

Phylogeny and the history of life

Phylogeny

The history of life

Processes of diversification

Outline

Phylogeny

Interpreting phylogenetic trees

Constructing phylogenetic trees

Example: the evolution of whales

The history of life

The shape of the tree

The fossil record

Putting the timeline together

Processes of diversification

Adaptive radiations

Mass extinctions

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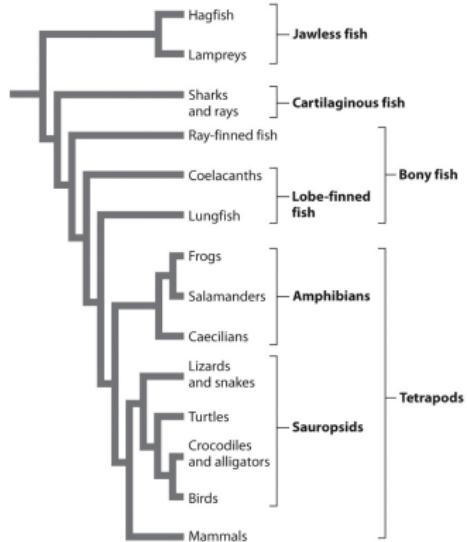


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Interpreting phylogenetic trees

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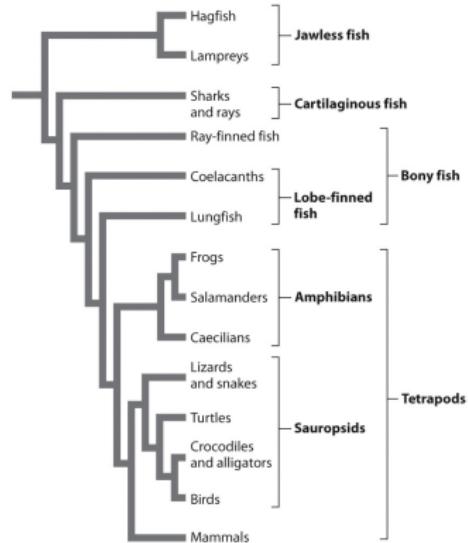


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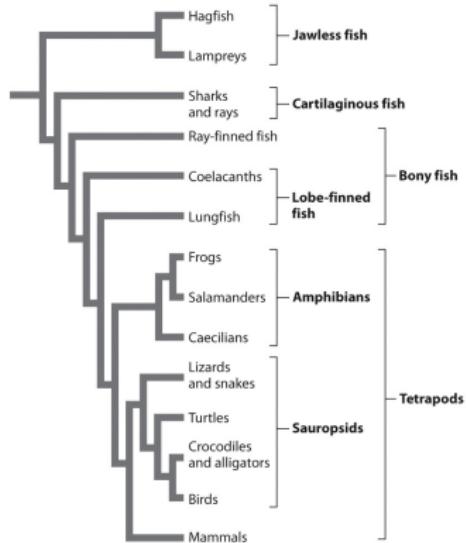


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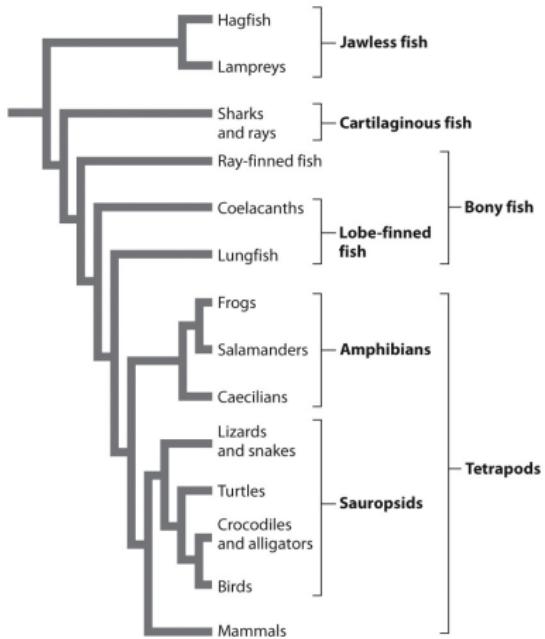


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Sister taxa

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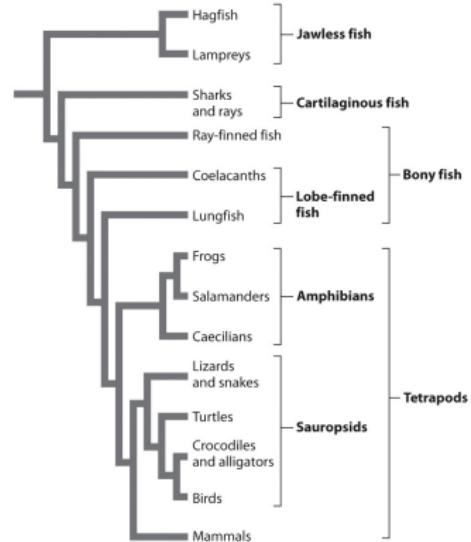


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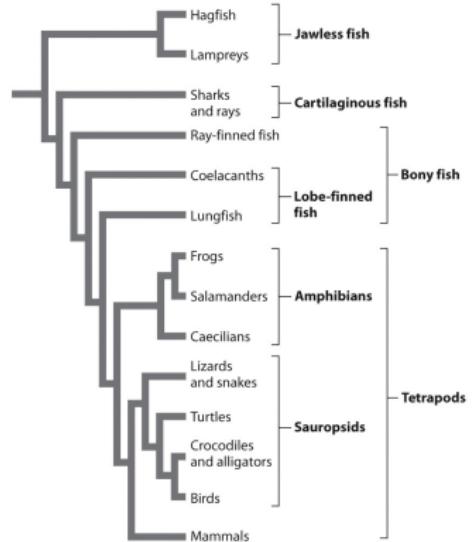


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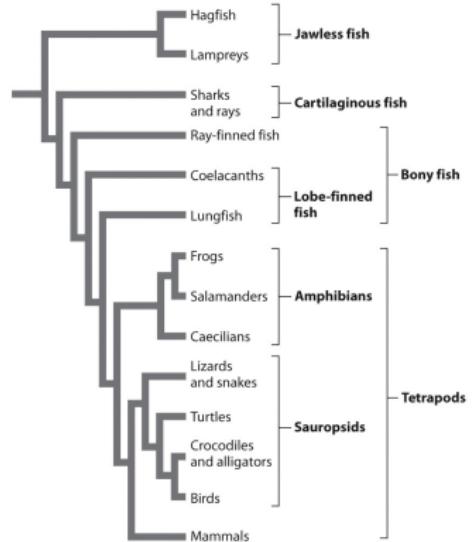


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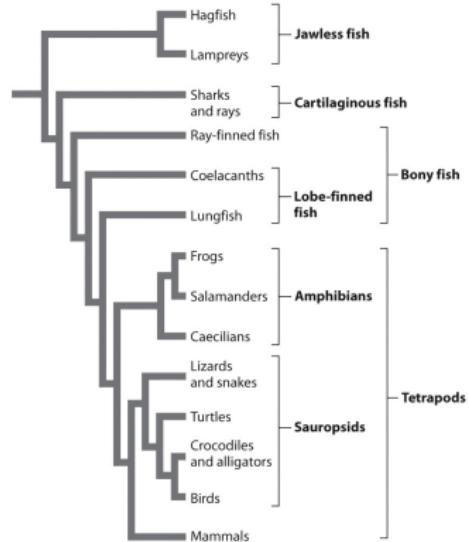


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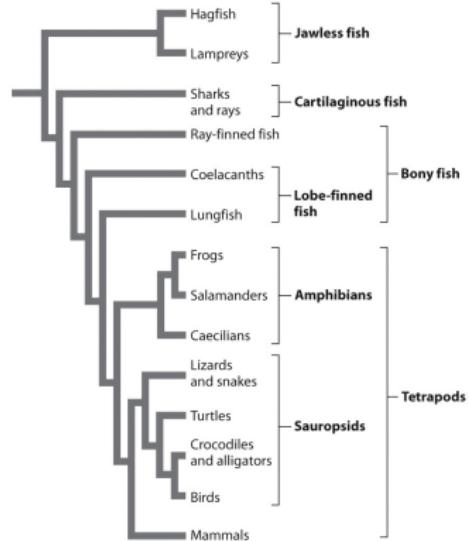


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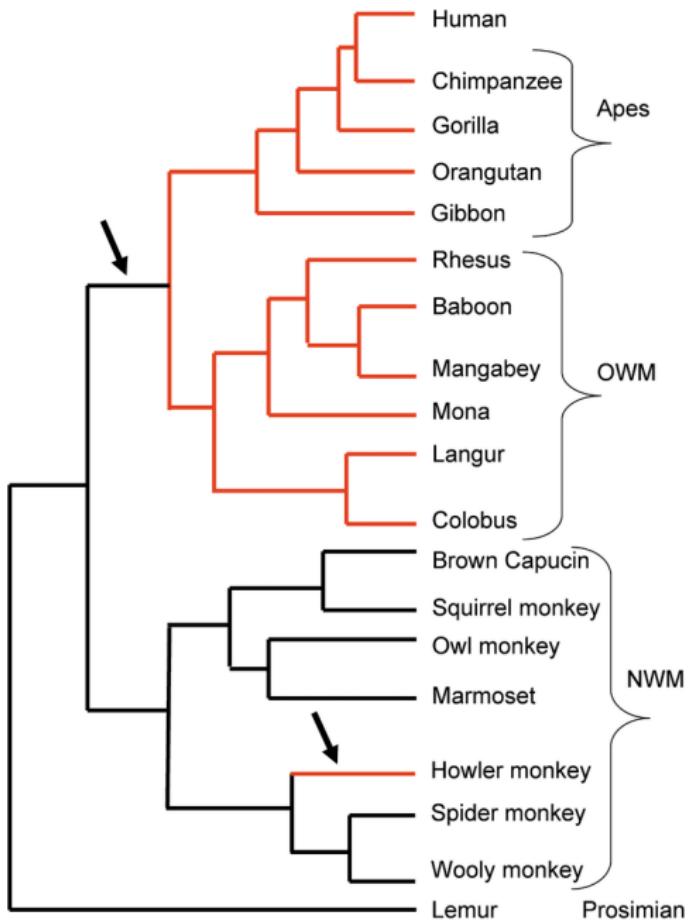
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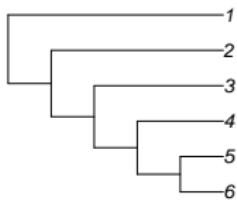
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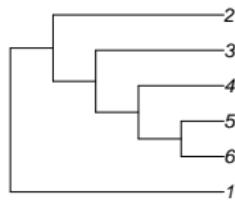


Activity: which of these things is not like the others?

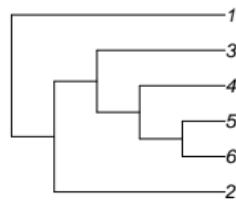
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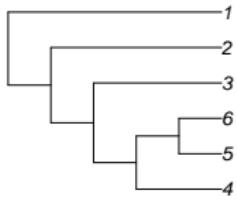
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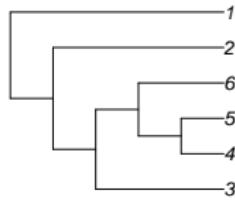
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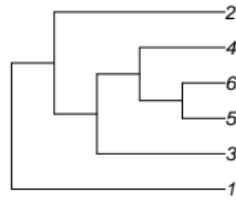
D



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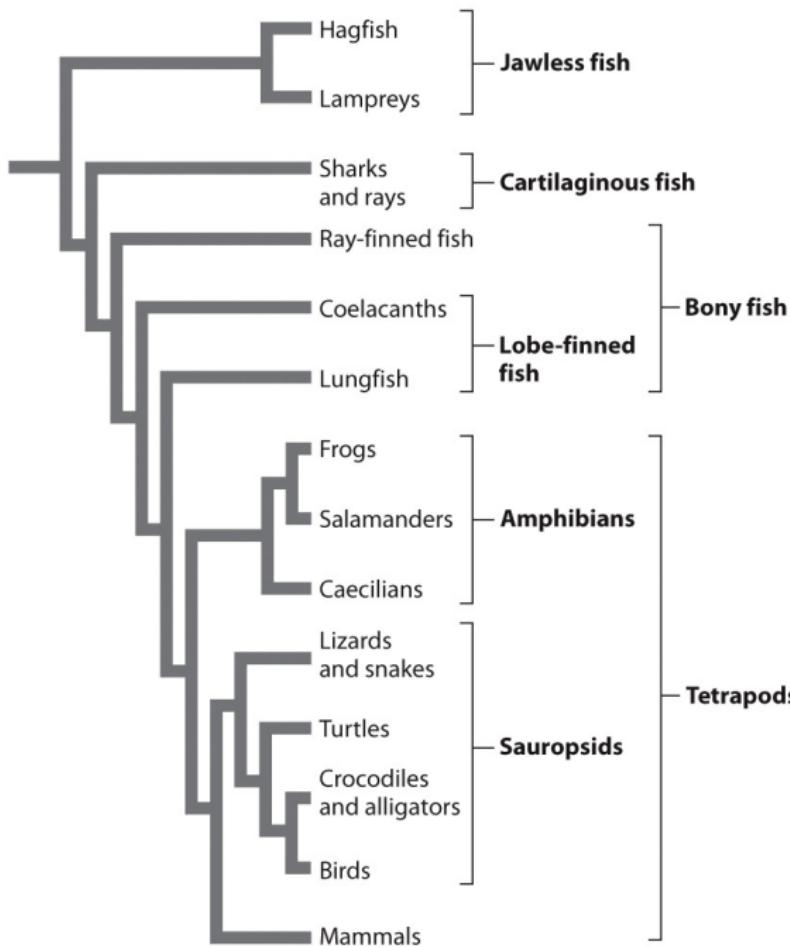
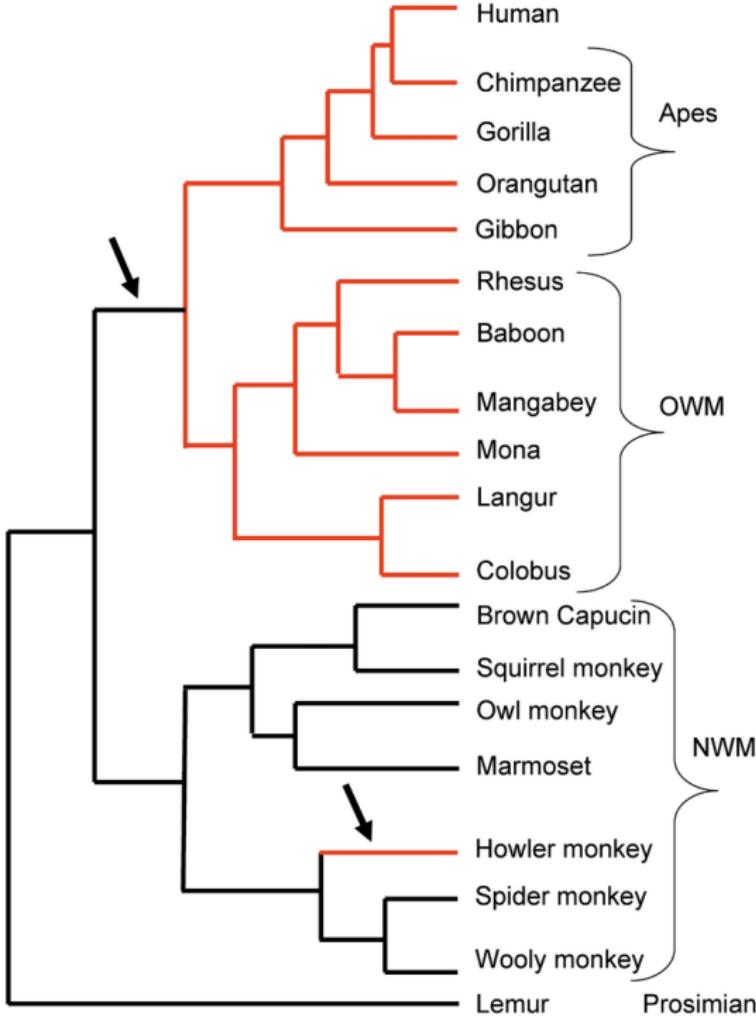


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Phenetic vs. cladistic analysis

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- ▶ Phenetic analysis ignores the phylogenetic model of organisms evolving from each other while inferring phylogenies
- ▶ Which is better?
 - ▶ * Cladistic analysis
- ▶ When should we use the other one?
 - ▶ * When our data are only distances, with no characters available – e.g., certain molecular techniques
 - ▶ * When we don't have enough baseline information
 - ▶ *The book talks about trusting the molecular clock, but this is complicated and there are still no advantages*



Tortoise in a box

A tortoise's shell is made of two bone plates - the plastron on the underside and the carapace on the upper side. These are covered by a layer of skin called scutes, which protect the animal.

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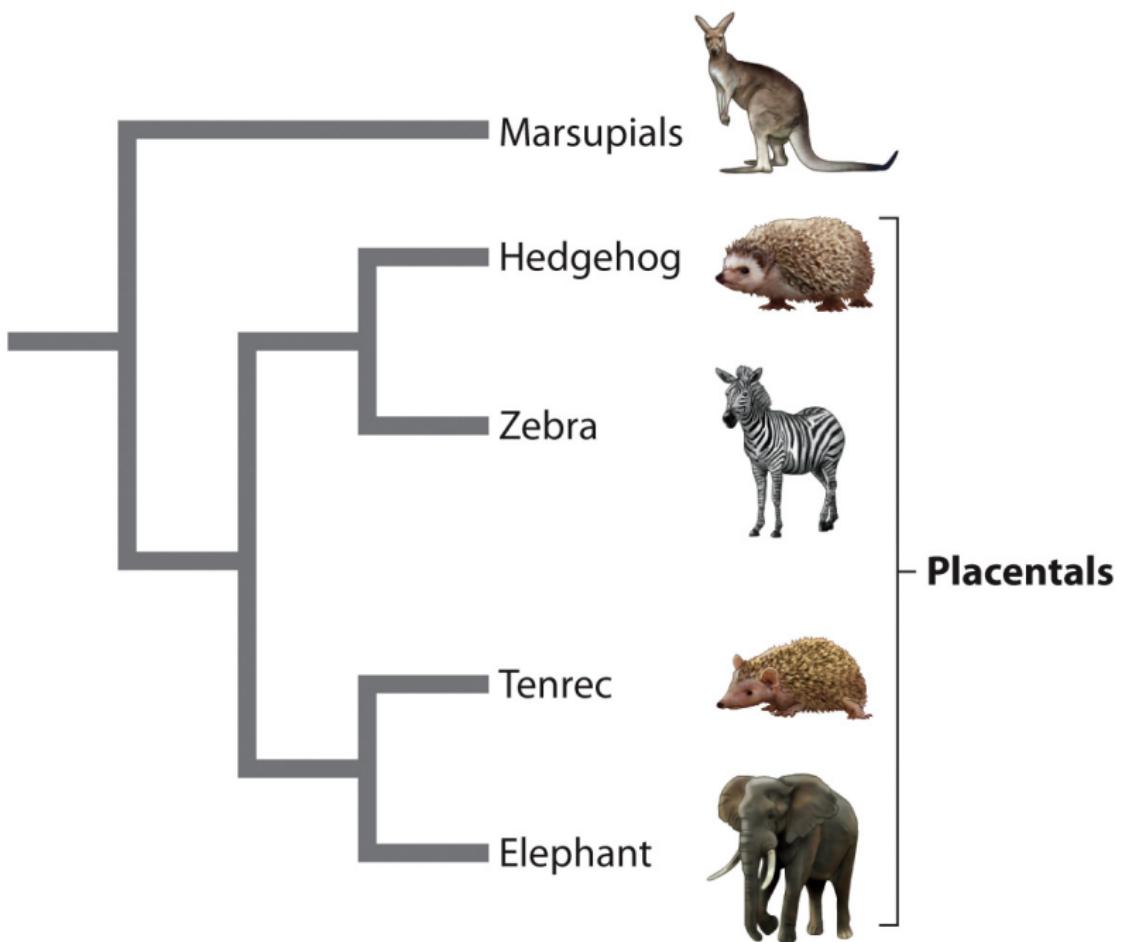


Figure 22.7
Biology: How Life Works
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Outline

Phylogeny

Interpreting phylogenetic trees

Constructing phylogenetic trees

Example: the evolution of whales

The history of life

The shape of the tree

The fossil record

Putting the timeline together

Processes of diversification

Adaptive radiations

Mass extinctions

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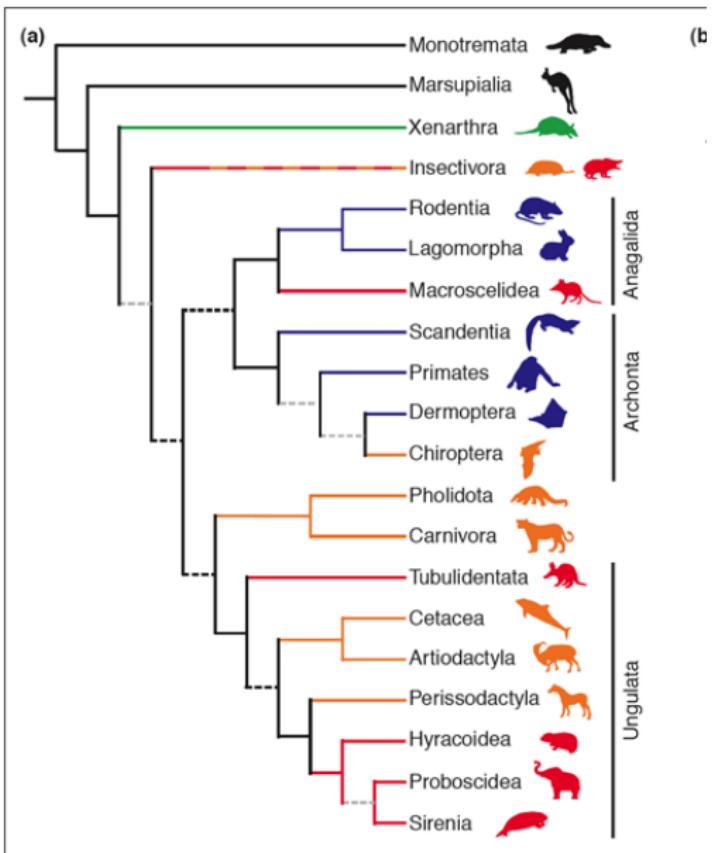
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Morphological tree



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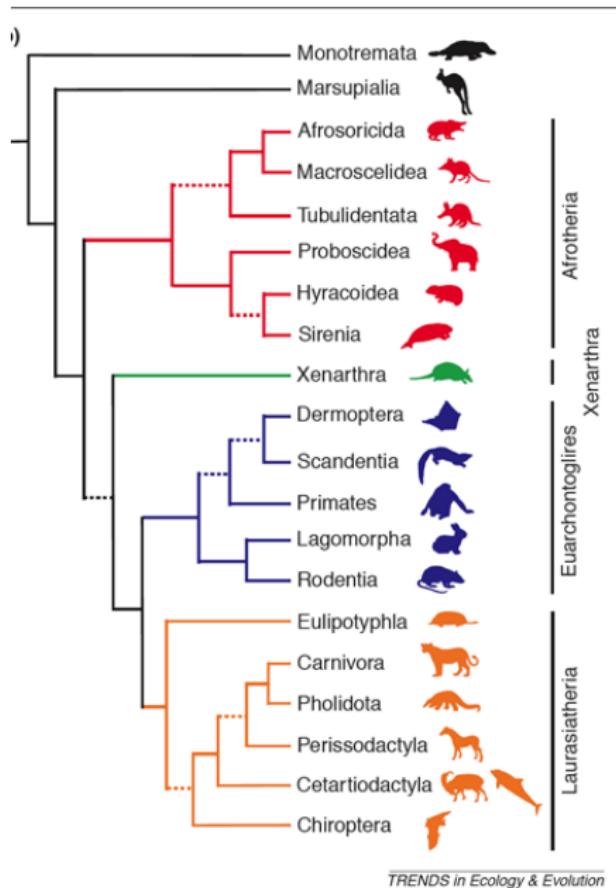
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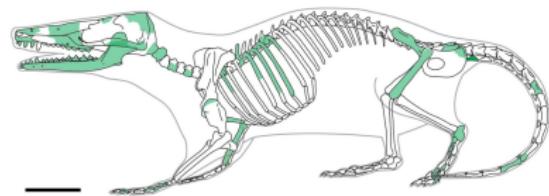
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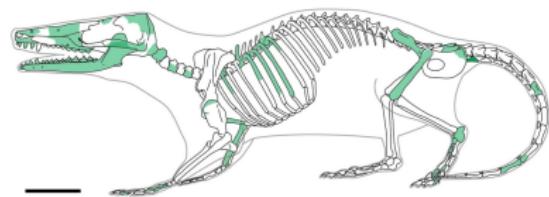


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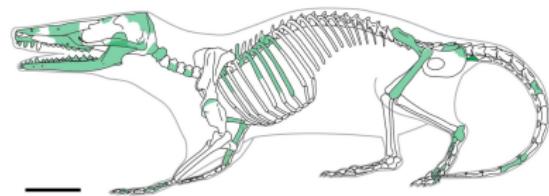
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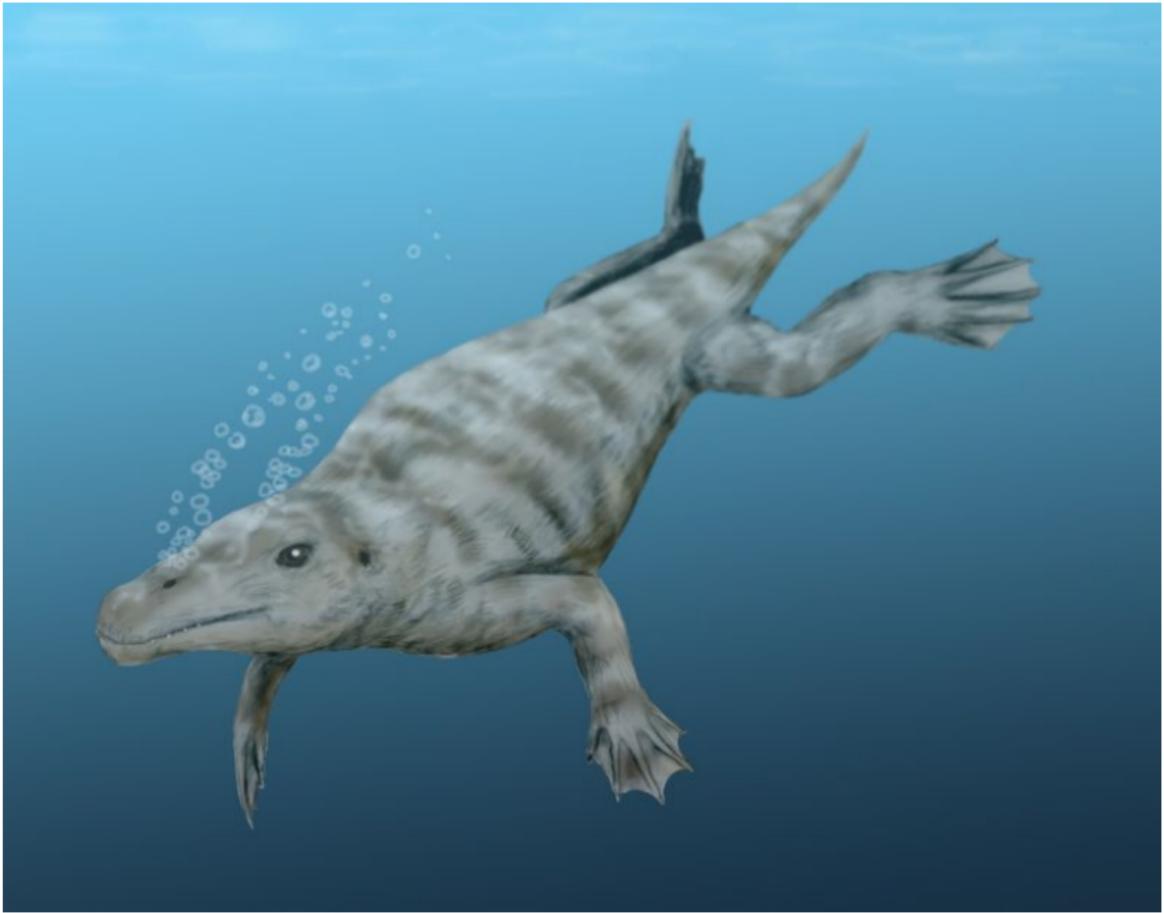


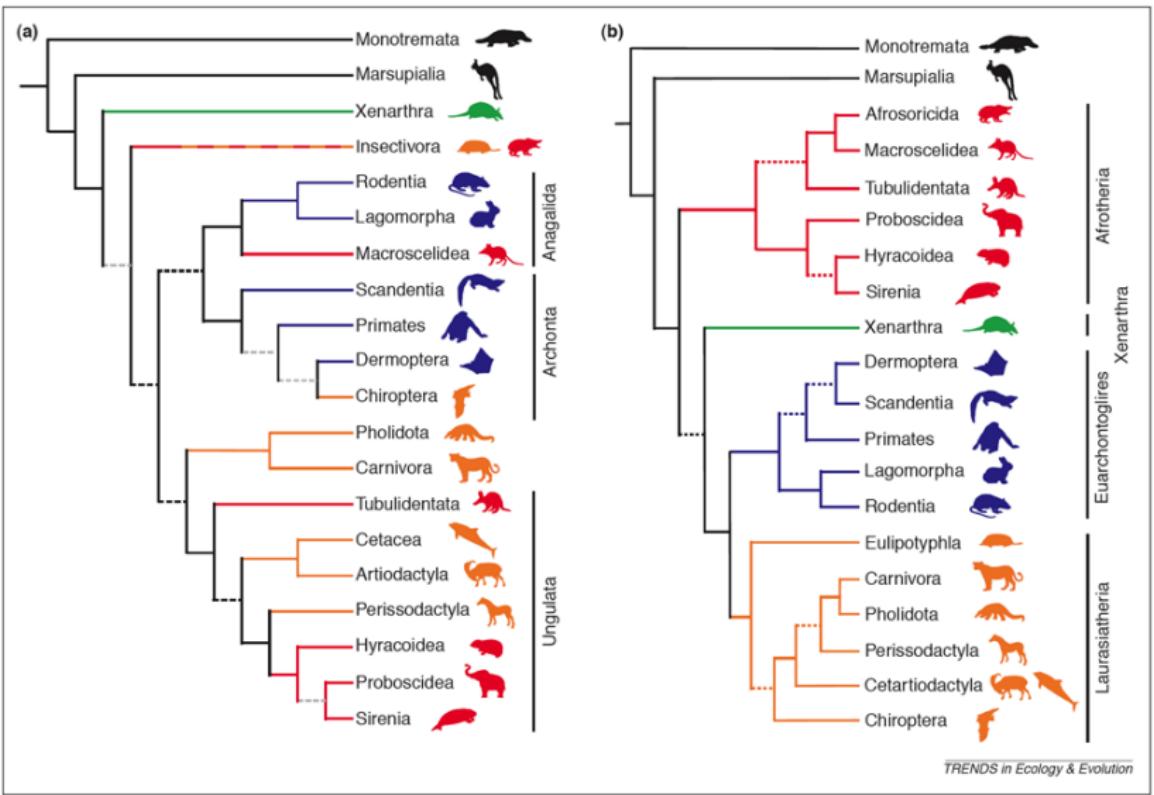
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- ▶ 3. Go back to step 1

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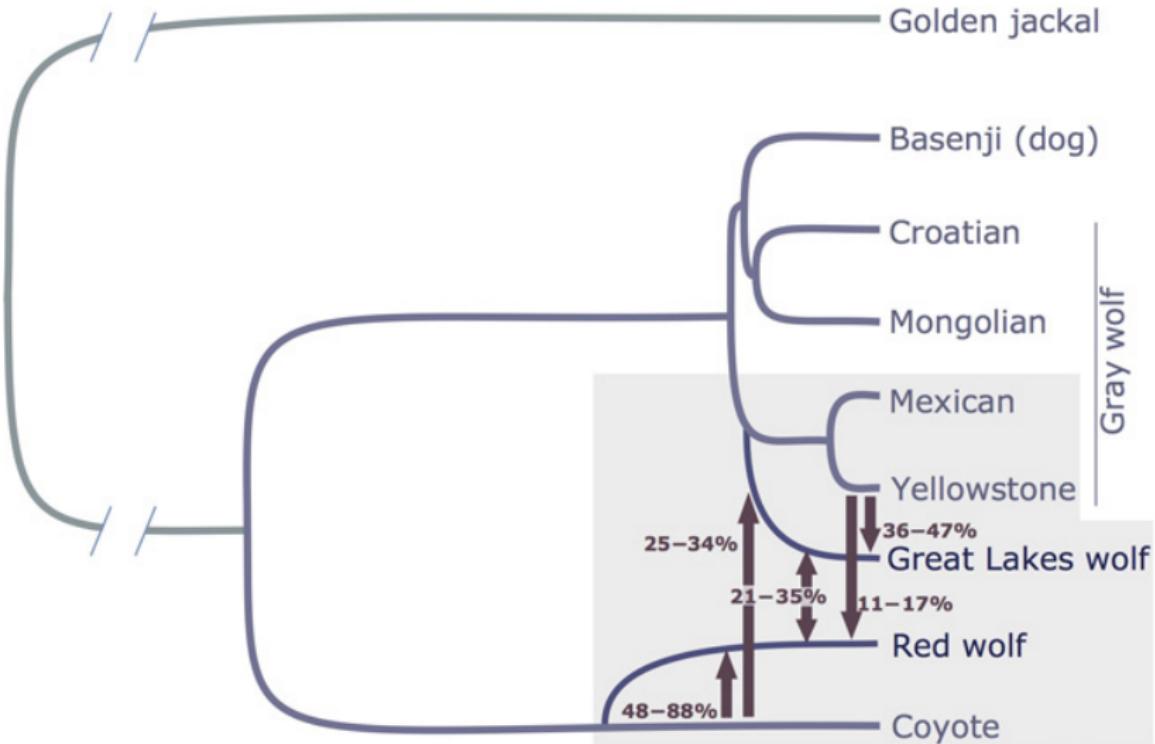
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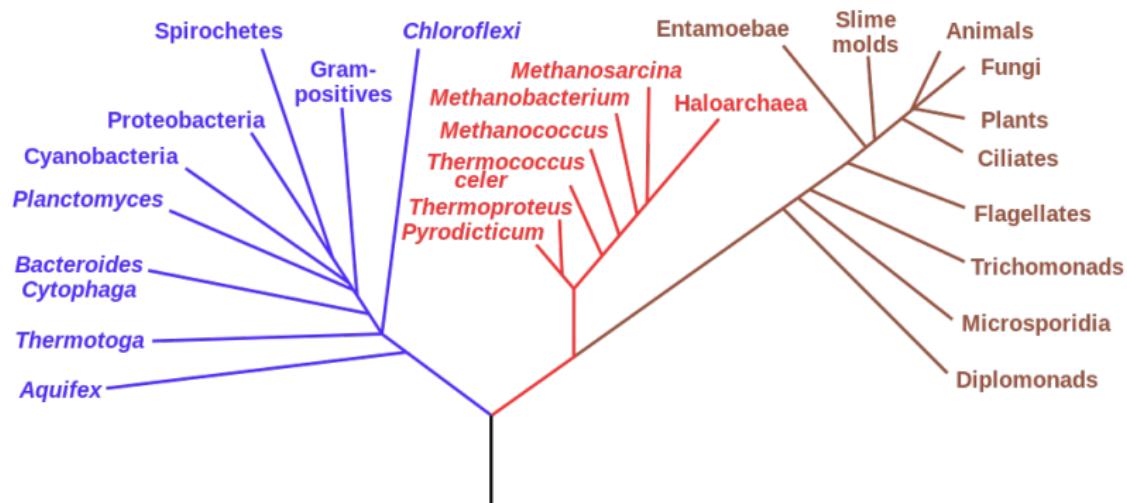
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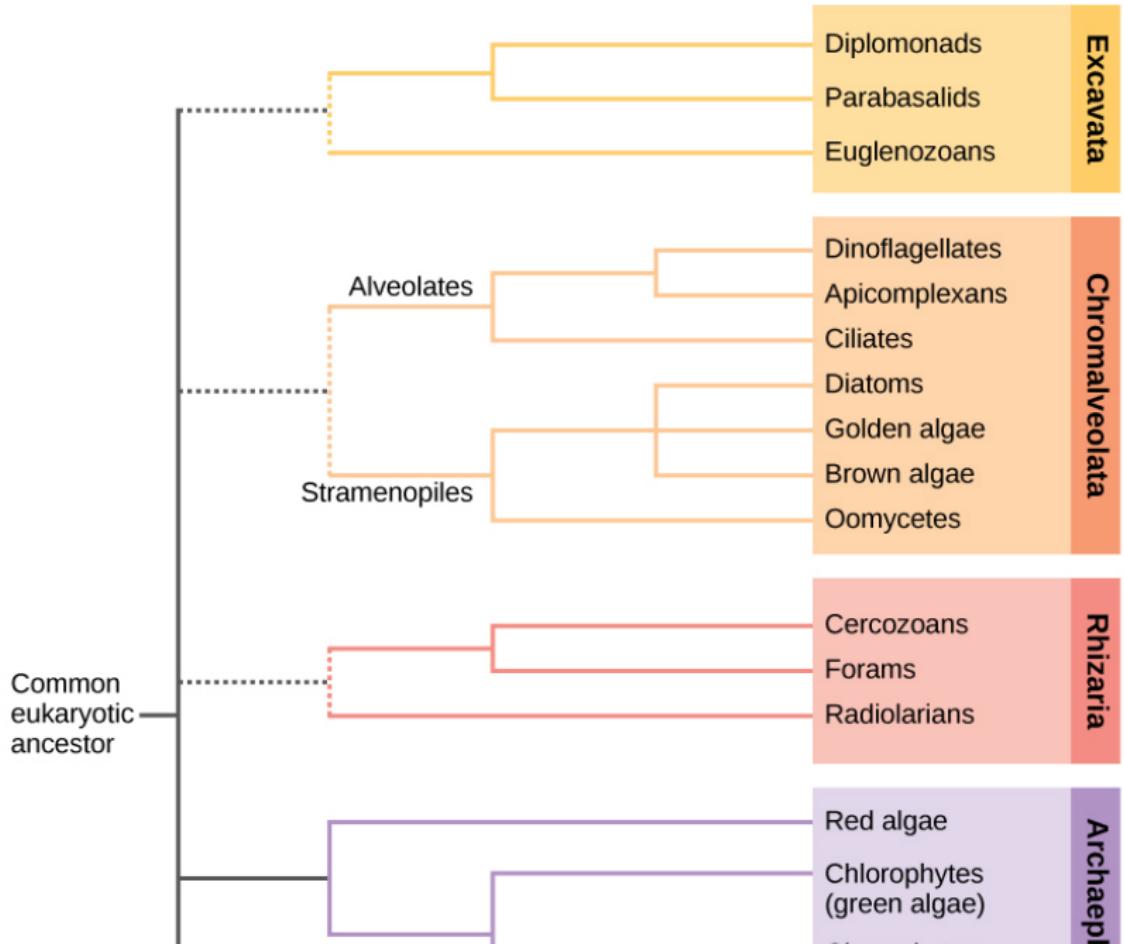
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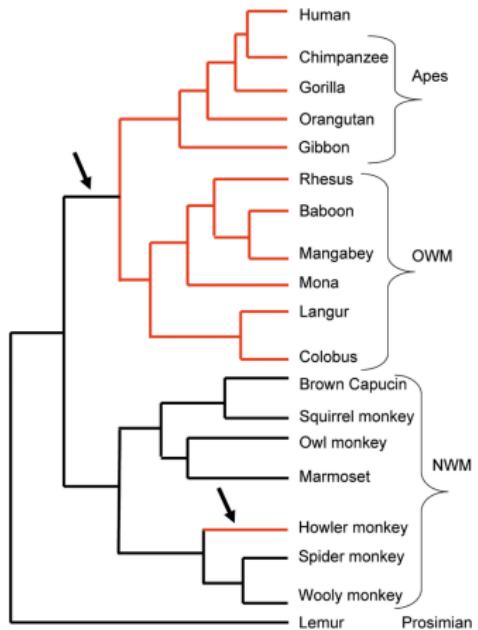


Eukaryotic Supergroups



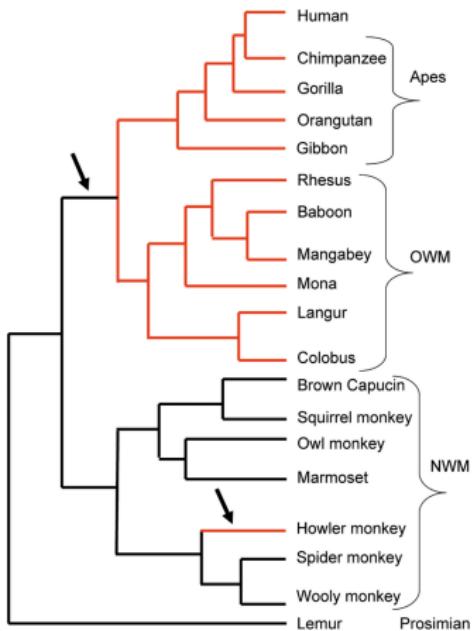
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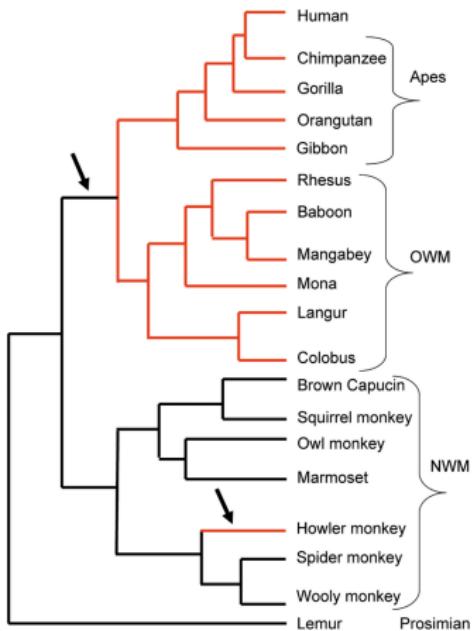
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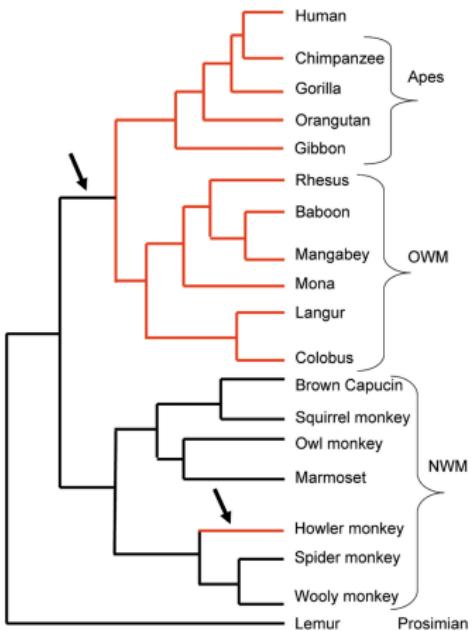
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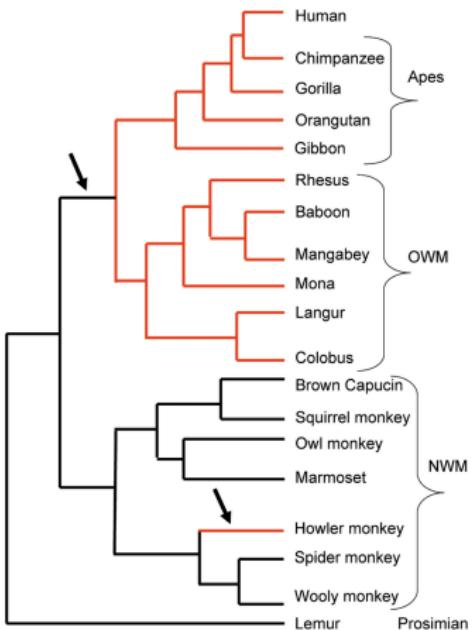
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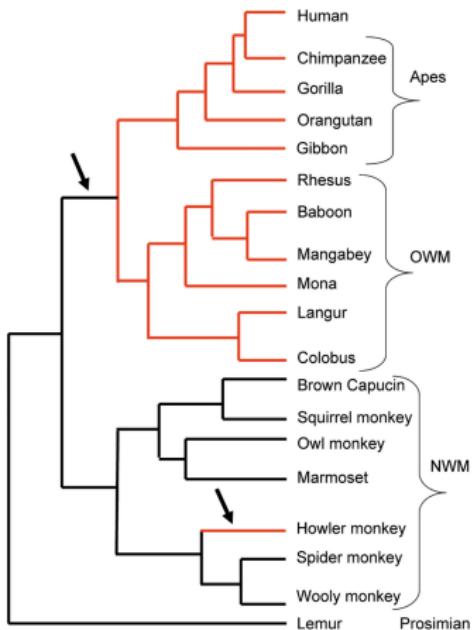
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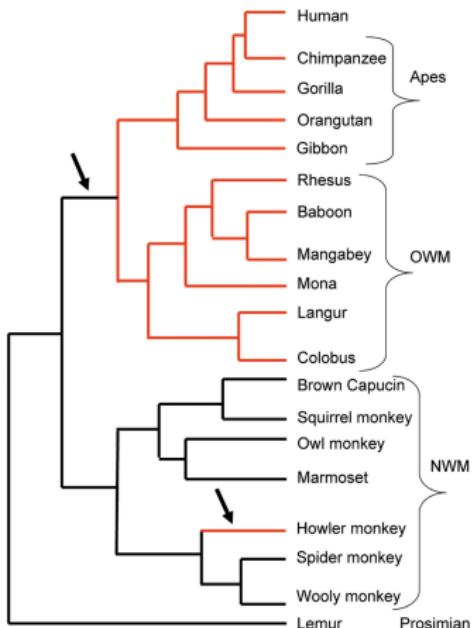
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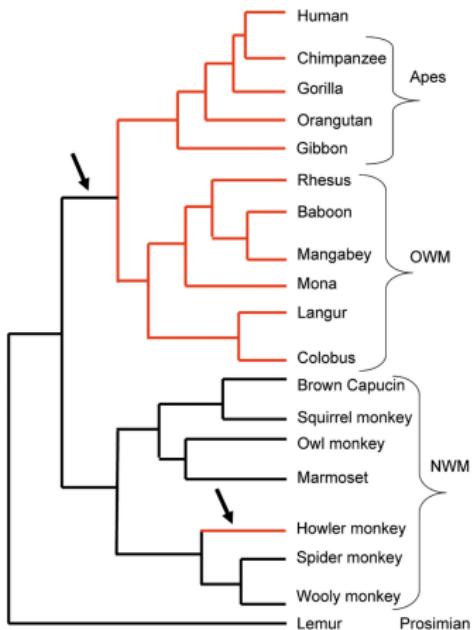
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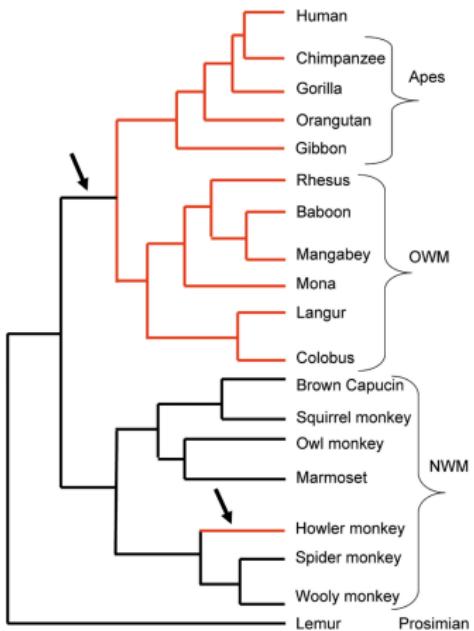
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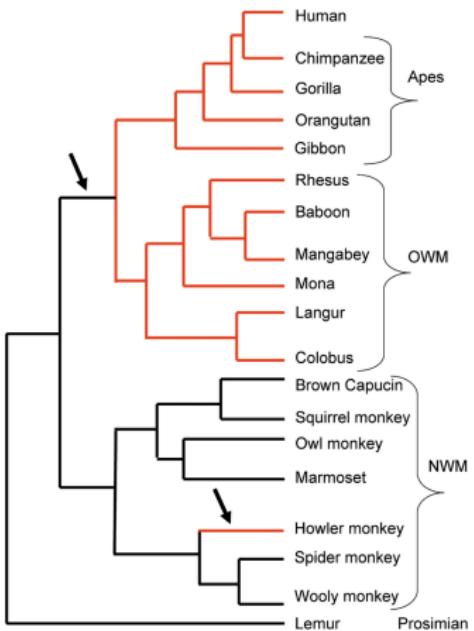
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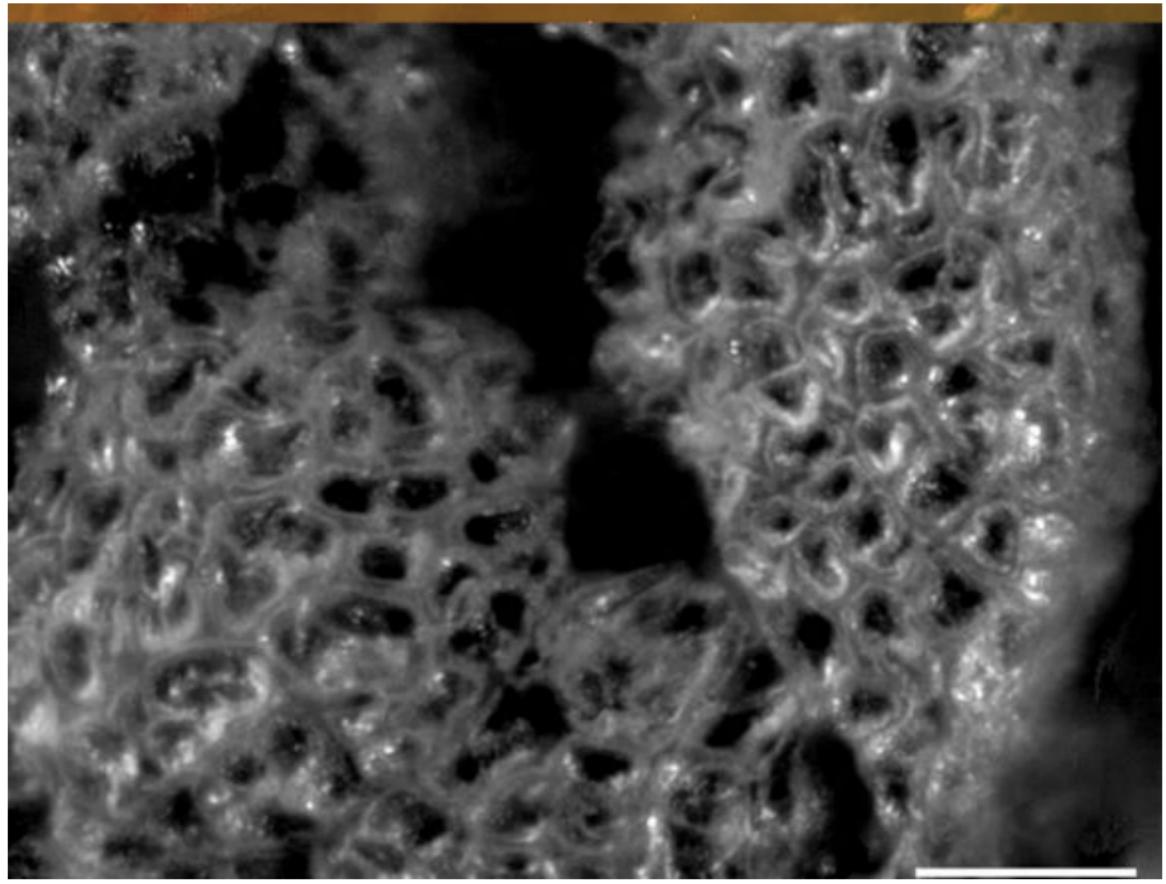
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- ▶ Geologic inferences can be made about the relative age of different things (for example, if one was deposited on top of another).
- ▶ Molecular clocks are based on inferences about how fast things are evolving
- ▶ These techniques are complicated, and making the timeline is a difficult and exciting puzzle

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Constructing phylogenetic trees

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Processes of diversification

Adaptive radiations

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