estimates are low, supporting the null hypothesis. These results are important because they show that although a trait may be highly heritable, it is not necessarily highly evolvable. Additionally, these results will significantly aid in the interpretation of the evolutionary change of LPs in humans and other primates.

Building a GIS geodatabase to aid in black howler monkey (*Alouatta pigra*) conservation management strategies.

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GIS geodatabases can inform primate conservation management by organizing data regarding vulnerable, endangered, and critically endangered species. One such endangered species is the black howler monkey (*Alouatta pigra*). To assess black howler monkey demographic patterns, I compiled and adjusted available data from 19 research sites throughout the species' range (Van Belle and Estrada 2006). For each site, I used ArcGIS to associate statistics for population density, group size, adult male to female ratio, and immature to adult female ratio with spatial reference points. To integrate demography with ecology, I added categorical data layers for degree of habitat protection, elevation, Normalized Difference Vegetation Index (NDVI), proximity to water resources, and proximity to roads. I placed a 5, 10, and 20 km buffer around each site reference point to assess ecological constraints. For each variable, I extracted parameters for species viability and combined them with known parameters (Luecke 2004) as a proxy to generate two best fit polygons. These polygons model the most operable corridors for *A. pigra* landscape conservation efforts without isolating breeding populations. In terms of demography, immature to adult female ratio and population density were the most important in corridor modeling. In terms of ecological variables, NDVI, elevation, and degree of formal habitat protection were the most limiting. The resulting model can be continuously adapted and expanded with the changing ecological, social, and economic data that make conservation strategies so complex. More importantly, such a model can be used as a tool to manage declining primate species worldwide.

How well does endocranial morphology predict behavioral differences in primates?

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Fossil endocranial surfaces provide the most direct evidence of brain evolution, yet they reflect only a fraction of the actual variation in brain anatomy. Ultimately, the goal is to make assessments of the behavioral implications of variation in endocranial form. Broca's cap appears to be larger on the surface of the left endocranial hemisphere in hominins, which is suggestive of elaboration in brain function relevant to language. While brain size has been shown to be significantly associated with both group size and vocalization repertoire size in primates, direct studies of endocranial morphology and behavior has not been attempted. We used non-rigid deformation techniques to quantify localized variation in endocranial morphology across 13 primate specimens using CT scans from the Open Research Scan Archive. Behavioral data for group size and vocalization repertoire size were extracted from the literature. Correlations were calculated between behavioral variables and the degree of localized distortion required to morph each species' endocranial form into a common atlas (*Pan troglodytes*). Maps of the endocranial surface illustrating these correlations on a voxel-by-voxel basis suggest that vocal repertoire size is associated with variation in Broca's cap, superior and dorsal lateral prefrontal, orbital frontal and anterior cerebellar areas. Group size correlations were less obvious and localized in orbital frontal and the anterior temporal regions. These results suggest vocal repertoire size and group size may leave signals on the endocranial surface; furthermore, suggestive associations around Broca's cap may have implications for the relationship between non-human primate vocal behavior and language.

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Changing gender roles in prehistoric America: physical activity with the transition to agriculture in the Midwest.

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Changes in physical activity and dietary indicators are the best ways that biological anthropologists have to assess changes in agriculture. In the prehistoric Midwest, dietary indicators have demonstrated that maize consumption becomes measurable during the Late Woodland trait complex. However, it is not until the Mississippian trait complex that people become truly dependent on maize agriculture. The physical activity changes that occur during this time seem much more complex. For this study, physical activity was measured through long bone measurements and osteoarthritis classification. These data suggest that upper body activity decreased with the transition to agriculture. The analyses are consistent with previous literature, which interprets these results as indicative of better food processing techniques. Increased activity, however, was seen in the femora and may thus suggest increased weight-bearing activities with dependence on agriculture.

Additional results indicated that during the Middle and Late Woodland complexes, male and female activity patterns ran parallel. However, during the Mississippian trait complex, a significant increase in osteoarthritis scores in the weight-bearing bones of females was found while males' scores during this period decreased. This trend suggests a change in the social division of labor with the transition to agriculture that has not previously been reported.

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COMP gene related malformations of the skull: evidence from Egyptian V-VIth dynasty skeletal remains.

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Osteochondrodystrophies are a class of skeletal deformities resulting from specific genetic mutations. Abnormal COMP and FGFR3 gene expression impacts cartilage ontogeny, resulting in multiple epiphyseal dysplasia/pseudoachondroplasia and achondroplasia (respectively). Impacts of FGFR3 mutations on cranial cartilages are known, whereas there is little understanding of abnormal COMP expression in cranial development. We investigate the impact of a COMP mutation on skull development and compare it to FGFR3 changes.

Archaeologically derived individuals expressing COMP and FGFR3 characteristics (n=3) were examined. Our normal sample comprises both sexes and representatives of similar populations (n=45). We made a series of metric measurements for skull comparisons. We also evaluated the skulls against condition-specific nonmetric features compiled from the literature.

COMP individual have an enlarged cranial circumference but normal cranial length/breadth. They also have a slightly enlarged frontal breadth, possibly related to the enlarged circumference. FGFR3 expression in the cranium shows a different pattern, with increases in the cranial breadth/length but not in the circumference. FGFR3 and COMP mutations are also expressed differentially in the cranial base.

Mutations in COMP have been considered to have no or only minor impacts on skull development. Here we document cranial modifications of the nasal capsule-parachortal plate that we believe are related to mutation of the COMP gene. In later development, these basicranial changes result in a modified cranial shape that is similar to, but different from, that occurring in FGFR3 mutations. We suggest that COMP gene expression in late fetal stages may result in this unique suite of cranial modifications.

First insight into the relationship between upper-limb musculoskeletal markers, cross-sectional properties and diaphyseal contour shape.