Great ape thorax and shoulder – adapted for arboreality or knuckle-walking?

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Great apes possess a constricted upper thorax and cranially positioned scapula, which have long been related to adaptations for arboreality. Recently, it has been proposed that these morphologies are adaptations for knuckle-walking in apes with dorsally positioned scapulae. Under this hypothesis, it is assumed that knuckle-walking entails high amounts of scapular cranial translation and protraction, and large impact transient forces at touchdown that entail an altered position (and potentially function) of *m. serratus anterior*. Here we test these predictions using kinematic, kinetic, and electromyographic (EMG) data from chimpanzees walking quadrupedally and vertically climbing, with comparisons to similar data in quadrupedal monkeys.

Chimpanzee data (n = 2 subjects) were recorded using a four-camera Xcitex motion capture system and four AMTI force plates, and EMG data for the cranial *m. serratus anterior* were collected via indwelling electrodes.

Contrary to the predictions outlined above, we found that the scapula is consistently more cranially positioned (relative to the vertebral column) during vertical climbing (5.1 ± 2.1 cm) compared to quadrupedalism (0.2 ± 1.3 cm; n = 10 strides per gait). Muscle activity in serratus anterior was no different than quadrupedal activity in other primates. Further, relative to body mass (BM), peak ground reaction force loading rates were similar, or slightly lower, in chimpanzees than in quadrupedal rhesus macaques (6.9 ± 2.2 BM/s versus 19.7 ± 5.4 BM/s). Together these results show little-to-no support for the hypothesis that upper thorax and scapular configuration are specifically linked to the mechanics of knuckle-walking.

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Handedness-related asymmetries in modern human brains: implications for paleoneurology

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Handedness has long been a topic of interest in paleoanthropology due to its unique distribution in the hominin lineage and its association with other behaviors, such as tool making and language. Research into the origins and evolution of right-hand predominance include work on skeletal asymmetry, evidence in lithics, and evidence from endocasts. We assessed handedness-related asymmetry in modern human brains using anatomical MRI scans of 42 subjects (21 strong left-handers; 21 strong right-handers, matched for age and sex) from the Human Connectome Project.

To compare overall structural differences in the brain, a "template brain" was first created using non-rigid morphing techniques (Advanced Normalization Tools software). This represents the average brain morhpology for the study sample. Voxel-wise scaling coefficients (Jacobians) were then calculated. These describe the localized size differences between each subject and the template. T-tests were then performed on the log Jacobians at each voxel, assessing the differences between left- and right-handers' brains. Correlations between Jacobians and Edinburgh Handedness Inventory scores were also calculated at each voxel. The resulting global statistical maps highlight differences in anatomy between left- and right-handers. Although these values did not survive conservative FDR correction, the areas which differ most between left- and right-handers in this sample are in expected brain regions, including the hand motor cortex, language- and tool-associated areas, and regions associated with petalias.

Our results provide additional incentives for researchers to continue exploring methodologies for identifying handedness in the fossil record, and have implications for assessing individual handedness from preserved endocasts as well.

Y-Chromosome Introgression: An Analysis of Spermatogenesis Genes Between *Macaca mulatta* and *Macaca fascicularis*

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Macaque monkeys live in multimale-multifemale social groups with males exhibiting some of the largest testis:body weight ratios among primates. As such, they are believed to experience intense levels of sperm competition. Several spermatogenesis genes are located on the Y-chromosome and, interestingly, occasional hybridization has led to the introgression of the rhesus macaque (*Macaca mulatta*) Y-chromosome deep into the range of the cynomolgus macaque (*Macaca fascicularis*). These observations have led to the hypothesis that the successful introgression of the rhesus Y-haplotype is due to selectively advantageous functional differences in sperm genes compared to those of the native cynomolgus Y-haplotype. The hypothesis is examined here at four Y-chromosomal genes: *RBMY*, *XKRY*, and two copies of *CDY*. The genes were surveyed in representative animals from north of, south of, and within the rhesus-cynomolgus introgression zone. Amino acid differences were uncovered in some genes; however, the McDonald-Kreitman test did not detect a definite signal of positive selection. Yet, because these amino acid differences yield distinct protein-folding predicted structures, they may indeed present selective advantages to the rhesus Y-haplotype. Implications of these results are discussed, as are directions for future study.

Comparison of callitrichid limb bone properties to those of cheirogaleids and arboreal sciurids

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Callitrichid limb bone biomechanical properties are compared to those of cheirogaleids and arboreal sciurids to explore whether callitrichid claws result in greater similarity to sciurids than to cheirogaleids. It was expected that the ability of callitrichids and sciurids to cling to large surfaces and jump to noncompliant supports would result in thicker bone cortices. Results partially support expectations.

Limb bone properties analyzed include humeral and femoral midshaft cortical areas and lengths obtained from X-rays. Log-transformed species averages for these properties and body mass were calculated and regressed on each other. ANCOVA was used to compare slopes and elevations of these regressions. Additional comparisons between sciurids and an *Aotus*/*Saimiri* data set were performed. Keel-nailed cheirogaleid *Phaner furcifer* was kept separate.

Results indicate sciurids are greater in humeral cortical area relative to body mass than cheirogaleids. Callitrichids plot in between the other groups, and don't differ significantly from either. For humeral cortical area relative to femoral cortical area, sciurid and callitrichid regressions lie on top of each other, and differ significantly from cheirogaleids and the *Aotus*/*Saimiri* sample. Comparisons of femoral cortical area regressed on body mass show no differences.

From these results, callitrichids appear to have thicker humeral cortices than expected for primates, somewhat like sciurids. This may be caused by clinging to trunks with claws and large landing impacts. Femoral cortical area may be similar for all groups because all are adept jumpers. Adding more callitrichid species may clarify results as this group is behaviorally variable.

Facial fluctuating asymmetry as a marker of cumulative health burden in women

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This study assesses the relationship between facial fluctuating asymmetry and allostatic