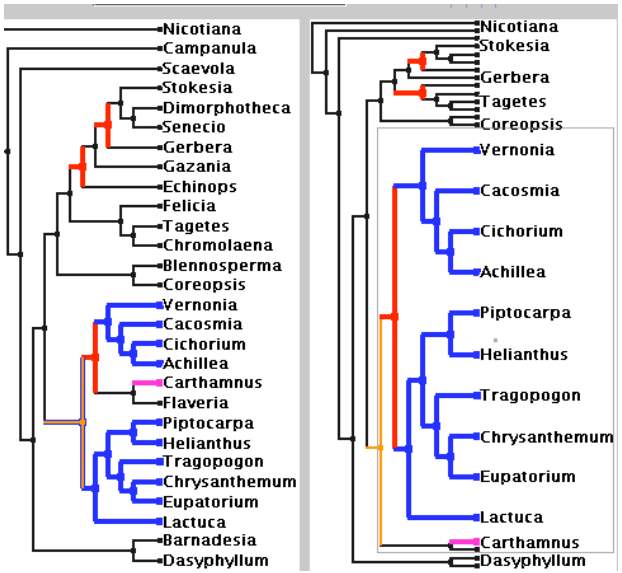
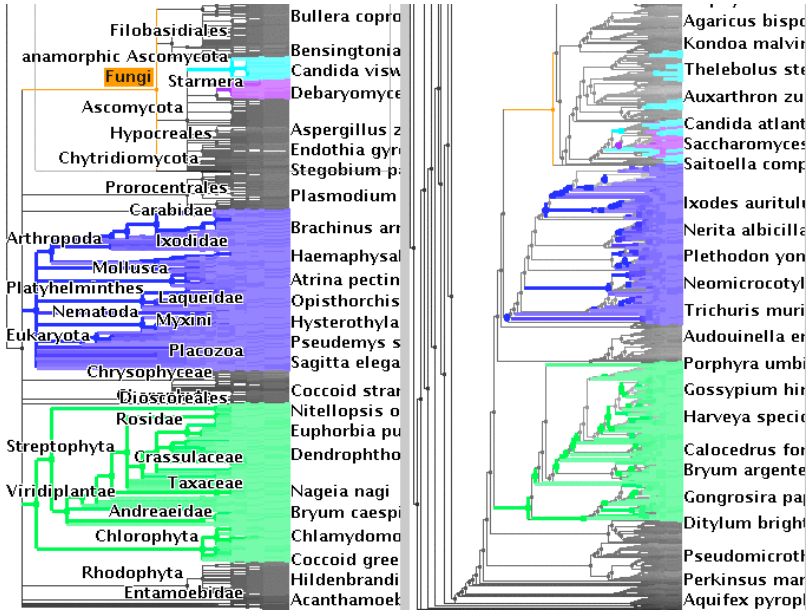
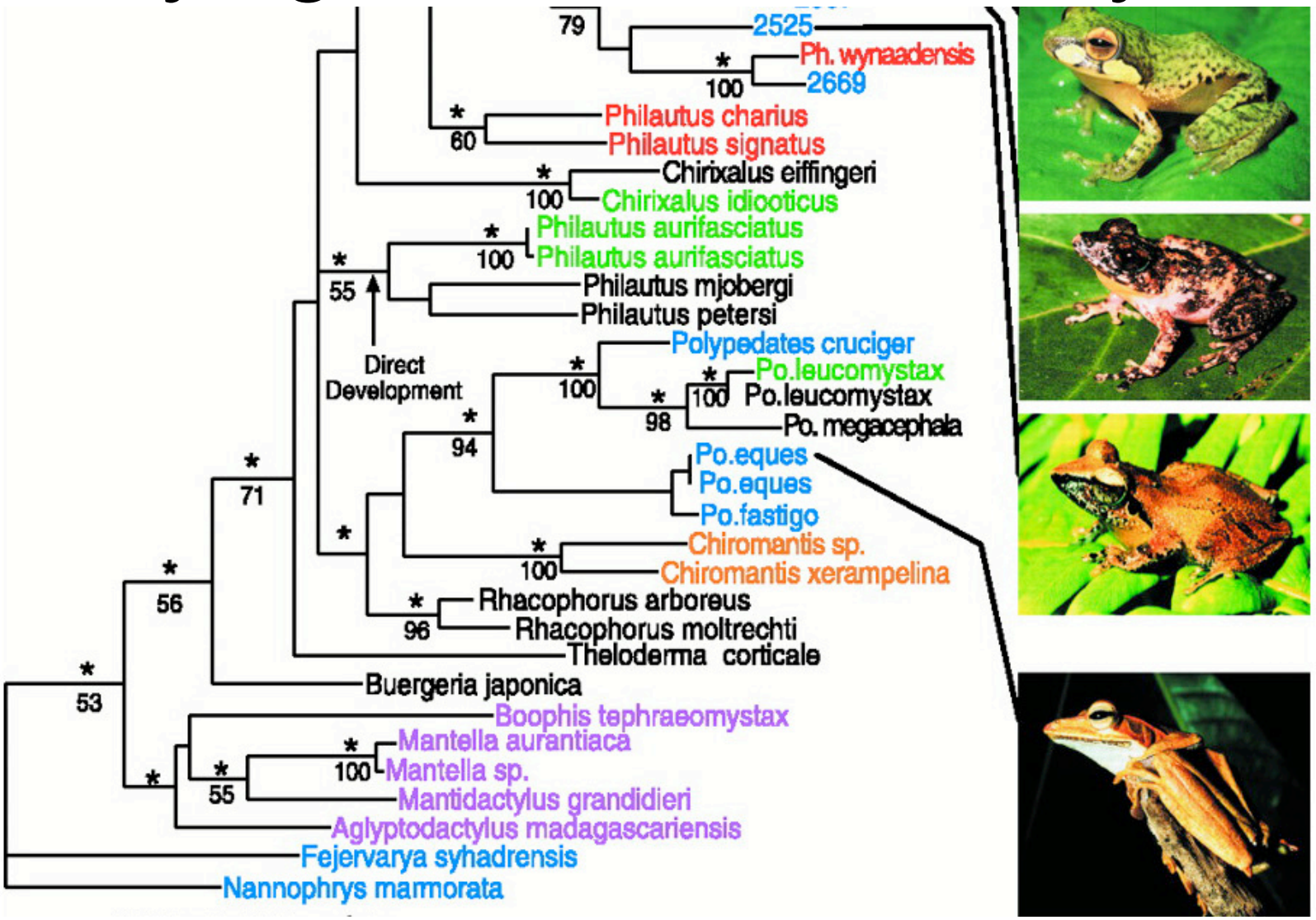
TreeJuxtaposer

- side by side comparison of evolutionary trees



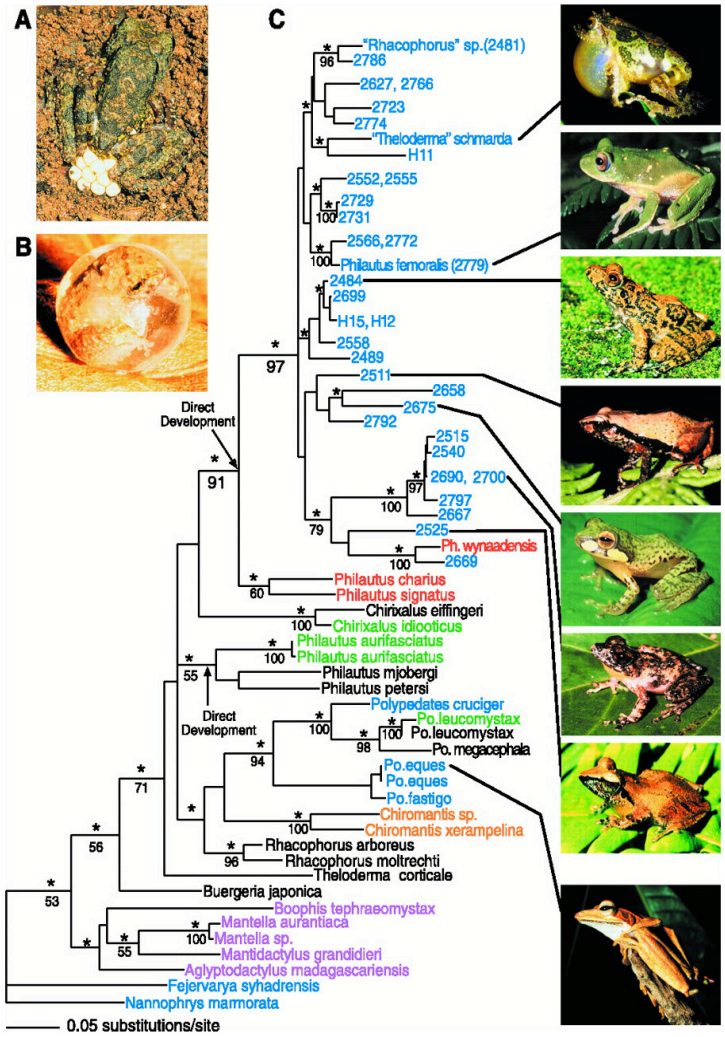


Phylogenetic/Evolutionary Tree



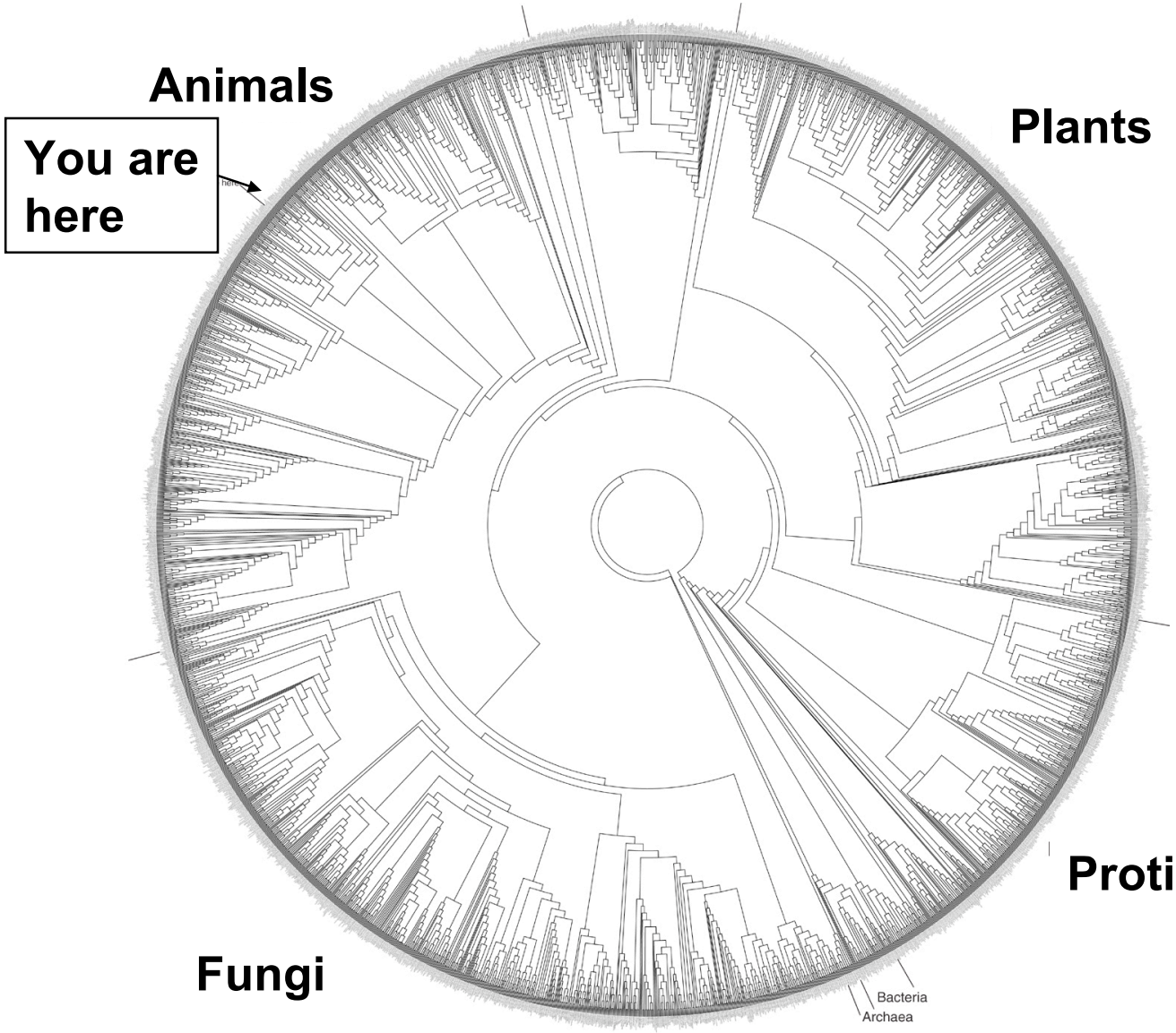
M Meegaskumbura et al., Science 298:379 (2002)

Common Dataset Size Today



M Meegaskumbura et al., Science 298:379 (2002)

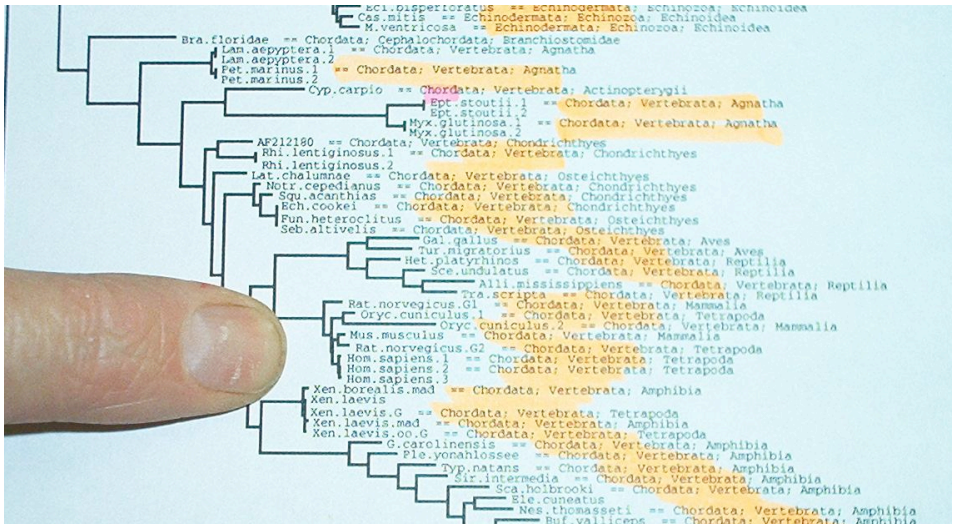
Future Goal: 10M node Tree of Life



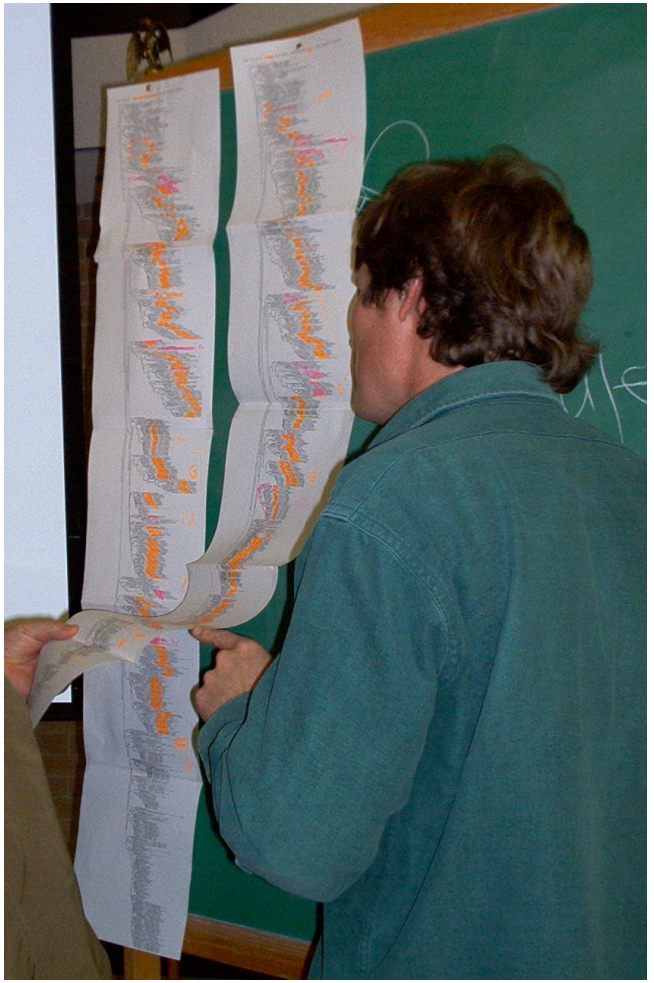
David Hillis, Science 300:1687 (2003)

Paper Comparison: Multiple Trees

focus

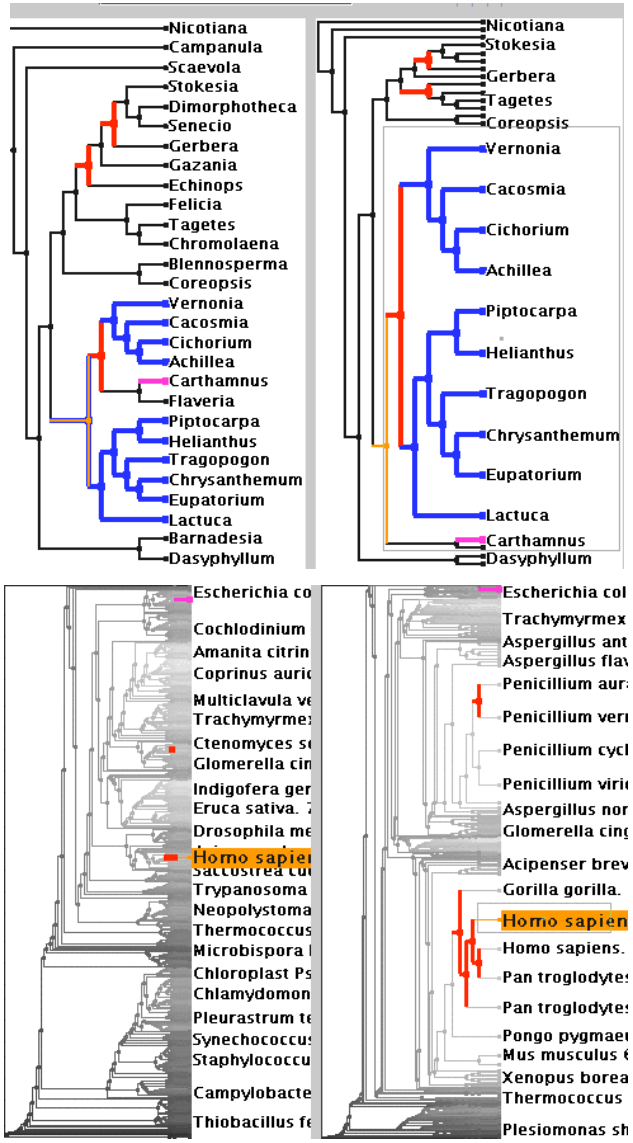


context



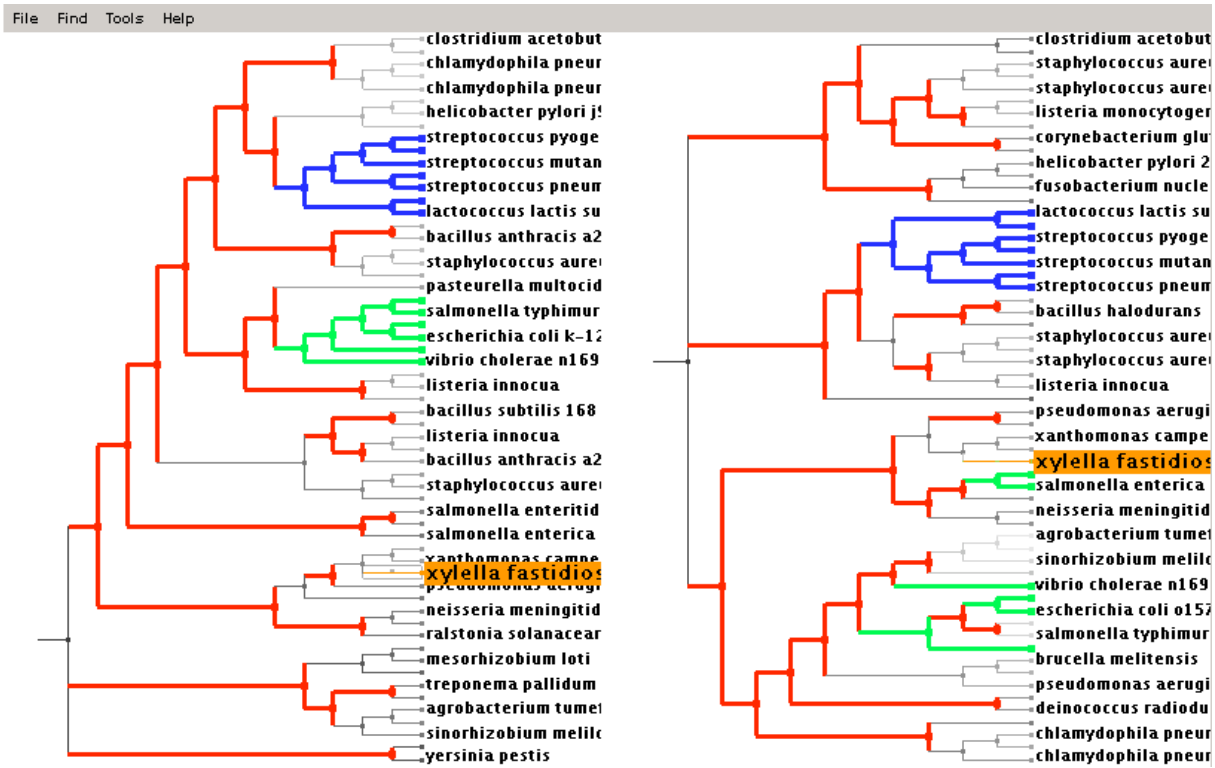
Accordion Drawing

- rubber-sheet navigation
  - stretch out part of surface, the rest squishes
  - borders nailed down
  - Focus+Context technique
    - integrated overview, details
  - old idea
    - [Sarkar et al 93], [Robertson et al 91]
- guaranteed visibility
  - marks always visible
  - important for scalability
  - new idea
    - [Munzner et al 03]

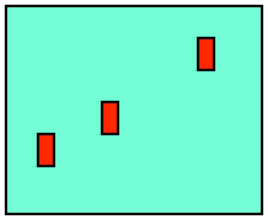


Guaranteed Visibility

- marks are always visible
- easy with small datasets



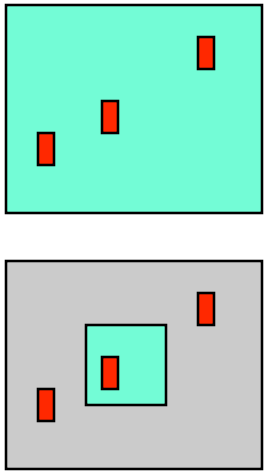
Guaranteed Visibility Challenges



- hard with larger datasets
- reasons a mark could be invisible

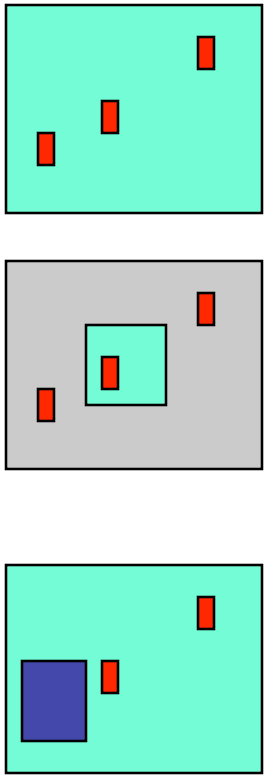
Guaranteed Visibility Challenges

- hard with larger datasets
- reasons a mark could be invisible
  - outside the window
    - AD solution: constrained navigation



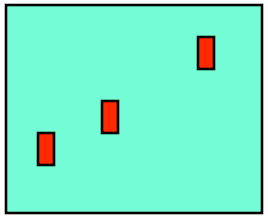
Guaranteed Visibility Challenges

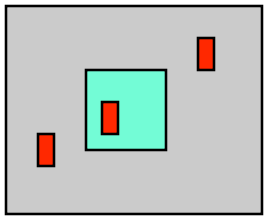
- hard with larger datasets
- reasons a mark could be invisible
  - outside the window
    - AD solution: constrained navigation
  - underneath other marks
    - AD solution: avoid 3D

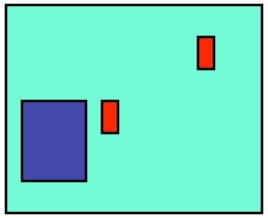


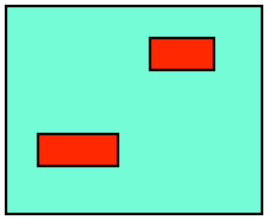
Guaranteed Visibility Challenges

- hard with larger datasets
- reasons a mark could be invisible
  - outside the window
    - AD solution: constrained navigation
  - underneath other marks
    - AD solution: avoid 3D
  - smaller than a pixel
    - AD solution: smart culling



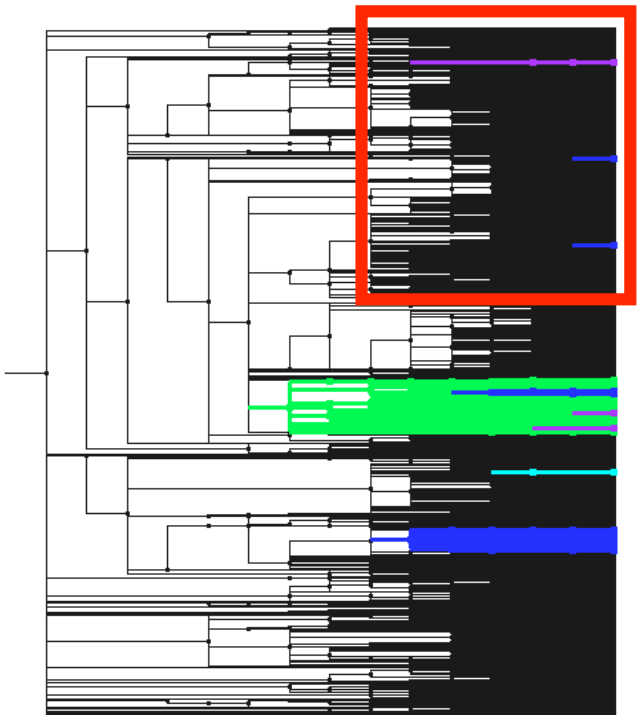




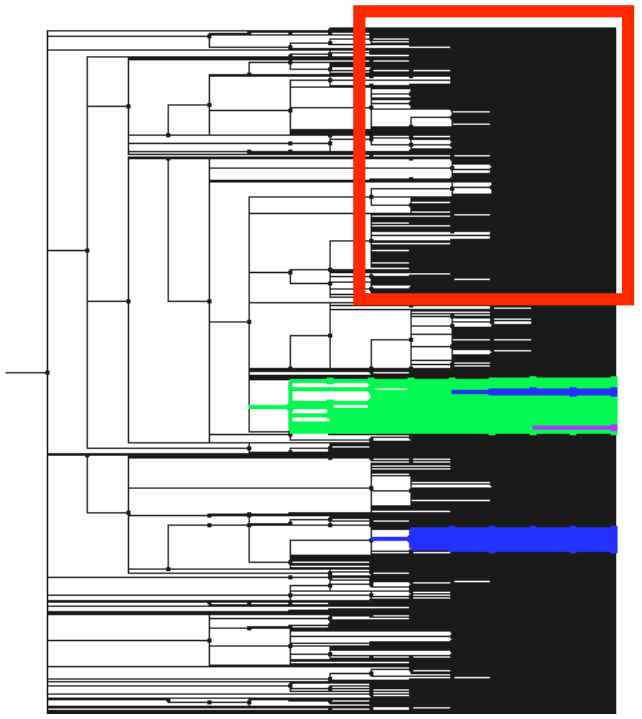


Guaranteed Visibility: Small Items

- Naïve culling may not draw all marked items



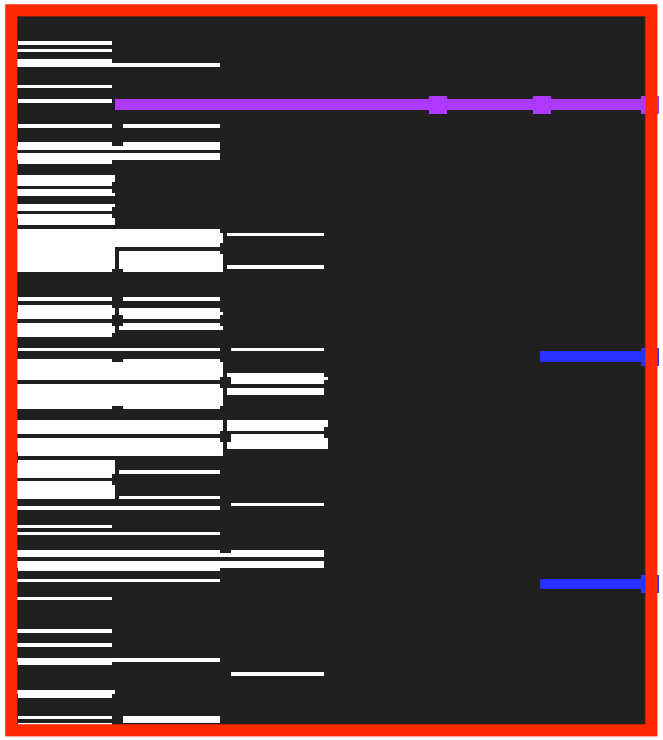
Guaranteed visibility of marks



No guaranteed visibility

Guaranteed Visibility: Small Items

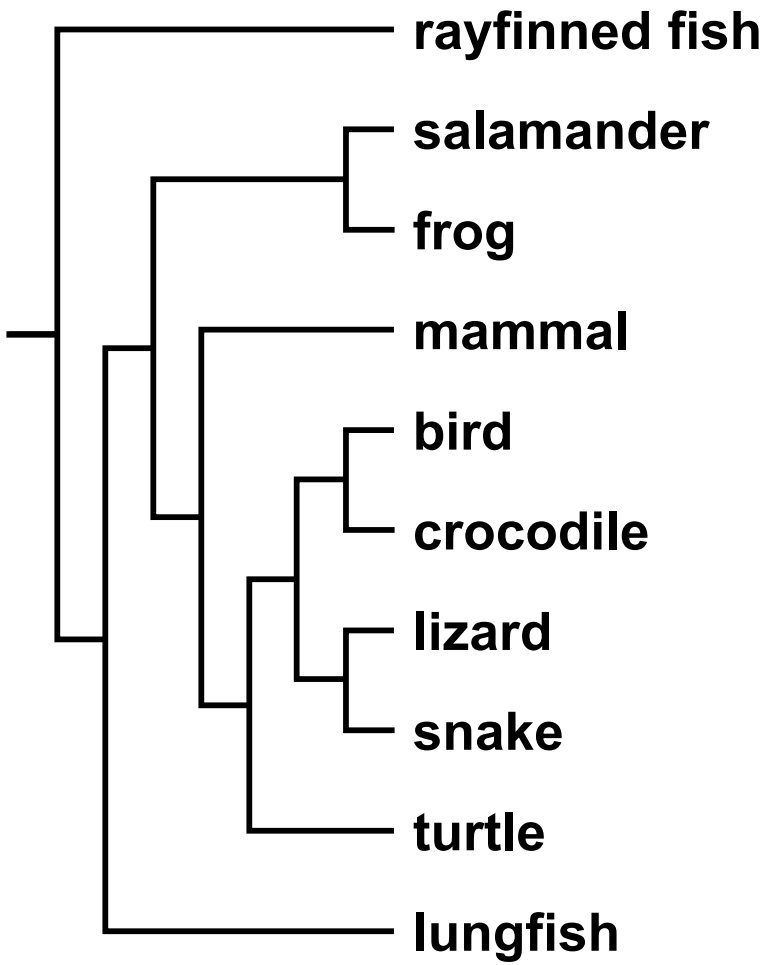
- Naïve culling may not draw all marked items

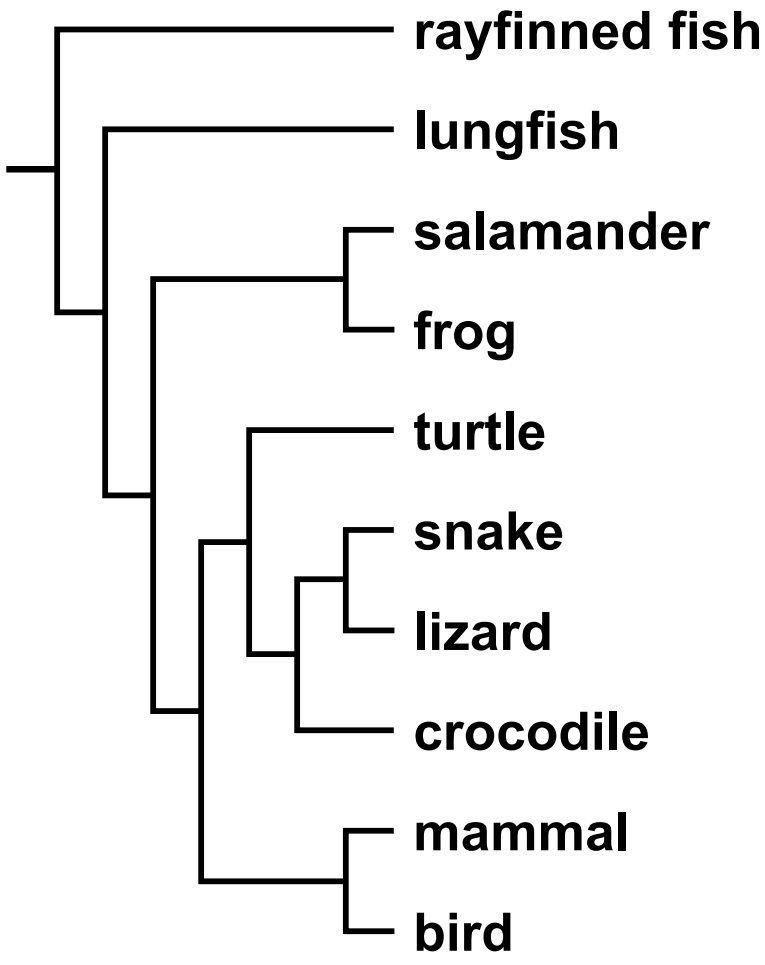


Guaranteed visibility of marks

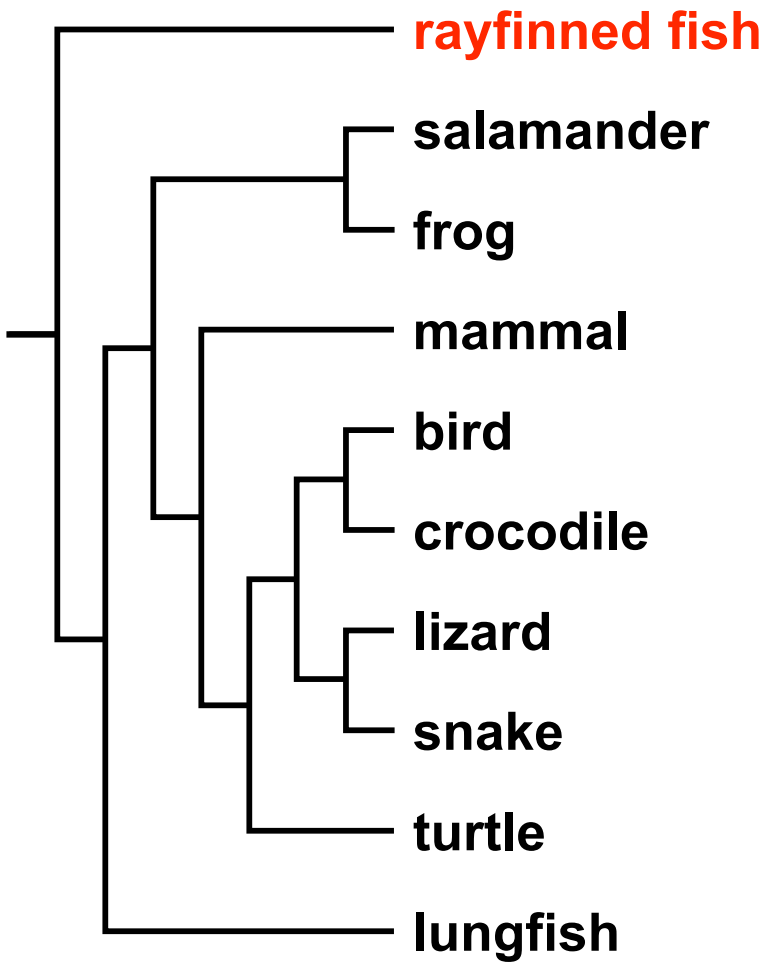
No guaranteed visibility

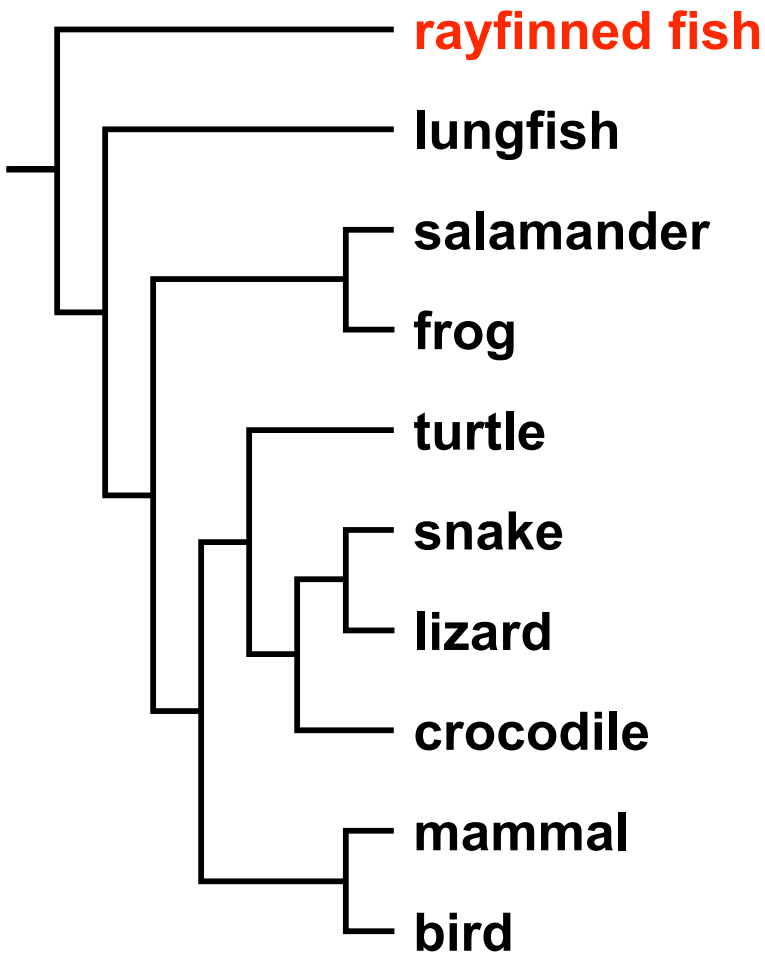
Structural Comparison



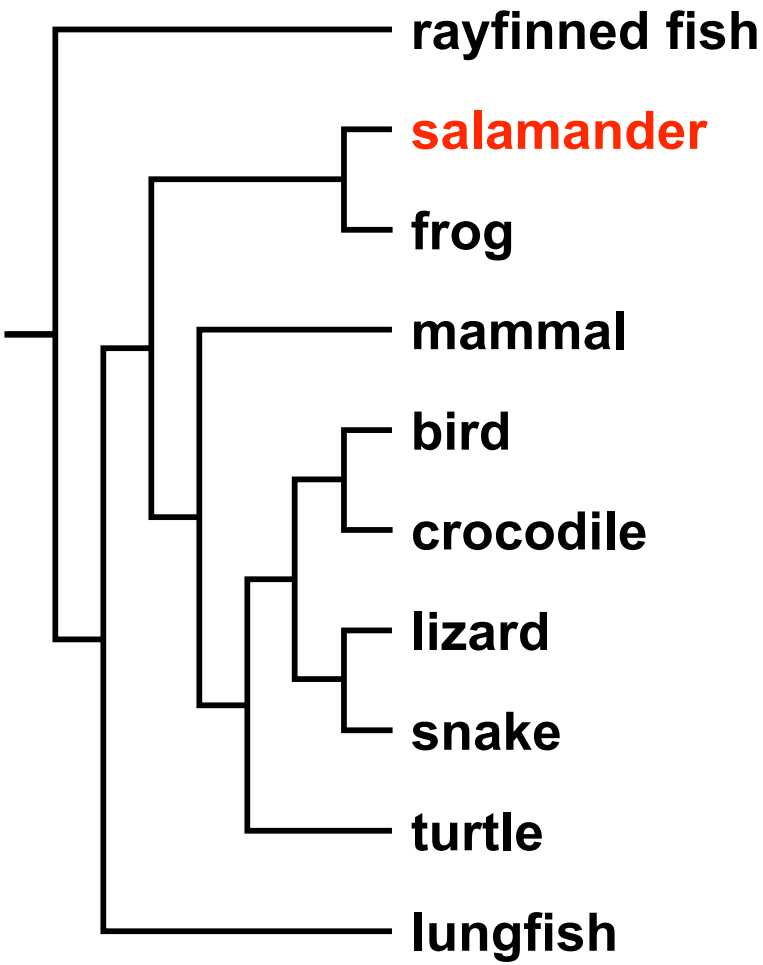


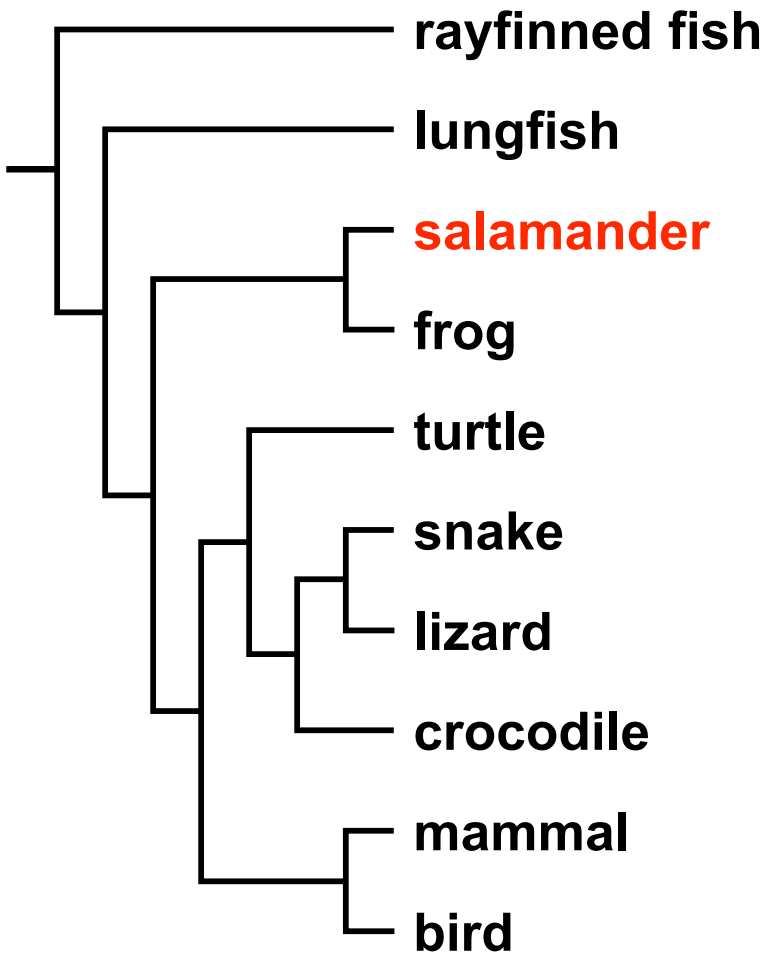
Matching Leaf Nodes



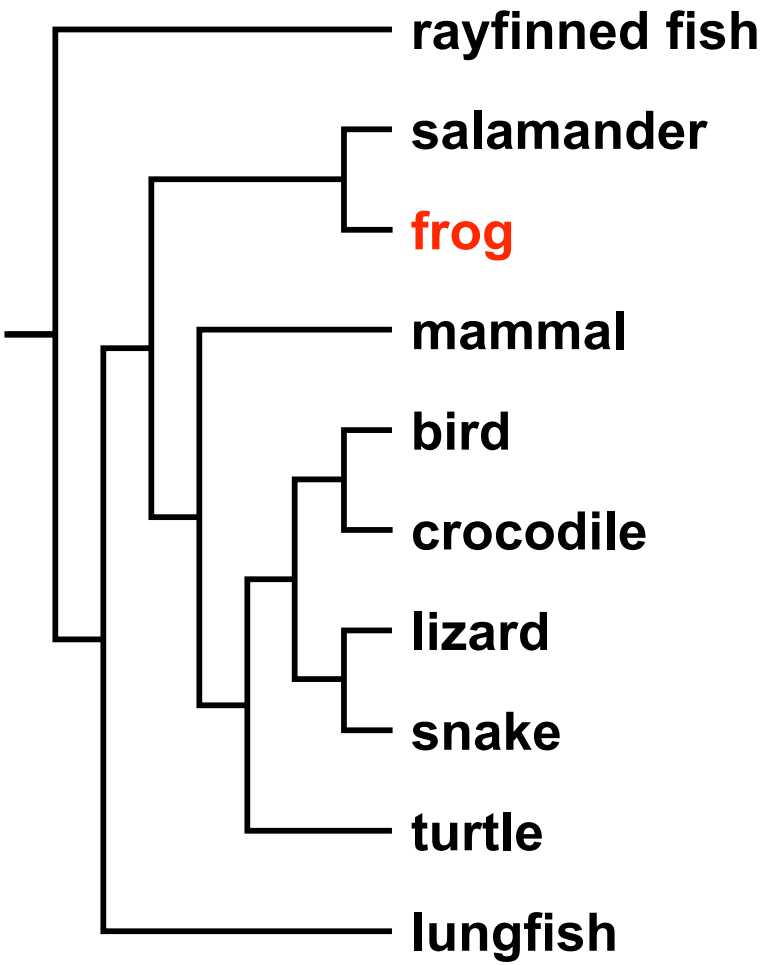


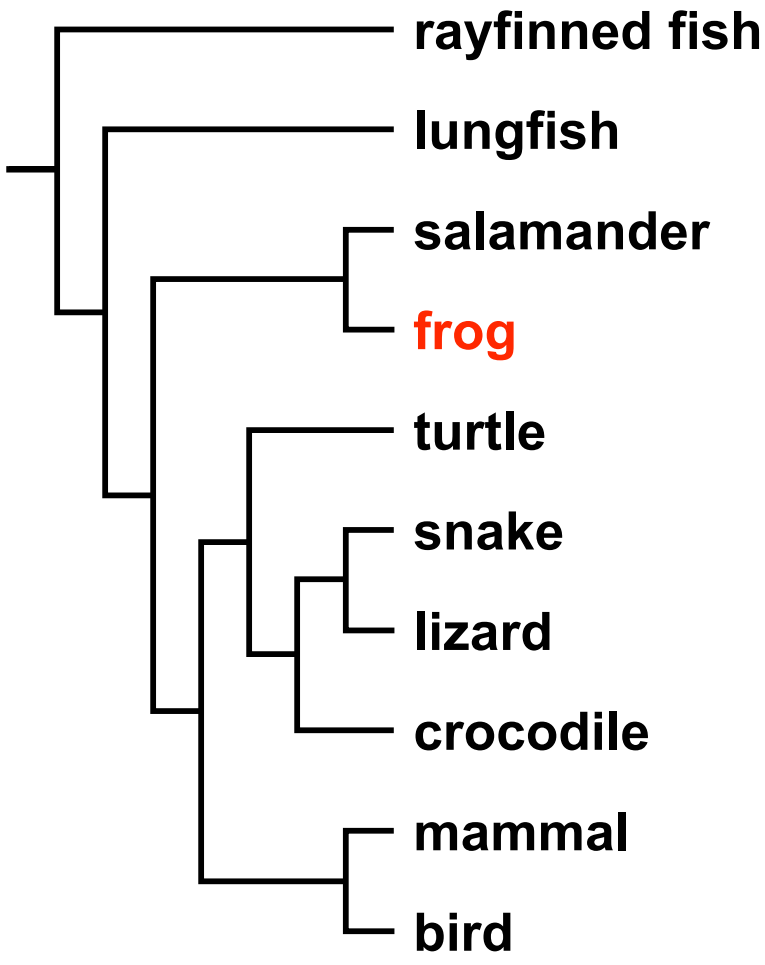
Matching Leaf Nodes



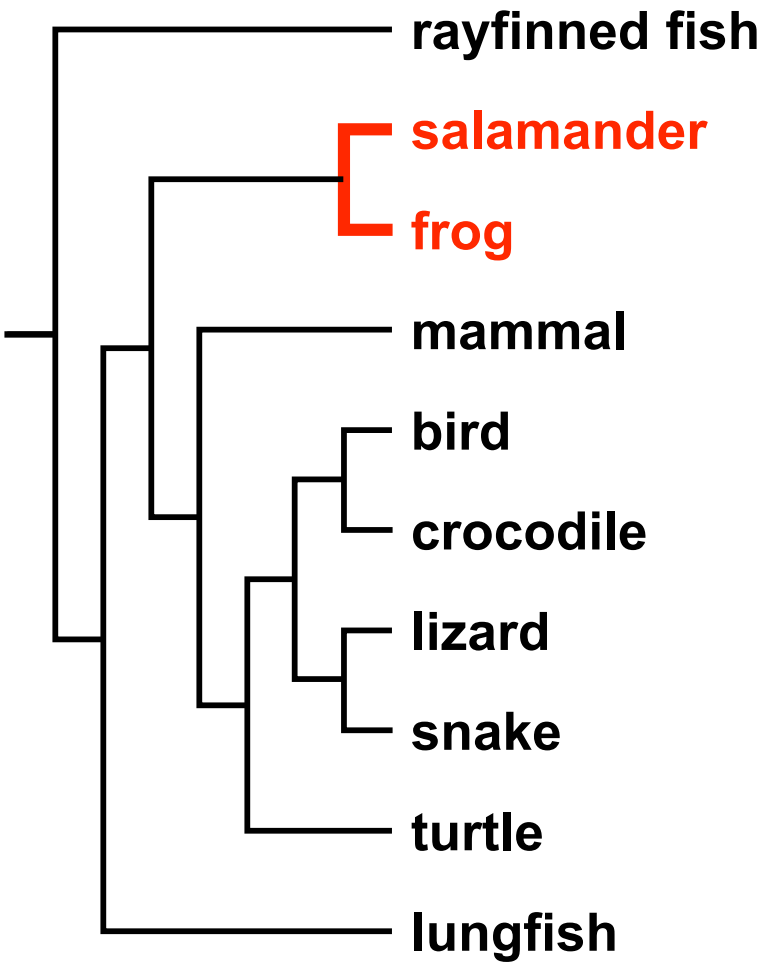


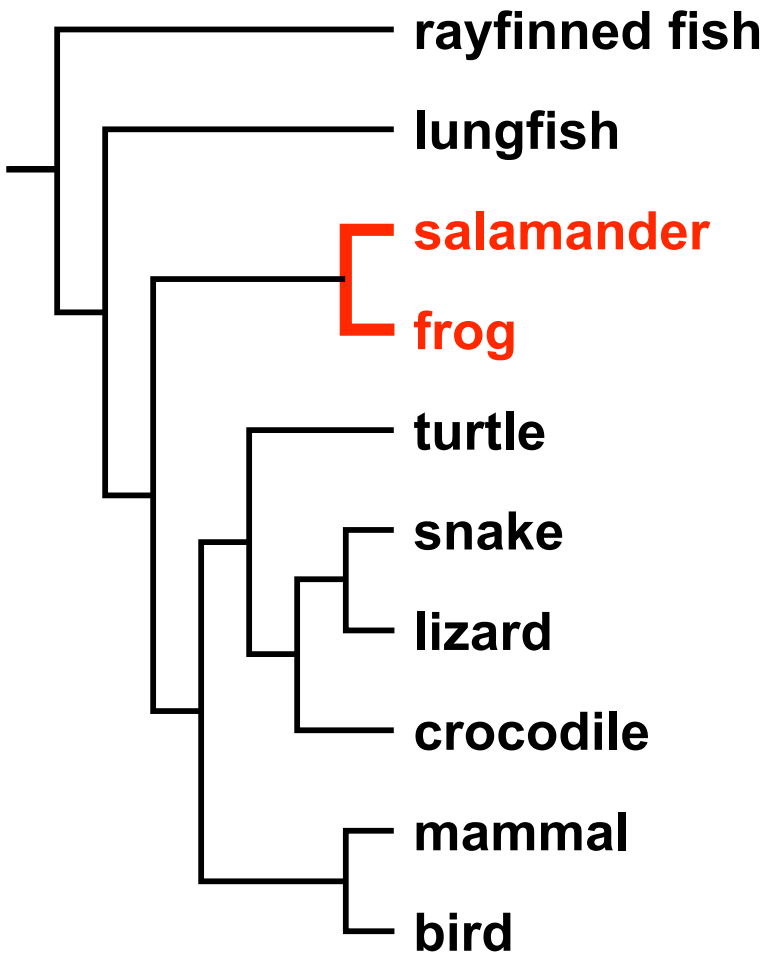
Matching Leaf Nodes



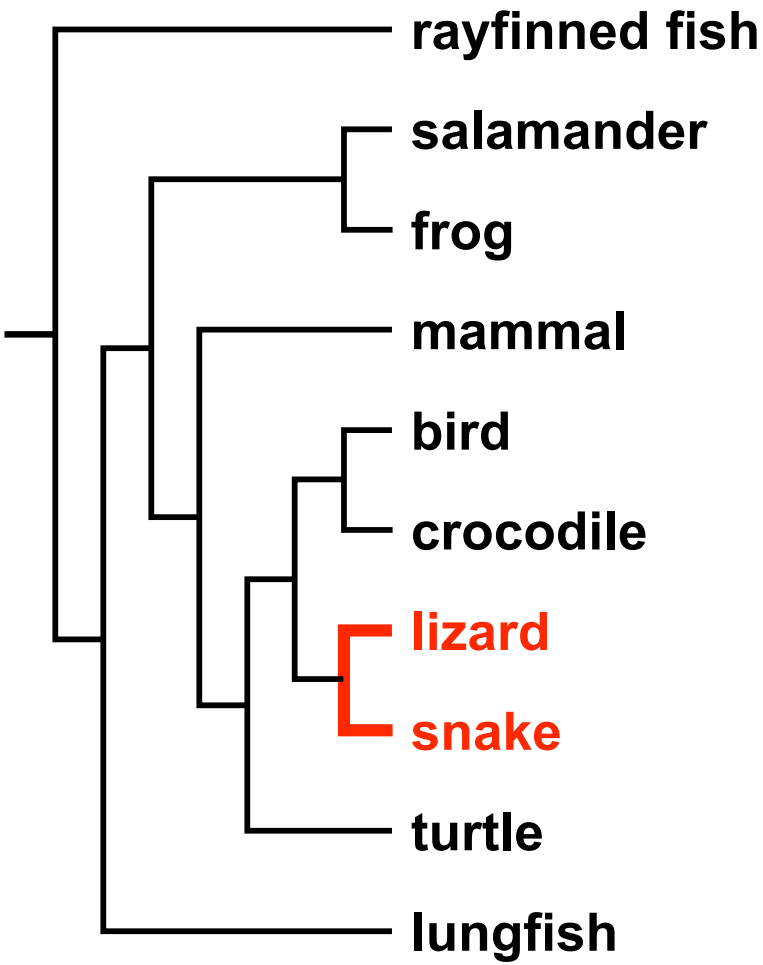


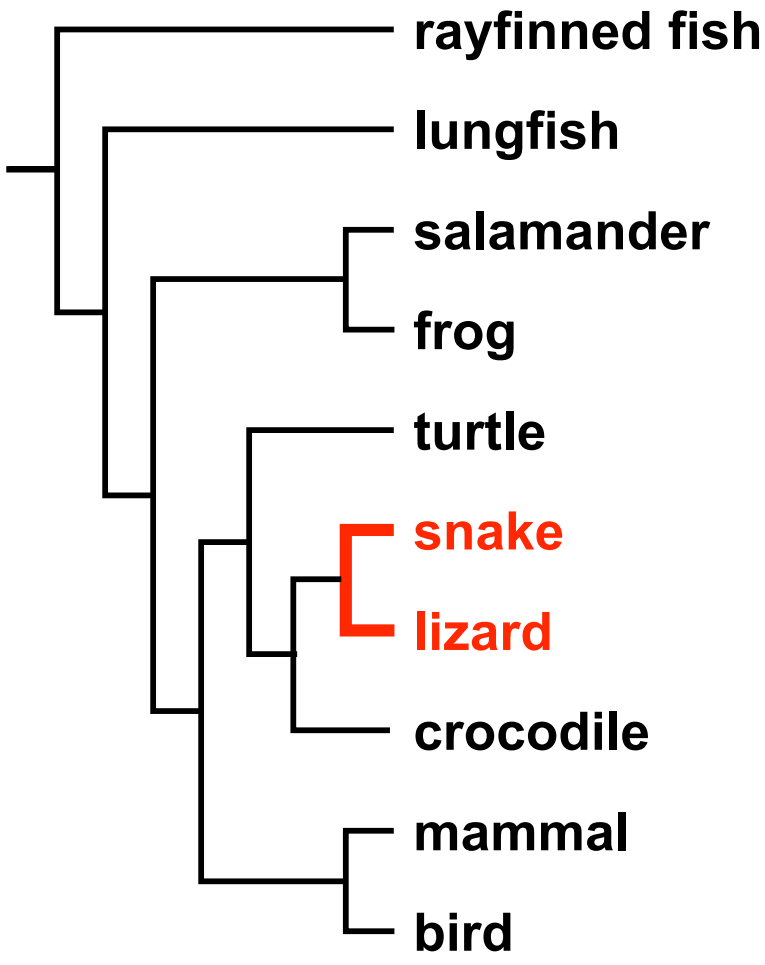
Matching Interior Nodes



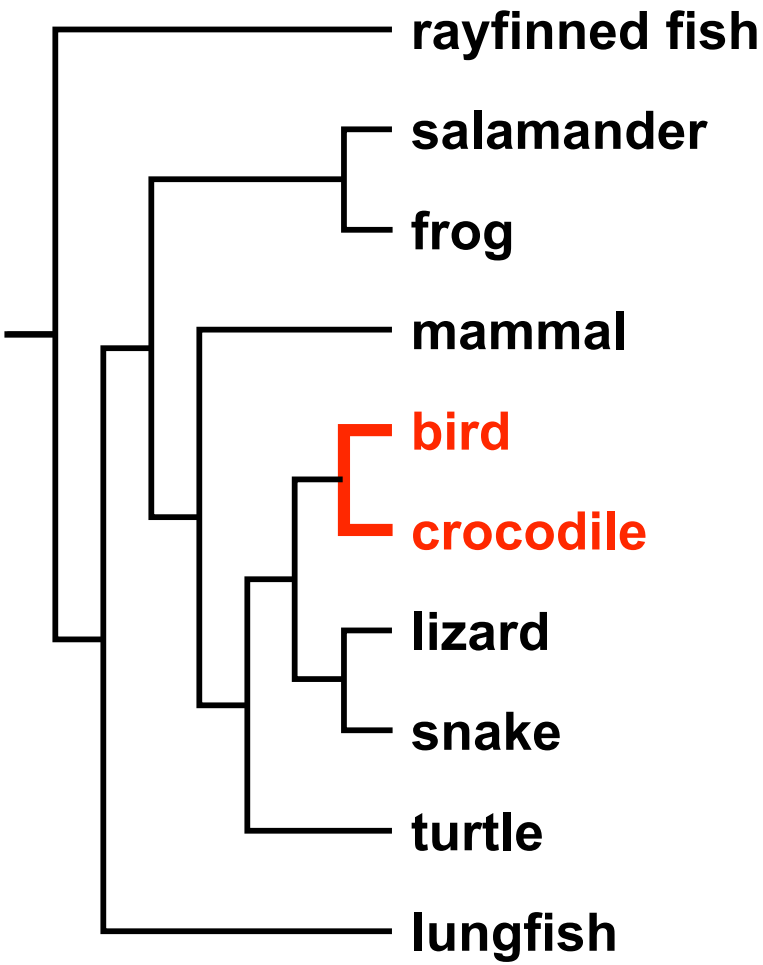


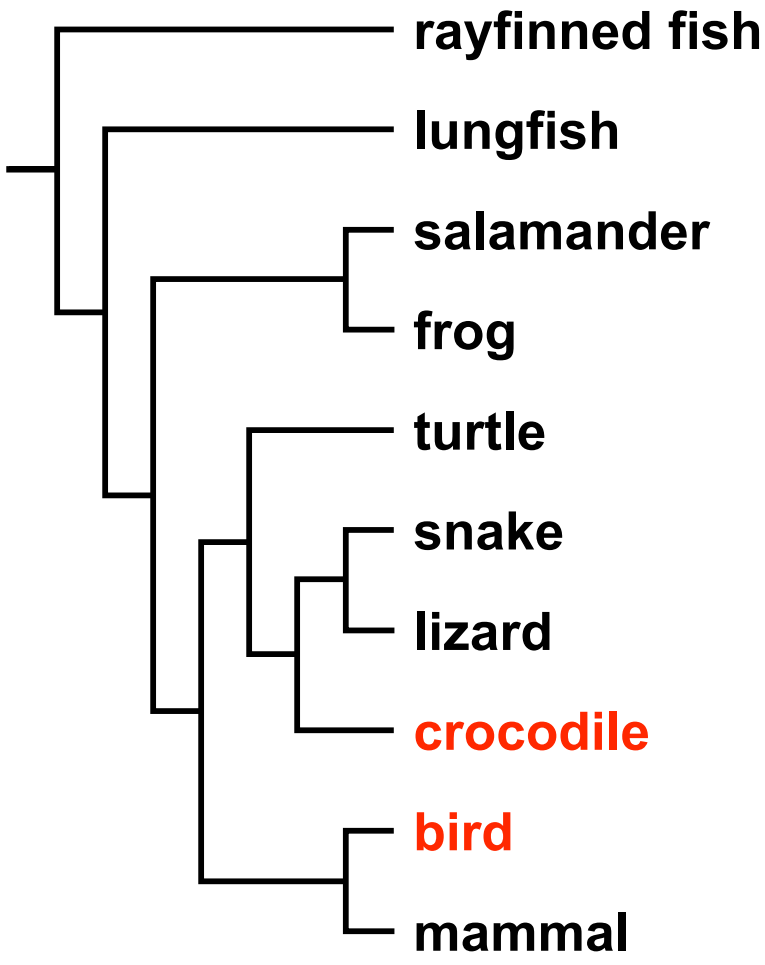
Matching Interior Nodes



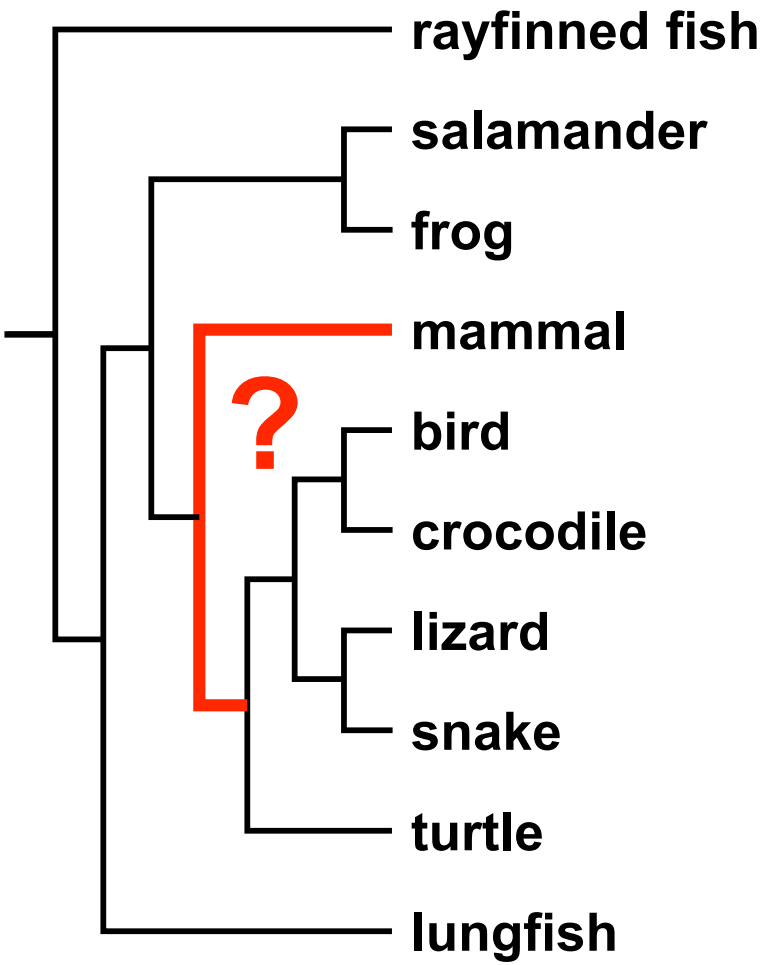


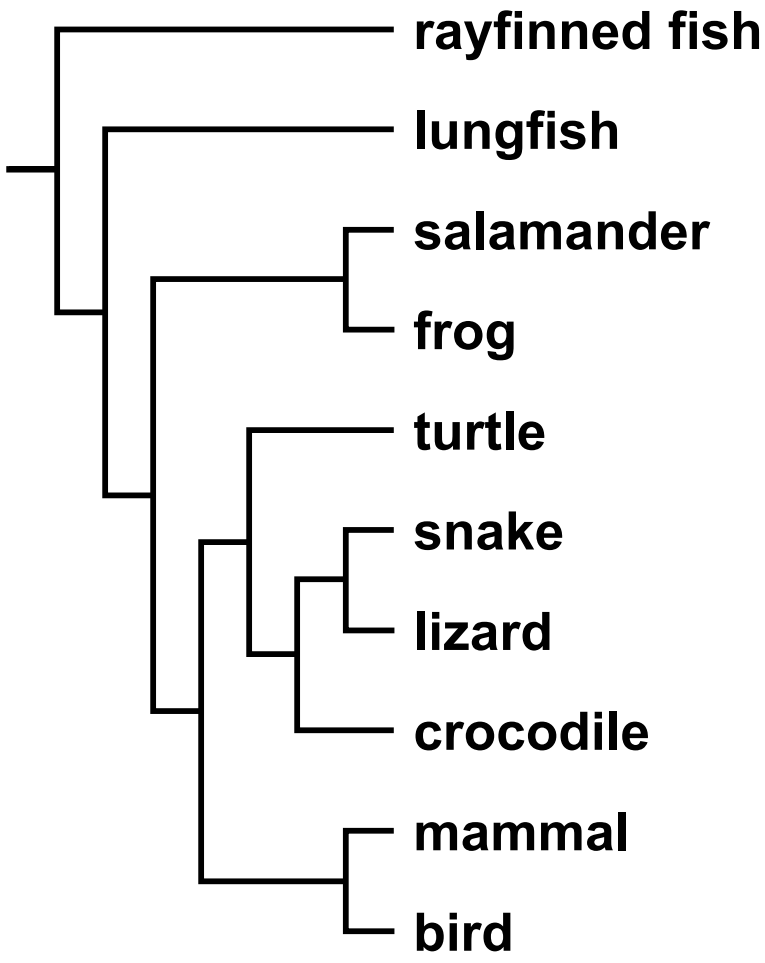
Matching Interior Nodes



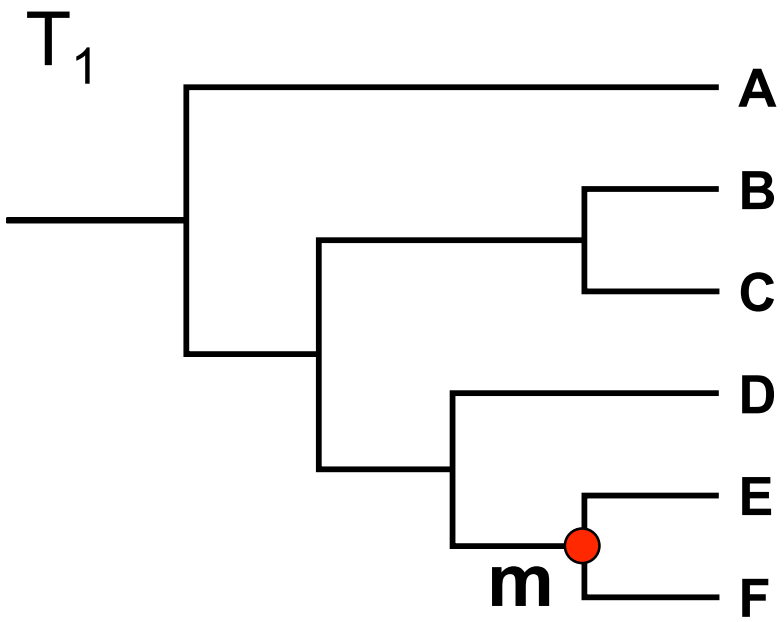


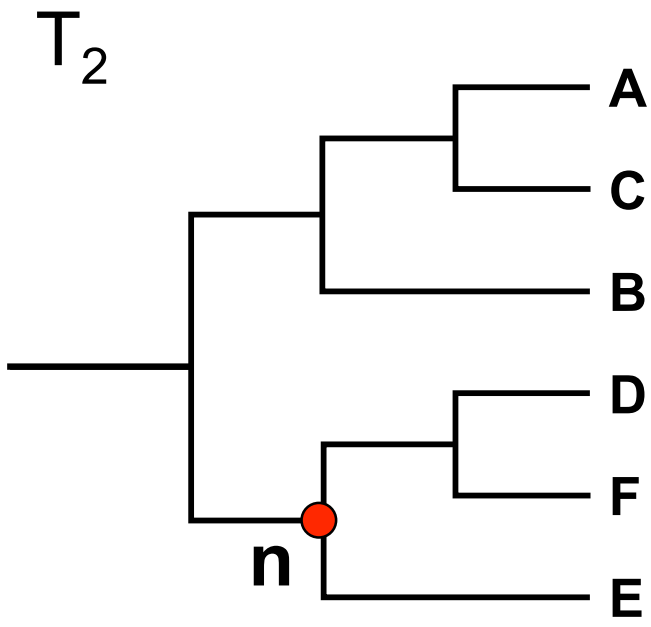
Matching Interior Nodes





Similarity Score: S(m,n)



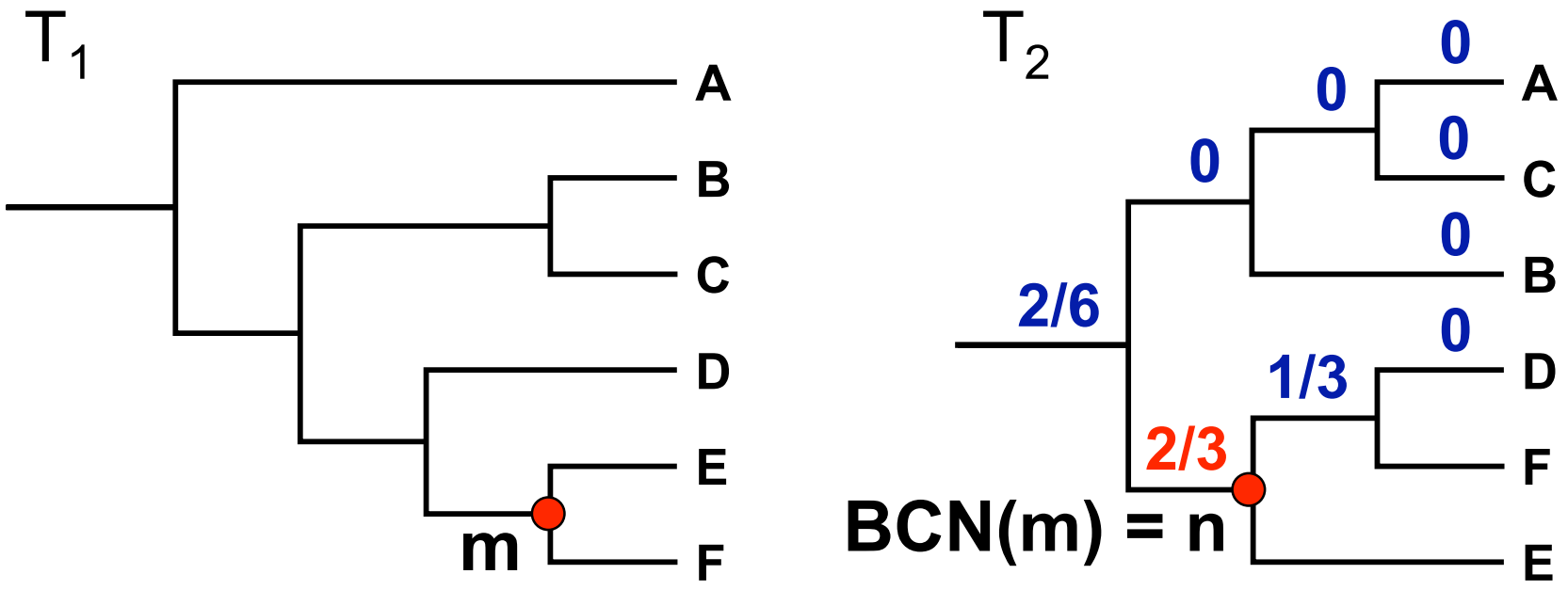


$$L(\text{m}) = \{\text{E},\text{F}\}$$

$$L(\text{n}) = \{\text{D},\text{E},\text{F}\}$$

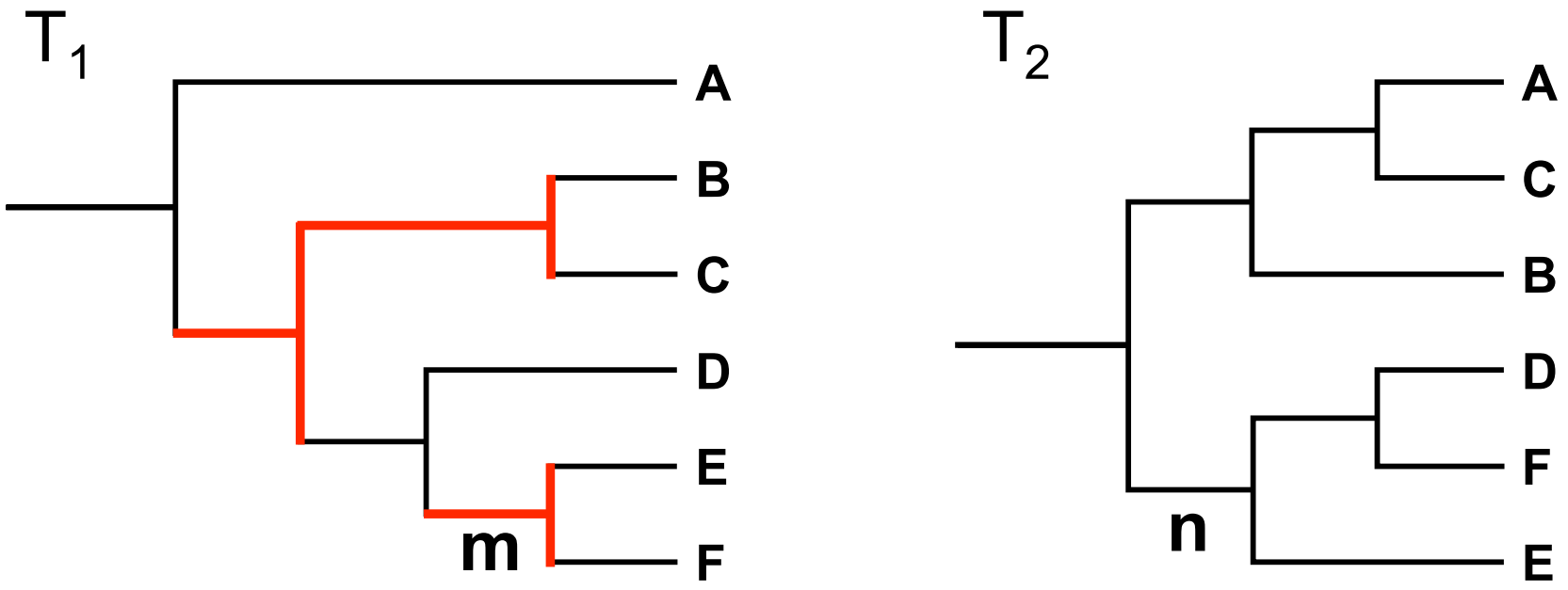
$$S(\text{m},\text{n}) = \frac{|L(\text{m}) \cap L(\text{n})|}{|L(\text{m}) \cup L(\text{n})|} = \frac{|\{\text{E},\text{F}\}|}{|\{\text{D},\text{E},\text{F}\}|} = \frac{2}{3}$$

Best Corresponding Node



- $\mathrm{BCN}(m) = \mathrm{argmax}_{v \in T_2} (S(m, v))$
  - computable in $O(n \log^2 n)$
  - linked highlighting

Marking Structural Differences



- Nodes for which $S(v,\text{BCN}(v)) \neq 1$
  - Matches intuition

TreeJuxtaposer

- video, software from olduvai.sourceforge.net/tj