

D.I.Y. Paraves Cladogram!

An interactive project for you to play and solve.



DESCRIPTION

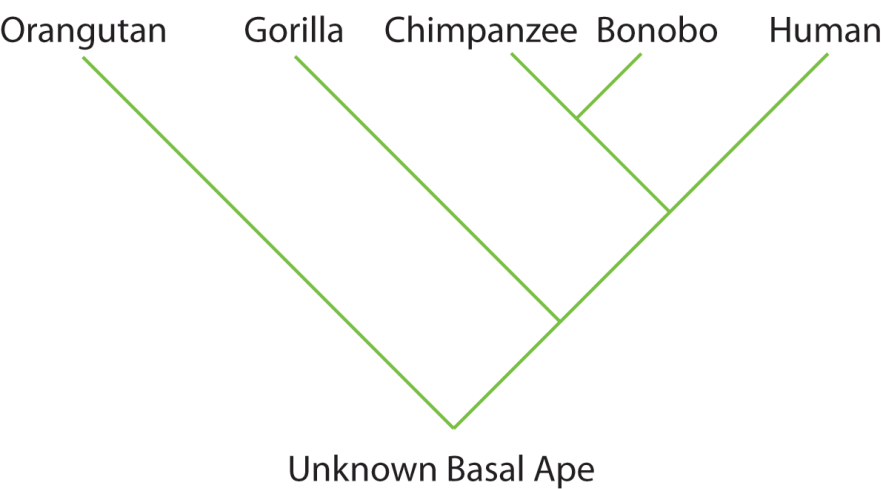
A cladogram shows the evolutionary divergences within a particular lineage. This is a simplified version of the *Paraves* cladogram, which begins with the most recent common ancestor of both birds and “classic” dinosaurs. (Because birds are descended from dinosaurs, they are actually dinosaurs themselves as well, and will be referred to as such from here on.) All *Paraves* species are ultimately descended from Theropods, the two-legged carnivorous dinosaurs like *Tyrannosaurus rex*. The *Paraves* cladogram splits into *Avialae* (which are more bird-like) and *Deinonychosauria* (which are more classically dinosaur-like), and from those groups into many different--but still related--species, including the one non-extinct group of dinosaurs, modern birds.

INSTRUCTIONS

How are you at splitting evolutionary hairs? Try your hand at placing these 19 extinct species and 1 extant group (modern birds) in their correct locations in the cladogram. Your goal is to figure out which dinosaurs are evolutionarily older (a.k.a. more “basal”) and which are evolutionary younger (more “derived”). The bottom of the diagram is the beginning of the *Paraves* lineage. At every split, one line goes off directly to the top of the diagram, and the other line continues up towards another split. The names of the species are placed at the end of the lines at the top of the cladogram. The fewer splits before one gets to a dinosaur’s name, the more basal that dinosaur is. The more splits before a dinosaur’s name, the more derived it is.

FOR EXAMPLE

Here is the cladogram for apes. Orangutans were the earliest species to derive from the original, most basal ape. Then gorillas split off, then there was a split between humans and the group that eventually became chimpanzees and bonobos.



HINTS

Your goal is simply to figure out in what order these dinosaurs evolved, and to stick their names up at the top of the cladogram in their proper order.

The group names printed on the cladogram may give you some hints at what dinosaurs may fall within them. Their silhouettes may help you guess which are more bird-like and which are more classically dinosaurian. And of course this is a good opportunity for you to brush off your Latin to figure out some final clues from their names!

The answers can be found on the back of this magnet!

CONTEXT

This is a difficult puzzle for everyday people, but its a challenge for paleontologists too. Figuring out how species relate to one another is done by figuring out which species share specific physical characteristics, but it is made much harder due to the fact that we only have fossils, and not the exteriors of their bodies, to work from, and some of those fossils are poorly preserved. So, while computerized analysis and long experience have helped to put together a fairly firm understanding of the main outlines of animal evolution (such as the fact that birds descended from dinosaurs), paleontologists have plenty of arguments about the details--was this particular species on this branch or that branch? So if you think this is hard because you don’t have all the information you would like, then you are in exactly the same position as real paleontologists!