

Tree-Based Alignment Selector (T-BAS)

v. 2.1

**A TOOLKIT FOR EVOLUTIONARY PLACEMENT OF DNA
SEQUENCES, VIEWING ALIGNMENTS AND SPECIMEN
METADATA ON CURATED AND CUSTOM TREES**

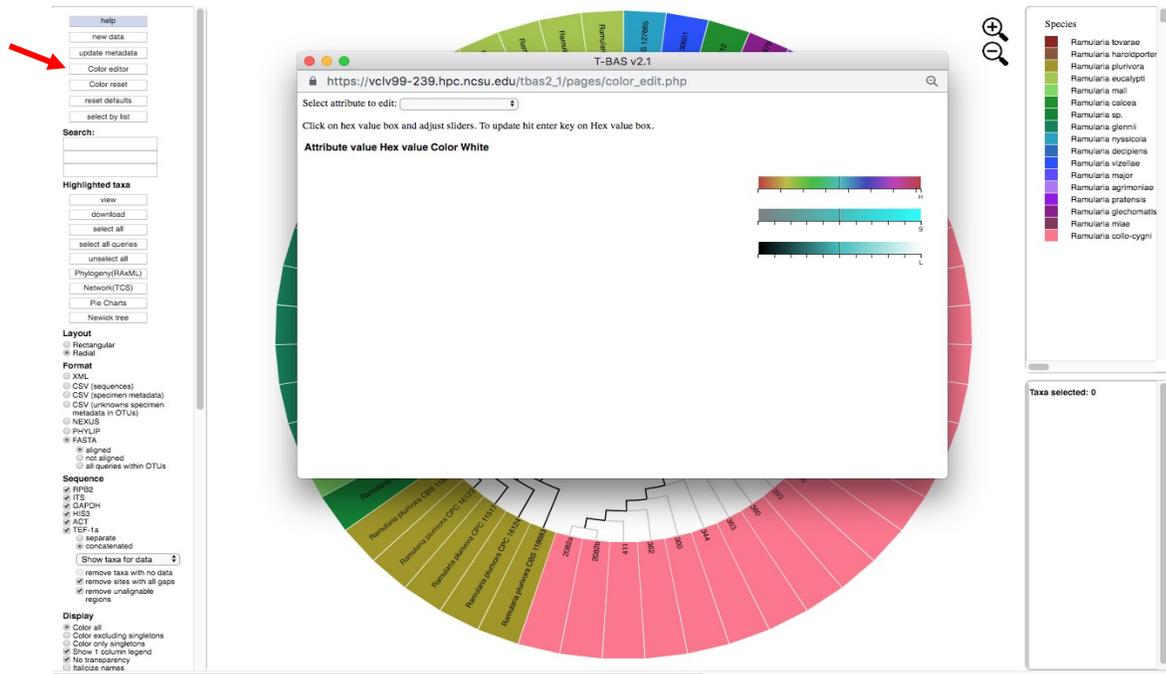
Table of Contents

- 1 Color Editor
- 2 Data Standardization
- 3 De novo single or multi-locus phylogenetic analysis
- 4 References
- 5 Appendix
 - 5.1 Description of Terms

1 Color editor

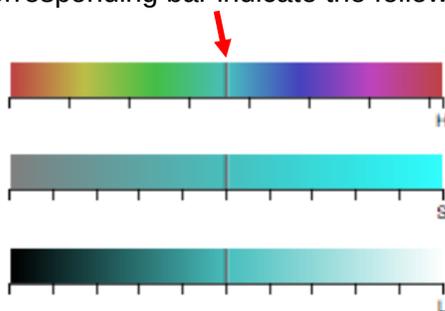
The purpose of the color editor is to allow the user to select preferred colors for the layout of the tree. When T-BAS creates a tree it randomly assigns colors to attributes from all colors in the spectrum. For each attribute, the rows in the legend are arranged by color so that the user can find the label of a color by looking in the legend. The colors can be changed in the color editor. However, the order of entries in the legend remains as for the original colors assigned. There is no limit to how many values or attributes can be edited.

To change the colors, click the color editor button and the color editor window will pop up.



There are two ways to change the colors. Colors can be selected on the color bars or inputting a known hex color value.

To change the color using the HSL (hue, saturation, lightness) color bars, slide the center vertical black line (while holding down the left mouse button) on one of the 3 bars to the left or right. One or all three bars can be modified in order to display the desired color. The letter under the corresponding bar indicate the following: H (hue), S (saturation), L (lightness).

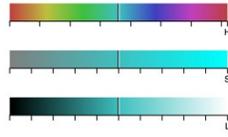


Selecting a specific attribute in the pull-down menu will display the current color arrangement on the tree. Here the hex values can be changed, if known. Hex values can be searched online or can be viewed [here](#). Enter the value into the box and press Enter/Return.

Select attribute to edit: Species

Click on hex value box and adjust sliders. To update hit enter key on Hex value box.

Attribute value	Hex value	Color	White
Ramularia_miae	8C2722		<input type="checkbox"/>
Ramularia_collo-cygni	FE768C		<input type="checkbox"/>
Ramularia_tovarae	8C2722		<input type="checkbox"/>
Ramularia_haroldporteri	8A5738		<input type="checkbox"/>
Ramularia_plurivora	A1971F		<input type="checkbox"/>
Ramularia_eucalypti	A5C54A		<input type="checkbox"/>
Ramularia_mali	7DD865		<input type="checkbox"/>
Ramularia_calcea	1C8F2B		<input type="checkbox"/>
Ramularia_sp.	0C8535		<input type="checkbox"/>
Ramularia_glennii	0E825D		<input type="checkbox"/>
Ramularia_nyssicola	18A0C6		<input type="checkbox"/>
Ramularia_decipiens	286ABC		<input type="checkbox"/>
Ramularia_vizellae	164EFD		<input type="checkbox"/>
Ramularia_major	5848FD		<input type="checkbox"/>
Ramularia_agrimoniae	AC78F5		<input type="checkbox"/>
Ramularia_pratensis	9204E4		<input type="checkbox"/>
Ramularia_glechomatis	8A198D		<input type="checkbox"/>



If the value is not known, click inside a box of an attribute to be changed, and select a new color on the color bar or adjust the vertical black lines until a desired color appears. For the change to take effect, the cursor must be inside the box that has the edited color value and press Enter/Return. The colors will then be updated in the color editor, in the tree, and in the legend. To select the color white, click the box in the last column.

Species

- Ramularia miae
- Ramularia collo-cygni
- Ramularia tovarae
- Ramularia haroldporteri
- Ramularia plurivora
- Ramularia eucalypti
- Ramularia mali
- Ramularia calcea
- Ramularia sp.
- Ramularia glennii
- Ramularia nyssicola

Attribute value Hex value Color White

G. Arnold	8C2722		<input type="checkbox"/>
P.W. Crous	c1a298		<input type="checkbox"/>
A.E. Glenn	A1971F		<input type="checkbox"/>
unknown_query	CCCCCC		<input type="checkbox"/>
H.-D. Shin	88BE4A		<input type="checkbox"/>
-	7DD865		<input type="checkbox"/>
W. Gams	48E749		<input type="checkbox"/>
E. Sachs	0C8535		<input type="checkbox"/>
M.K. Crous & P.W. Crous	52E7D5		<input type="checkbox"/>
A. Weber	18A0C6		<input type="checkbox"/>
W. Quaedvlieg	469CDB		<input type="checkbox"/>
G. Verkley	164EFD		<input type="checkbox"/>
R. Olsen	7954D0		<input type="checkbox"/>

Clicking the color reset button will undo all changes.

help

new data

update metadata

Color editor

Color reset

reset defaults

select by list

Search:

Highlighted taxa

view

download

select all

select all queries

unselect all

Phylogeny(RAxML)

Network(TCS)

Pie Charts

Newick tree

Layout

Rectangular

Radial

Format

XML

CSV (sequences)

CSV (specimen metadata)

CSV (unknowns specimen metadata in OTUs)

NEXUS

Species

- Ramularia miae
- Ramularia collo-cygni
- Ramularia tovarae
- Ramularia haroldporteri
- Ramularia plurivora
- Ramularia eucalypti
- Ramularia mali
- Ramularia calcea
- Ramularia sp.
- Ramularia glennii
- Ramularia nyssicola
- Ramularia decipiens
- Ramularia vizellae
- Ramularia major
- Ramularia agrimoniae
- Ramularia pratensis

Taxa selected: 0

To copy a color scheme from one tree to another, copy hex values and then enter them manually in the color editor on the next tree.

cifr:genes

The cifr:gene tags saves metadata of the alignments.

The cifr:genes tag contains cifr:gene, which contains cifr:locus, cifr:nchar, and cifr:exset.

```
<?xml:version="1.0" encoding="UTF-8"?>
<phyloxml:xmlns:cifr="http://www.cifr.ncsu.edu" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://www.phyloxml.org"
xsi:schemaLocation="http://www.phyloxml.org:phyloxml.xsd">
  <cifr:genes>
    <cifr:gene>
      <cifr:locus>rpb2</cifr:locus>
      <cifr:nchar>670</cifr:nchar>
      <cifr:exset>666-670</cifr:exset>
    </cifr:gene>
    <cifr:gene>
      <cifr:locus>his3</cifr:locus>
      <cifr:nchar>363</cifr:nchar>
      <cifr:exset>359-363</cifr:exset>
    </cifr:gene>
    <cifr:gene>
      <cifr:locus>gapdh</cifr:locus>
      <cifr:nchar>556</cifr:nchar>
      <cifr:exset>55-69-552-556</cifr:exset>
    </cifr:gene>
    <cifr:gene>
      <cifr:locus>tef</cifr:locus>
      <cifr:nchar>389</cifr:nchar>
      <cifr:exset/>
    </cifr:gene>
    <cifr:gene>
      <cifr:locus>act</cifr:locus>
      <cifr:nchar>182</cifr:nchar>
      <cifr:exset>178-182</cifr:exset>
    </cifr:gene>
    <cifr:gene>
      <cifr:locus>its</cifr:locus>
      <cifr:nchar>610</cifr:nchar>
      <cifr:exset>1-8-36-100-117-147-156-171-174-202-203-230-231-246-260-463-474-501-503-558-569-572-605-610</cifr:exset>
    </cifr:gene>
  </cifr:genes>
  <cifr:otus:similarity="">
  <phylogeny:rooted="false">
</phyloxml>
```

3 De novo single or multi-locus phylogenetic analysis

This feature under the RAxML options can be used to Infer best tree for reference and unknown query sequences. Potential applications include: (1) inferring trees for species delimitation using the Genealogical Concordance Phylogenetic Species Recognition (GCPSR) concept (Taylor et al 2000), and (2) inferring an input tree for Poisson Tree Processes (PTP) model to delimit putative species (Zhang et al 2013).

RAxML options:

RAxML analysis:

EPA with likelihood weights
Fast, only with bifurcating reference tree.

Backbone constraint tree with bootstraps
Slow, bifurcating or multifurcating reference tree.

De novo single or multi-locus phylogenetic analysis
Infer best tree for reference and unknown query sequences. [more](#)

Number of bootstrap replicates:

Rate heterogeneity model:

GTRCAT is recommended on large datasets with many taxa.

DNA substitution model:

Specifying a model here will apply to all DNA partitions and override other models.

Use outgroup

Outgroup:

Ladderize tree:

Sort clades in-place according to the number of terminal nodes. Deepest clades are placed last by default. Use reverse=True to sort clades deepest-to-shallowest.

4 References

Section 1 Color Editor

https://www.compuhelpts.com/Color_Codes_1.pdf

Section 2 Data Standardization

Han MV, Zmasek CM (2009) phyloXML: XML for evolutionary biology and comparative genomics. BMC bioinformatics 10, 356.

Section 3 De novo single or multi-locus phylogenetic analysis

Taylor, J.W., D.J. Jacobson, S. Kroken, T. Kasuga, D.M. Geiser, D.S. Hibbett, et al. 2000. Phylogenetic species recognition and species concepts in fungi. Fungal Genet Biol 31: 21-32. doi:10.1006/fgbi.2000.1228.

Zhang, J., P. Kapli, P. Pavlidis and A. Stamatakis. 2013. A general species delimitation method with applications to phylogenetic placements. Bioinformatics 29: 2869-2876. doi:10.1093/bioinformatics/btt499.

5 Appendix

5.1 Description of Terms

Term	Description
Backbone constraint tree with bootstraps	RaxML method
Bifurcating tree	Tree where each node has 2 children
BLAST	Basic Local Alignment Search Tool, used to match unknown sequences to known sequences in database
MEP	Metadata Enhanced PhyloXML format that is a valid phyloXML with added tags for use in T-BAS and DeCIFR
De novo phylogenetic analysis	RaxML method
EPA with likelihood weights	RaxML method that places sequence on edges of existing tree
FASTA	A file sequence format for unaligned data
Genetic distance cutoff	Value used by custom algorithm to exclude divergent species from placement
GTRCAT (Rate heterogeneity model)	Faster model than GTRGAMMA that uses a different approximation to capture rate heterogeneity across sites
GTRGAMMA (Rate heterogeneity model)	General Time Reversible (GTR) model with Gamma distributed rates across sites
ITS	Internal transcribed spacer locus
Labels: Display Names	Node-click context menu, display leaf names in selected clade in large trees. Tree with greater than 2000 leaves do not display names for performance reasons.
Labels: Likelihood Weight	Node-click context menu, click on leaf of EPA placement will show all leaves attached to the edge that gives 95% cumulative weight."
Ladderize tree	Sort tree leaves from deepest to shallowest or reverse
Locus (Loci)	A location on a chromosome
LSU	Large subunit locus
Metadata: Download	Node-click context menu, download data of

	selected according to selections in format and sequence
Metadata: View	Node-click context menu, view data of selected according to selections in format and sequence in pop-up window
Multifurcating tree	Tree where each node can have multiple children
NEWICK	A standard for representing trees
NEXUS	A file format with multiple uses, can contain trees and alignments
OTUs	A grouping of sequences into percent similarity by the program QIIME
Outgroup	Leaves of a tree placed in a distinct clade, used to root tree
PHYLIP	A file format for aligned sequence data
PhyloXML	XML language designed to describe phylogenetic trees (or networks) and associated data
Query sequences	Unaligned unknown sequence data
Rate heterogeneity model	A phylogenetic model that accounts for evolutionary rate heterogeneity
RAxML	Software tool used to place alignment on a tree, plus some other utilities
Reference set	A set of tree, alignments, and metadata of known species at a specific taxonomic level used for placement
Taxa: Select All	Node-click context menu, select all leaves on tree
Taxa: Select(unselect)	Node-click context menu, select or unselect all leafs in clade
Taxa: Unselect All	Node-click context menu, unselect all leaves on tree
Tree: Collapse(expand)	Node-click context menu, collapse clade into a single node. Collapsed clade appears as a small circle. Click on this circle to restore clade.
Tree: Network (TCS)	Node-click context menu, create TCS network of all query strains in clade
Tree: Newick tree	Node-click context menu, download newick tree of selected clade in either phylip or NEXUS format
Tree: Phylogeny (RaxML)	Node-click context menu, create de novo tree of

	selected clade
Tree: Pie Charts	Node-click context menu, create pie charts to show relationships of selected attributes
Tree: Subtree (new window)	Node-click context menu, view subtree of selected clade in new window
Tree: Subtree(tree)	Node-click context menu, view subtree of selected clade
UNITE	Database of fungal ITS for BLAST