

Sauropod remains from the Late Jurassic of Asturias (North Spain)

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Introduction

In this paper we update the record of sauropod osseous remains discovered in the Late Jurassic of Asturias.

The first mention of possible sauropod bones was made by ROYO GÓMEZ & GÓMEZ LLUECA (1927), who cited «*a vertebra and a head, apparently of humerus, of a gigantic dinosaur*» in the «Wealden facies» of Ribadesella. These remains would come from the Upper Jurassic (maybe from the continental facies of the Vega Formation; RUIZ-OMEÑACA *et al.*, 2006), and are, at present, missing.

It was not until almost 70 years later that new discoveries of sauropod remains were made in Asturias. From 1996 to now, some remains have been come to light.

Localities with sauropod skeletal remains

The majority of the sauropod remains come from several coastal localities in the Villaviciosa, Colunga and Ribadesella municipalities (Tab. I) that form part of the known as «The Dinosaur Coast» by their abundant record of footprints and fossil bones from dinosaurs and other reptiles. They are from west to east:

- Villaviciosa: Aranzón (Quintueles parish), Tazones W-1 and Puerto de Tazones (Tazones parish), El Piensu (Selorio parish).
- Colunga: El Talameru (Lastres parish), La Griega (San Juan de Duz parish).
- Ribadesella: playa de Vega and Abeu (Leces parish), playa de Ribadesella (Ribadesella parish).

A single bone was discovered in La Felguera (Celles parish), Noreña municipality in 1998. It is the only remain which come from an outcrop of Jurassic rocks inland and not in the coast.

All the coastal localities are stratigraphically placed in the Vega and Lastres formations (Tab. I). Both formations have been dated as Kimmeridgian according to ammonites, charophytes and ostracods (see OLÓRIZ *et al.*, 1988; SCHUDACK & SCHUDACK, 2002; and references therein). The unnamed formation that outcrops in La Felguera was dated as Kimmeridgian-Tithonian by BEROIZ *et al.* (1973).

Updating of the record of sauropod skeletal remains from Asturias

A total of 14 sauropod remains are currently housed in the Jurassic Museum of Asturias (MUJA). Six of them have been previously cited or described:

- A pencil-like tooth from Tazones W-1 (MUJA-0323), described and figured by MARTÍNEZ *et al.* (2000a; as JVLH-162), also figured by GARCÍA-RAMOS *et al.* (2002, 2006), regarded as Diplodocoidea by ROYO-TORRES & CANUDO (2003).
- A spoon-shaped tooth from Tazones W-1 (MUJA-0635), described and figured by MARTÍNEZ *et al.* (2000a; as JVLH-163), also figured by GARCÍA-RAMOS *et al.* (2002; reproduced in ROYO-TORRES *et al.*, 2009: fig. 4A, who attributed it to Turiasauria).
- A caudal vertebra from Puerto de Tazones (MUJA-1912) described by MARTÍNEZ *et al.* (2000b; as JVVH-78) and figured by GARCÍA-RAMOS *et al.* (2002, 2006).
- A caudal vertebra from La Griega (MUJA-1911), figured by GARCÍA-RAMOS *et al.* (2002).
- An ulna from Aranzón (MUJA-1910), figured by GARCÍA-RAMOS *et al.* (2002, 2006).
- A dentary fragment from La Griega (MUJA-1946), first figured in GARCÍA-RAMOS *et al.* (2006) and later fully described and figured in CANUDO *et al.* (2010).

DGO-3500 is a caudal centrum from La Felguera housed in the Museum of the Department of Geology, University of Oviedo (DGO), described by RUIZ-

*Table 1. Sauropod remains from the Late Jurassic of Asturias. +: previously described and/or figured, see text for references; *: unpublished.*

Taxon	Material	Locality
Lastres Formation (Kimmeridgian)		
Sauropoda indet.	ulna (MUJA-1910) +	Aranzón
Turiasauria? indet.	tooth (MUJA-3588) *	
Diplodocoidea? indet.	tooth (MUJA-0323) +	Tazones W-1
Turiasauria? indet.	tooth (MUJA-0635) +	
Sauropoda indet.	caudal centrum (MUJA-0070) *	El Talameru
Vega Formation (Kimmeridgian)		
Sauropoda indet.	caudal vertebra (MUJA-1270) *	Puerto de Tazones
Sauropoda indet.	caudal vertebra (MUJA-1912) +	
Turiasauria? indet.	tooth (MUJA-1019) *	El Piensu
Sauropoda indet.	caudal vertebra (MUJA-1911) +	La Griega
<i>cf. Turiasaurus riodevensis</i>	fragment of righth dentary (MUJA-1946) +	
Sauropoda indet.	caudal centrum (MUJA-0650) *	Playa de Vega
Sauropoda indet.	dorsal rib and fragment of dorsal neural arch (MUJA-1023, 1024) *	Abeu
Turiasauria? indet.	tooth (MUJA-1227) *	Playa de Ribadesella
unnamed formation (Kimmeridgian-Tithonian)		
Diplodocidae indet.	caudal centrum (DGO-3500) +	La Felguera de Noreña

OMEÑACA *et al.* (2008) as Diplodocinae indet. It has been recently referred to the less exclusive clade Diplodocidae based on the possession of a prominent lateral pneumatic (MANNION *et al.*, in press).

We present here eight additional unpublished remains: three spoon-shaped teeth, three caudal vertebrae, and a dorsal rib associated to a fragmentary dorsal neural arch (Tab. I).

Conclusions

Sauropod skeletal remains are scarce in the Late Jurassic of Asturias. Fifteen remains from ten localities are presently known, including cranial, axial and appendicular elements. Only diplodocids and turiasaurs have been identified with certainty.

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