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Phylogenies for groups of living organisms are routinely constructed based on molecular data. These phylogenies generate hypotheses about the morphology of implied ancestor species, often in the form ancestral morphotypes.

We present some computer graphics visualizations of the crania of the hypothetical ancestors of the Old World monkeys, based on the crania of their living descendants. These reconstructions are based on geometric morphometric techniques using a large series of landmarks and semilandmarks on laser surface scans to estimate the morphology of ancestor species. Ancestral morphology is based on an estimated landmark and semilandmark configuration based on those of extant species weighted by phylogenetic distance using squared change parsimony. Phylogenetic distance is based on current molecular phylogenies from the literature and their estimated divergence dates.

Our reconstructions of the basal ancestors clearly differ from the oldest fossils for the group. We consider several of the technical issues involved in integrating the fossil information into the morphological hypothesis, and we demonstrate how including the fossils improves the estimated morphology and can affect the inferences we draw from the tree. This study was funded by the NSF, grants number 0513660 and 0513894.

Evolutionary morphing.

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