

taxa, *Callicebus* has a deeper, narrower mandible overall and more robust symphysis in cross section than *Aotus*. *Callicebus torquatus* best exemplifies this pattern, and has been reported to consume more seeds than other species of *Callicebus*, or than *Aotus*. Though lacking the specialized anterior dentition of pitheciine seed predators, *C. torquatus* jaw shape is suggestive of adaptation for eccentrically loaded, powerful unilateral biting. Thus, they may offer a useful model for understanding the evolution and diversity of sclerocarpic foraging strategies and the emergence of the more highly modified pitheciine seed predators.

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**92. Drifting osteons seem unlikely to be a mechanical adaptation in view of inconsistent regional distributions and overall low prevalence in adult chimpanzee and human femora.**

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Drifting osteons (DOs) are common osteon variants that might have important mechanical or metabolic functions. As shown previously, DOs are more prevalent in "tension" cortices of chimpanzee proximal femora, but did not exceed 11% of the total osteon population density (OPD) (Keenan et al. 2010 AAPA). Based on this previous study, we expected an increased prevalence of DOs in "tension" cortical regions as an adaptation for the inferior mechanical properties in tension compared to compression. Twenty-four sections from 12 modern adult human proximal femoral shafts were embedded in methacrylate, ultramilled, and imaged in circularly polarized light. DOs were identified/counted using published methods, and percentages of DOs (%DOs = #DOs/OPD) were obtained for each image. Unexpectedly, more DOs were found in the medial "compression" cortex of the proximal shaft ( $p < 0.05$ ). The relatively small %DOs ( $4.04\% \pm 4.39\%$ ; range:  $0\% - 27.1\%$ ) is similar to our findings in chimpanzee femora. But the regional differences in human femora are opposite to our previous findings in chimpanzee femora (human femora = more DOs in medial "compression" cortex; chimpanzee femora = more DOs in lateral "tension" cortex). These results reduce the likelihood that drifting osteons are an important toughening mechanism, at least not in the context of regionally prevalent/predominant tension vs. compression. If there is a preferential mechanical or metabolic 'purpose' for DOs, then it has not been discovered. It may be that DOs are sporadic manifestations of the plasticity of a remodeling process and as such have little metabolic or mechanical functions in adult osteonal bone.

**C-peptide and the cost of reproduction in Bornean orangutans.**

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In energy-limited environments, life history theory posits a trade-off between reproduction and maintenance of physiological condition. However, obtaining a measurement of this trade-off is challenging. C-peptide, a product of the conversion of pro-insulin to insulin, has been shown to be a reliable indicator of energetic condition in wild apes. Here we use this tool to test hypotheses about the relative cost of reproduction in both male and female wild Bornean orangutans. Results come from over 2000 samples collected at Gunung Palung National Park, in West Kalimantan, Indonesia from 1994 through 2011. In females, we found highest C-peptide values in non-lactating, non-pregnant females, supporting our prediction that freed from the cost of reproduction females are able to maintain highly positive energetic status. Significantly lower C-peptide values were found in lactating females, supporting the prediction that this is the most energetically draining stage for females. This contributes to our understanding of why orangutans have such long inter-birth intervals as they may take many years to regain positive energetic status. Interestingly, pregnant females were able to maintain relatively high C-peptide levels. This may reflect a similar mechanism as found in humans, where women are able to add fat reserves during pregnancy to support the cost of lactation. In males we found that prime, flanged male orangutans exhibited the highest C-peptide levels, reflective of their good condition. In contrast, flanged past prime males, exhibiting deteriorated physical condition, had the lowest C-peptide values recorded. Unflanged males were able to maintain relatively neutral levels.

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**Human remains processing for skeletal collections using laboratory "burials."**

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Museums, laboratories, and law enforcement agencies curate the skeletons of contemporary humans for research, teaching, and medicolegal purposes. However, the process of rendering a human from body to bone can be challenging, especially when dedicated tracts of land are not available to allow remains to decompose naturally. Without burial, marrow fat can remain in bone and, over time, become destructive to bony tissues. Our experiments with non-toxic methods of maceration for long-term stable curation of twenty-eight human skeletons have yielded a process that involves mechanical tissue removal, serial hot water baths with enzymatic detergent, and laboratory "burials" – the placing of bones for three months in plastic tubs filled with dirt. This procedure derives from the observation that taphonomic burial processes naturally remove marrow fats from bone over time. While in soil, these

laboratory burials have no special temperature or humidity requirements, and are stored in a space where other anthropological cases are also stored, processed, and analyzed. Our process is relatively simple and inexpensive, which allows bones to be housed in perpetuity with minimal space requirements. This method can be useful for anthropologists developing museum collections as well as for forensic anthropologists, medical examiners, and coroners so they may maintain collections for forensic analysis and identification.

**Optimal trait scoring for age estimation.**

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The optimality of a trait scoring system for age estimation often is defined in terms of lower observer error, which explains, for example, preference for Demirjian et al.'s scoring system for dental formation over Moorrees et al.'s. But as Ed Harris (2007) points out in the AJPA, observer error studies for ordinal categorical traits will always find that decreasing the number of stages reduces the error level. We argue for testing the distributional assumption in "transition analysis" instead of using observer error studies to find optimality. We extend a previously described Lagrange multiplier goodness-of-fit test to consider all possible ways of collapsing ordered scores into smaller sets of stages, using Todd scores from 422 males in the Terry Anatomical Collection and from 495 females in either Terry or the Gilbert and McKern cast collection as an example. To enumerate all possible ways of collapsing stages, the problem is framed in terms of partitioning integers and forming permutations in light of possible ties. Looking at all 510 possible ways to collapse stages within males and females, we found that the probability of a revised system of Todd phases I, II, III, IV, V, VI and VII-X (combined) arising from a log normal transition model was 0.9962 for males and 0.7849 for females. In contrast, the scores from the original Todd ten-phase system and from the collapsed T2 six-stage system (Suchey and Katz 1986) yielded very poor goodness-of-fit statistics for both normal and log normal transition distributions.

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**A biochemical marker for scurvy in archaeological bones.**

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How is it possible to infer health from archaeological populations when only their bones remain? This much-debated osteological conundrum is well illustrated by scurvy. The disease must have been a common problem for past populations over-wintering on stored produce and particularly amongst the poor, yet the true scale of the problem is difficult to estimate. Despite extensive historical