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THE BRAINS OF THE EARLIEST PRIMATES: ENDOCASTS AND THE QUESTION OF PRIMATE BRAIN SIZE INCREASE

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The endocasts of plesiadapiforms provide direct information relevant to elucidating the earliest stages in the evolution of the brain in Primates. Full or partial endocasts are now known from representatives of three plesiadapiform families (Plesiadapidae, Paromomyidae, and Microsyopidae) including both virtual and natural endocasts for *Microsyops annectens*, and a virtual endocast for *Ignacius graybullianus* derived from ultra high resolution X-ray computed tomography data. Relative to living and fossil euprimates, plesiadapiforms possessed larger olfactory bulbs compared to the overall size of the brain, less caudally extensive cerebra, and less well developed temporal lobes. These features suggest that plesiadapiforms were less visually oriented than living primates and more dependent on smell. The range of Encephalization Quotients (EQs) calculated for plesiadapiforms overlaps with the bottom end of the range of EQ estimates for fossil euprimates, providing a plausible starting point for the process of primate brain evolution. All plesiadapiform endocasts fall outside of the range of EQs for living euprimates, however, and plesiadapiforms had brains that were only a third to a half the size of those of typical living mammals. The possession of such small brains in forms that can be reconstructed as omnivorous or frugivorous suggests that the adoption of fruit eating did not contribute significantly to the evolution of large brain size in Primates. However, the contrasts between the endocasts of plesiadapiforms and those known for early Tertiary euprimates support the hypothesis that brain size increase was related to improvements to the visual system in early primate evolution.

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