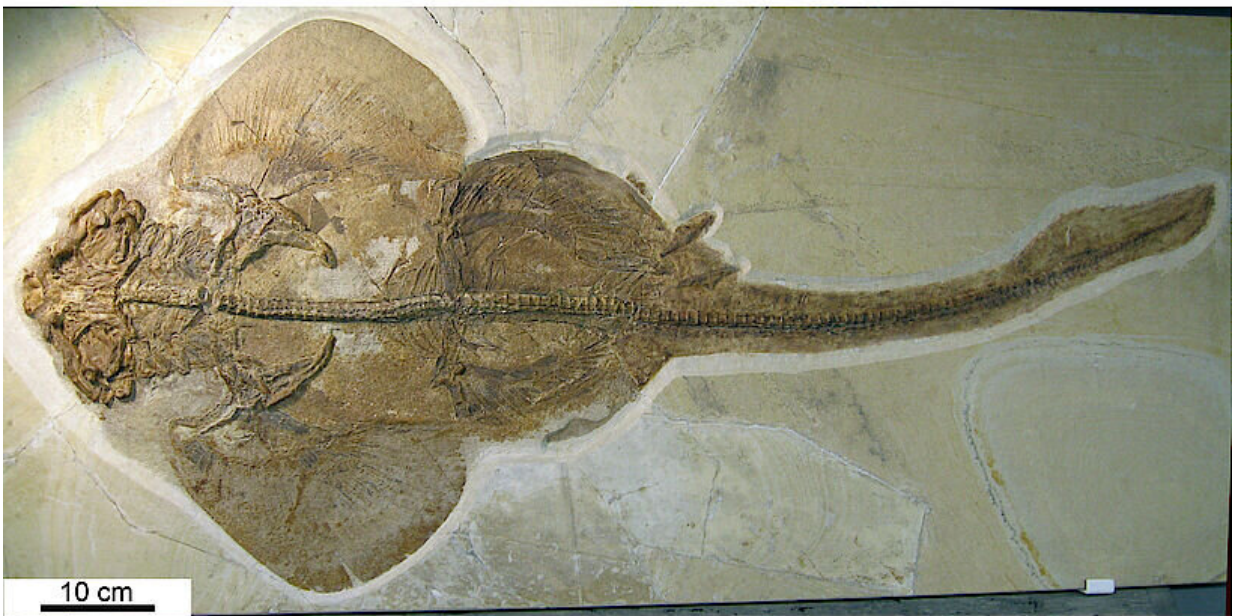


Between shark and ray: The evolutionary advantage of the sea angels

August 4 2020



Complete skeleton of a sea angel (*Pseudorhina acanthoderma*; SMNS 86214/41) from the Upper Jurassic period (ca. 155 Millionen years) from the Nusplinger Plattenkalke in Baden-Württemberg (Germany). Credit: J. Kriwet

The general picture of a shark is that of a fast and large ocean predator. Some species, however, question this image—for example angel sharks. They have adapted to a life on the bottom of the oceans, where they lie in wait for their prey. In order to be able to hide on or in the sediment,

the body of angel sharks became flattened in the course of their evolution, making them very similar to rays, which are closely related to sharks.

Flattened body as indication for a successful lifestyle

The oldest known complete fossils of angel sharks are about 160 million years old and demonstrate that the flattened [body](#) was established early in their evolution. This also indicates that these extinct angel sharks already had a similar lifestyle as their extant relatives—and that this lifestyle obviously was very successful.

Angel sharks are found all over the world today, ranging from temperate to tropical seas, but most of these species are threatened. In order to understand the patterns and processes that led to their present low diversity and the possible consequences of their particular anatomy, the team has studied the body shapes of angel sharks since their origins using modern methods.

Today's species are very similar

For this purpose, the skulls of extinct species from the late Jurassic period (about 160 million years ago) and of present-day species were quantitatively analyzed using X-ray and CT images and prepared skulls employing geometric-morphometric approaches. In doing so, the evolution of body shapes could be explained comparatively, independent of body size.

The results show that early angel sharks were different in their external shape, whereas modern species show a comparably lower variation in shape. "Many of the living species are difficult to identify on the basis of their skeletal anatomy and [shape](#), which could be problematic for species

recognition," explains Faviel A. López-Romero.

Angel sharks are well adapted, but react slowly to environmental changes

It has been shown that in living species the individual parts of the skull skeleton are more closely integrated than in their extinct relatives. This led to a reduced variability in appearance during the evolution of angel sharks. "The effect of integrating different parts of the skull into individual, highly interdependent modules can lead to a limited ability to evolve in different forms, but at the same time increases the ability to successfully adapt to specific environmental conditions," explains Jürgen Kriwet.

In the case of the [angel](#) sharks, increasing geographical isolation resulted in the development of different [species](#) with very similar adaptations. "But modular integration also means that such animals are no longer able to react quickly to environmental changes, which increases their risk of extinction," concludes Jürgen Kriwet.

More information: Faviel A. López-Romero et al, Evolutionary trends of the conserved neurocranium shape in angel sharks (Squatiniformes, Elasmobranchii), *Scientific Reports* (2020). [DOI: 10.1038/s41598-020-69525-7](#)

Provided by University of Vienna

Citation: Between shark and ray: The evolutionary advantage of the sea angels (2020, August 4) retrieved 26 April 2024 from

<https://phys.org/news/2020-08-shark-ray-evolutionary-advantage-sea.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.