

# 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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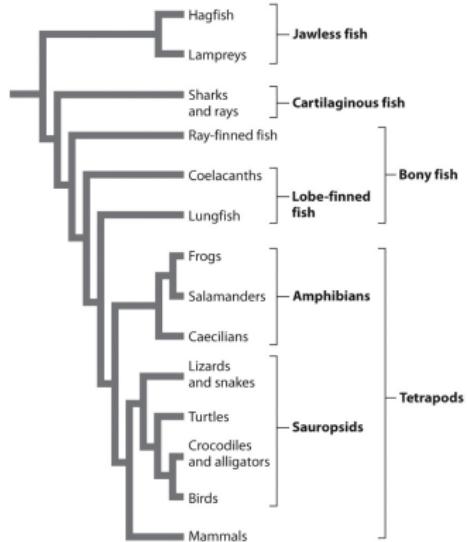


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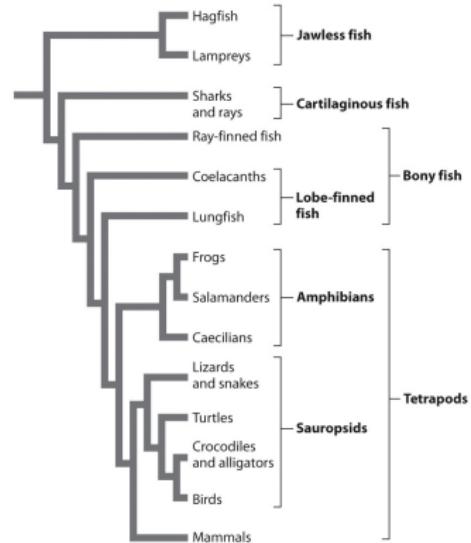


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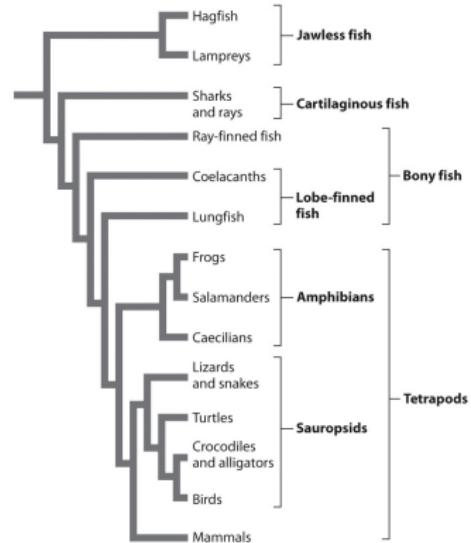


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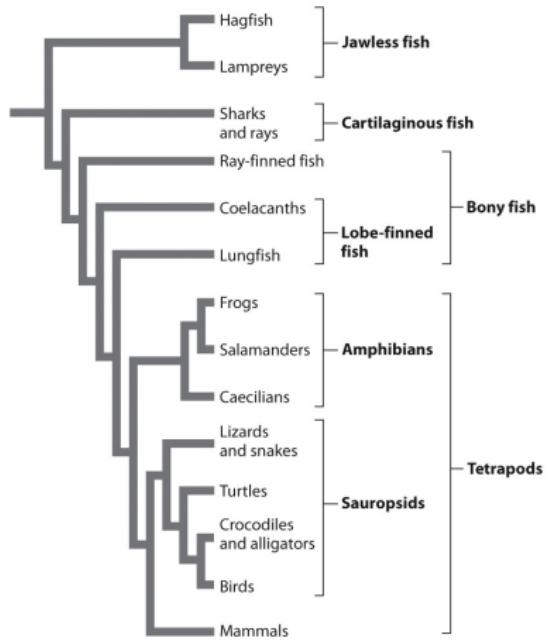


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# Sister taxa

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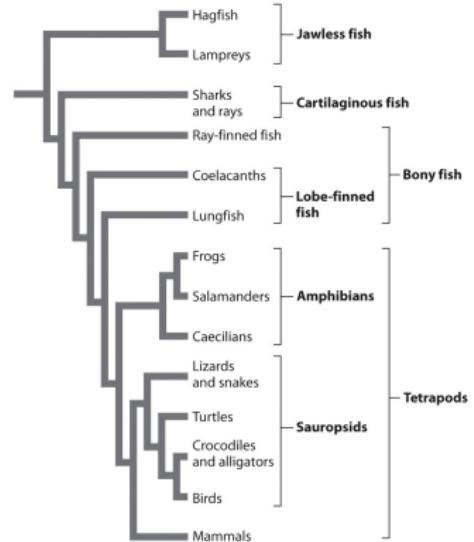


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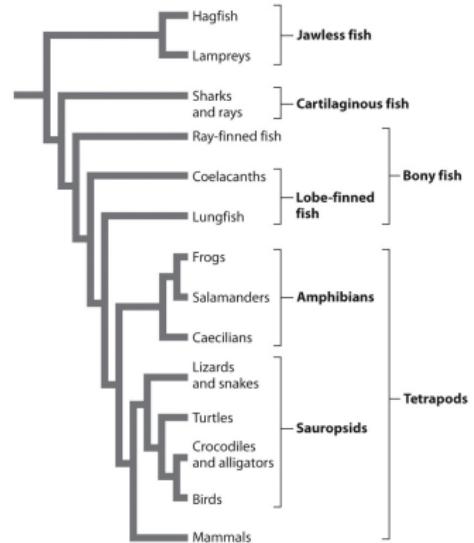


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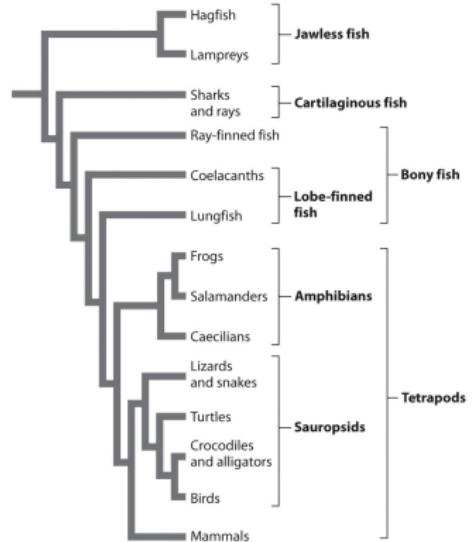


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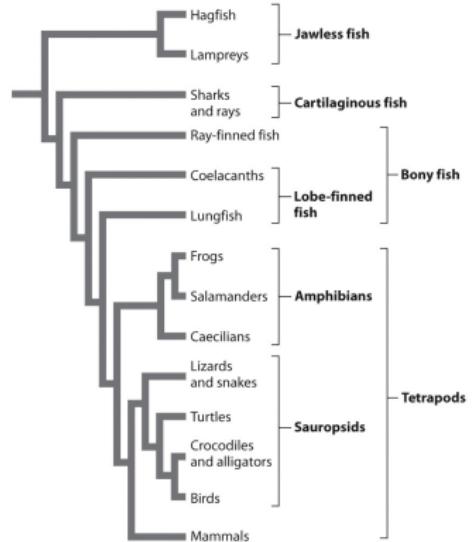


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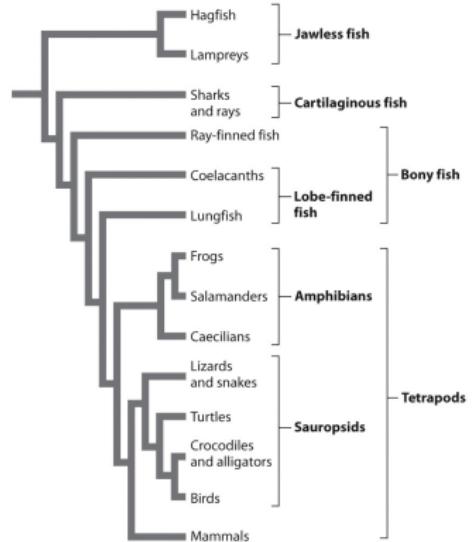


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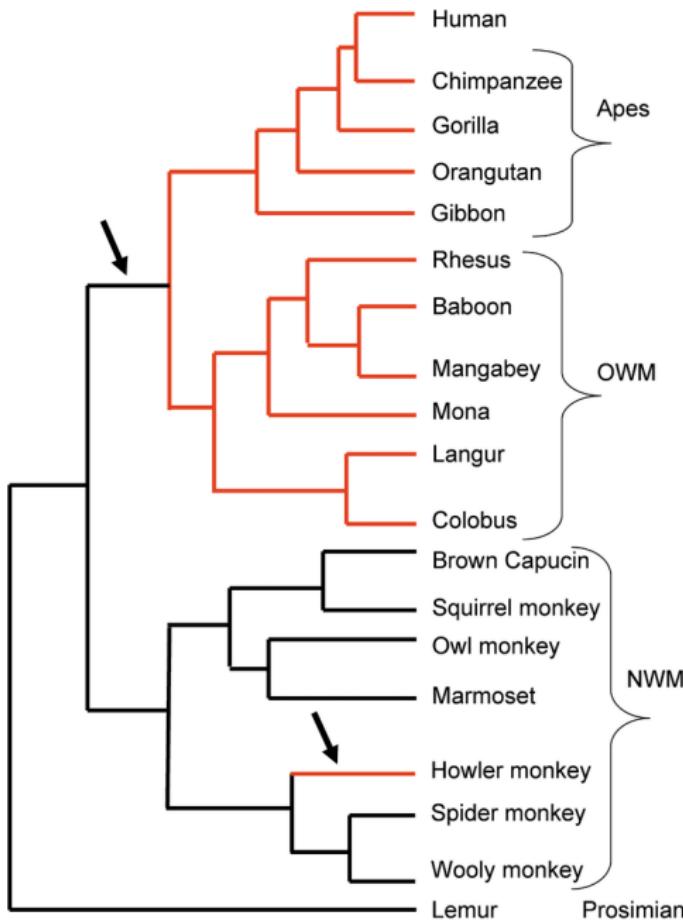
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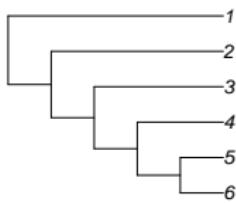
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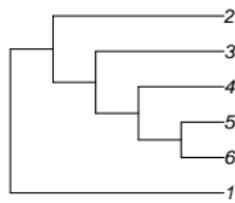


# Activity: which of these things is not like the others?

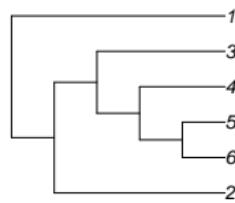
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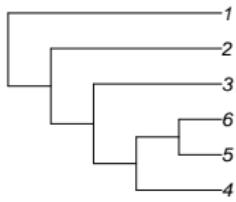
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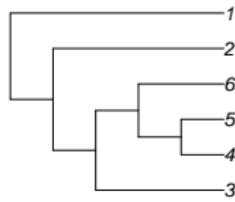
**C**



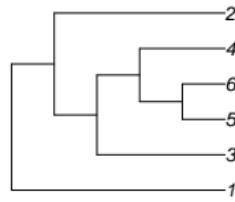
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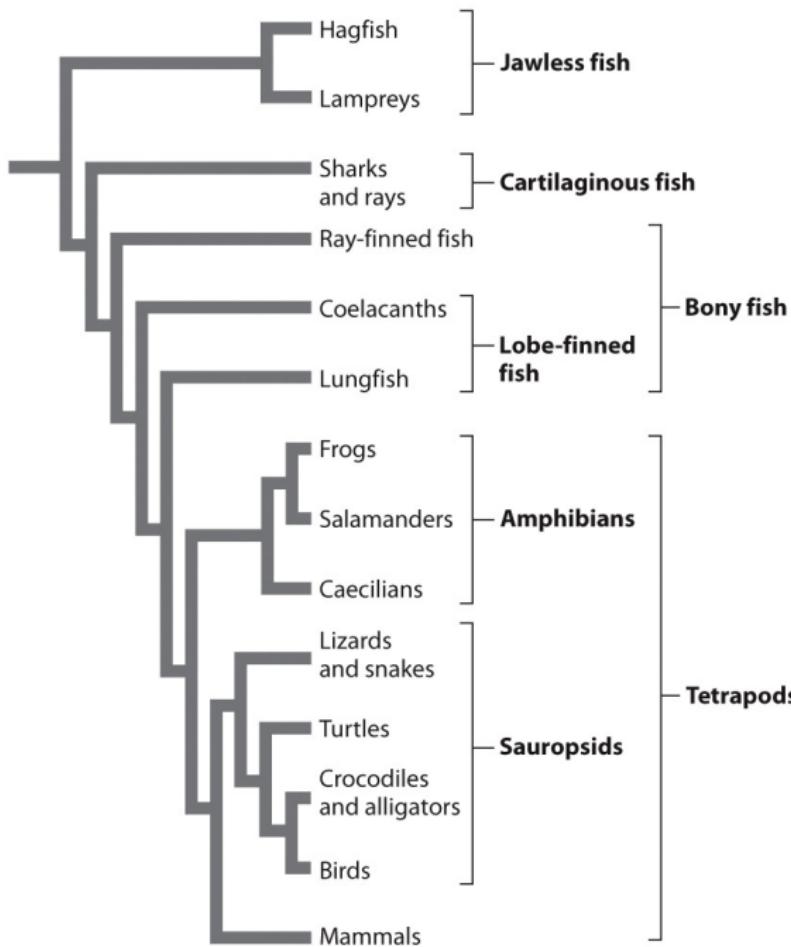
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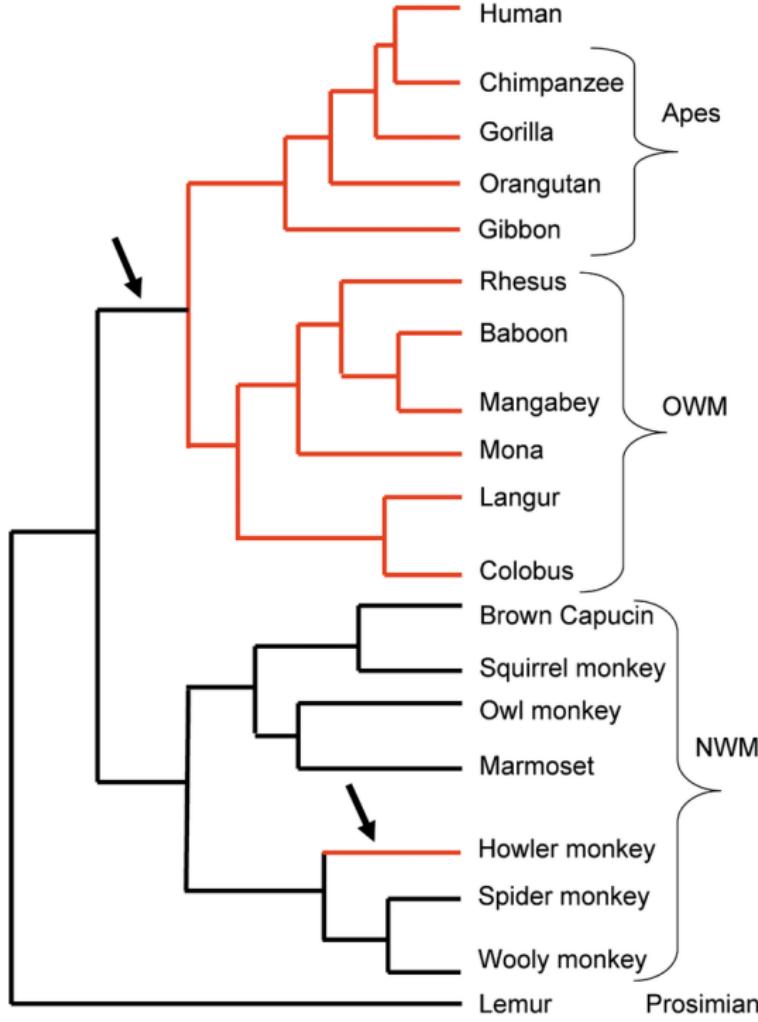
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  - ▶ \* When our data are only distances, with no characters available – e.g., certain molecular techniques
  - ▶ \* When we don't have enough baseline information
  - ▶ *The book talks about trusting the molecular clock, but this is complicated and 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 underside. The carapace is covered in scales called scutes, cover

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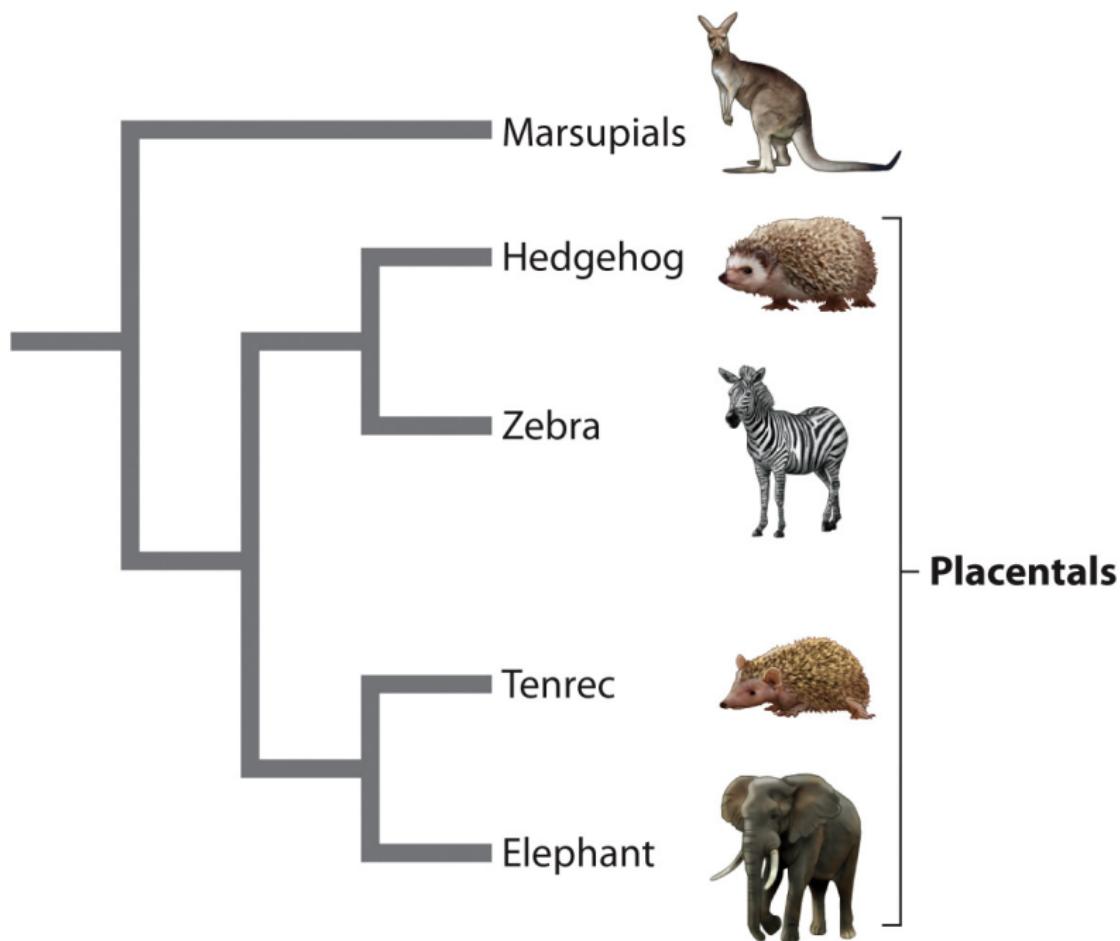
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**Figure 22.7**  
*Biology: How Life Works*  
© Macmillan Learning





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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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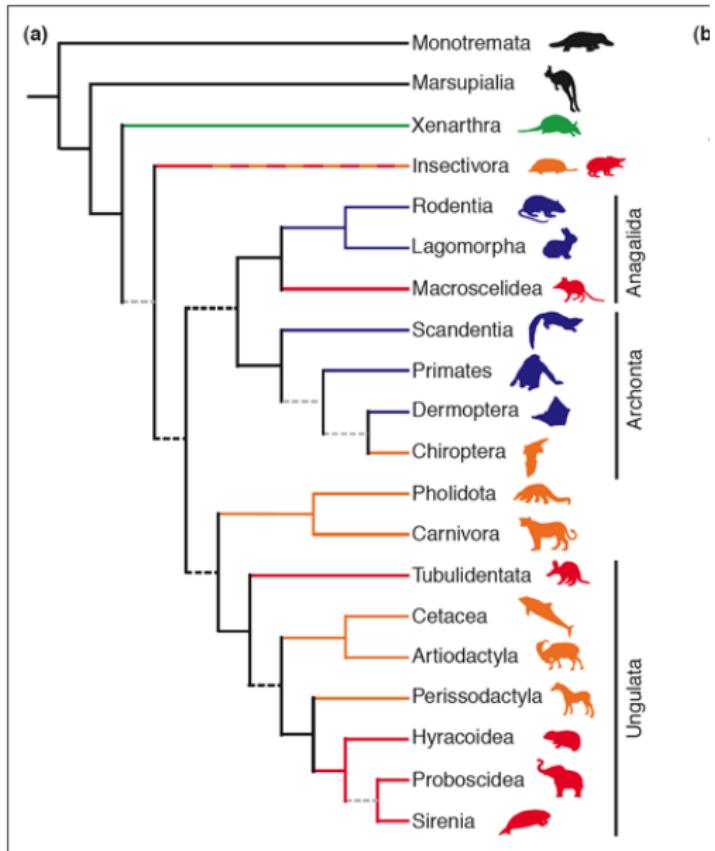
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# Morphological tree



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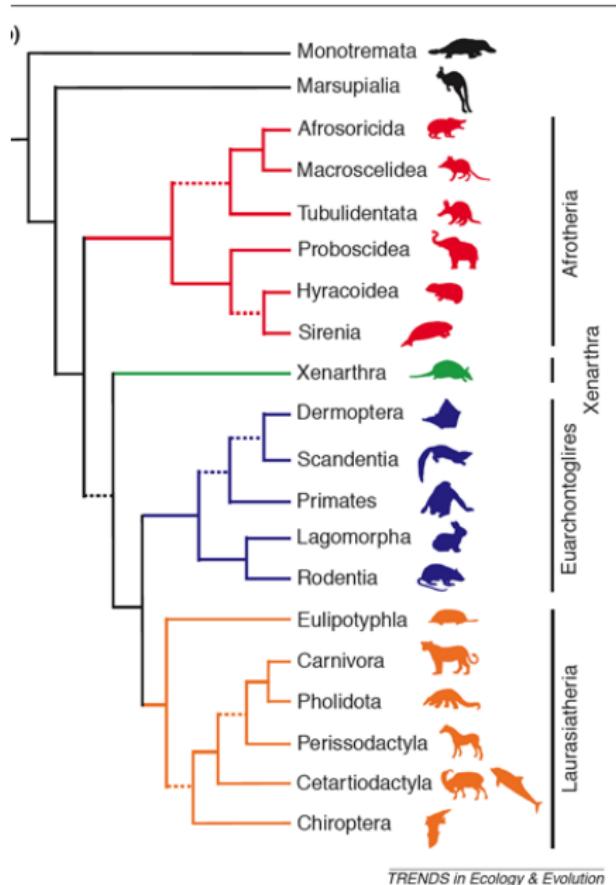
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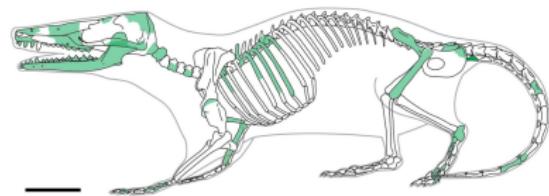
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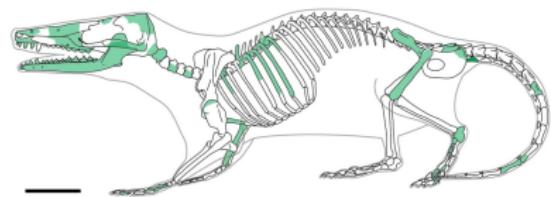


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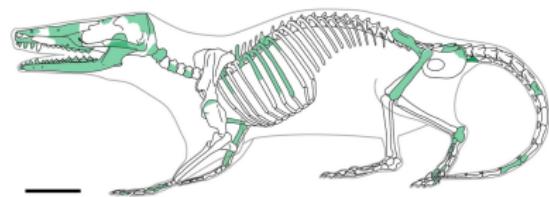
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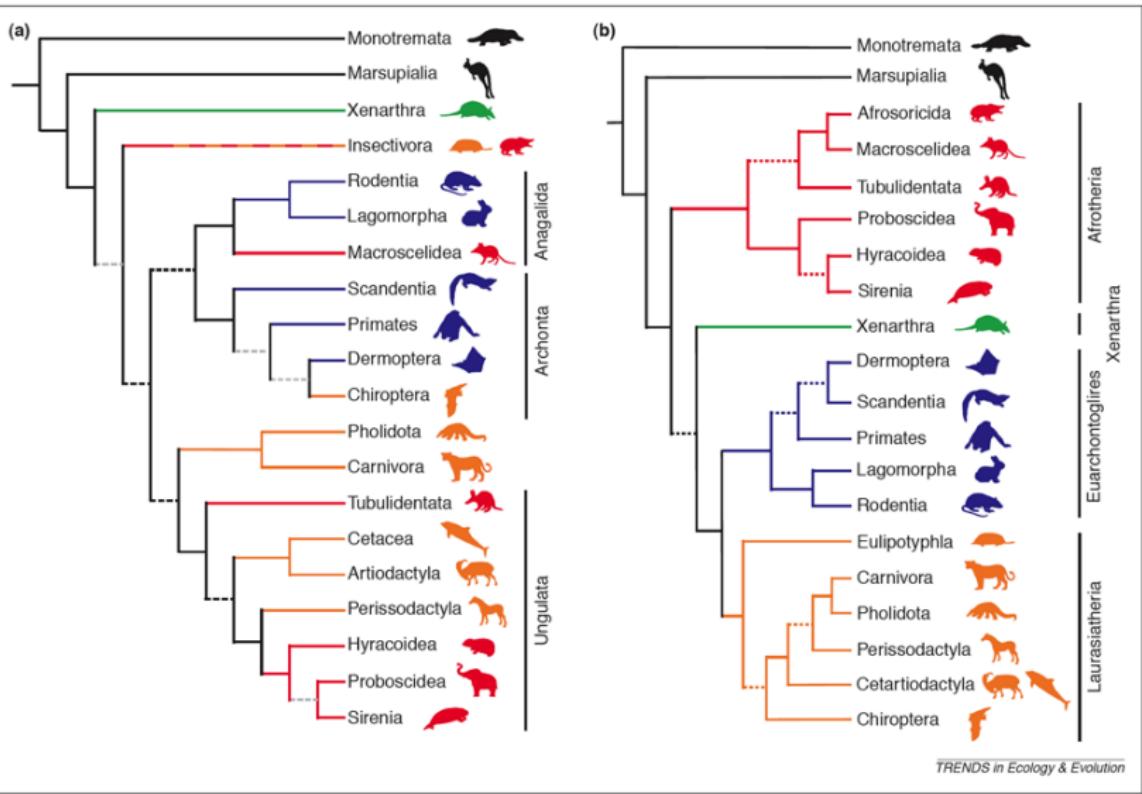
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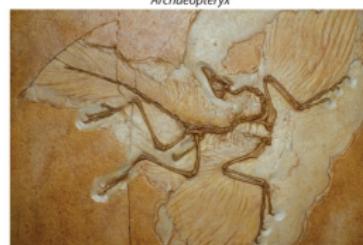
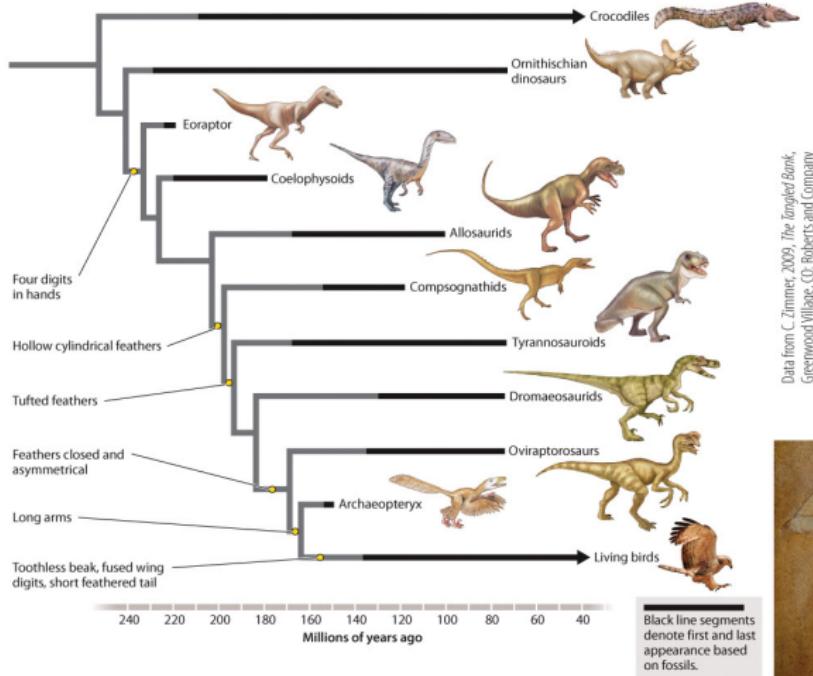
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**Figure 22.21**  
*Biology: How Life Works*  
© Macmillan Learning

Data from C. Zimmer, 2009, *The Tangled Bank*, Greenwood Village CO: Roberts and Company

Jason Edwards/National Geographic/Getty Images

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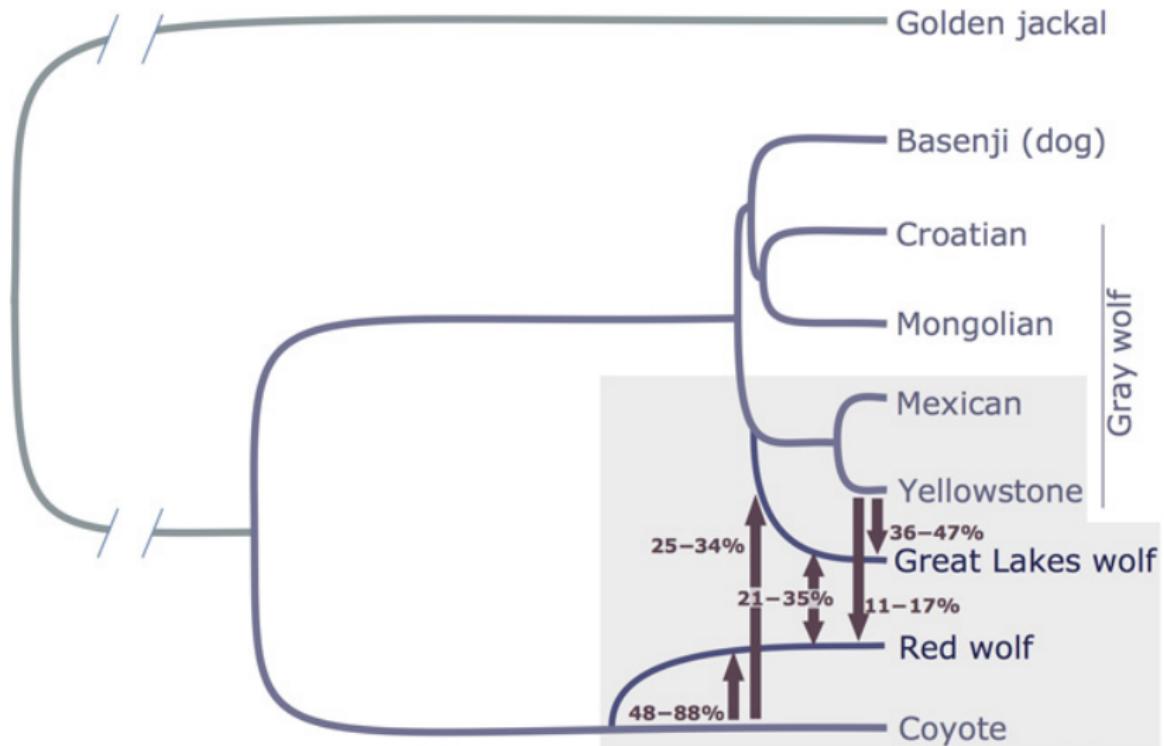
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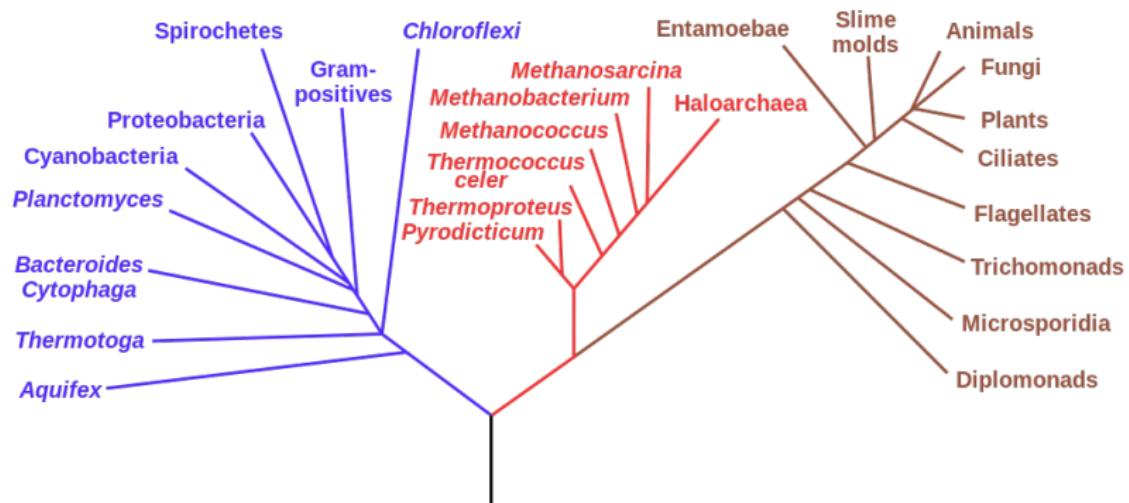
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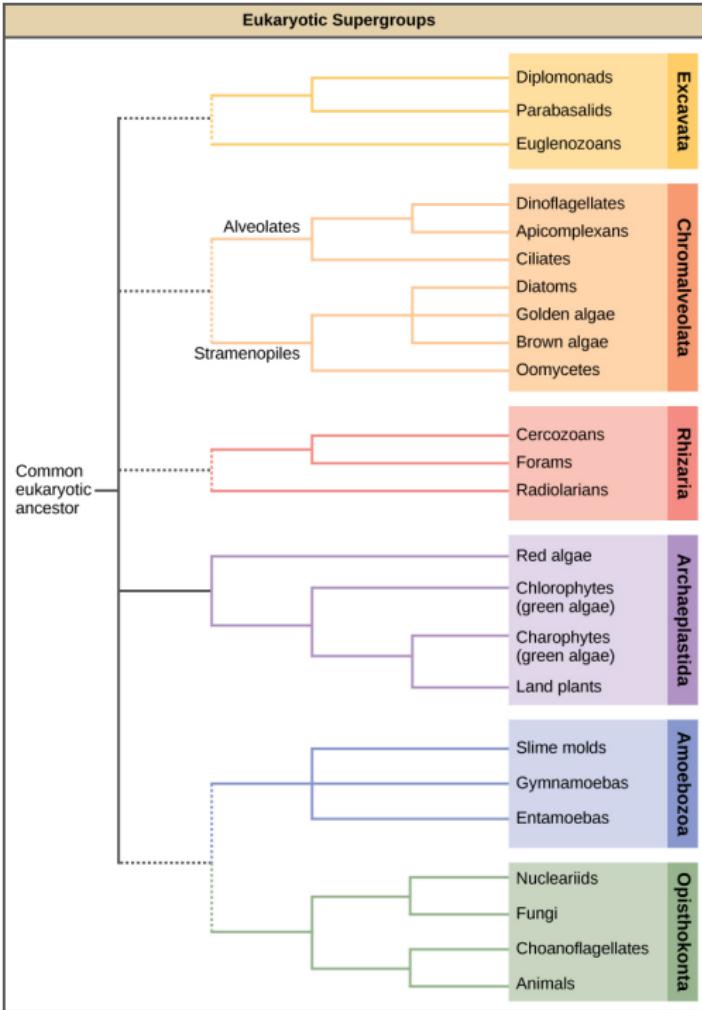
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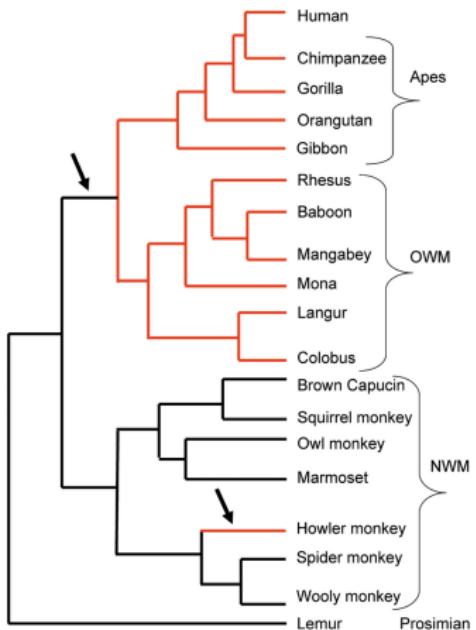
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## Eukaryotic Supergroups

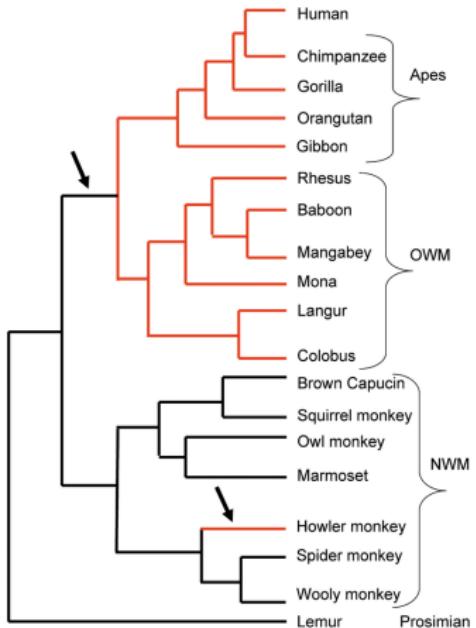


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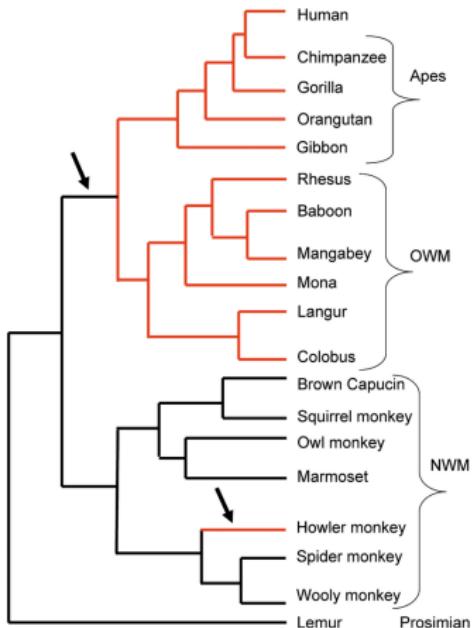
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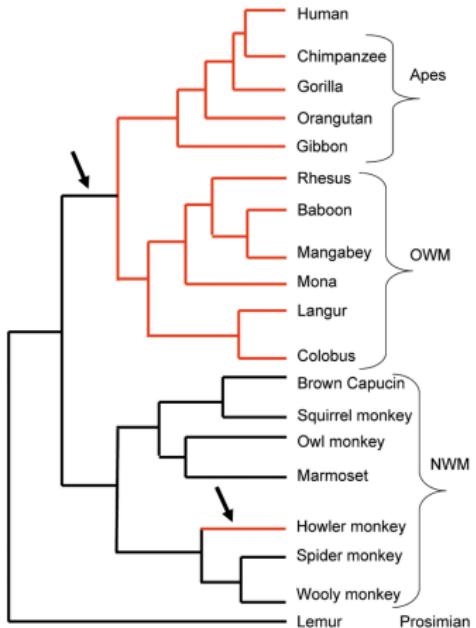
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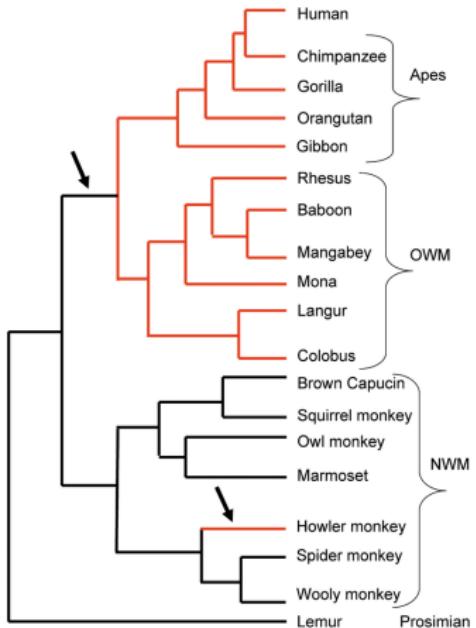
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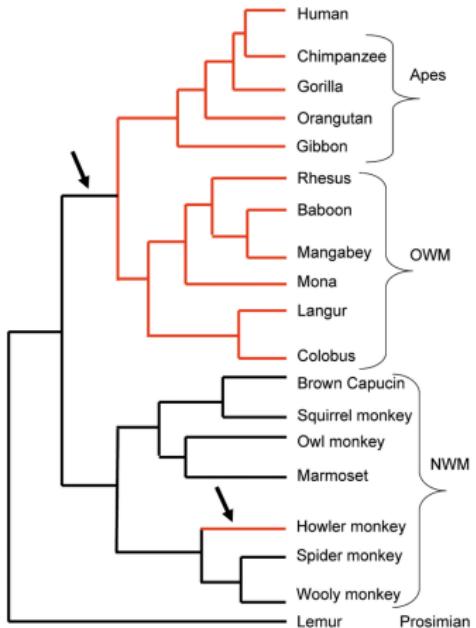
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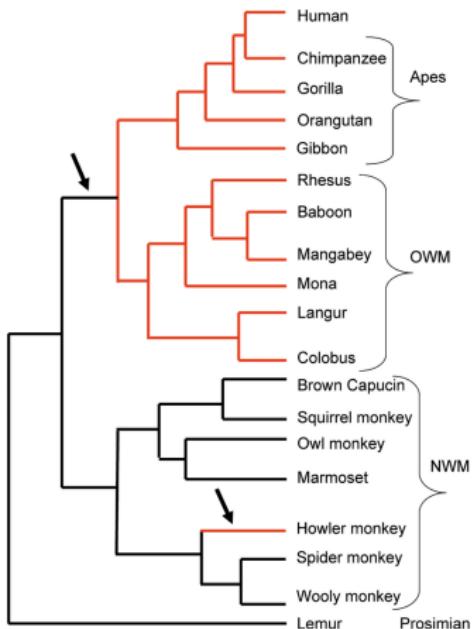
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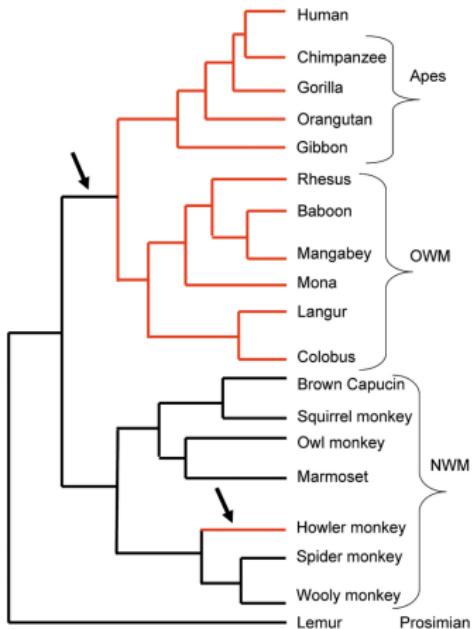
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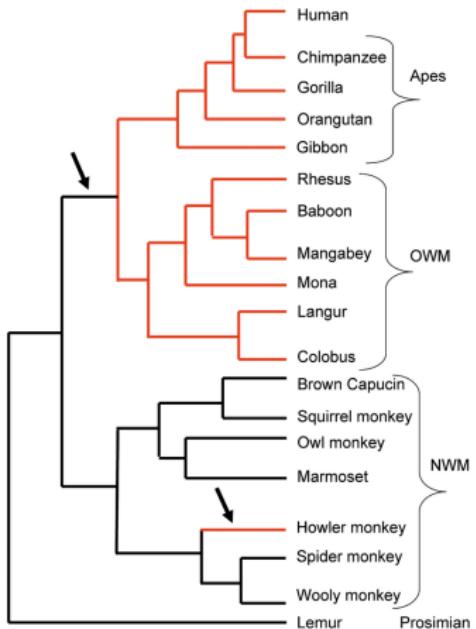
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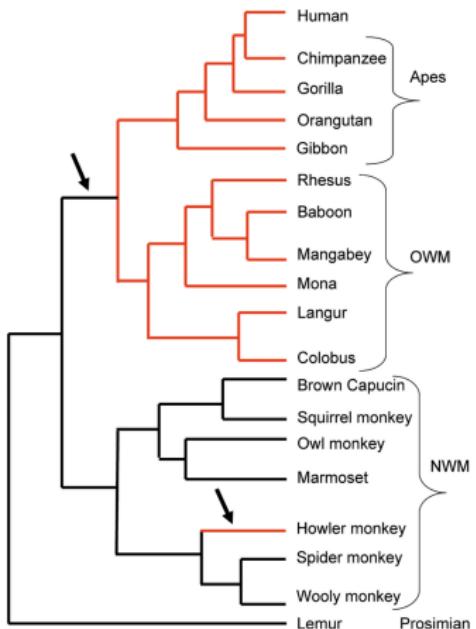
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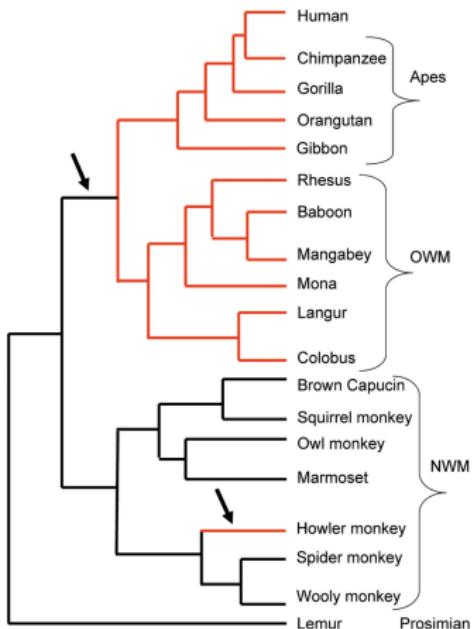
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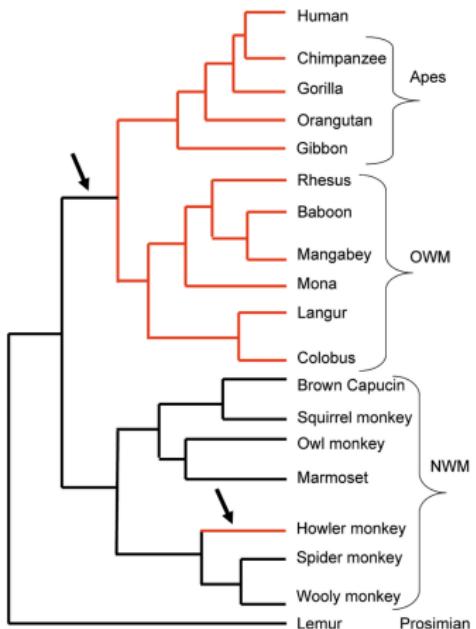
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White beds contain fossilized tracks of vertebrate animals that lived about 260 million years ago.

Limestone accumulated in the oceans about 335 million years ago, burying marine animals and preserving their skeletons.

Slopes made of mud laid down in a shallow sea about 500 million years ago contain fossils of early arthropods called trilobites.

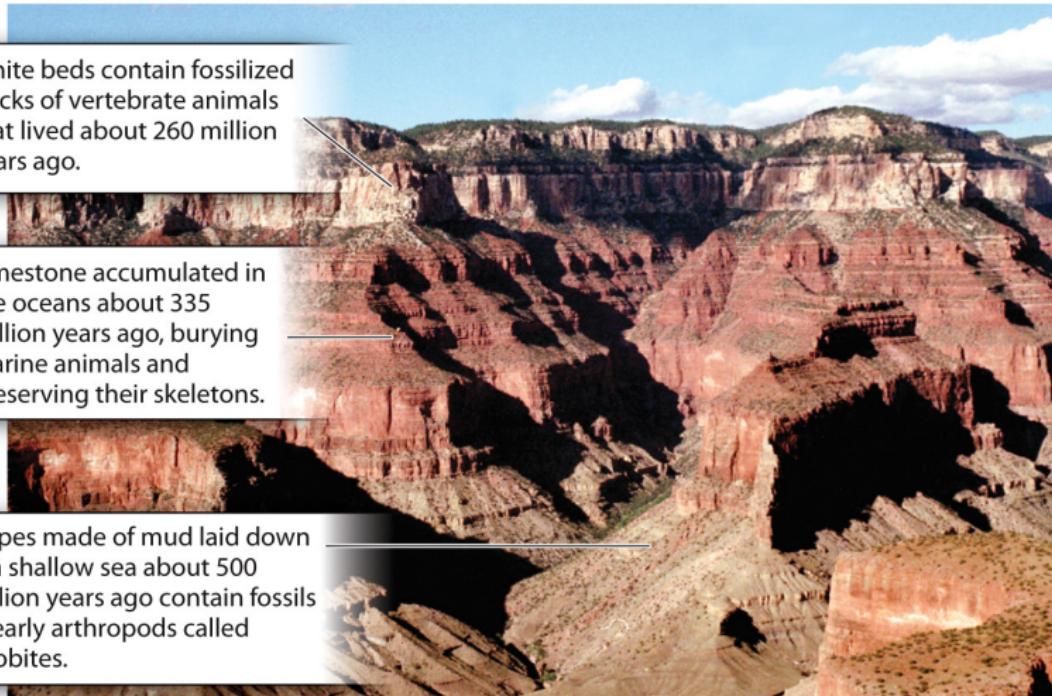


Figure 22.14

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**Figure 22.15**  
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José Antonio Hernaiz/AGENCE FOTOSTOCK



**Figure 22.16**  
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**Figure 22.17**  
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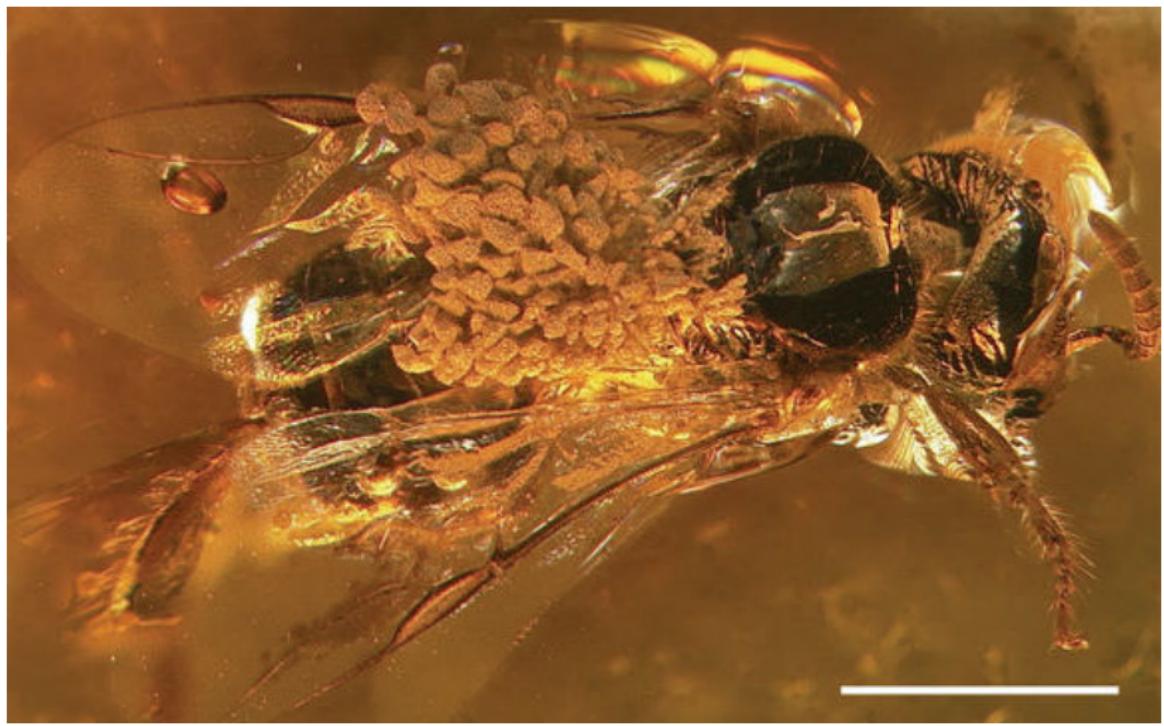
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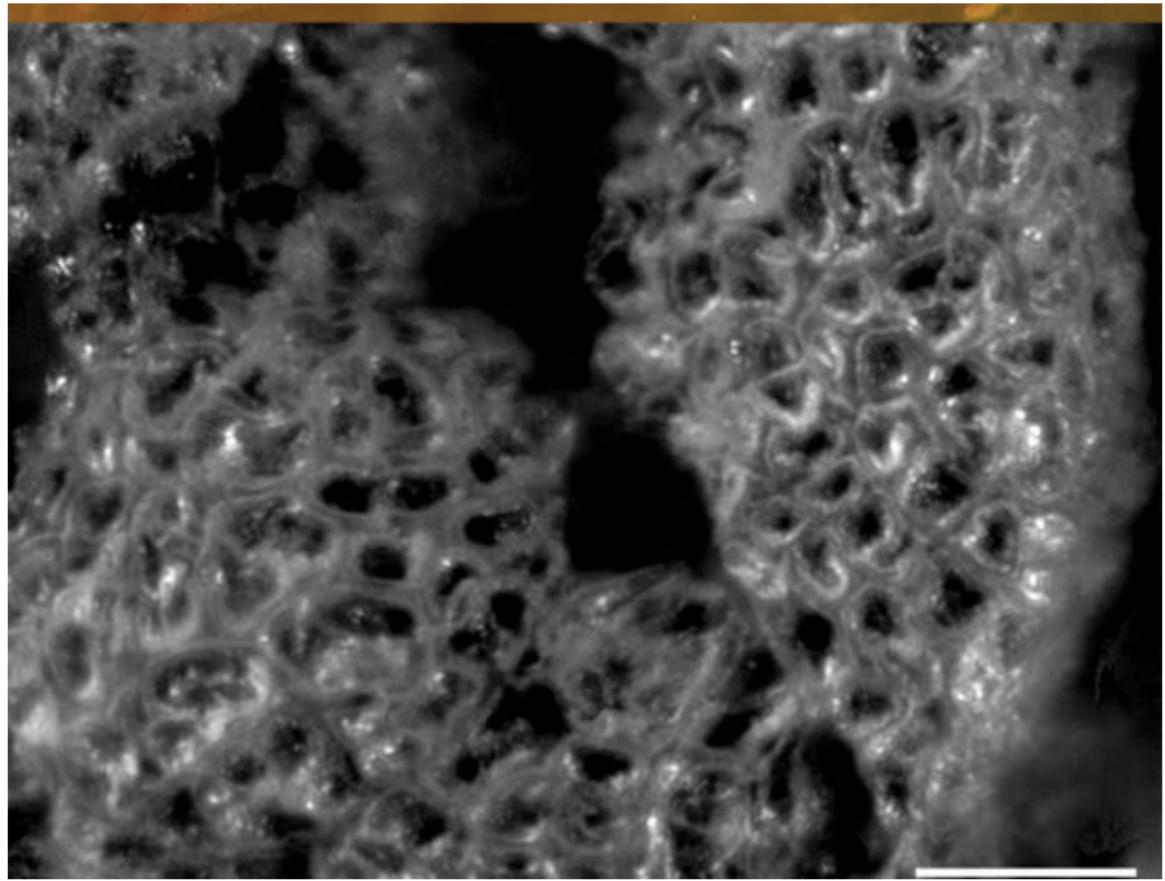
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Constructing phylogenetic trees

Example: the evolution of whales

## The history of life

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**Putting the timeline together**

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