phology. Height, width, and tooth angle of suture teeth in pleural bone samples was characterized. Data indicate that there is considerable variation in suture morphology across ontogeny. Adult turtles display larger tooth angles and decreased tooth number when compared to smaller sized juvenile turtles. Additionally, the sutures responses to force were suprising given the high stiffness of this collagenous region. Size-related differences in these sutures likely have biomechanical implications that change throughout ontogeny but also inform of the potential evolutionary role of this structural design.

Functional models from limited data: parametric anatomy and 3D kinematics of basking shark feeding

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Basking sharks feed by gaping their mouths and gill slits, greatly reorienting their cranial skeletons to retain food from water. The 3D biomechanics of this behavior, however, are exceptionally difficult to study due to the size, elusiveness, and CITES-status of these animals and the rarity of well-preserved specimens. To overcome these challenges, we integrate anatomical, digital design and computer imaging approaches to reconstruct poseable 3D skeletal models of feeding basking sharks. The skeleton, segmented from CT-scans of intact heads, was abstracted as a bio-realistic rigging for guiding skeletal positioning in 3D space. Directed by anatomies of museum and dissected beached specimens, the digital scaffolding helped virtually correct skeletal distortions (e.g. from specimen collapse), resetting the skeleton to closed-mouth symmetry. Open-mouthed feeding postures were recreated by repositioning skeletal joints to biologically-relevant destination coordinates defined from videos of feeding sharks, exploiting the basking shark's undeviating feeding posture to build 3D photogrammetry models from successive video frames. The resultant "digital puppet" bridges diverse imaging data while capturing the coordinated motion of "hidden" cranial joints, deconstructing complex form-function relationships into computationally controllable parameters for exploring 3D skeletal movement. This biological fidelity gives insights into dynamic feeding processes impossible to observe in the laboratory and a platform for future kinematic modeling (e.g. of individual variation, other species), while demonstrating interdisciplinary approaches for studying large and elusive wildlife.

Proteomic insights into winner-loser effects: aggression, learning, and brain protein profiles

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Fighting experience significantly affects aggressive behavior and physiology, known as winner-loser effects, which are conserved from invertebrates to vertebrates, though the underlying mechanisms remain unclear. While much research has focused on how winning and losing alter aggression, growing evidence suggests these experiences also influence other behaviors, including learning. In mangrove rivulus fish (Kryptolebias marmoratus), winners become more aggressive and excel in spatial learning whereas losers show reduced aggression but improved risk-avoidance learning. This suggests that fighting experiences may shape various behaviors through key brain regions within the social decision-making network, particularly the dorsolateral pallium (Dl; homologous to the hippocampus) and dorsomedial pallium (Dm; homologous to the basolateral amygdala).

We examined whole-proteome expression in the forebrain (where Dl and Dm are located) of adult rivulus fish with winning or losing experiences. A total of 1,307 brain proteins were identified, with 23 showing significant differential expression between winners and losers. Losers' forebrain protein expression indicated modulation of cellular processes, recovery from energy deficits, and altered learning. In contrast, winners' protein profiles suggested restoration of neuroendocrine balance, energy utilization, neuronal plasticity, and distinct learning processes. These findings highlight functional differences in the brains of winners and losers, revealing potential mechanisms underlying the modulation of aggression and learning. Future genetic manipulation studies are needed to establish causality between specific protein expressions and behavior changes induced by experience.

Variation in nighttime thermal preference in diurnal lizards

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In many parts of the world nighttime temperatures are increasing faster than daytime temperatures. In comparison to rising daytime temperatures, however, assessing the impact of increasing nocturnal temperatures on ectothermic organisms has received relatively little attention. Previous studies in plants and invertebrates demonstrated contrasting physiological responses to warming in the day versus the night. Here we compare daytime and nighttime thermal preference