

Geographic Variation in the Forelimb and Hindlimb Skeletons of African Apes

by

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## ABSTRACT

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Understanding geographic variation in African ape skeletal morphology is important for the study of both modern and fossil apes. Regarding modern apes, it is important for the study of their taxonomy, biogeography, evolutionary history, and adaptations. Regarding fossil apes, it is important in order to enhance our ability to refer to a modern analog when interpreting variation among specimens. While species-level variation in *Gorilla* and *Pan* is relatively well-studied, variation among subspecies and populations has received little attention, and most of this work has focused on craniodental morphology.

This study documents patterns of geographic variation in the forelimb and hindlimb skeletons of African apes. Linear measurements of ten limb bones were collected from 266 *Gorilla* and 274 *Pan* adults. Univariate and multivariate analyses were conducted on raw measurements from all ten bones and on ratios of hand and foot bone measurements.

Results from analyses of both raw measurements and hand and foot ratios are generally consistent in the patterns of geographic variation they reveal. Variation is present at the species, subspecies, and population levels in both *Gorilla* and *Pan*, but greater differences exist among subspecies and populations in *Gorilla*, and *Pan*

populations do not cluster as reliably into their assigned subspecies. These are the same patterns detected in studies of *Gorilla* and *Pan* craniodental morphology and genetics.

Analyses of hand and foot bone ratios also permit exploration of the potential functional significance of hand and foot bone morphology. These ratios were proposed to reflect relative frequencies of characteristically arboreal and characteristically terrestrial positional behaviors; however, in comparisons of taxa with documented differences in degrees of arboreality and terrestriality, only four of twenty-two ratios vary as predicted.

The results of this study have implications for the interpretation of variation in hominoid fossils. Although hominoid fossil taxonomy is usually based on craniodental morphology, limb bones are likely to reflect the same patterns of variation between geographic groups. Many features of the hand and foot that have been proposed to reflect differences among hominoids in arboreality and terrestriality do not appear to be reliable indicators of functional differences between taxa of African apes.