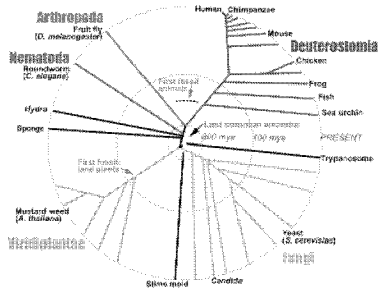


Wednesday, October 20  
The Evolution of Us



Quiz #2 will be on Friday.

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The Evolution of Us  
Key Concepts

- 1) The **Cambrian Explosion** of biodiversity occurred at the start of the Phanerozoic.
- 2) Plants colonized the land ~475 Myr ago; animals followed later.
- 3) The first primates lived ~60 Myr ago; the first modern humans lived ~0.2 Myr ago.

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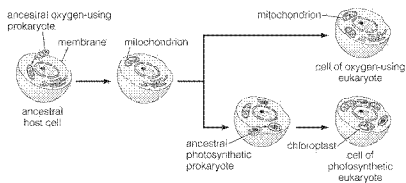
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You are a eukaryote (containing cell nuclei).

The 1<sup>st</sup> eukaryotes arose ~2.1 Gyr ago, during the early Proterozoic.



Eukaryotes started as a **symbiosis** of prokaryotes: Mitochondria (where ATP is made) and chloroplasts (where photosynthesis happens) began as "invaders".

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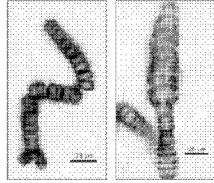
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**You are a multi-celled eukaryote.**

The 1<sup>st</sup> multi-celled eukaryotes arose ~1.2 Gyr ago, during the middle Proterozoic.

Fossil algae resemble their modern descendants.

They probably started as colonies of cells, then developed specialized cell functions.



*Bangiomorpha pubescens*

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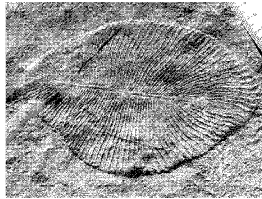
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**Body plans of multi-celled organisms didn't evolve much during the late Proterozoic Eon.**

Only toward the end of the Proterozoic (~600 Myr ago) did complex multicellular organisms arise.



*Dickinsonia costata*

These first large organisms (up to 4 feet long) were soft-bodied; no shells, no bones.

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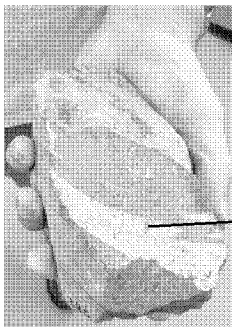
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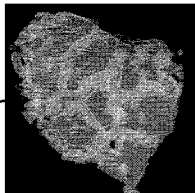
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**You are a member of the Animal kingdom.**  
(Animals are self-mobile, and eat food.)



Oldest animal fossil:  
sponge-like critters dating to ~650 Myr ago.



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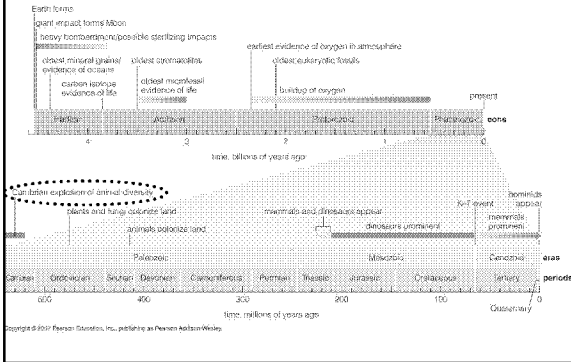
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## The Phanerozoic Eon marks the spread of animal and plant life around the planet.




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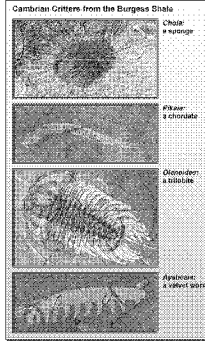
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## The Cambrian Explosion in complex life marks the start of the Phanerozoic Eon.

Most major groups (or phyla) of animals appeared rapidly during a 40 Myr period at the start of the Cambrian Period.

Complex animal and plant life filled most available ecological niches.




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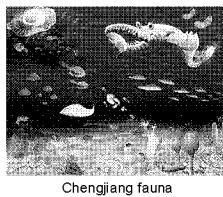
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## Why was there an explosion in biodiversity at the beginning of the Phanerozoic Eon?

Abundant atmospheric  $O_2$  allows larger animals by providing faster metabolism.

“Snowball Earth”, at the end of the Proterozoic, caused mass extinctions & opened up ecological niches.




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You are a **land** animal (mostly).

Animals and plants colonized the land **slowly**.

Ultraviolet light is hazardous;  
life on land was only safe after  
the **ozone layer** built up.

Plants and fungi colonized the  
land ~475 Myr ago; animals  
followed ~400 Myr ago.



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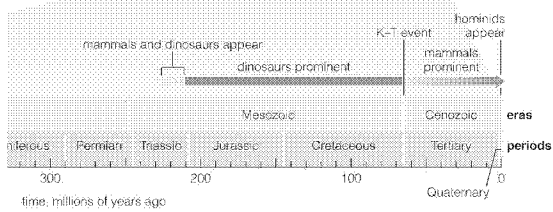
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You are a **mammal**. (Mammals are animals  
that are warm-blooded, and have hair.)



**Mammals and dinosaurs** appeared roughly  
simultaneously, ~220 Myr ago.

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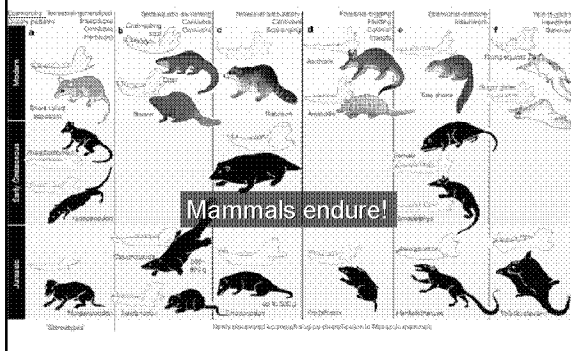
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Dinosaurs went extinct 65 Myr ago.  
(Why? Tune in tomorrow...)



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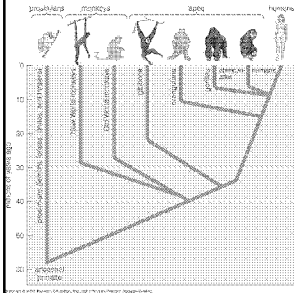
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You are a **primate**. (Primates are mammals with binocular vision and flexible, grasping hands.)



The first primates appeared ~58 Myr ago.  
 The lineage of monkeys split off ~40 Myr ago.  
 The last common ancestor of chimpanzees and humans lived ~7 Myr ago.

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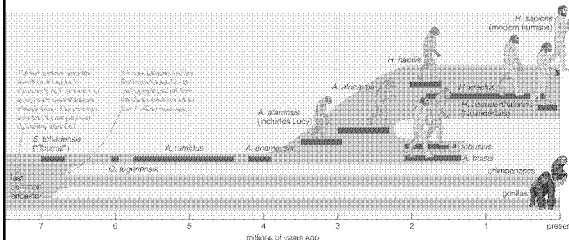
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You are a **hominid**. (Hominids are upright bipedal primates.)

The first hominids lived ~6 Myr ago.




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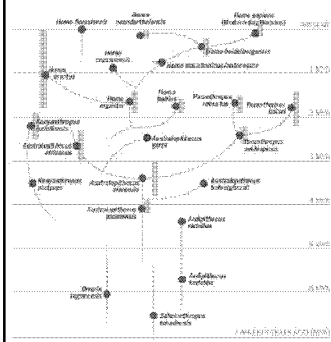
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Humans (*Homo sapiens*) are just one branch on the hominid "tree of life".



Although *H. sapiens* is the only living hominid species, there were many other hominid species, now extinct.

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