# How to build a deep body: endoskeletal insights from *Chirodus granulosum*

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Deep bodies are a distinctive and repeated motif of actinopterygian fishes; no commensurate examples are known in outgroups. Six separate origins of deep-bodied fishes have been proposed in the Palaeozoic, yet large-scale phylogenetic analyses fail to resolve their affinities. This might be attributed to homoplasies associated with the fusiform to deep body transformation, including coordinated changes to the dermal bones, feeding apparatus, scales, and fins. While these external features may be confounding, endoskeletal anatomy could be a more reliable source of phylogenetic information. Despite the emergence of abundant and diverse actinopterygian taxa during the post-Hangenberg extinction recovery, the majority of published endoskeletal data are restricted to small, fusiform species. Here we present new endoskeletal anatomy of *Chirodus granulosum*, one of the earliest known deeply rhombic actinopterygians, and discuss alternative approaches to building a deep body. The specimen NMS 1894.73.472 reveals a nearly complete axial column, articulated pectoral fin, partial neurocranium, palate, and gill arches. Unlike Mesozoic or modern deep bodied fishes, *Chirodus* does not elongate the neural or haemal spines, has separate supraneurals, and lacks centra. The lack of fused or elongated vertebral ossifications is surprising given the structural demands of an extremely deep body. Dorsoventral stability may have been supplemented by cross-bracing with the thickened leading edge of dermal scale rows. The palatoquadrate supports large and distinctive toothplates, which combined with short gill bars lends support to the assignation of *Chirodus* as a durophage with limited suction facility. Details of the pectoral endoskeleton, including fin orientation, propterygial breadth, and number of radials, are associated with increased fin surface control and manoeuvrability. Unexpectedly, these skeletal characteristics are shared with the Triassic chondrostean-aligned *Birgeria*. These detailed endoskeletal data not only provide insight into constraint and adaptation regarding transitions to deep bodied forms, but might also unveil cryptic evolutionary relationships of the earliest deep bodied clades.

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