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Estimating body weight via postcranial dimensions in extinct Cercopithecidae. E. DELSON[1234], C. J. TERRANOVA[15], W. L. JUNGERS[6], E. SARGIS[13]; [1]New York Consortium in Evolutionary Primatology, [2]Lehman College, [3]City University of New York Graduate School, [4]American Museum of Natural History, [5]North Carolina State University, [6]State University of New York, Stony Brook

Body size is a major aspect of a species' adaptation. Some statistical analyses attempt to partial out its effects in order to concentrate on the study of "shape", while other studies seek to understand the allometric effects of evolutionary changes in size. Body weight is the most often sought measure of size, especially among primates, and its estimation in fossil taxa has been the subject of numerous books and papers. Gingerich *et al.* '82 and Conroy '87 have used literature-based body weights regressed on dental measures to provide estimates of weight in a variety of primate groups, and other workers have used these in secondary analyses. For example, Dunbar '92 argued that *Dinopithecus* and *Gorgopithecus* must have been closely related to *Theropithecus* because their estimated weight was too large to allow a *Papio*-like feeding adaptation, even though this contradicted their dental morphology; in fact, the weight estimates seem far too high. In order to better address such questions, we regressed humeral and femoral lengths and midshaft diameters on weights from the same 174 individual cercopithecids in log space, using the methodology reported by Terranova *et al.* (abstract below). These measures were employed on the assumption that weight-bearing structures were most likely to directly reflect body weights.

Among the results obtained are estimates for: *Paracolobus chemeroni*, *Cercopithecoides cf. williamsi, Mesopithecus pentelicus, Dolichopithecus ruscinensis, Paradolichopithecus arvernensis, Macaca majori, Macaca ?sylvanus pliocena, Theropithecus brumpti*, *T. oswaldi darti*, *T. o. oswaldi* and *T. o. leakeyi.* Despite the precise methodology and testing employed, estimates based on different dimensions varied up to 50% within single samples. Nonetheless, best-case values are probably reliable within 20% for species mean weights by sex. Future comparisons with dental and cranial estimates based on published weights for modern taxa will allow determination of such adaptations as relative micro- or macrodonty.

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Body weight estimation of extant cercopithecids.
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Estimating the body weight of extinct taxa is an important first step in exploring aspects of their biology. Lately, estimation exercises have become common in the literature. Previous studies, however, have not been based on samples composed entirely of skeletons with associated body weights. As such, it is impossible to fully determine the accuracy of the estimates. Here we report the results of an investigation of the accuracy and precision of humeral and femoral dimensions in estimating the weight of extant ceropithecids.

Humeral and femoral lengths, anteroposterior (ap) and transverse (tr) shaft diameters were measured on a sample of 174 cercopithecids for which body weights were available. The total sample is split into two portions: one for model construction and one for model validation. Two units of analysis are presented: individuals and species means, each is further divided by sex and subfamily. Prediction is based on OLS regression of natural logarithm transformed weights (y) and skeletal dimensions (x). Estimates, in grams, are corrected for transformation bias using the quasi maximum likelihood estimator. Models characterized by high correlations, low standard errors of the estimate, small mean prediciton errors (MPE) and ranges, and a high percentage of estimates close to the actual weight are identified as useful to estimate the weights of fossil cercopithecids (see Delson et al. abstract, above).

For all subsets of the data correlations range between .80 and .98. When estimating weight in the validation sample, femoral tr and humeral length perform best (14% MPE), humeral and femoral ap perform well (18%MPE), while humeral tr and femur length are relatively poor predictors (21% MPE). This order of variables is found using a variety of characteristics of estimation models. Using all available data, the most accurate estimators are femoral midshaft dimensions, humeral length and ap, MPE's range from 14% to 18%. Femoral length and humeral tr models result in the largest standard errors and range of estimates. However, other patterns result when using models restricted by subfamily and sex. Models constructed of skeletal samples with associated body weights can be used to examine the precision and accuracy estimates

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