

TORVOSAURUS SP. (DINOSAURIA: THEROPODA) IN THE LATE JURASSIC OF PORTUGAL

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INTRODUCTION

Only three taxa of large theropods (Carnosauria *sensu lato*) are known in the Late Jurassic of Portugal: *Lourinhanosaurus antunesi* (Allosauroidea; Mateus, 1998), *Allosaurus fragilis* (Allosauridae; Pérez-Moreno *et al.*, 1999), *Ceratosaurus* sp. and the embryos briefly described by Mateus *et al.* (1997) show affinities with *Lourinhanosaurus*.

The ascription of the Portuguese theropod of “Andrés” to *Allosaurus fragilis* should be carefully regarded because its anatomy does not exclude the possibility to corresponds to *Lourinhanosaurus*.

In 1998 was discovered a theropod tibia (ML430) that is here described. It was found at Casal do Bicho on the border of Caldas da Rainha and Alcobaça Municipalities, Portugal. The horizon is recognised as Late Jurassic, Lower Tithonian; “Grés Superiores” Formation according to Marques *et al.* 1992).

DESCRIPTION

This large left tibia (fig. 1) is nearly complete, only the cnemial crest is lacking. The tibia is quite robust (high minimal diaphyseal circumference and the minimal diaphyseal diameter) for its length.

The shaft has a slightly concave curve in medial view.

The proximal epiphysis shows a broken cnemial crest. It is nearly round in proximal view and somewhat compressed lateromedially and anteroposteriorly expanded. In the proximal epiphysis surface, the medial edge is above the fibular condyle at the lateral side of the epiphysis. The fibular condyle is convex and well developed. It is well defined at its posterior side; there is a groove between the fibular condyle and the internal condyle. The anterior side of the fibular condyle progressively grades into the cnemial crest not bearing an anterior projection. The cnemial crest is not complete, but apparently, was not very developed. The long fibular crest is placed at the proximal half of the diaphysis and in an anterolateral position.

The distal epiphysis is quite expanded lateromedially. The anterior side of the distal epiphysis bears the articular surface for the fibula, astragalus, and calcaneum with a ridge marking the proximomedial contact with the astragalus.

This tibia is quite robust and the Tibial Ratio (Minimal Circumference / Length) is quite high (47.0) being the highest ratio described in literature.

Measurements of the tibia:

Maximum length: 820 mm; Minimal circumference: 385 mm; Minimal diaphyseal diameter: 106 mm; Maximum distal width: 279 mm; Tibial ratio: 47.0; Fibular crest length: 155.

COMPARISONS AND TAXONOMIC DISCUSSION

The tibia ML 430 is part of a Tetanurae dinosaur because:

- the distal end of tibia is transversely expanded (Serenó, 1997: 456) and is “backing calcaneum” (Serenó *et al.*, 1994: 266; Sereno *et al.*, 1996: Character 14).
- the astragalus is not preserved but it is possible to determine by the tibial contact with the astragalus, that the ascending process of the astragalus was moderately high. Following

Gauthier (1986: 25) and Sereno (1997: 456) the high ascending process on the astragalus is synapomorphic of Tetanurae.

The presence of fibular crest is not synapomorphic of Tetanurae (contra Holtz, 1994: Character 100) due to its common presence in Ceratosauria. However, its distal position is only present in Tetanurae. ML430 is clearly a basal Tetanurae.

The anterior side of the fibular condyle is continuous with the cnemial crest not bearing a cranial projection as in *Allosaurus* and in the tyrannosaurids (Molnar *et al.*, 1990: 197).

Comparing the ML 430 tibia with *Torvosaurus* tibial insertions of the astragalus we see that it should have a similar shape to the astragalus of *Torvosaurus* (see Britt, 1991: fig. 23) and “allosauroid type” described in Welles & Long (1974: 197). However, note that *Sinraptor* (Currie & Zhao, 1993: fig.23) has quite low dorsal process. Therefore, this feature could be dubious in the theropod classification and therefore should be used with some precaution.

Nevertheless, it is possible to infer by regarding the ML430 tibia that the feature “ascending process of astragalus enlarged both in height and width to cover most of anterodistal quarter of tibia”, which is synapomorphic of Coelurosauria (Gauthier, 1986: Character 65) is not present. Therefore, this tibia is not a Coelurosauria.

A high tibial ratio is more common in carnosaurs (sensu Gauthier) and other big theropods. One of the diagnostic features of *Torvosaurus tanneri* is the “tibial circumference to length index = 47” (Britt, 1991:11). Until now, *T. tanneri* tibia had the highest tibia ratio value (45.1) among theropods described in the literature. This ratio in the Portuguese tibia ML430 is exactly 47, confirming the similarity with *Torvosaurus*. Therefore ML430 tibia is here provisory regarded as a basal tetanuran related to *Torvosaurus tanneri* of Morrison Formation while new material is not described.

The ascription of ML430 tibia to *Torvosaurus* sp. is coherent with the biochronology of that genus which was previously known from Kimmeridgian-Tithonian beds (Kowallis *et al.*, 1998) of Morrison Formation.

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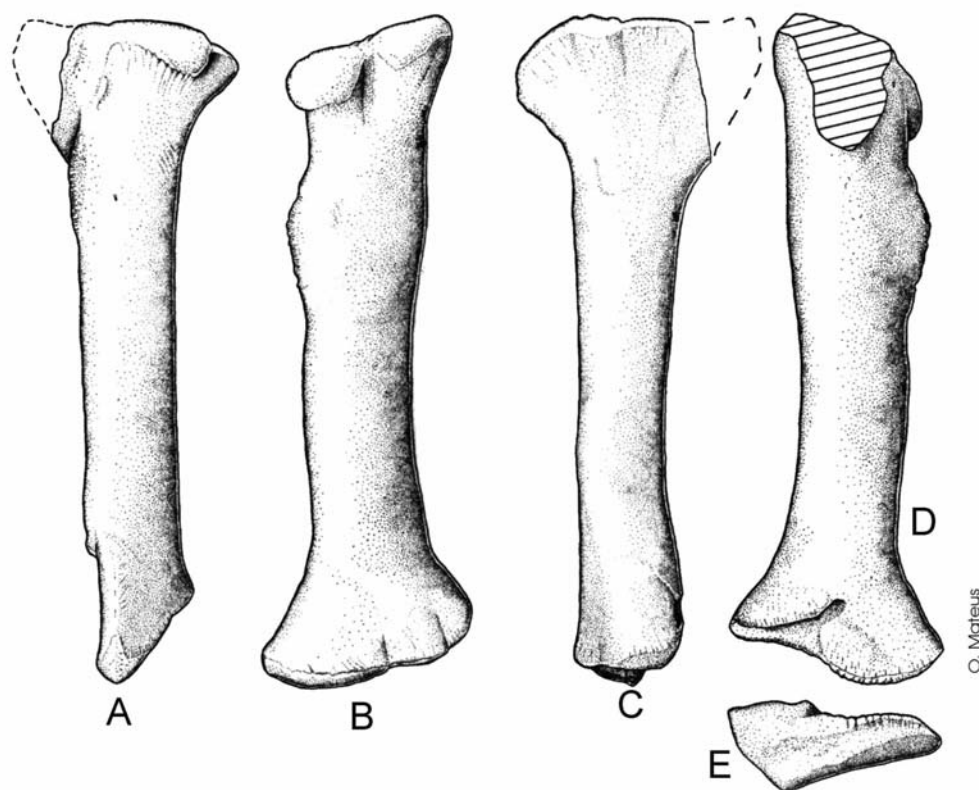


Figure 1- *Torvosaurus* sp. left tibia ML430 in (A) lateral, (B) posterior, (C) medial, (D) anterior, and (E) distal view. Drawing by O.M.

Acknowledgements:

We are grateful to Sr. Carlos Rosa that found the specimen and kindly permitted the study. To Horácio Mateus and Dr. Costa Rodrigues, that help us in different ways. This research was financed by the PhD PRAXIS XXI scholarship BD21616/99 grants of Fundação para a Ciência e Tecnologia and by GEAL-Museu da Lourinhã.