

HOW ARE EVOLUTIONARY TREES BUILT?

Evolutionary trees are diagrams used to show evolutionary relationships between different species. They are based on estimates of how closely related current-day species are to each other.

How do we arrive at such estimates? Earlier, evolutionary relationships between species were determined on the basis of their external appearance (morphology). But this technique is not always reliable. Similarities in the physical appearance of two species can also arise from a process called **convergent evolution**. This is a process where distantly-related species evolve similar traits. For example, both birds and bats can fly, but we know that bats are mammals and their evolutionary history is different from that of birds. Modern methods look at how the genetic material of a present-day species is likely to have changed over time, given certain assumptions about the rate of mutation, past geological occurrences, etc. These methods can help determine the evolutionary history of present-day species far more reliably.

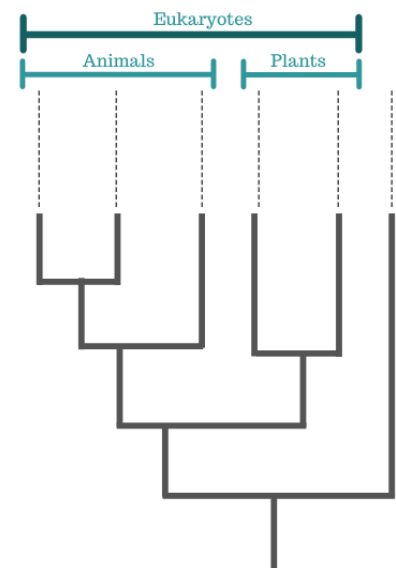
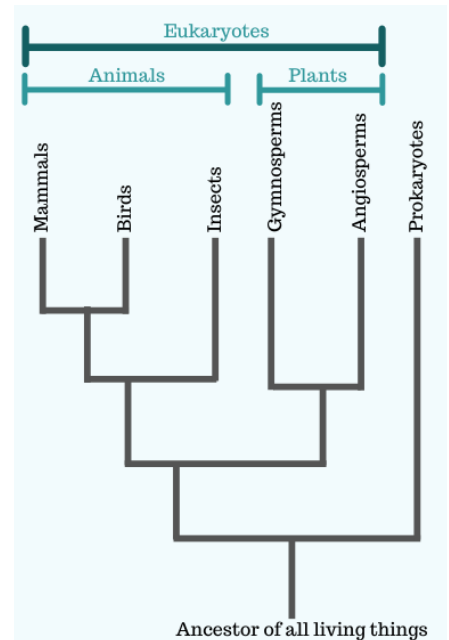
Build a tree activity

Background: You can build an evolutionary tree based on the assumption that organisms that are likely to share a common ancestor appear on branches splitting off at a node. For example, the tree on your top right shows how all living beings share a common ancestor, from which prokaryotes and eukaryotes split. Within eukaryotes, plants and animals share a common ancestor. Gymnosperms and angiosperms share a common plant-like ancestor; birds, insects and mammals share a common animal-like ancestor.

An activity for students: Share the background given above and the six taxa listed below with your students. Ask them to find out which categories these taxa belong to – animals, plants, prokaryotes, birds, or gymnosperms, etc. Can they use what they learn to fit these taxa into the empty tree on the right?

- *Gnetum ula*
- *Actias luna*
- *Bacillus thuringiensis*
- *Caryota urens*
- *Upupa epops*
- *Platanista gangetica*

Note for teachers: Students can be asked to bring pictures of these taxa, draw out the tree on chart paper, and paste the pictures in the correct spot. Don't forget to display the chart in your classroom!



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