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# First evidence of an unenlagiid (Dinosauria, Theropoda, Maniraptora) from the Bauru Group, Brazil

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ABSTRACT

In this study, we describe a small theropod dorsal vertebra from the Late Cretaceous Bauru Group (Brazil). The specimen is referred to the maniraptoran clade Unenlagiidae based on the following combination of characters: diapophyses short, wide and weakly inclined; dorsal surface of the neural spine transversely expanded; neural spine at least twice as high than it is long at mid-height; and deep lateral excavations of the ventrolateral surface of the neural spine. The vertebra belonged to an ontogenetically mature individual with an estimate total body length of around 1 m. This is the first evidence of Unenlagiidae in Brazil, a clade currently known only from Argentina and possibly Madagascar. The presence of large- to small-bodied forms in the Turonian–Santonian of South America indicates that Unenlagiinae were ecologically disparate during the first half of the Cretaceous. The Bauru vertebra shows a combination of avian-like, *Rahonavis*-like and *Unenlagia*-like features, making it a possible pivotal taxon in future phylogenetic investigations of intra- and interrelationships of unenlagiids.


## 1. Introduction

Fossil bones of theropod dinosaurs in Late Cretaceous deposits of Brazil are extremely scarce. The putative abelisaurid *Pycnonemosaurus nevesi* from the Adamantina Formation (Turonian–Santonian) of the Cambebe area, Mato Grosso State (Kellner and Campos, 2002), and the spinosaurid *Oxalaia quilombensis* from the Alcantara Formation (Cenomanian) of the Maranhão State (Kellner et al., 2011) are the only theropod taxa known to date. In addition, the Brazilian record also includes isolated bones and teeth which have been referred to suprageneric clades (i.e., abelisaurids, carcharodontosaurids, maniraptorans, spinosaurids; e.g., Vilas Bôas et al., 1999; Medeiros and Schultz, 2001, 2002; Novas et al., 2005; Candeiro et al., 2006; Medeiros, 2006; Candeiro, 2007; Elias et al., 2007; Medeiros et al., 2007; Machado et al., 2009).

Early Cretaceous Brazilian theropods are relatively more diverse and a few taxa are recognized. They include spinosaurids (*Irritator challengeri* and its possible junior synonym *Angaturama limai*; Kellner and Campos, 1996; Martill et al., 1996; Kellner et al., 2011), coelurosaurs (*Santanaraptor placidus* and *Mirischia asymmetrica*; Kellner, 1999; Naish et al., 2004), and isolated remains (Medeiros, 2006; Elias et al., 2007; Medeiros et al., 2007; Machado et al., 2009).

In this contribution we describe an isolated dorsal vertebra of a maniraptoran comparable in size to those of the extant *Anser anser* (Linnaeus, 1758). The specimen was collected from beds of the Adamantina Formation, approximately 12 km northwest of the city of Marilia (São Paulo State). It is housed in the collection of the Museu de Paleontologia de Marilia under the collection number MPM 011. In the same quarry, fish, notosuchian crocodyliform, and indeterminate theropod remains were also unearthed.

*Institutional abbreviation*. MPM, Museu de Paleontologia de Marilia city, São Paulo State, Brazil.

## 2. Systematic palaeontology

Dinosauria Owen, 1842
Theropoda Marsh, 1881
Maniraptora Gauthier, 1986
Unenlagiidae Bonaparte, 1999 sensu Agnolín and Novas, 2011

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Gen. et sp. indet.
Fig. 1

*Locality and horizon*. Amaden Amaral rural district, Marilia municipality, Sao Paulo State, Brazil; Turonian–Santonian Adamantina Formation, Bauru Group (Fernandes and Coimbra, 1996).

*Description*. The specimen MPM 011 (Figs. 1 and 2) is a small, isolated vertebra that has been mostly prepared on the left side because of a hard, oxide layer covering the bone surface and because of the size and soft nature of the bone. The vertebra is 39 mm high and 26 mm wide at the maximum point of the neural arch (i.e., at the level of the diapophyses). Based on the relative size of the centrum and neural arch, the presence of a well-developed ventral keel and the position of parapophyses, we assume that it is an anterior–middle dorsal vertebra.

The centrum is amphicoelous with the posterior articular surface wider than the anterior one (Fig. 1A, C). The anterior surface is subcircular whereas the posterior surface is oval (wider than high). In lateral view (Fig. 1B), the ventral edge of the posterior surface is ventrally projected in comparison with the anterior border of the centrum, suggesting a slight anterior upturning of the vertebral column in that region, and supporting the interpretation of MPM 011 as a vertebra close to the cervicodorsal transition (Taylor et al., 2009). In ventral view, the centrum is transversely concave and constricted in the middle. The ventral surface bears a narrow keel. On the left lateral side of centrum (Fig. 1B), an oval pleurocoel is located on the cranial haft of the centrum, immediately below the base of the neural arch. The elliptical pleurocel is deep and with distinct margins. There is no clear suture between the centrum and the neural arch, suggesting that the vertebra belongs to a mature animal.

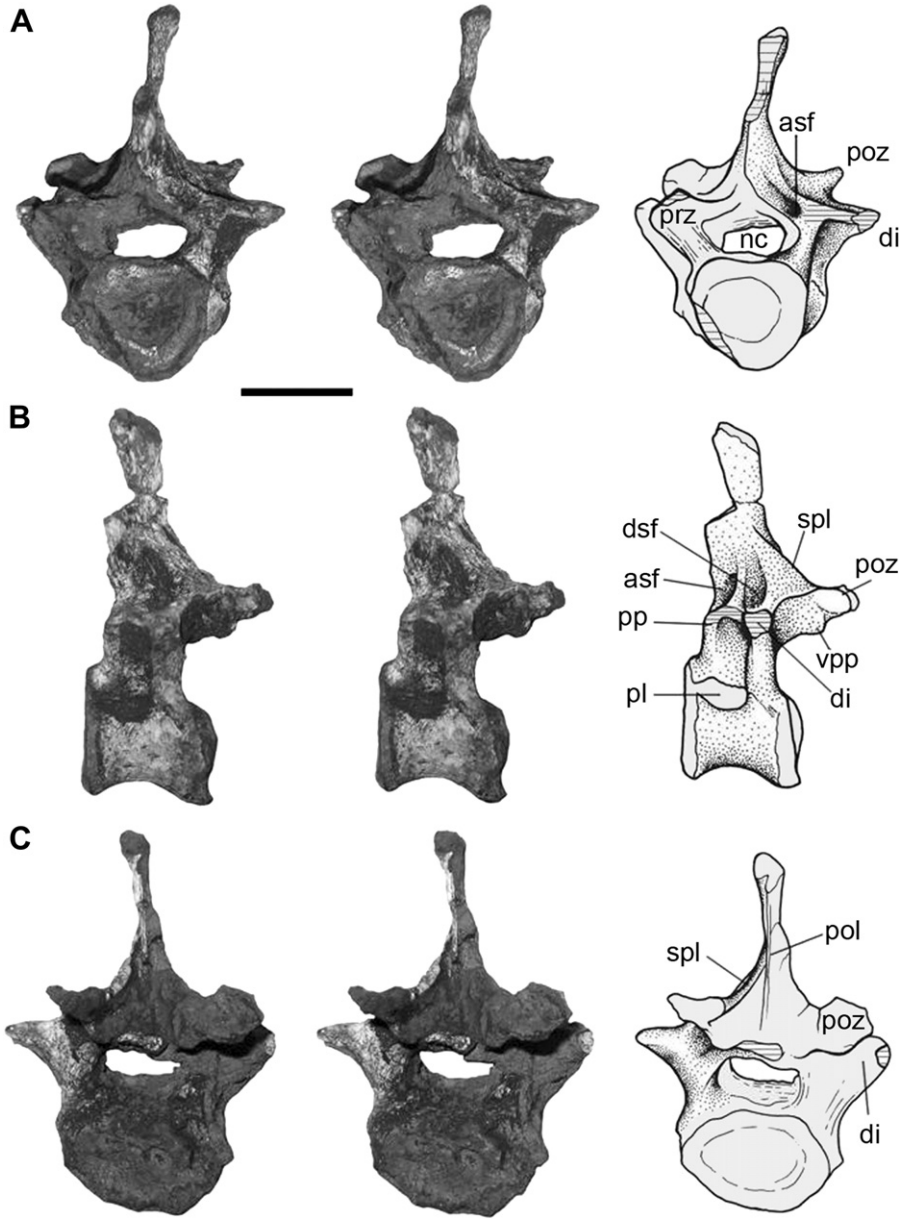


**Fig. 1.** Dorsal vertebra of Unenlagiidae gen. et sp. indet., MPM 011. Stereopairs and schematic drawings in A, anterior, B, left lateral and C, posterior views. Abbreviations: asf, anterior spinal fossa; di, diapophysis; dsf, dorsal spinal fossa; nc, neural canal; pol, postspinal lamina; poz, postzygapophysis; pp, parapophysis; prz, prezygapophysis; spl, spinopostzygapophyseal lamina; vpp, ventral process of postzygapophysis. Scale bar represents 1 cm.