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mammalian species including rodents, marsupials, and primates. We predict that, within and among taxonomic groups, saltatory species have greater cortical bone strength properties compared to quadrupeds. Using micro-CT scans of the femur and tibia, we calculated estimates of bending strength (Z_p), torsional strength (J), compressive strength (cortical area), and cortical bone distribution (I_{max}/I_{min}) at diaphyseal midshaft. CSP were scaled, log-transformed, and compared between saltatory and quadrupedal taxa 1) within and among mammalian groups and 2) within and among bone using ANOVA. Relationships among body size, CSP, and locomotion were explored using generalized linear models. Some, but not all, of our predictions were supported. For example, contrary to predictions, for some CSP (e.g., scaled femoral cortical area and J), quadrupeds exhibit significantly larger values than saltators. Body size is consistently a significant effect on scaled CSP in linear models. Our results suggest that both within and among Orders, body size may have a greater influence on CSP than locomotor mode.

Title: 23-5: Lessons from really big fish : integrating incomplete data in parametric modelling of coherent skeletal model

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Basking sharks filter-feed by widely opening their mouths and gill slits, causing gill arch cartilages and associated gill rakers to change positions and shapes. This, however, is hard to capture using conventional video or tomography methods, due to these animals' size, elusiveness, and CITES-status and the rarity of well-preserved specimens.

To overcome these extreme challenges to anatomy and physiology study of basking shark feeding and reconstruct coherent 3D skeletal models, we split the problem into three levels, integrating digital design and computer imaging approaches: generation of a simplified line scaffold, meshing of cartilages, and setting of parametric variables to accommodate assumptions.

The feeding apparatus was segmented from CT scans of intact shark heads using Amira-Avizo and abstracted by a set of points, polylines and curves (representing skeletal joints, medial cartilage axes and rakers roots, respectively).

3d models of open mouths were generated from diver videos using photogrammetry. Silhouettes of open arches and rakers were rebuilt into a second set of points and curves approximating feeding position. CT data were converted to mesh and parametrically mapped onto medial curves and joint points were moved from resting- to feeding-landmark locations, creating a 'digital

puppet' to capture the dynamic process of feeding and estimate anatomical movements of cartilages and rakers.

These results demonstrate the power of integrative and interdisciplinary approaches for the study of large and elusive wildlife.

Title: P1-13: Morphological diversity and functional adaptations of the non-avian maniraptoran manual claws and indication of their ecological niche shifts

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Maniraptora means 'hand snatchers', but the hands of maniraptorans in fact had various functions beyond grasping and diverse morphologies. We choose through ungual to investigate morphological specialisation and functional evolution in maniraptoran hands. Main reasons include the unguals exhibit the most distinctive morphologies among all manus elements, the unguals are located at the end of the forelimb mechanical systems, and therefore bear high stress in applications. By implementing the newly developed method of Deakin et al. (2021), we generated theoretical morphologies and build the functional performance surface and the adaptive landscape based on 274 manual claw shapes from 130 maniraptorans. We measured mechanical advantages (MA) and radiational efficiency (RE) to indicate the speed of claws, and simulate von Mises stress (VMS) distribution by finite element analyses (FEA) to represent the strength of claws during piercing, scratch-digging, and scooping. The speed and strength of claws formed a trade-off. To evaluate the pleiomorphic digging, scooping and capturing prey ability, we calculated the Pareto optimality of the trade-off based on the MA, RE and different VMS. Phylomorpho-functional spaces were generated to explore the morphological diversity via functional adaptations across maniraptoran phylogeny. Our findings support several independent grasping function losing events in Mesozoic maniraptorans, some may cause by degradation of forelimbs, while some adapted other functions like digging. Grasping abilities also re-emerged in some lineages, e.g., the late-branching dromaeosaurids.

Title: 12-3: Characteristics of Obstructive Sleep Apnea in Obese Minipigs

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Four obese and three non-obese minipigs(8.5-months to 6.5-years). The approaches included: 1) Sleep monitoring to identify OSA during natural/sedated sleep; 2) Sonometric technique to quantify 3D respiratory deformational changes of the tongue base(TB) and soft palate(SF); 3) Fat-weighted MRI and ultrasound elastography(EUS) to calculate fat deposition and tissue strain in TB, SF, and pharyngeal wall; 4) Sleep videofluoroscopy(SVF) to trace respiratory movements of SF and TB; 5) MRI to quantify pharyngeal spaces, and computational flow dynamic(CFD) to