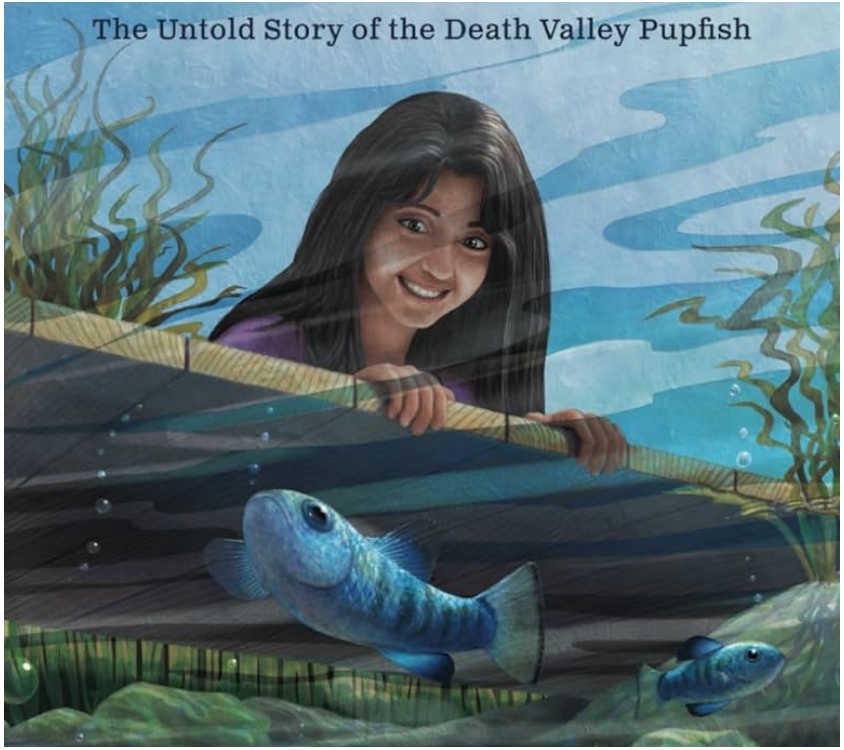
BI377 Morphometry – October 28

Outline

- Linear regression
- Procrustes distance linear modeling
- Pairwise contrasts
- *B. borealis* v. *B. fervidus*?
- Tree Thinking



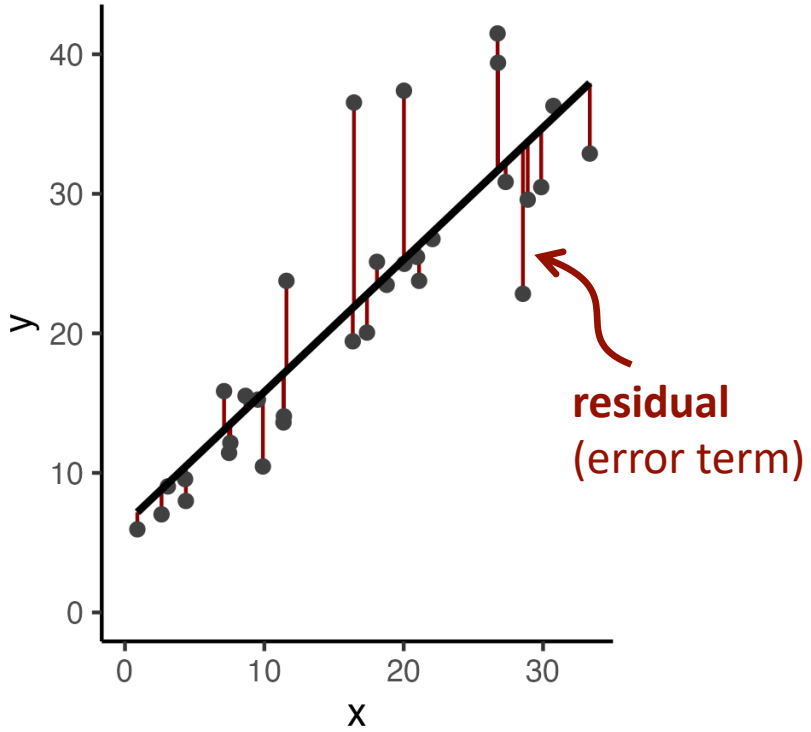
Reading associated with this week

- Kondrashov 2016 (pages 177-196)

Reading for next week…

- Revell & Harmon 2022; Symonds & Blomberg 2014

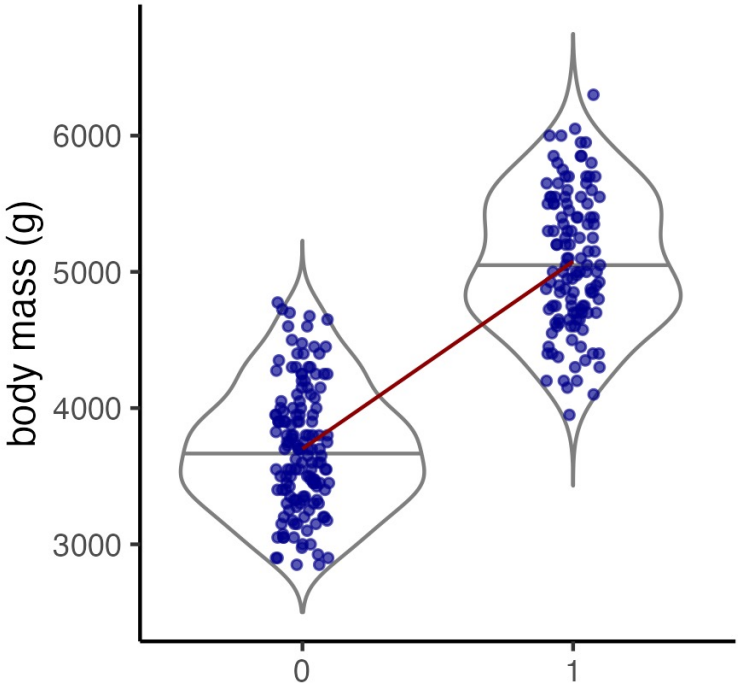
Linear modeling



$y = ax + b$

y ~ intercept + slope * x

ANOVA is linear modeling



$y = ax + b$

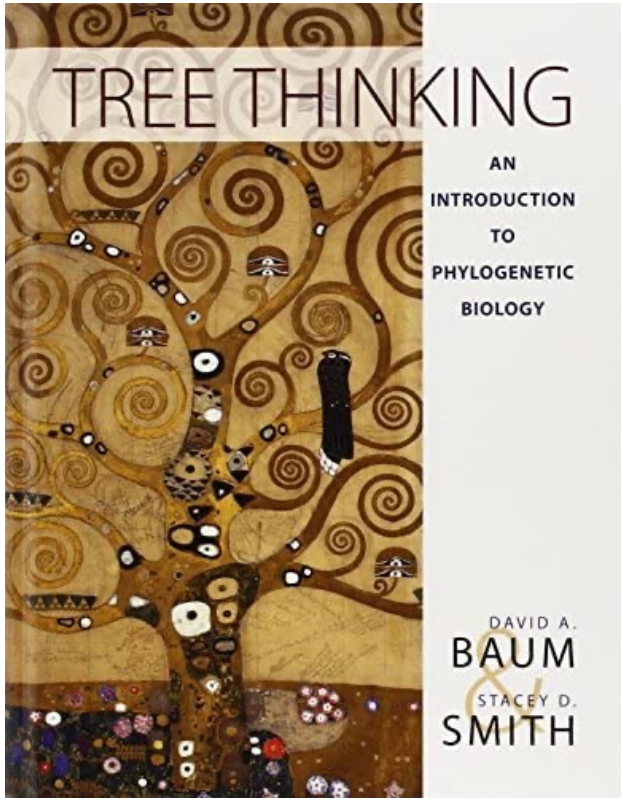
$y \sim \text{intercept} + \text{slope} * x$

The coefficient you obtain from ANOVA is analogous to the slope in linear regression

Tree thinking

- People do not naturally think in a phylogenetic context
- Baum & Smith (2012) raised this issue in biology education

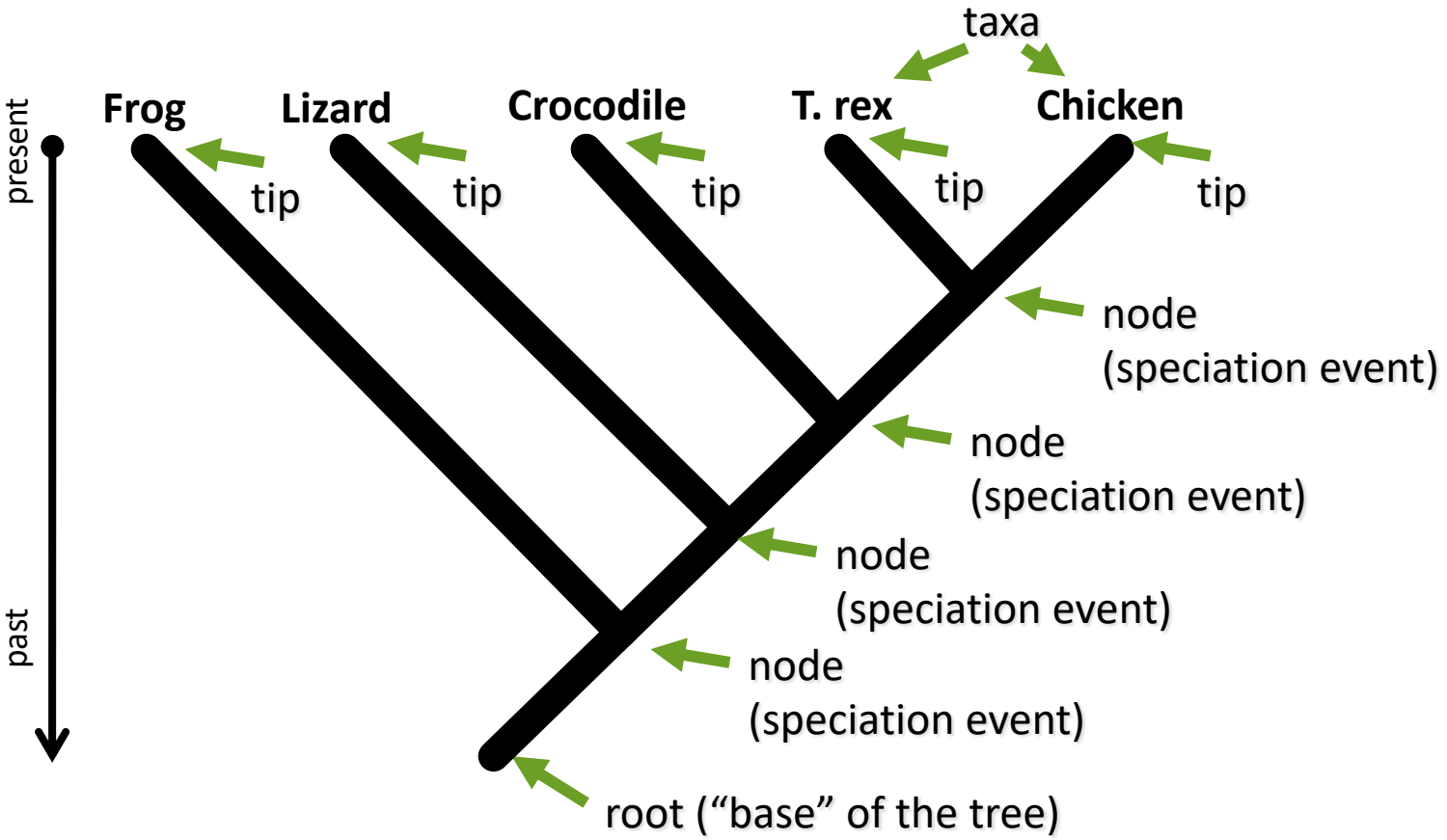
- Let's test ourselves!



Tree terminology

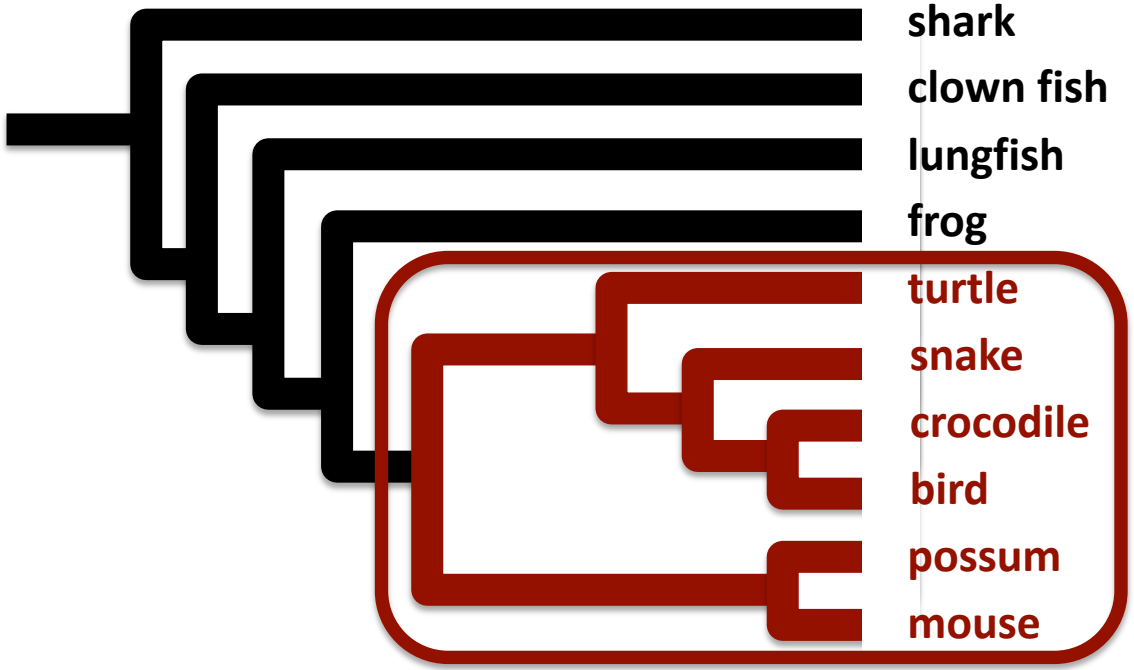
- A **phylogeny** is a branching diagram that represents the evolutionary relationships of different organisms
- Phylogenies look like the branching pattern of a tree, and for this reason they are often simply called "**trees**" by biologists
- **Phylogenetics** is the study of the evolutionary history and relationships among organisms (or individual genes or proteins)
- **Taxonomy** is the field of biology concerned with the naming of organisms and with their classification into higher groups

Tree terminology



Tree Terminology

- A **clade** is a group of organisms that all share a common ancestor, and all descendents of that ancestor are in the group
- A clade can be described as **monophyletic**
- A **synapomorphy** is a trait that is unique to a clade



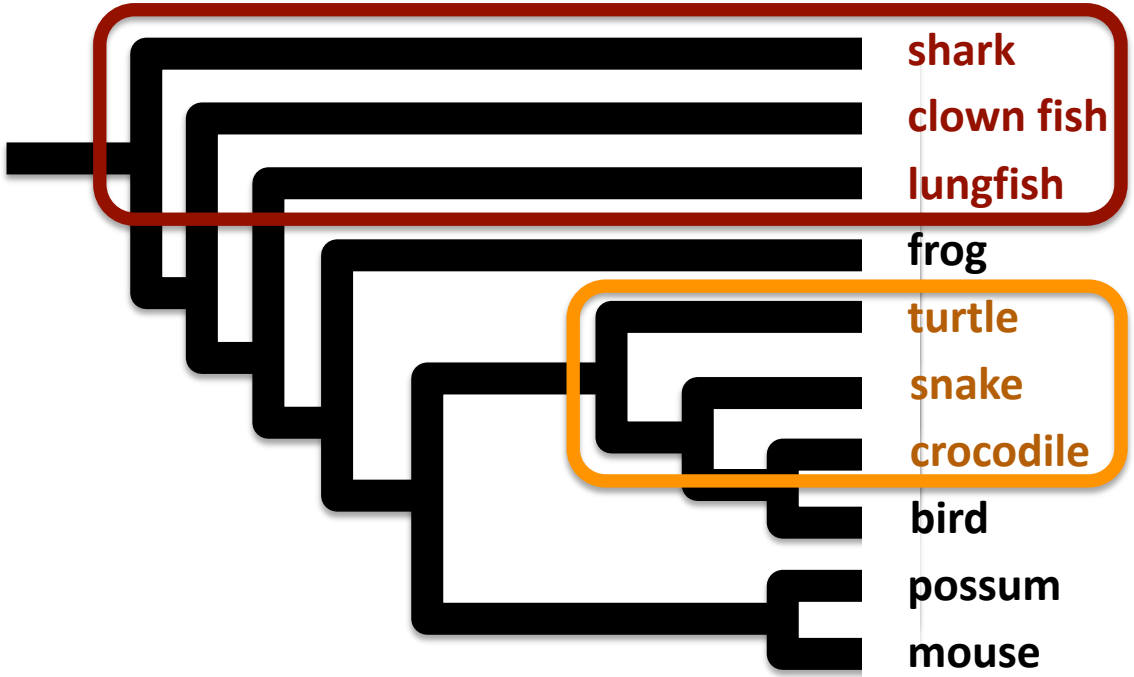
Amniotes are a monophyletic group.

All members share a common ancestor.

They share an amnion, a structure for gas exchange surrounding their eggs.

Tree Terminology

- A **paraphyletic group** is one where all organisms don't share a common ancestor, or even if they do, all descendents of that ancestor are not also in the group



Fish are a paraphyletic group

Retiples are a paraphyletic group