L23-Phylogeny

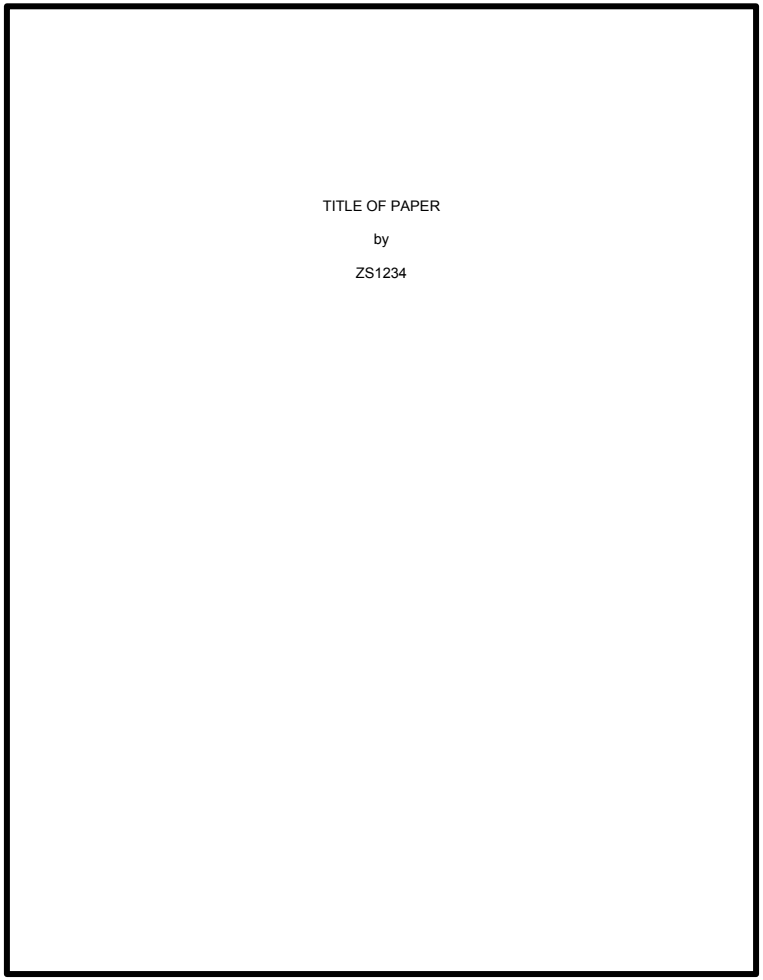
Announcements

1st Drafts for papers due Oct 29th

-DO NOT INCLUDE YOUR NAME

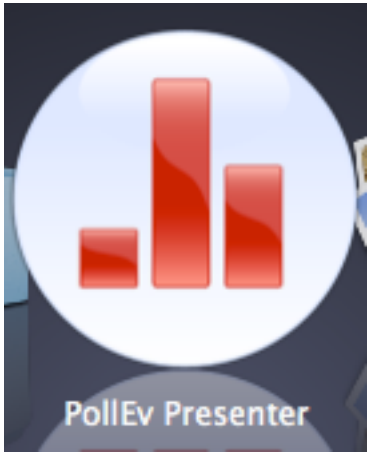
--first and last initials and last four-digits of student ID

--include the recitation date and time as well.



THINK-PAIR-SHARE (90 sec)

Why are there so many unusual species on the Galapagos Islands or in Madagascar? What kind of speciation might explain this phenomenon?



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Categorization facilitates understanding relationships

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Animal type

Habitat

Appearance

Food type

Shape

Ingredients

Clothing type

Material(s)

Usage

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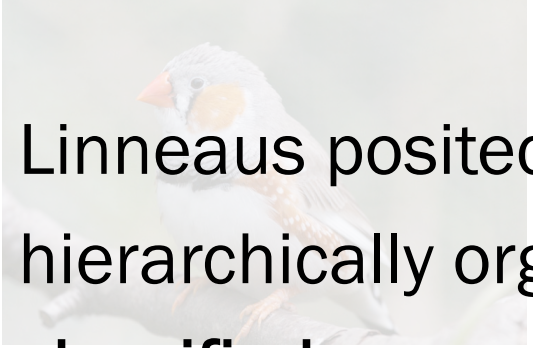
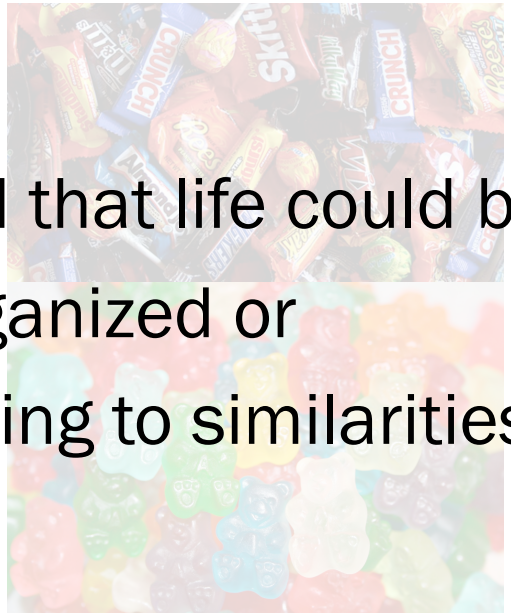




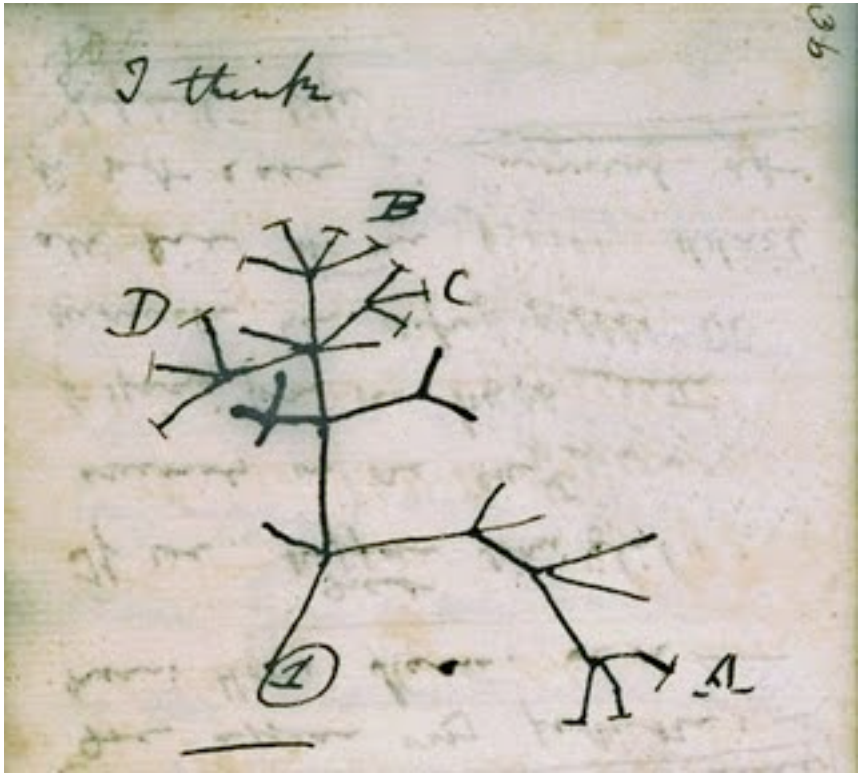
Linneaus posited that life could be hierarchically organized or **classified** according to similarities

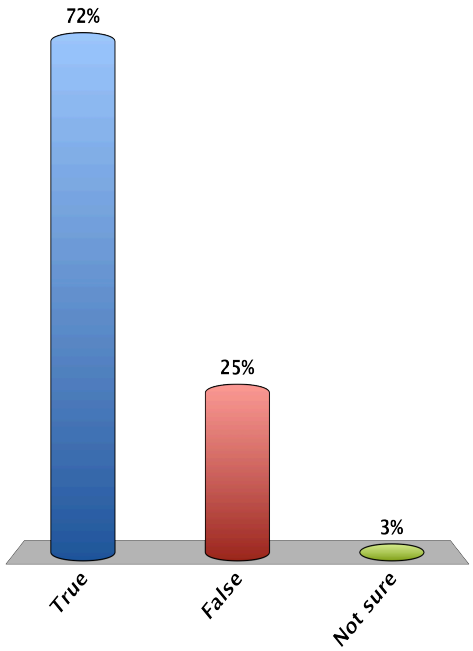
Darwin showed that descent with modification could explain and support Linneaus' hierarchical organization through similar features.

A. True

B. False

C. Not sure





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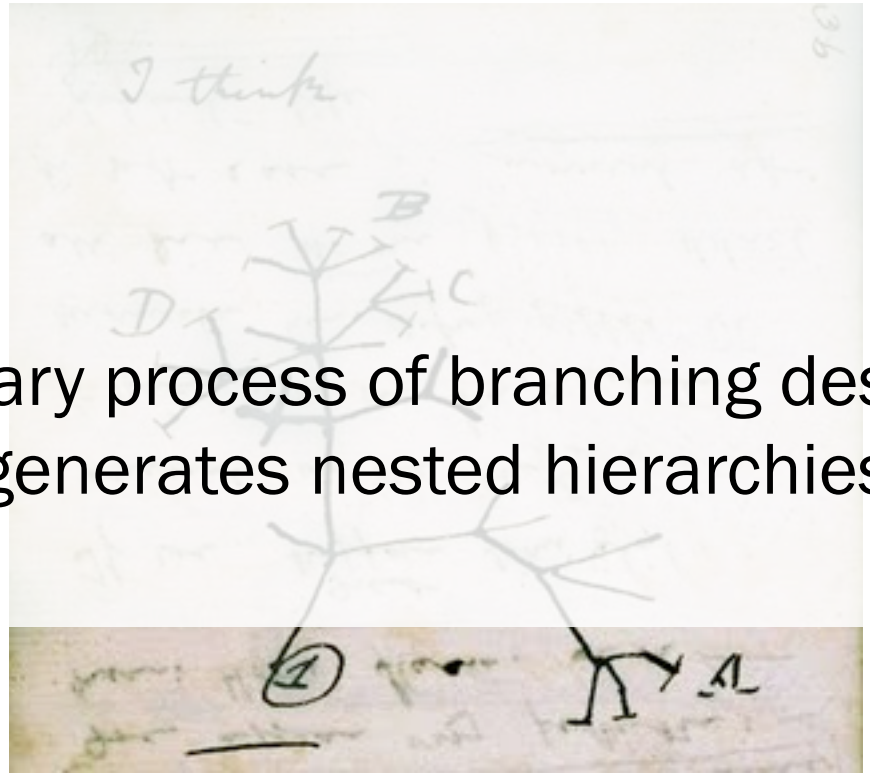


The evolutionary process of branching descent with modification generates nested hierarchies of similarities

Classification using similarities (Linneaus)

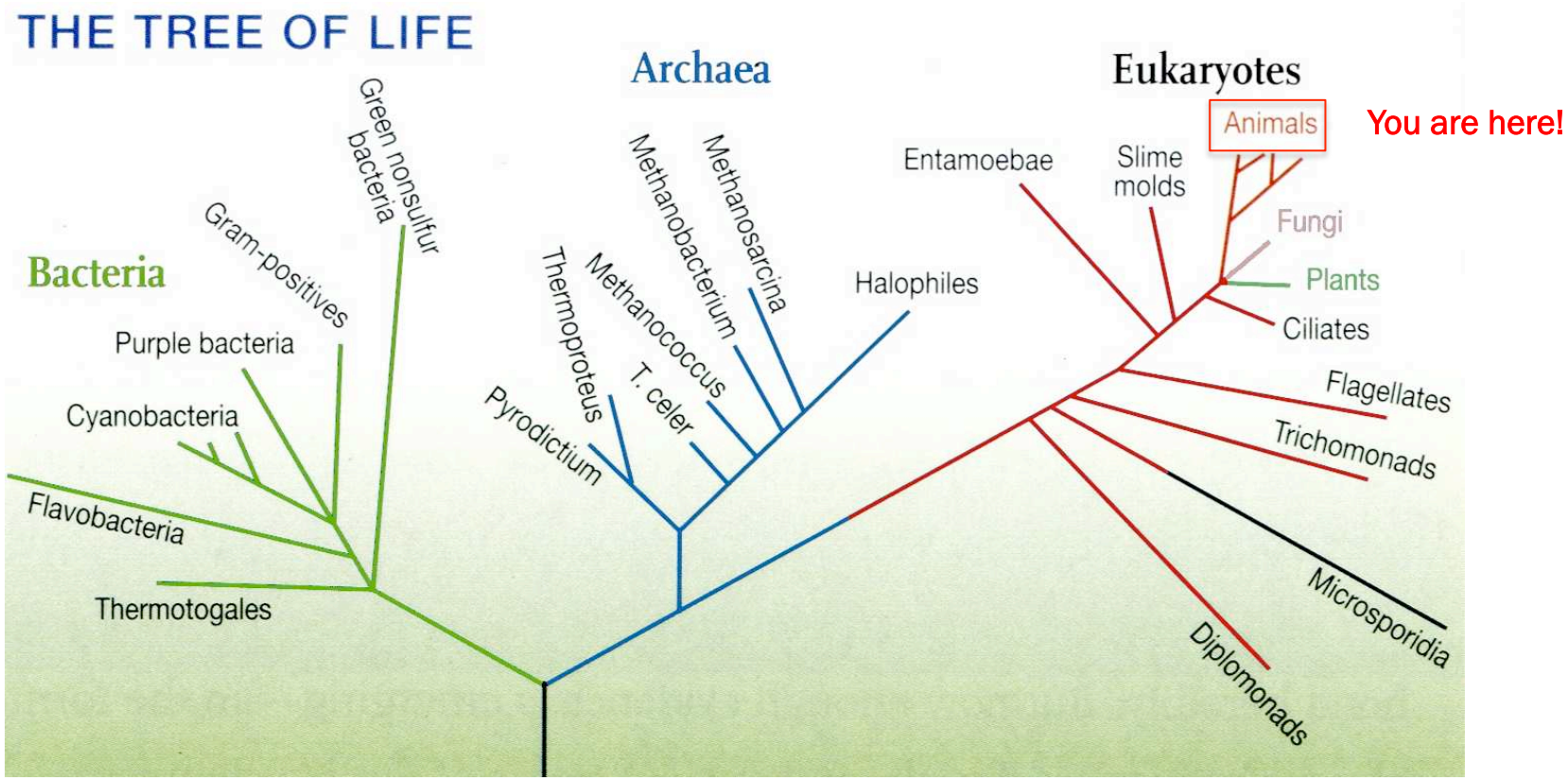
+ Branching descent (Darwin)

= **Modern phylogenetics**

Phylogenetics- the study of patterns of branching relationships of populations that give rise to populations over evolutionary time

Phylogenetics…

…aims to discover shared ancestry between organisms



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…aims to discover shared ancestry between organisms

…identify history of descent between populations characterized by shared features

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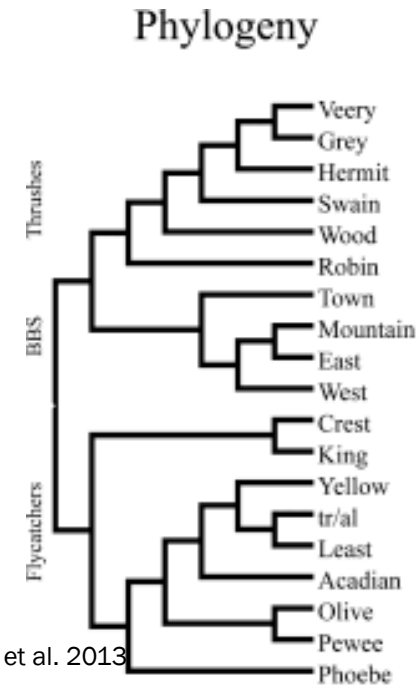
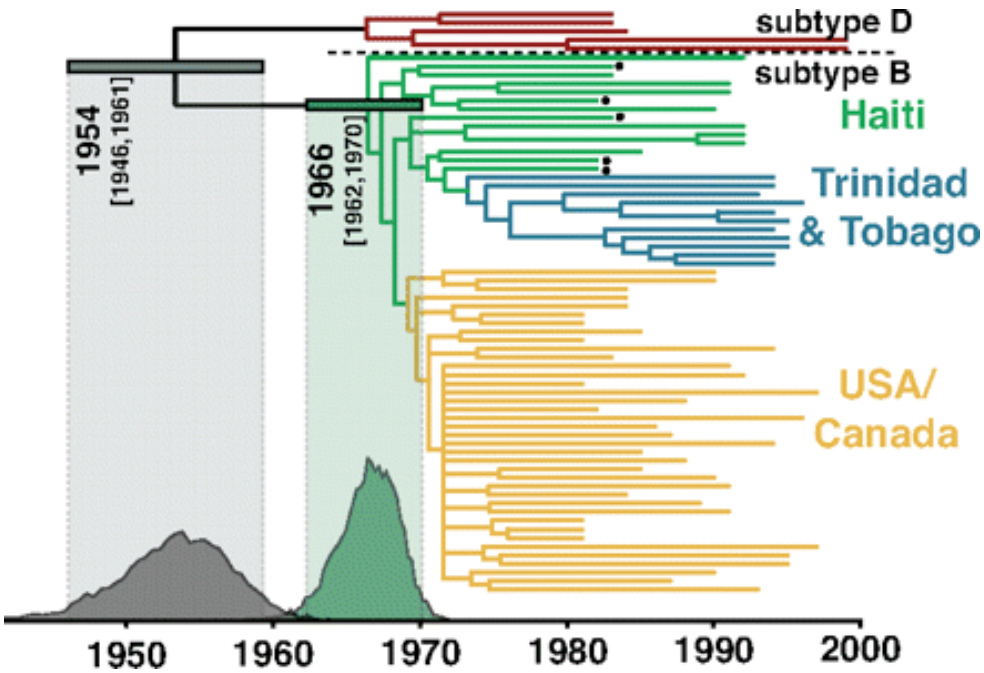


Corbin et al. 2013



Gilbert et al. 2007

Traits are the qualitative/quantitative characteristics used in constructing phylogenies

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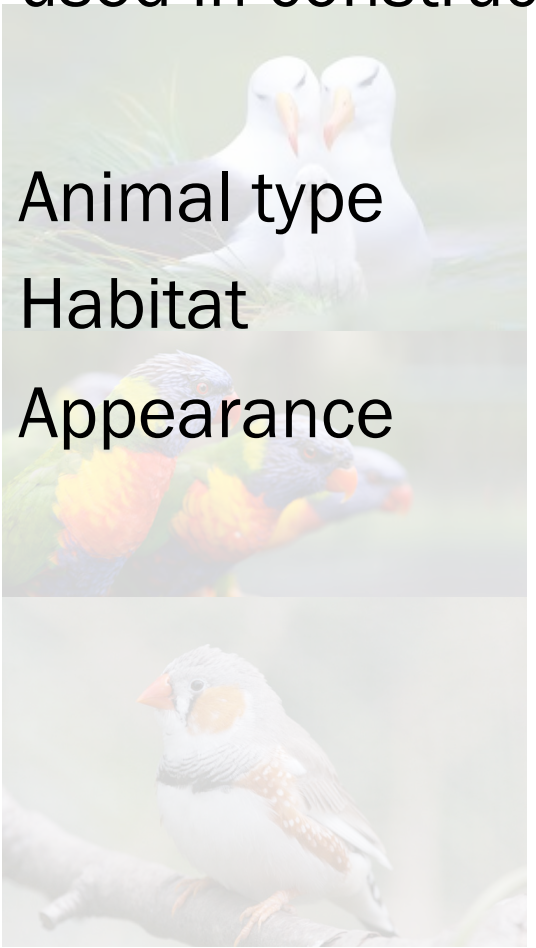

Animal type

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Clothing type

Material(s)

Usage

Traits are the qualitative/quantitative characteristics used in constructing phylogenies

Pre-DNA: anatomical, behavioral, systemic

Post-DNA: well…DNA (genes, ncDNA, introns, exons)

Traits are used to infer **patterns of ancestry** and the **sequence and timing of events**

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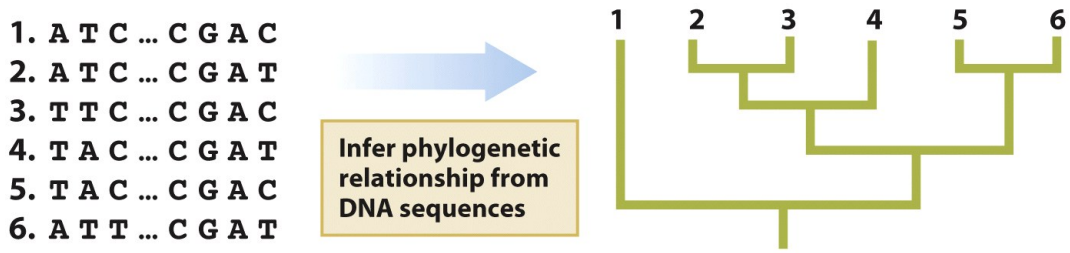
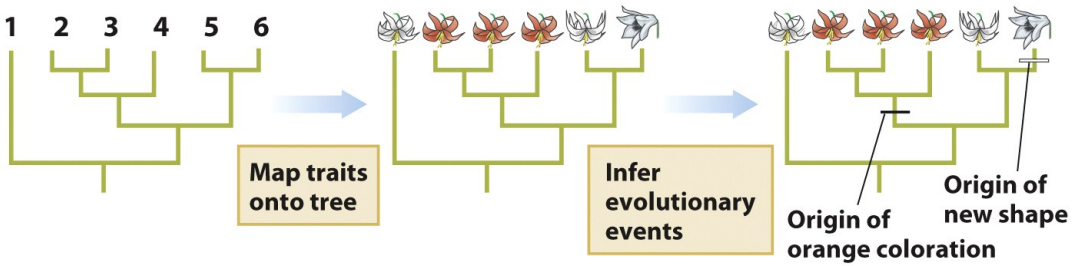


Evolution, 1/e Figure 4.4a



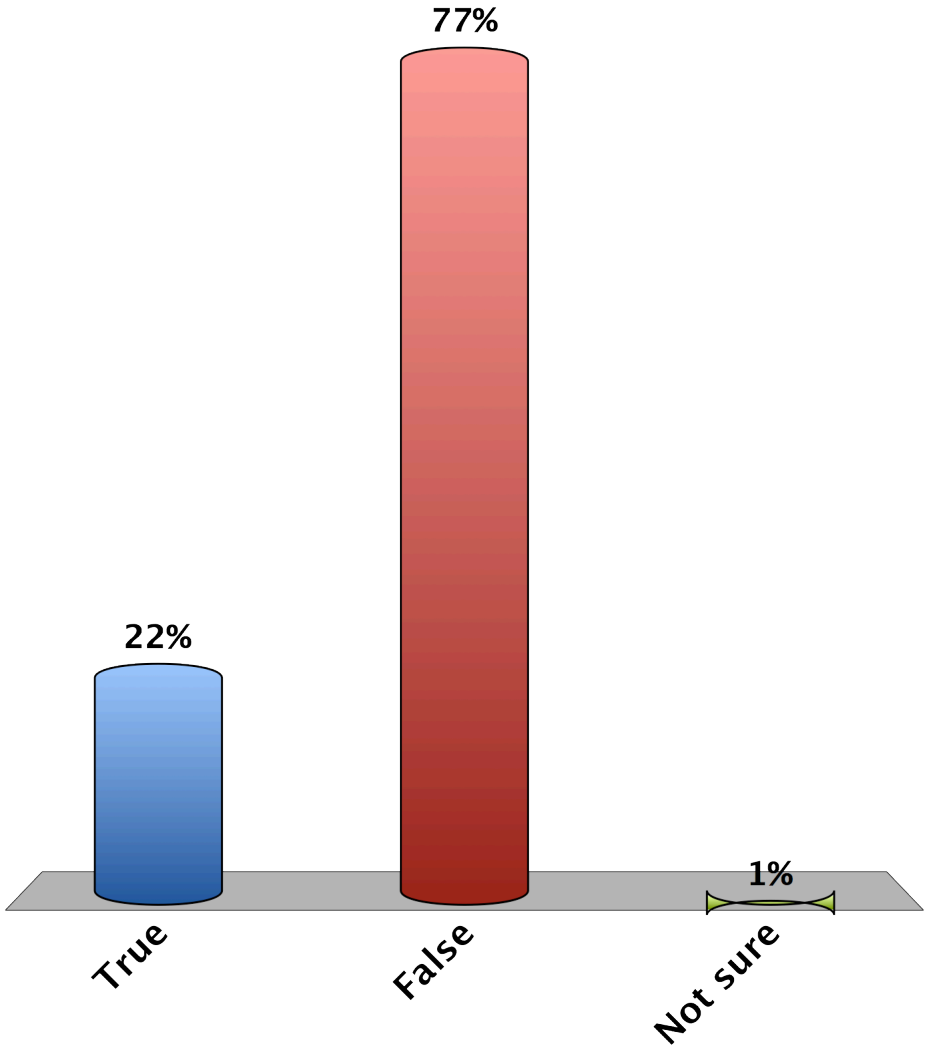
Evolution, 1/e Figure 4.4b

Darwin inferred common ancestry **and** demonstrated its underlying means…

A. True

B. False

C. Not sure



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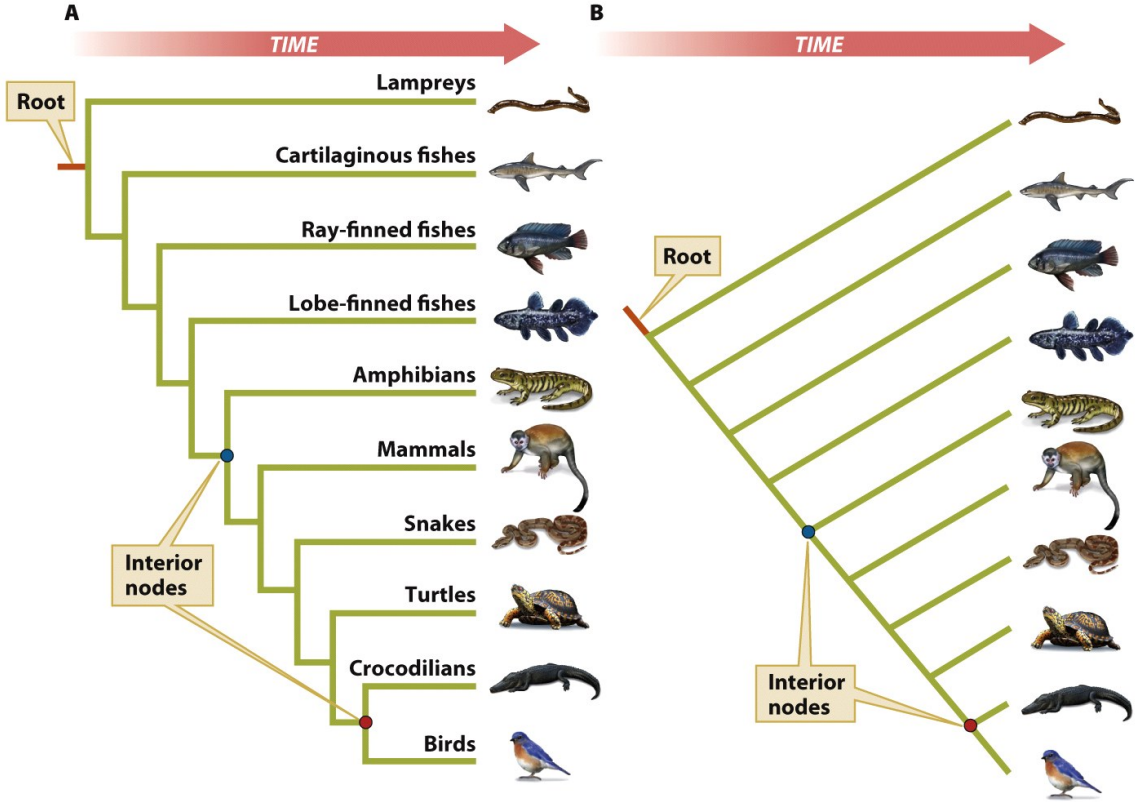
A) True
B) False
C) Not sure

Darwin predicted the presence of heritable material but it was not proven until DNA was discovered.

If descent with modification holds, DNA sequence similarity should reflect patterns of common ancestry inferred from morphological traits and fossil evidence.

Anatomy of a phylogenetic tree



Evolution, 1/e Figure 4.5

Root- convergence of all taxon relationships

Interior nodes- hypothetical common ancestor for connected taxa

Taxa- related organisms (species, genera, phyla)

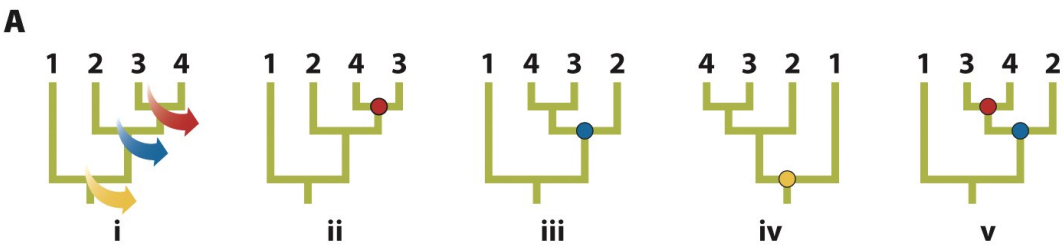
Which tree is unlike (i)?

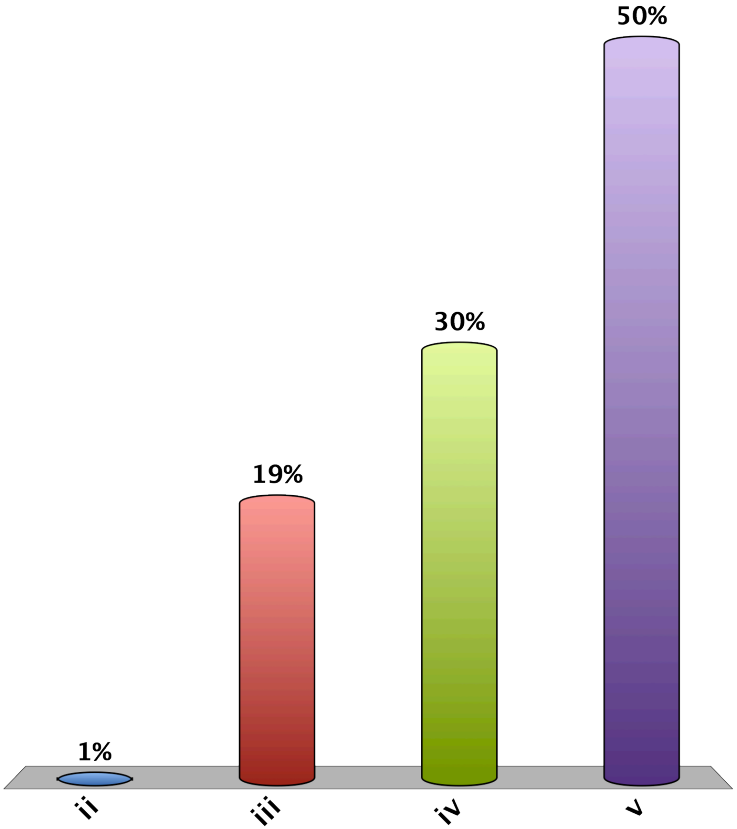
A. ii

B. iii

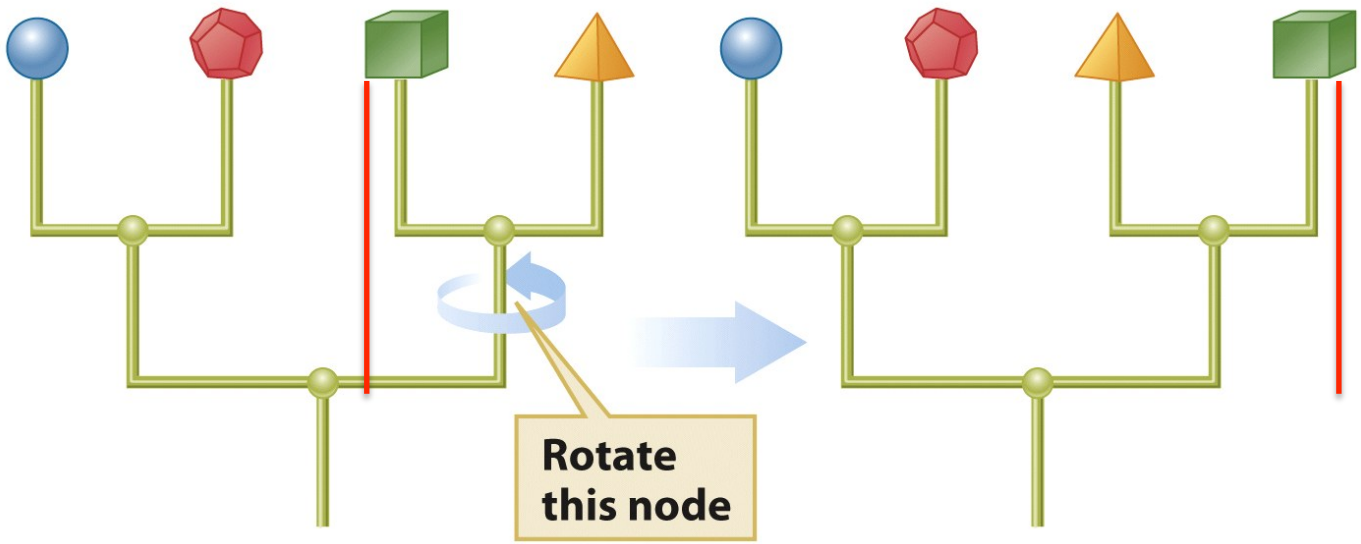
C. iv

D. v





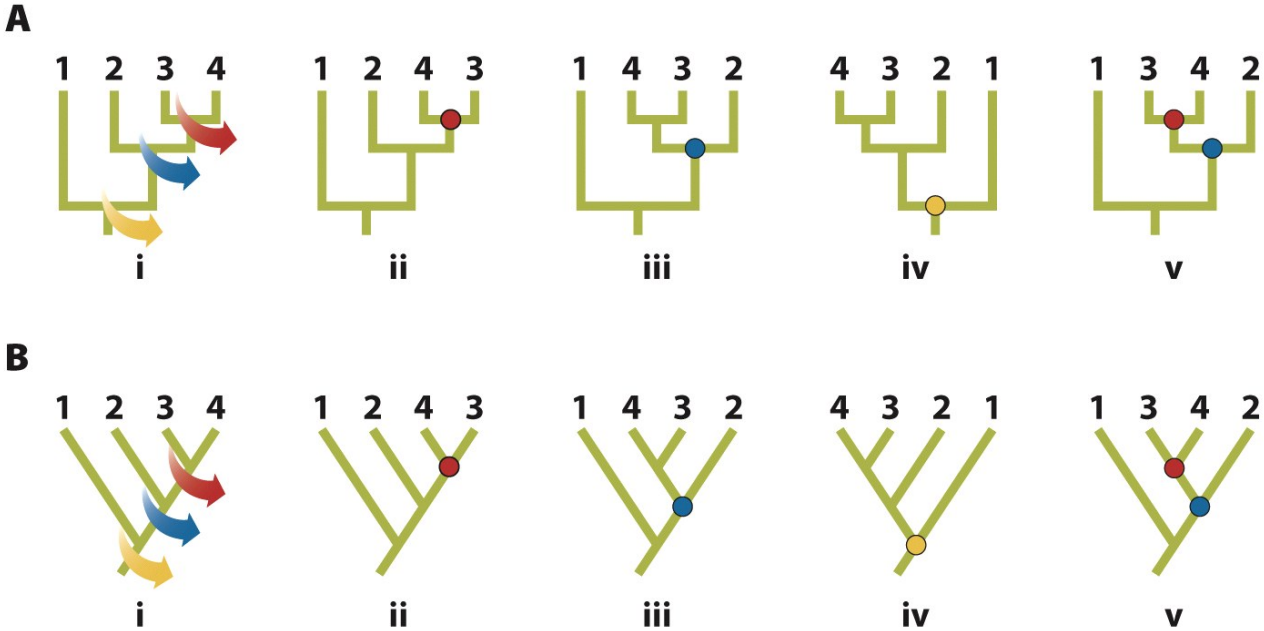
Rotation does not change taxon relationships



Evolution, 1/e Figure 4.7

Traits inform the relationships between taxa and define the hypothetical ancestor (node)

Rotation does not change taxon relationships



Evolution, 1/e Figure 4.8

Taxon branch lengths do not change with rotation