weight gain or diabetes, conditions known to alter lifelong growth. This is one example of the many ways that the impacts of environmental and developmental variation on gene expression can be evaluated on a genome-wide scale in captive non-human primates.

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Hand and foot postures and loading patterns in monkeys and apes: implications for cheiridial design

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It is widely assumed that cheiridial morphology and posture reflects locomotor loading, but this relationship is rarely tested. Here we describe cheiridial posture as it relates to force distribution using two species—baboons and gorillas—that, unlike many other primates, have forelimb/hindlimb vertical peak (Vpk) force ratios that are close to or equal to one. We collected force and video data on juvenile and adult *Papio anubis* at Stony Brook University (n=2) and Duke University (n=1) and juvenile and adult *Gorilla gorilla* at the North Carolina Zoo (n=7). In both species, forelimb/hindlimb Vpk increases with age (get closer to one) and the elbow and wrist show limited yield compared to other primates. Results show that depending on palm position, young gorillas land with a more flexed or deviated wrist and a more protracted arm compared to adult gorillas, which almost exclusively use extended, knuckle-walking postures and retracted forelimbs. Similarly, juvenile baboons use a more flexed wrist and elbow than adult baboons. The use of a vertical manus appears to moderate hand and wrist joint moments when forelimb forces are relatively high. In the hindlimb, throughout ontogeny, gorillasadopt an extended and non-yielding knee and ankle and heel-strike plantigrady while baboons adopt a semiplantigrade posture, both of which can moderate ankle moments in the first half of stance. Adjusting cheiridial mechanics, especially in the forelimb, a pattern reported in other studies, seem to reflect locomotor loading and may be used to better understand form-function relationships in living and extinct species.

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Putting Neanderthal endocranial form into modern context: Comparing Neanderthal vs. modern human differences with respect to differences *among* modern human populations

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Although Neanderthal endocrania are not smaller than those of modern humans on average, they are generally longer (anterior-posteriorly) relative to their height (inferior-superiorly), and tend to have a pronounced occipital protuberance. These differences have long been used to suggest Neanderthals might have differed significantly behaviorally from modern humans, such as possibly having less linguistic ability, poorer executive function, and/or smaller episodic and working memory capacity. However, the extent to which these morphological differences are actually large enough to merit meaningful behavioral implications is not clear. To put them into the context of known populational variation in human brain shape, we have compared shape differences between Neanderthal (specifically: LaChappelle, LaFerrassie, LaQuina 5, and Saccopastore 1) vs. modern human endocrania, to shape differences between a standard modern human brain atlas based on American and European subjects (MNI152) vs. one based on 2020 modern Chinese subjects (CHINESE2020). Morphological registration and quantification of localized shape differences was accomplished using Advanced Normalization Tools (ANTs). We find that on average the morphological differences are only slightly greater than that found between the MNI152 and CHINESE2020 atlases. Specifically, the average (root mean squared) Jacobian scaling difference for Neanderthal vs. modern human voxels was 16%, whereas the equivalent for the MINI152 vs. CHINESE2020 was 13%. Given the lack of clear cognitive differences between Chinese and American/European populations, this calls into question the suggestion of significant cognitive differences between Neanderthal and modern humans. The extent to which surface morphology may hide internal morphology will be evaluated.

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Morphological rates of evolution in the *Phenacolemur praecox - Phenacolemur fortior* and *Phenacolemur praecox - Phenacolemur citatus* lineages in the Bighorn Basin, Wyoming

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The plesiadapiform primate, *Phenacolemur fortior,* is hypothesized to have evolved from *Phenacolemur* praecox in the Bighorn Basin, Wyoming, through rapid sympatric speciation, with intermediate stages known stratigraphically between the two species. This evolutionary transition occurred during a faunal turnover event (Biohorizon A) in the Bighorn Basin. *P. fortior* went extinct and was replaced by *P. citatus* before a second faunal turnover event (Biohorizon B). An ancestor-descendant relationship between *P. praecox* and *P. citatus* has been proposed based on similar morphology and size, suggesting that *P. citatus* arose by allopatric speciation. This study tests whether neutral evolution can explain morphological evolution observed during and between each speciation event. We calculate a rate of morphological evolution, based on the ratio between inter- and intra-species variation in height and protoconid height of p4 and length and width of p4, m1, m2, and m3, between early and late individuals of *P. praecox*, *P. fortior*, and *P. citatus* and over both lineages. Results show that changes in height and protoconid height of p4 and lengths and widths of all cheek teeth within and between species are consistent with strong stabilizing selection (rate <0.000001). Moreover, there is evidence of a release of the selective pressure (rate >0.000001) in both lineages associated with the biohorizons, which resulted in increased rates of morphological change for these tooth dimensions. This suggests that changes resulting in species-level divergence can occur under a process of relaxed stabilizing selection and highlights the importance of the biohorizons for their disruptive effects.

Strontium isotope variability (^{87}Sr /^{86}Sr) in the ancient Nile Valley (Egypt and Nubia): Establishing baseline data and tracking human mobility

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Previous research of (^{87}Sr /^{86}Sr) in the ancient Nile Valley has provided compelling evidence for population movement through time. The estimation of local values, based on faunal sampling, has been established at several sites, providing a better