Hips, tips and sweet sweptback rays: Looking beyond traditional cranial characters in Pachycormiformes

Jeff Liston[1,2,3] & Anthony Maltese[4]
[1]*Bayerische Staatssammlung für Paläontologie und Geologie, Munich, Germany*
[2]*National Museums Scotland, Edinburgh, Scotland*
[3]*Yunnan Key Laboratory for Palaeobiology, Yunnan University, Kunming, People's Republic of China*
[4]*Rocky Mountain Dinosaur Resource Center, Woodland Park, USA*

A focus on cranial characters for determining relatedness is a predominant trait in many datasets, however this overemphasis can lead to distortion from sampler bias. We report on revised analyses of pachycormids - a key group within Actinopterygii, as part of the Holostei-Teleostei transition, which display a phyletic trend towards reduced skeletal ossification with the increased adult size of a pachycormid taxon. This reduced preservation potential for the axial skeleton makes it difficult not to base phylogenetic assumptions primarily on the limited skull material present. However, pachycormids show a remarkable conservatism in their dermatocranial anatomy, the few differences being useful for showing the separation of genera, but of little utility in working out broader intrafamilial relationships. The combination of a paucity of postcranial characters in the Late Cretaceous pursuit predator *Protosphyraena* with a poor knowledge about the skulls of suspension-feeding pachycormids (SFPs) had led to the absence of Early Cretaceous predatory pachycormids being interpreted as indicating a ghost lineage between *Protosphyraena* and the European Upper Jurassic taxa *Orthocormus* and *Hypsocormus* over an almost 50-million-year gap. However, the inclusion of several features from the pectoral and pelvic fins, supplemented by splanchnocranial characters, produces a much clearer picture that questions the traditional perception of a single carnivore lineage: *Protosphyraena* emerges as secondarily carnivorous from the SFPs' tribe, mirroring 130 years of misidentification of North American *Bonnerichthys* specimens as *Protosphyraena*. Confirmation of this will rely on the further recovery of data concerning the skull morphology of SFPs.