Pattern and process in evolutionary radiations of ray-finned fishes

Summary / Zusammenfassung
Palaeontologists approach evolutionary questions primarily via the study of overall patterns of diversity changes at higher taxonomic levels and along a geological time axis. Biologists, on the other hand, concentrate largely on population and species-level approaches during much shorter time spans. Yet, if a comprehensive understanding of the processes governing the generation of biological diversity is to be achieved, then an integration of the two approaches is essential. This liaison is, unfortunately, diminished by e.g. biases of preservation in the fossil record, limited communication among disciplines, and the lack of case studies with appropriate phylogenetic and ecological frameworks. In this project, these difficulties are overcome with the availability of a unique collection of palaeontological population samples (in a controlled stratigraphical and palaeoecological context and consisting of hundreds of fossil specimens resembling an extinct species flock) and the access to three extant evolutionary radiations. Subject of our surveys are ray-finned fishes. As members of the largest clade of living vertebrates, they represent an appropriate model to examine the origin of biodiversity. We apply a diverse set of methods to quantify – in the fossil and the living models in parallel – the interplay between morphological differentiation and taxonomic diversification in an ecological context. The fossil group to be investigated is Saurichthys, a Triassic genus with three fundamental features: (i) a worldwide distribution at a critical geological time in view of global extinction and biodiversity recovery events, and (ii) a fine-scaled stratigraphical record of large populations preserving individual growth data in (iii) contemporaneous basins, in which palaeoecology can be assessed. The palaeontological data are the starting point for comparative analyses, using the same suite of methods, in three extant species flocks: the cichlid assemblage of Lake Tanganyika in East Africa, the notothenioids of the Antarctic waters, and the sticklebacks of the temperate zone. The study of growth trajectory data in fossils and in extant taxa will provide valuable information on the developmental mechanisms behind the diversification patterns. The integration of approaches on exceptional materials should result in the establishment of new model cases to study evolutionary diversification events in the largest clade of vertebrate animals.

Publications / Publikationen
Argyriou T, Clauss M, Maxwell EE, Furrer H, Sánchez-Villagra MR. 2016 Exceptional preservation reveals the gastrointestinal anatomy of a triassic ray-fin (Saurichthys) – on the evolution of the spiral valves of fishes. Scientific Reports. 6:18758


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Other Links to external Webpages / Andere Links zu externen Webseiten

http://www.msanchezlab.net/
http://evolution.unibas.ch/salzburger/

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