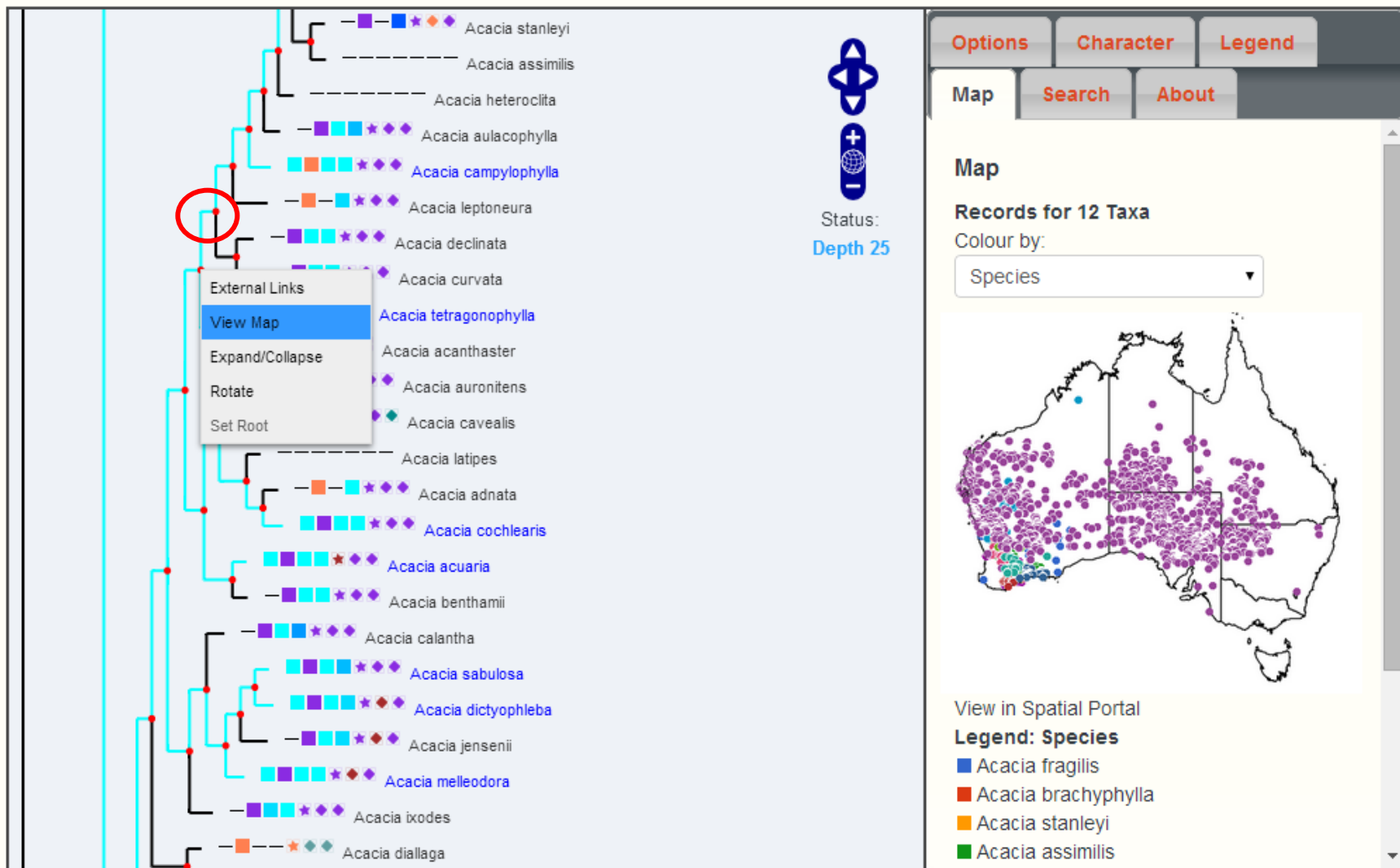
Reconstruct ancestral state

Tree: Case Study 1: Acacia



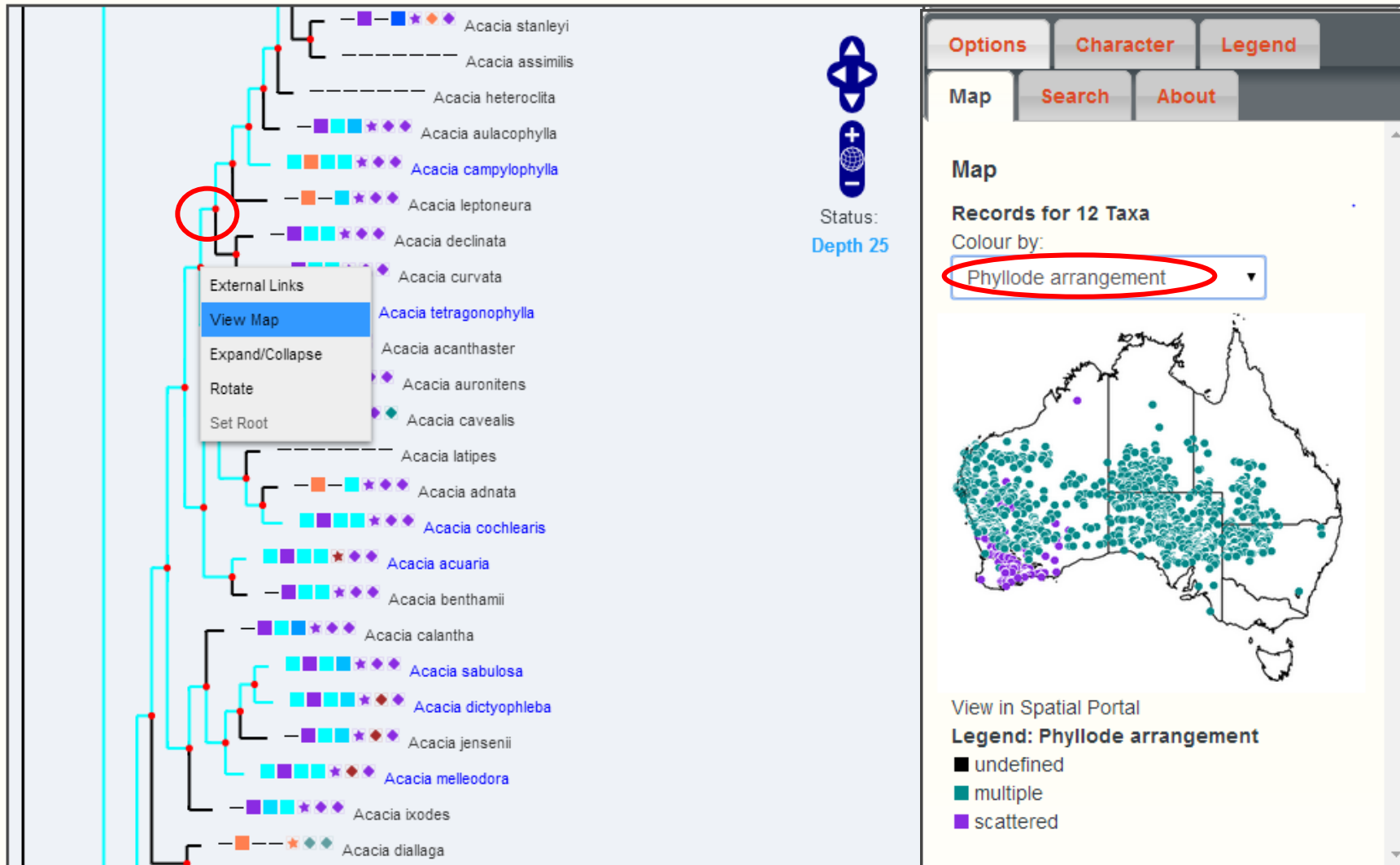
Map records – by taxon

Tree: Case Study 1: Acacia



Map records – by character state

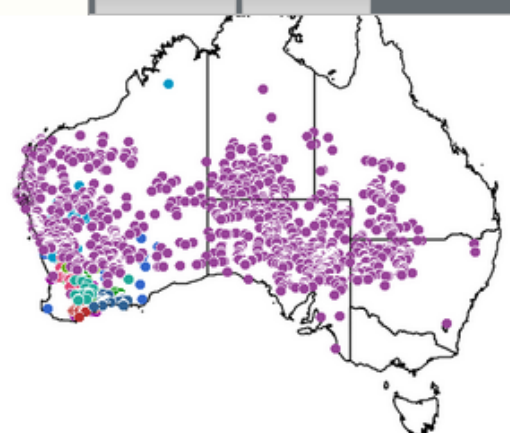
Tree: Case Study 1: Acacia



Integrate with ALA spatial portal

Options Character Legend

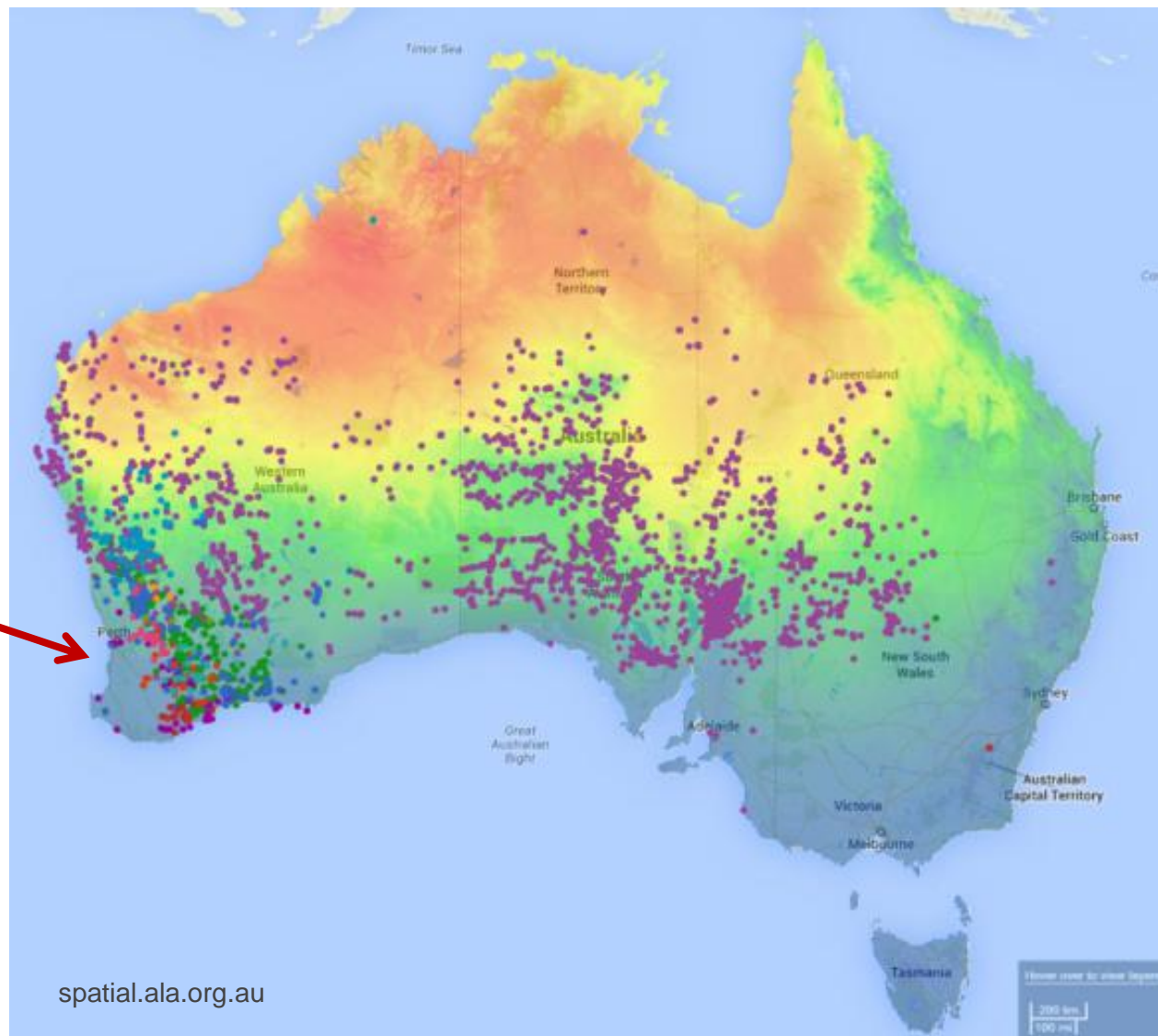
Map Search About



View in Spatial Portal

Legend: Species

- Acacia fragilis
- Acacia brachyphylla
- Acacia stanleyi
- Acacia assimilis
- Acacia heteroclita
- Acacia aulacophylla
- Acacia campylophylla
- Acacia leptoneura
- Acacia declinata
- Acacia curvata
- Acacia tetragonophylla
- Acacia acanthaster



Enabling phylogenetic views of ALA data

- sourcing trees
- organising and searching trees



treebase.org

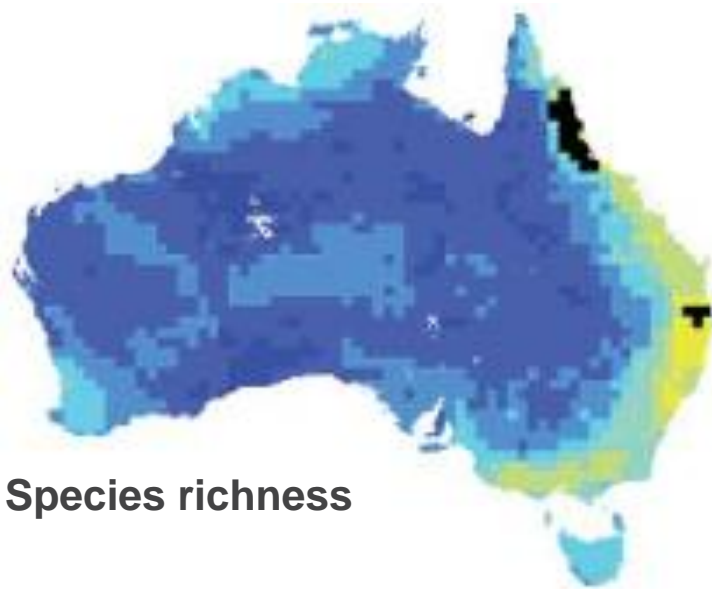


blog.opentreeoflife.org

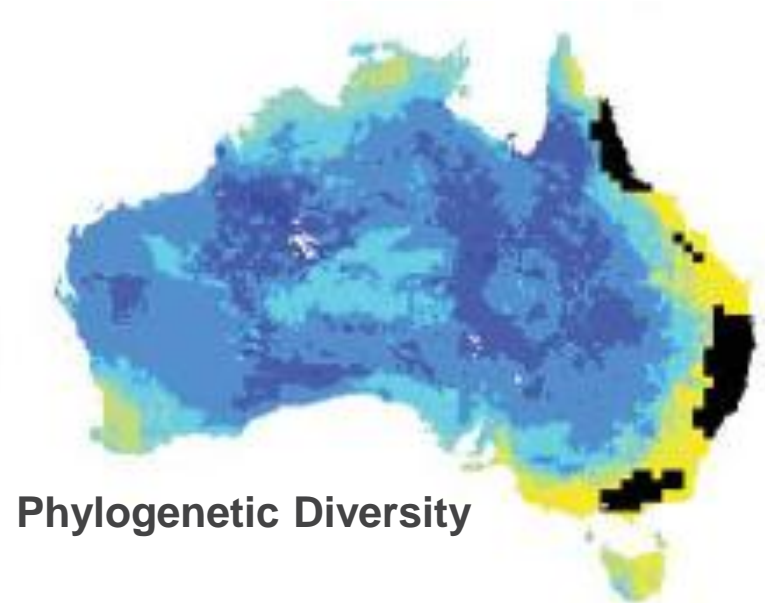
- navigating Atlas pages via phylogenies

Enabling phylogenetic views of ALA data

- calculate phylogenetic measures – e.g. phylogenetic diversity
 - compare to measures generated from non-phylogenetic approaches (e.g. PD and species richness)



Species richness



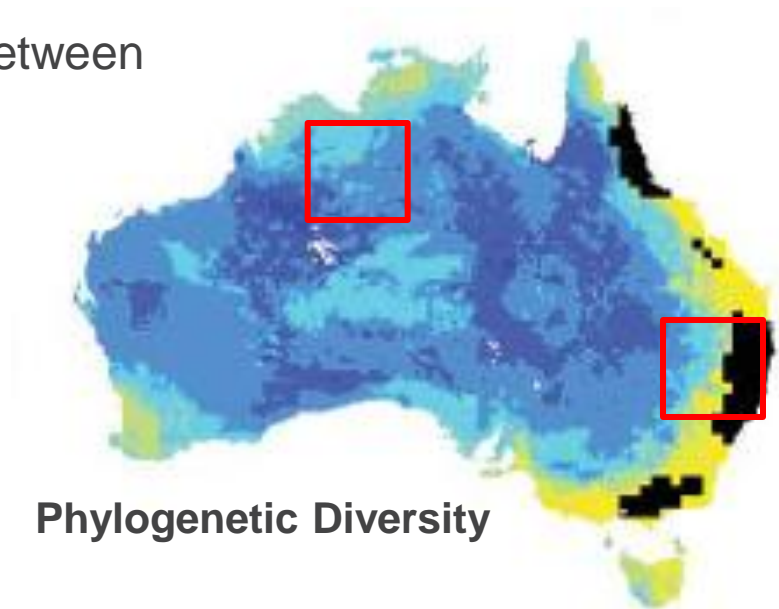
Phylogenetic Diversity

Marsupial diversity – black indicates hotspots

Amboni & Laffan 2010

Enabling phylogenetic views of ALA data

- calculate phylogenetic measures – e.g. phylogenetic diversity
 - compare to measures generated from non-phylogenetic approaches (e.g. PD and species richness)
 - compare phylogenetic measures between user defined areas



Phylogenetic Diversity

Marsupial diversity – black indicates hotspots

Amboni & Laffan 2010

Enabling phylogenetic views of ALA data

- calculate phylogenetic measures – e.g. phylogenetic diversity
 - compare to measures generated from non-phylogenetic approaches (e.g. PD and species richness)
 - compare phylogenetic measures between user defined areas
- generate environmental distributions for clades using ALA occurrence records and environmental layers

Stimulating other assessments...

Other analyses using phylogenetic views of aggregated biodiversity data:

- risk analyses to understand the impact of species loss on biodiversity
- anticipating the effects of climate change

