

A SAUROPOD VERTEBRA AT RÂPA ROȘIE (ALBA DISTRICT)

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Abstract. Dinosaur bones had been mentioned in Alba district, at Râpa Roșie near Sebeș, since long time ago. The first one who stressed out their dinosaurian status was Ferenc Nopcsa, but in fact such bones were found even earlier, but Koch had mistakenly assigned them to Miocene large herbivores. Recently, at Râpa Roșie a sauropod caudal vertebra had been collected by one of us. Until now, it is the most representative fossil documenting the sauropods in this site. Through its morphology, this vertebra can be located in the middle part of the tail, between the typical median vertebrae and the distal ones. For instance, the only sauropod genus ever mentioned in the Latest Cretaceous (Maastrichtian) formations from our country is *Magyarosaurus*. Therefore, one can suppose that this vertebra belongs to it. However, all the dinosaur fossils ever discovered at Râpa Roșie are reworked into the Sebeș Formation, which deposits belong to the Lower Miocene (? Eggenburgian-Ottangian). This fossil doesn't break this rule. According to its fossilization, probably this bone is originating from the underlying Șard Formation (Maastrichtian-Priabonian), later removed by erosion.

Key words : Dinosaurs, Late Cretaceous, Transylvanian Basin, Romania.

INTRODUCTION

Sauropod remains were documented from a few European countries that including Rumania. Here, Nopcsa (1905, 1915) collected the most abundant material from the Hațeg Basin, described as "*Titanosaurus dacus*". Also he collected bones from other localities of Transylvania. Later, Huene (1932) changed the genus name in *Magyarosaurus*, separating three distinct species based on their different morphologies of the caudal vertebrae. Today, only *Magyarosaurus dacus* (NOPCSA, 1915) is accepted as valid species. However, even actually some paleontologists are arguing for more than one genus' species in Transylvania (Csiki et al., 2007).

One of the most representative sites for the land formations exposures on the SW side of the Transylvanian Basin is the one from Râpa Roșie, near Sebeș town. Since 1969, it represents a natural monument (Toniuc et al., 1992) mainly due to its very peculiar landscape, with red-beds resembling the notorious „badlands” from North America. In fact, there is a pile of weakly cemented detrital deposits, mainly coarse, as pebbles and sands of fluvial origin.

The geological age of the strata is even now controversial, due to the scarcity of fossils in these rocks. However, recently Codrea & Dica (2005) in a tentative to refine the stratigraphy of the area, assigned the Râpa Roșie red beds to the Early Miocene (? Eggenburgian-Ottangian), as long as among the pebbles there are nummulite-bearing clasts and oyster shell

fragments, reworked from the older nearby formations. On the other hand, the red beds are overlying by transgressing Lower Badenian conglomerate. In this manner, the red beds should be younger than the nearby Upper Cretaceous, Paleogene or Lowermost Miocene formations, but older than the Badenian. As a matter of fact, they included these rocks into a distinct lithostratigraphic unit, the Sebeș Formation, Râpa Roșie being its type section.

Among the scarce fossils ever found at Râpa Roșie, there are also some vertebrates. The first such findings are running long ago in time, to the end of 19th, when Koch (1891, 1900) mentioned there "*Aceratherium cf. Goldfuss*". However, only some years after Nopcsa (1905) rejected this assignation. On opposite to Koch, he was agreeing with a dinosaurian origin for these bones.

Long time after this dispute, for several decades, no other fossil vertebrate had been found at Râpa Roșie. Later, Grigorescu (1987) illustrated a humerus fragment belonging to an ankylosaur, as well as a (?) theropod dinosaur tooth, stressing out that they are reworked from Upper Maastrichtian deposits. Then, he concluded that the Râpa Roșie red beds should be Oligocene, but in a subsequent contribution (Grigorescu et al., 1990), the age had been interpreted either as Paleocene-Early Eocene, or Middle-Late Eocene. In a synthesis on the nonmarine Cretaceous formations of Rumania, Grigorescu (1992) agreed with the Oligocene or Lower Miocene age of Râpa Roșie.

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Jianu et al. (1997) described a larger number of late Mesozoic dinosaur bones always reworked in the same deposits, curate at the Babeş-Bolyai University Paleontology-Stratigraphy Museum in Cluj-Napoca. Among these fossils, one can point out several belonging to indeterminate sauropods (incomplete ulna, fibula and femur).

Concomitantly, Codrea & Vremir (1997) described a plastron fragment found in the lower third of Râpa Roşie succession, assigned to the cryptodire turtle *Kallokibotion bajazidi* NOPCSA 1923, stressing out its reworked status.

In the last decade, no other fossil had been mentioned from this site. However, in the last summer, one of us (M.V.) succeeded in finding a sauropod vertebra, further described.

PALAEONTOLOGY

Dinosauria OWEN, 1842

Saurischia SEELEY, 1889

Sauropodomorpha HUENE, 1932

Sauropoda MARSH, 1878

Neosauropoda BONAPARTE, 1986

Titanosauriformes SALGADO, CORIA & CALVO, 1997

Genus *Magyarosaurus* HUENE, 1932
(Pl. I, figs. 1-6)

DESCRIPTION

The fossil concerns a distal caudal vertebra, exposing transition features between the most posterior middle caudal vertebrae and the distal ones, with the vertebral body dorso-ventrally slightly compressed. The centrum is elongated (length – 105 mm), the neural arch was broken probably during the bone reworking before its definitive burial.

Its both lateral sides are slightly concave and are exposing on the dorsal third cranio-caudally elongated crests, just beneath the former neural arch area. In fact, these crests represent nothing else but transverse process reminiscences. The left lateral side is badly crushed in its anterior part.

On the ventral side of the centrum, two crests can be followed, outlining a restricted central depression. The articulation facets with the haemapophysis cannot be observed: either they had been seriously damaged, or were completely missing.

The dorsal side still preserves the base of the former neural arch, clearly outlining the neural canal on the anterior half of vertebra.

Both articulation faces are severely damaged. The cranial one is the most damaged, being broken and also corrupted by the bone crushing. In these circumstances, its initial shape cannot be observed. However, one can suppose an oval dorso-ventral elongate outline. The caudal one seems to have had an oval transverse elongate outline, with concave surface.

DISCUSSION AND CONCLUSION

Defined by Salgado et al. (1997), the Titanosauriformes expose a series of postcranial synapomorphies, which include dorsoventrally compressed posterior caudal vertebrae. The Râpa Roşie vertebra follows this rule.

It is evident that this bone suffered the consequences of a hard reworking process: the neural arch was broken and the rims of the articular faces are completely razed through the rolling movement of the bone. In fact, the water streams have rolled the vertebra centrum likewise a boulder.

The initial deposit where the sauropod vertebra has been buried was an arenite bed, with medium sized quartz grains. A small part of this rock can be still observed into the neural canal.

This vertebra has been compared with recently unearthed vertebrae from Haţeg Basin, at Nălaţ-Vad (unpublished material), preserved in the Vertebrate Paleontology Laboratory of the Department of Geology and Paleontology at the University of Cluj-Napoca. These fossils concern a median caudal vertebra (NVM1-3) and a distal caudal one (NVM1-47). The first one exposes transverse processes as well as well express ventral depression and articulation haemapophysis facets. On the opposite, the last one does not show any of these features. As a consequence, the Râpa Roşie vertebra by its peculiar morphology can be located in an intermediary position inside the sauropod tail, within its middle part, anyhow, between the typical median vertebrae (each one with “ball and socket” articulations) and the distal ones (with flat articulation faces).

For instance, the only sauropod genus ever mentioned in the Latest Cretaceous (Maastrichtian) formations from our country is *Magyarosaurus*. As a consequence, one can suppose that this vertebra belongs to it.

The phylogenetic analysis carried out by Upchurch (1998), Wilson (2002) and Curry Rogers (2005) placed *Magyarosaurus* into the *Nemegtosaurus* clade. However, this pattern is

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based only on the rather scarce material discovered and published until now.

According to its fossilization, probably this bone, like the other ones of Late Cretaceous reptiles had been reworked from the Șard Formation (Maastrichtian-Priabonian; Codrea & Dica, 2005).

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Plate caption:

Pl. I: *Magyarosaurus* sp. Râpa Roşie, Sebeş Formation. Caudal vertebra, reworked from Maastrichtian deposits. Figs. 1-2 lateral views; Fig. 3: dorsal view; Fig. 4: ventral view; Fig. 5: cranial view; Fig. 6: caudal view.
Scale bar: 60 mm.

