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The Pace and Processes of Early Divergence and Stasis: Morphological Evolution in Isolated Populations of the Sulawesi Booted Macaque, *Macaca ochreata* (Cercopithecidae)

Abstract

I conducted a morphological field study of two primate populations (*Macaca ochreata ochreata* and *M. o. brunnescens* of Sulawesi, Indonesia) that have been isolated from one another for approximately 9,000 years, under subtly different ecological conditions. My aims were to (1) determine which morphological traits have undergone evolutionary change during this period, and which have remained stable; and (2) ask which evolutionary processes may have contributed to the observed divergence or stasis, as the case may be.

My results indicate (1) subtle divergence in head breadth, and (2) marked stability in body size, body proportions, limb proportions, and male secondary sexual characters (maxillary canine teeth and testes). Genetic drift is suspected as the cause of divergence in head breadth, due to small population size in the divergent population (*brunnescens*), the small magnitude of change, and the lack of a known effect of head breadth on ecological performance in this taxon.

There is some evidence that strong parallel selection within each population maintains the populations' morphological stability, i.e., their lack of divergence (except in head breadth). First, the femur shows positively allometric growth relative to the other limb segments; furthermore, relative growth of the limb segments (but not the trunk) seems to be highly canalized (resistant to environmentally-induced change). In

combination with behavioral evidence from primary-forest populations that this species is highly arboreal, the evidence suggests strong, parallel ecological selection for leaping ability, via faster growth of the femur relative to the other limb segments. Second, strongly positive allometry and a high coefficient of variation in male secondary sexual traits (especially maxillary canine teeth) suggest that on-going, parallel sexual selection may enforce stasis in these traits as well.

The results suggest that some morphological traits (e.g., cranial characters) may be less constrained by selection than are others, and thus more free to diverge by genetic drift, replicating previous studies on New World primates and on Neandertals and modern humans. The results also highlight the possible role of ecological and sexual selection in constraining evolutionary change.