

Poorly armed, but successful: The rise of the tyrants of the South

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The stubby arms of *Tyrannosaurus rex* obviously weren't designed for hand-to-hand combat. However, the abelisaurids of the Southern hemisphere were even less well equipped in that department—and upper limb reduction began very early in their evolution.

When *Tyrannosaurus* and its relatives roamed North America and Asia, the abelisaurids occupied a similar niche in Patagonia and other areas of Gondwanaland. They were the dominant predators in the [Southern hemisphere](#) and resembled the tyrannosaurids in their general appearance, but their unusually short and high skulls were unique. This characteristic form suggests that the animals could muster an extremely powerful bite.

In one respect, however, their northern counterparts could claim to be better equipped. Though they were pretty stubby, the arms of [Tyrannosaurus rex](#) were much more impressive than the puny forelimbs of the abelisaurids. LMU paleontologist Dr. Oliver Rauhut, who is also affiliated with the Bavarian State Collections for Palaeontology and Geology in Munich and his Argentinian colleague Dr. Diego Pol have now discovered when the trend toward reduction of the upper extremities began in the abelisaurids.

Origins obscure

"Abelisaurids were a highly diverse and widely distributed group during

the Cretaceous," says Rauhut, "but their origins have so far remained enigmatic." Fossil material from Patagonia representing a new abelisaurid species has now thrown light on their early evolution. The specimen is of Jurassic age and 40 million years older than any other known abelisaurid - and it reveals that arm reduction must have begun at an early stage in the group's evolutionary history.

Rauhut and Pol have named the new species *Eoabelisaurus mefi*, or "dawn Abelisaurus of the Museo Paleontológico Egidio Feruglio (MEF)", in recognition of the Museum's support for their research collaboration. "The new find reveals that the abelisaurid lineage is more ancient than we thought," says Rauhut. "The reason why so little is known about it is that the fossil record of predatory dinosaurs in the Southern hemisphere is very incomplete, especially for the period from the Middle Jurassic to the Early Cretaceous."

The researchers were also surprised to find that *Eoabelisaurus* had evolved on the supercontinent Pangea before it fragmented into the landmasses we know today, and yet abelisaurids were not distributed globally. "One possible explanation is that a huge desert in Central Pangea prevented dispersal of the group to the North, confining the evolution of the lineage to the Southern hemisphere," says Pol. Recent geological studies, together with the results of climate modeling, support the existence of such a geographical barrier.

Extreme extremities

How did the shortening of the forelimbs proceed? "The trend apparently set in early on, and began at the distal end," says Rauhut. In *Eoabelisaurus*, the upper arm is of normal size, but the lower arm is much shorter in comparison; the hand is very stunted and the fingers and claws are tiny." US paleontologists had recently suggested that reduction in abelisaurids began with the hand, and the new data seem to confirm

this.

Rauhut and Pol hope to extend their successful long-term project on the Jurassic dinosaurs of Patagonia, which has so far been supported by funding from the Deutsche Forschungsgemeinschaft (DFG) and the Argentinian Agencia Nacional de Promoción Científica y Tecnológica. "Our picture of dinosaur evolution in the Jurassic is largely based on fossils from Northern sites," says Rauhut. "The Southern hemisphere surely still has many surprises in store for us." (suwe)

More information: A Middle Jurassic abelisaurid from Patagonia and the early diversification of theropod dinosaurs Pol, Diego; Rauhut, Oliver, *Proceedings of the Royal Society B: Biological Sciences*, May 23, 2012.

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