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Preliminary analysis of tamarin trabecular bone structure suggests a correlation with leaping distance

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Primate locomotor diversity is enabled by specific functional adaptations, epitomized by distinctive limb bone traits. A link between primate long bone anatomy and locomotion has been identified at various anatomical levels - e.g. external shape, diaphyseal and epiphyseal internal structure. The latter, characterized by trabecular bone, has yielded evidence of relationships with locomotor loadings. However, it remains strikingly underexplored in South American monkeys. We examined the humeral and tibial trabecular structure in four tamarin species that, while generally sharing the locomotor repertoire, differ in leaping specialization, i.e., long-distance vs. short-distance leaping. The former, involving greater loadings due to more energetically demanding take-off and landing, were expected to show a distinctive trabecular configuration. Using CT scans and a whole-epiphysis approach, we quantified trabecular properties on cancellous topological skeletons: node density, tortuosity, thickness, length, and fractal dimension. Our results substantiated some of our expectations: long-distance leapers exhibit higher trabecular node density and tortuosity, and lower fractal dimension values, aligning with hypothesized functional trends, i.e. denser and more tortuous trabecular networks, with a lower fractal dimension, may be structurally able to support greater loadings. Trabecular thickness and length, did not, however, discriminate species with different leaping capacities. Despite the preliminary nature of this work – due to relatively low sample size – these outcomes suggest that leaping distance may be associated with distinct adaptations in tamarin trabecular architecture, hence encouraging future investigations. Notably, such variation was not detected in tamarin long bone structure studied through Volumes of Interest. Hence, a whole-epiphysis analytical approach may better capture subtle interspecific differences in loading history and locomotor behavior.

Comparative Genomic hybridization (CGH) and satellite DNA pattern into representative species genomes from Cebidae and Atelidae (Platyrrhini)

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Heterochromatin sequences, also known as satellite DNA and consist of tandemly arranged repeats, at first seen as serving no useful purpose and known as the dark matter of the genome are recently evaluated showing different role and function. The intraspecies and interspecies Comparative Genomic Hybridization (CGH) between representative species of platyrrhini species, *Saimiri infilatus, Aotus trivirgatus*, (Cebidae) *Ateles paniscus chameck, A. fusciceps* (Atelidae) was performed to determines balanced and unbalanced repetitive DNA sequence distribution and reveals their dynamics during evolution. Platyrrhines species present a very high level of chromosome rearrangements, thus are a good model to studies genomic dynamics.
The CGH was performed mapping by Fluorescence *in situ* hybridization (FISH) total DNA from two individual animals labeled with two different fluorescent dyes on a target metaphase, which can be from the same species or from a different species. This approach permitted to obtain signals at centromeric positions, at telomeric position and with an interstitial distribution. The present work extends the previous Cross-species CGH study and results were compared with CGH repetitive DNA distribution previously found in other Cebinae species such as capuchin monkeys (*Cebus capucinus, Sapajus apella*), and the tamarins (*Saguinus mystax, Leontocebus fuscicollis*). The comparative study permitted to analyze repetitive sequences distribution from an evolutionary perspective to elucidate their genomic dynamics at the level of chromosomal organization. It has demonstrated genus-specific pattern of repetitive sequences while during evolution these sequences were differently organized among different genera possibly through a variety of mechanisms; in particular, re-arrangements, amplification and concerted evolution. Furthermore, some of these sequences could be seen as symplesiomorphies, and other sequences can be shared derived synapomorphies or can be automorphisms sequences. This study demonstrated repetitive sequences as useful markerers at phylogenetic level and for conservative purpose.

Tracing oral and skeletal pathologies in Wild Nonhuman Primates: A Study of Colonial-Era Specimens from Lisbon's National Museum of Natural History and Science

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Nonhuman primates experience illness and injury in the wild. There is considerable variability in how pathologies affect various primate groups, often linked to their diet and behavior. Injuries can also impact survival in the wild, with the timing of their occurrence in the life cycle being crucial for an individual's survival and overall fitness. Such injuries are likely more fatal in adults than in juveniles. During a review of the nonhuman primate collection at the National Museum of Natural History and Science in Lisbon—comprising specimens collected in the 1940s and 1950s from the former Portuguese colonies in Africa (Mozambique, Guinea-Bissau, São Tomé and Príncipe, and Angola)—we examined the presence of dental and skeletal pathologies. Our methods included macroscopic observation and X-ray examinations of the most noteworthy cases. We identified oral and skeletal pathologies—including carious lesions, apical lesions, dental enamel hypoplasias, periodontal disease, calculus, enamel wear, dental fractures, *cribra orbitalia*, bone fractures, and osteomyelitis—in approximately 20% of the 151 individuals studied. Among the most notable cases were two individuals. Case 1 - an adult female *Papio papio* from Guinea-Bissau showed extensive dental wear on both the mandible and maxilla, with numerous carious lesions, apical lesions, and alveolar bone osteolysis caused by penetrating caries. Case 2 - an adult male *Papio ursinus* from Mozambique with an exuberant osteomyelitis and a bony callus (approximately 7 cm wide) formed around the fused broken bone segments. The affected femur is shortened by nearly one-third. This likely caused the individual to walk using three limbs. The same leg also had a more recent, unhealed fracture of the tibia and fibula, which had led to additional infection. Despite these severe conditions, both individuals had reached adulthood and showed signs of overall health in the rest of their skeletal remains, suggesting that they were able to survive and function in the wild. These cases illustrate that, even with compromised health and chronic infections, some individuals can survive for extended periods in natural environments. While oral health directly affects longevity in free-ranging mammals, recent literature also suggests that bone fracture recovery in wild primates is less common than previously believed.