genetic lineage tracing data from chick and mouse, a scenario is emerging where the posterior gill arch skeleton of gnathostomes may have ancestrally received contributions from both neural crest and lateral plate mesoderm, implying Gegenbaur's serial homology hypothesis need not necessarily be rejected on the grounds of embryonic origin.

Some Details of the Green Frog's Skull Anatomy of the Genus *Pelophylax* (Anura, Ranidae)

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Despite the fact that frogs of the genus *Pelophylax* Fitzinger, 1843 are important for research on comparative anatomy of vertebrates, some details of skull anatomy of green frogs not previously described were found. At the base of the lateral branches of the nasal bones (nasale) we found sharp protrusions that are not described in the literature. They were called "spike-like" protrusions and could arise from retardation of ossification of the nasale. We showed that the maxillary bone (maxillare) in the upper jaw overlaps with the square-zygomatic bone (quadratojugale) for about 3mm. The quadratojugale is developed by ossification of the connective tissue ligament between the maxillare and the ossified lateral part of the square cartilage (pars quadrata palatoquadrati) or part of the square bone (quadratum). The quadratojugale is fused with part of the quadratum. We found that in green frogs a smaller part of the ligament that forms the quadratojugale is retained and connects the oral end of the quadratojugale to the medial side of the maxillare. Therefore, we can consider this ligament in green frogs to be homologous to the ligament between maxillare and quadratum in the upper jaw of Urodela, allowing to suggest a similar evolution of batrachian skulls. In the caudal part of the quadratojugale of green frogs, a flat process was found, that not described in other representatives of Anura and that we called "scaly". It has been found that in the lower jaw of green frogs the reduced dental bones (dentale) overlap by their rostral ends with the mento-mandibular bones (mento-mandibulare) and are fused with them. The details of the frog's skull anatomy of the genus *Pelophylax*, described here, may arise due to loss of bone, retardation to ossify, and fusion of the bone primordia. These details reflect simplification of structure as general evolutionary trajectory of batrachian skulls.

Functional Morphology of Trabecular Bone in the Lumbar Spine of Shrews (Mammalia: Soricidae)

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The nature of the form-function relationship varies across organisms, scales, and structures, and is especially difficult to understand for extreme or unique morphologies. Extra bony reinforcements have evolved in the lumbar spine of the shrew genus *Scutisorex*, but it is unclear what purpose these reinforcements serve. The extreme and unusual shape of *Scutisorex* lumbar vertebrae makes them difficult to compare with other shrews using conventional homology-based morphological analyses. To circumvent this problem, we used X-ray micro computed tomography (μCT) to analyze the internal structure of the vertebrae in a phylogenetically and ecologically broad sample of shrews (family Soricidae), including both currently known species of *Scutisorex*, which have different degrees of external vertebral modification. Internal trabecular bone architecture (TBA) correlates to *in vivo* bone loading, and is therefore informative about an animal's behavior, locomotion, and ecology. We used phylogenetic comparative methods and a variety of measurements collected on soricid TBA, including trabecular orientation and degree of anisotropy; bone volume fraction; and trabecular number, spacing, thickness, and connectivity; to test the following hypotheses: i) vertebral loading schemes vary across Soricidae according to locomotor type rather than size or phylogeny; and ii) a greater degree of external modification (within *Scutisorex*) corresponds to a vertebral column that is superior in bearing high *in vivo* loads. Because our sample includes one of the smallest known terrestrial mammals (*Suncus madagascariensis*), we also discuss the limitations of using TBA to investigate bone function in animals with extremely small vertebrae (maximum dimensions in the order of a few millimeters).

Exploring the Evolution of the Amniote Forelimb Musculature by Studying its Embryology

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In amniotes, cells from the dorsal portion of the somite, the dermomyotome, delaminate and migrate to invade the limb bud, in contrast to non-tetrapods in which at least some somitic extension takes place. Reaching the limb bud, these cells aggregate into a dorsal and ventral mass of pre-muscular cells. These two masses subdivide, forming smaller divisions that will eventually split into individualized recognizable muscles of the adult. The pattern of cleavage of the shoulder and arm muscles has been described only in a handful of species, representing urodeles, lizards, turtles, marsupials and birds. Since the time of these seminal investigations, the embryonic pattern of muscle development has been used sometimes as a tool for understanding homologies across amniotes, but we remain limited to the information provided by the few species investigated and the constraints of the available technologies at the times of these studies. Half a century later, we have a clearer picture of the phylogenetic relationships among clades and new tools for studying and visualizing developing anatomy. We studied the development of closely spaced embryonic series of different species of mammals, archosaurs, lizards and turtles, comprising most major groups of amniotes alive, and studied the embryology of forelimb muscles, along with the developing nerves and skeleton, by using fluorescent immunostaining and confocal microscopy. Our data reveals a sequence of early events and muscle division much more conserved across amniotes than previously described, also placing these early divisions in the context of the rest of the developing anatomy of the arm. We also tracked and followed the embryonic origin of each adult muscle, comparing it with their supposed homologues across different clades. Based on our results, we