analyze long-term data to determine which factors increased the likelihood that an individual disappeared in a Verreaux's sifaka (*Propithecus verreauxi*) population from Kirindy Mitea National Park of western Madagascar. Since the beginning of the study in 2006, 69 individuals in 9 social groups have been marked with collars. Individuals in 5 social groups have been censused monthly, and 4 groups have been the focus of behavioral observations. In an analysis of these individuals representing 233 lemur years, 38 individuals disappeared, including 5 confirmed deaths. Disappearances occurred at a rate of 0.16/lemur year, much lower than at the nearby Kirindy Forest sifaka population. In a mixed effects logistic regression model, group size and sex were significant predictors of whether an individual disappeared from the study population but age was not. Nearly half (47%) of the disappearances were infants and juveniles, who were unlikely to have dispersed. Infant mortality (32%) was unrelated to mother's rank and substantially lower than the Beza-Mahafaly sifaka population but similar to the Kirindy Forest population. These differences between sifaka populations are probably the result of variation in habitat and population density. These results showing an effect of group size and sex but not rank on the probability of disappearance fit expectations for folivorous primates with male-biased dispersal according to socioecological models.

**What is the role of geometric morphometrics in testing functional hypotheses? A case study using 3D pelvic shape .**

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The pelvic girdle is a complex structure with critical roles in locomotion and obstetrics, and efforts to model these mechanical effects on its shape remain difficult because it is not amenable to structural simplification. While geometric morphometric (GM) analysis yields important information regarding changes in shape among groups, its utility in testing biomechanical hypotheses has been questioned. This study evaluates the contributions of both univariate and GM methods to testing hypotheses relating pelvic form to locomotor function.

Three-dimensional landmarks were collected on a phylogenetically-broad pelvic sample of 787 individuals from 40 primate taxa. Linear interlandmark distances were calculated to facilitate testing of biomechanical hypotheses, and a principal components (PC) analysis was performed on Procrustes coordinates. Both linear dimensions and PC scores were subjected to phylogenetic ANOVA by locomotor group. Many of the hypotheses relating linear dimensions to locomotor loading mechanics were rejected, but lower ilium cross-sectional area varies as predicted among groups (F=17.28, $p<0.001$), demonstrating an adaptive signal. Shape analyses support the univariate results, with significant differences evident along the first five PCs separating vertical clingers and leapers from arboreal and terrestrial quadrupeds

(all $p<0.05$). While both analytical approaches suggest that ilium dimensions differ among locomotor groups, the GM analysis also suggests that ischiopubic shape differentiates groups. Although GM provides additional quantitative results beyond the univariate analyses, it cannot replace all tests of specific, directional hypotheses of pelvic biomechanics and adaptation; it would be prudent to use both approaches concurrently until more targeted GM hypothesis-testing methods are developed.

**Using admixture mapping to identify genetic linkages with variation in human facial shape.**

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Using a dataset of 594 individuals from three populations with genetic ancestry contributions primarily from European and West African parental populations, we tested 72 SNPs in 45 selection-nominated candidate genes that are known to be involved in Mendelian craniofacial dysmorphologies as well as 68 ancestry informative markers with no known involvement with craniofacial variation for association with normal variation in facial shape. A dense mesh of over 7,000 high-density landmarks was placed on three-dimensional images of adult faces taken with the 3dMDface imaging system. Principal Component (PC) scores were then calculated as a representation of normal morphological variation across the surface of a face. A subset of the top PCs that showed significant associations with West African genetic ancestry was selected for the association study.

The program ADMIXMAP was used to test for admixture linkages between these 140 SNPs and facial shape variation. Sex, height, weight and BMI were included as covariates to control for the effects of body size on face shape morphology. After applying a correction for multiple testing, four SNPs were found to be significantly associated with facial variation. Two of these SNPs were located in craniofacial candidate genes, suggesting a role for these genes in determining normal facial variation. Interestingly, two of the AIMs, which are not located in candidate genes, were also significant. This suggests that these SNPs may be in admixture linkage disequilibrium with variants in the region that may have a previously unknown role with craniofacial variation.

**The relationship between clinical markers of frailty and measured physical activity using accelerometers: Results of a SAGE sub-study among older adults in India.**

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Frailty is common in old age and increases risks of adverse health outcomes. However, few studies have examined frailty across countries, and even fewer have evaluated the relationship between markers of frailty and measured physical activity among older adults in non-Western settings. The present study examines associations between measured activity (total daily energy expenditure [TDEE], physical activity level [PAL], activity counts [AC], activity energy expenditure [AEE]) and clinical markers of frailty (grip strength, self-reported exhaustion, timed walking speed) among 200 older adults in urban India as part of a sub-study of the World Health Organization's Study on global AGEing and adult health (SAGE). Participants wore ActiGraph GT3X accelerometers for seven consecutive days, combined with pre- and post-health interviews.

Results indicate that men had higher TDEE levels than women (P < 0.001). Self-report exhaustion differed significantly by sex (P = 0.001), with 87.3% of men and 66.1% of women reporting none/mild exhaustion whereas 12.7% of men and 33.9% of women reported moderate/severe exhaustion. For men, grip strength was positively correlated with TDEE, PAL, and AEE (P < 0.05). For women, all physical activity measures were positively correlated with grip strength (P < 0.01), while average walking time was negatively associated with all activity measures (P < 0.001). This study illustrates the utility of using accelerometry to examine the relationship between measured physical activity and factors associated with frailty in aging populations. This area of research provides an opportunity to target modifiable risk factors for frailty with increasing age and chronic diseases.

**Native American genetic diversity before and after European colonization: Evolution, pathogens, and the environments of the Americas.**

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