

Centro de Investigação em Ciência e Engenharia Geológica

Evolution of Diplodocid Sauropods

Vertebrate Paleontology



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Objectives

Evolution of Diplodocidae (Dinosauria, Sauropoda)

The sauropod dinosaur clade Diplodocidae includes some of the most iconic sauropods. With their strongly elongated necks and tails, Diplodocidae constitute the typical image of sauropod dinosaurs. The clade is historically important, having provided the first described, complete sauropod skull (*Diplodocus*), the first published reconstruction of an entire sauropod skeleton (*Brontosaurus excelsus*), as well as the first mounted sauropod specimen (*Apatosaurus*). However, the validity and relationship between species is still ambiguous, mostly due to fragmentary and sometimes undiagnostic holotype specimens. New, almost complete material from the Howe Ranch, Wyoming (Late Jurassic) should help in clarifying these relationships, and thus shed new light on the evolution of this classic sauropods.

Methodology

New material from the Howe Ranch is described (one of the skeletons shown to the right).

A specimen-based phylogenetic analysis is attempted to reveal relationships between species. The phylogenetic analysis compares the specimens based on morphological characters of the preserved bones. These characters are obtained from previous studies and from personal observations of the skeletons included in the study.

Retrodeformation methods were applied to 3D models of neck vertebrae (see figure to the right: from right to left: original Dodo neck vertebra, retrodeformed method 1, retrodeformed method 2, deformed model) in order to test the influence of deformation on the morphology. By doing so, the utility of morphological characters used in phylogenetic analyzes was tested.

Expected Results

The description of the new material already resulted in the discovery of a new sauropod species (*Kaatedocus siberi*), and the first definitive report of dinosaur belly ribs (gastralia) and interclavicles. The presence of interclavicles in dinosaurs indicates that the bird furcula might have originated from the interclavicle, instead of representing fused clavicles. Future embryological studies on lacertilian interclavicles and clavicles and bird furculae would be needed in order to test the furcula homology.

The specimen-based phylogenetic analysis is expected to provide a conclusive view on the validity and relationships between species of e. g. *Diplodocus* or *Apatosaurus*.

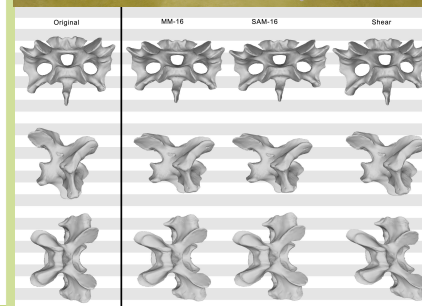
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Left: 1st skull reconstruction (Marsh 1884); below: 1st mount (Matthews 1905)



Left: life reconstruction of *Kaatedocus* (Tschopp & Mateus, in press); below: gastralia (Ga) and interclavicles (In), articulated (Tschopp & Mateus 2013)

