

Frequent leaping origins: unpredictable substrate orientation and position as the selective context for euprimate visual system improvements.

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Primates are a highly arboreal clade characterized universally by grasping appendages and hind-limb dominated climbing. Plesiadapiform fossils recently unearthed in North America implicate grasping as predating orbital convergence (and hind limb elongation) -- suggesting that leaping, a behavior hypothesized to provide the selective context for such morphology, may have been a penultimate step in the evolution of the primates of modern aspect (Euprimates). Other theories such as “visual predation” and “camouflage breaking” also predict these vision changes but additionally accommodate for the fact that the benefits of binocular parallax are limited to close range targets. I hypothesized that these close range preferences could be advantageous late in a leaping bout when urgently determining appropriate limb positioning and grasp orientation for safe landing (as destination substrate configuration may be unknown or ambiguous during take-off). Because precise knowledge of early primate leaping behavior is currently unavailable, I compiled quantitative locomotor estimates for 103 species (from 42 source studies) and performed ancestral character estimation [ACE] on them to calculate a phylogenetically-weighted, average leaping frequency for the ancestral Euprimate. My analysis shows that the first true primates had repertoires with leaping composing nearly half (47%) of their locomotor bouts, strongly supporting a leaping-based theory of Euprimate morphological origins. Future origins models might benefit from a composite approach whereby elements are incorporated from multiple theories (e.g. leaping as a mechanism of snake predation avoidance).