

Speciation

Definition:

Process by which new species are created from an existing species

Causes:

- mutations
- variety through sexual reproduction
- natural selection

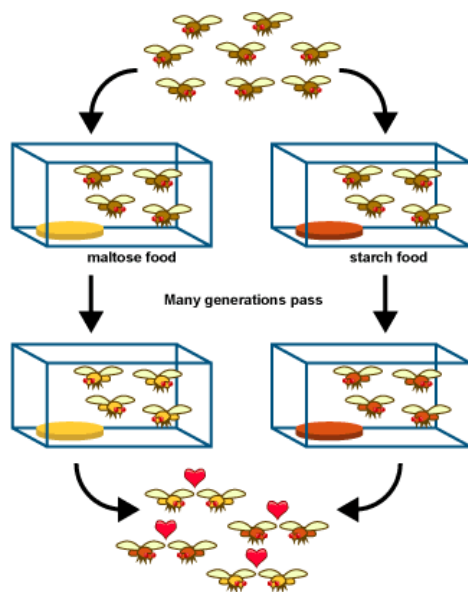
} all work to produce and choose different adaptations based on current environment

*Over time, if enough changes are accumulated in a population, it could be reproductively isolated from the rest of the species and actually become a separate species

Events that can lead to speciation:

Geographic Isolation- when a physical barrier divides a population into smaller groups such as a mountain range or a highway

- *If the environment on each side of the barrier is different enough, the two groups may have different traits selected for*
- *As a result, the two groups may eventually become two separate species as they will no longer be able to reproduce and have fertile offspring*



- The original population of flies were divided into two tanks
- One tank was fed maltose, while the other starch
- After many generations, the two groups were combined once again
- Those fed the maltose would only mate with other flies fed maltose and the same for those fed starch
- The two groups can no longer mate with each other and have fertile offspring, so they are now considered two separate species

Reproductive Isolation- enough variations have accumulated to make that population different enough to not be able to reproduce with the main population

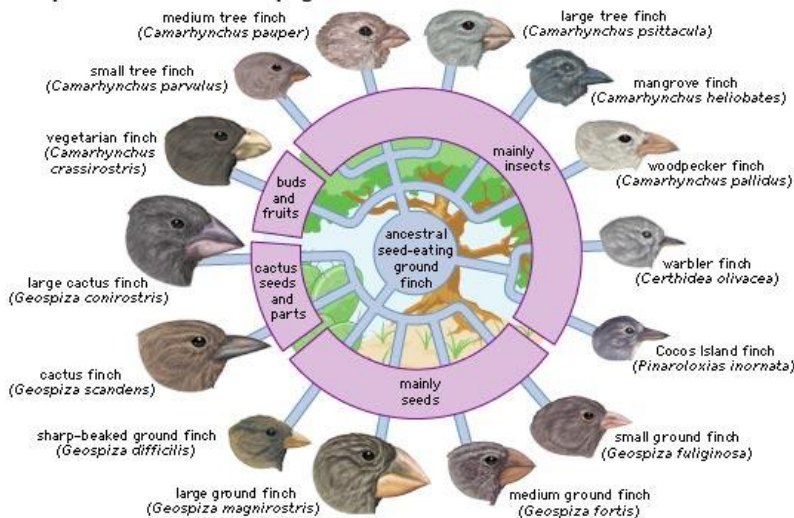


Bowerbirds

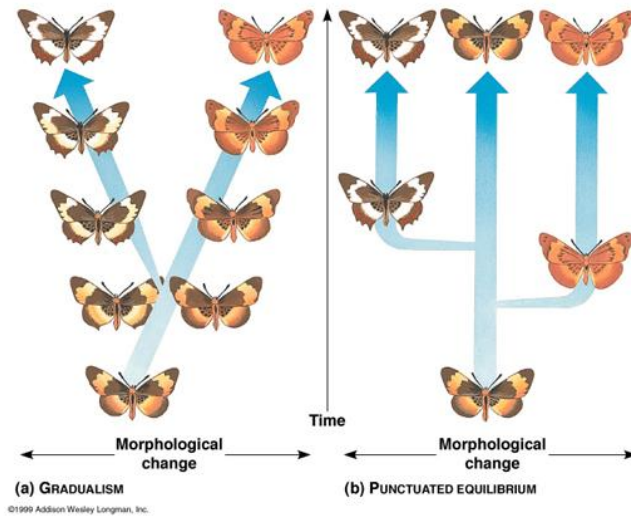
The blue bowerbird (left) will only mate with other blue bowerbirds and brown will only mate with other brown bowerbirds. Their nests are specific colors as well to avoid mixing eggs

Adaptive Radiation- one original (parent) species is divided into multiple smaller groups found in different environments. Over time, each group is different enough to be considered its own species.

Adaptive radiation in Galapagos finches



Rates of Evolution:

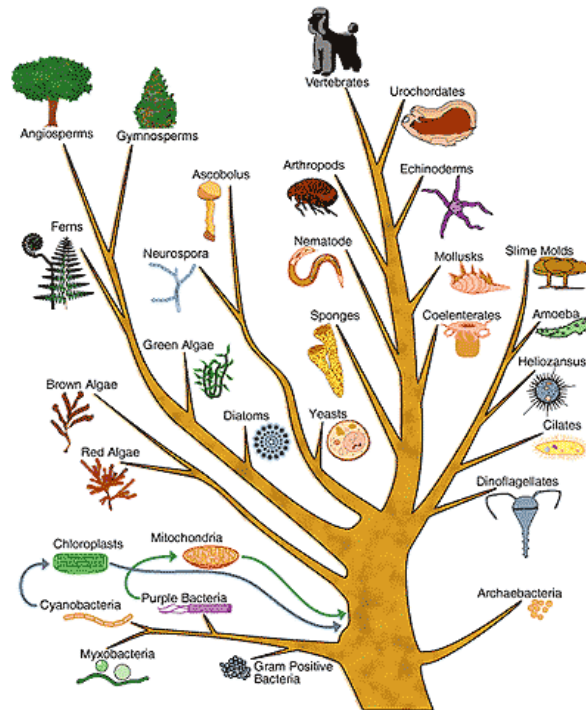


Gradualism (left)- The idea that evolution occurs slowly and continuously over time.

Punctuated equilibrium (right)- The idea that there are long periods of no change followed by brief periods of drastic change.

*both theories are accepted and apply to different species at different times

Determining Evolutionary Relationships



1. What does the diagram above resemble?

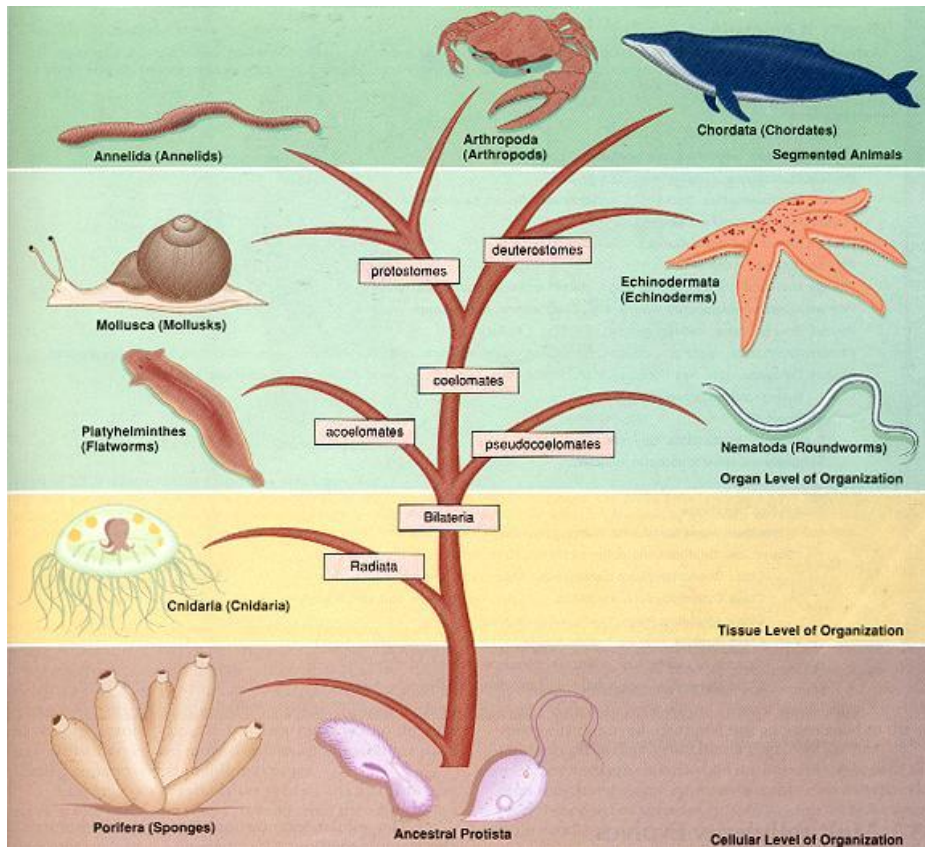
A tree

2. Which group is most closely related to vertebrates? Explain.

Urochordates- they branch off from vertebrates most recently

Evolutionary biologists use tree diagrams such as the one shown above to illustrate evolutionary relationships between different species. These diagrams are also referred to as phylogenetic trees or cladiograms.

Examine the tree on the following page and answer the questions that follow:



3. What phylum is most closely related to echinodermata? Explain.

Chordata (they share the most RECENT common ancestor)

4. What is the common ancestor that mollusks and arthropods share? Explain
 Protostomes are the most recent point that mollusks and arthropods have in common (their most recent common ancestor).

5. Which two are more closely related: flatworms and annelids or arthropods and mollusks? Explain.

Arthropods and mollusks are more closely related as they share a more RECENT common ancestor than flatworms and annelids.

6. Summarize the steps taken to identify common ancestry on a phylogenetic tree. Locate the two groups and trace back to where they share a common point, that is the most recent common ancestor.