

New interpretations of *Dortoka vasconica* Lapparent de Broin and Murelaga, a freshwater turtle with an unusual carapace

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ABSTRACT

The discovery of abundant new material of the European turtle *Dortoka vasconica* at its type locality and a review of the previously analyzed material allow new interpretations of the anatomy and lifestyle of this Cretaceous taxon to be proposed. Both its carapace and plastron are highly varied and several characters are identified as subject to individual variability. Some characters previously considered in the diagnosis of this taxon were found to vary. Two morphotypes of the anterior lobe of the plastron are identified, both of which are characterized by a particular morphology and disposition of their bony elements and scute patterns. We also identified two morphotypes taking into account the morphology of the anal notch, which are potentially related to two sexual morphs. The curious shape of various elements of the carapace had been mentioned previously. We identify here the presence of a pair of autapomorphic fontanelles, which justify the development of these peculiar structures. The presence of these large fontanelles, which remain open throughout ontogeny, and a histological study examining various elements of the carapace and plastron corroborate our interpretation of *Dortoka vasconica* as having a more aquatic lifestyle than previously thought.

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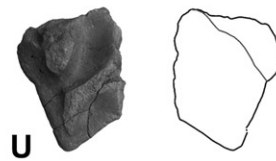
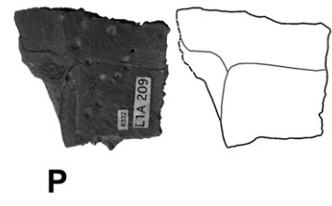
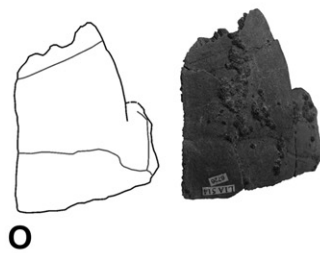
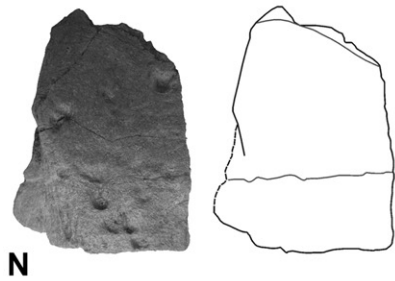
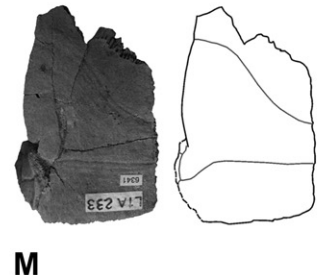
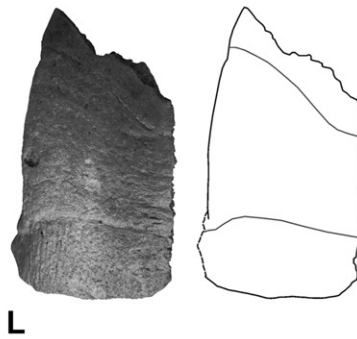
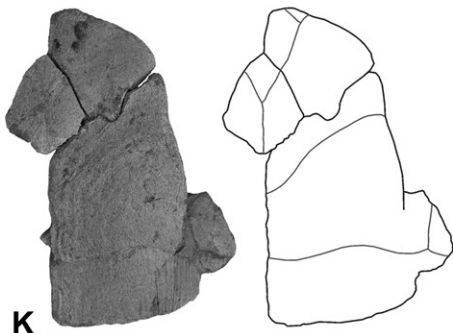
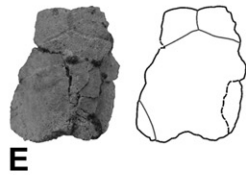
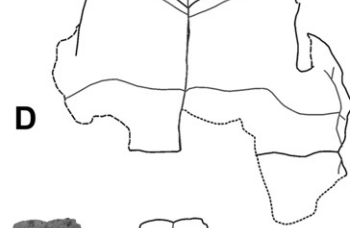
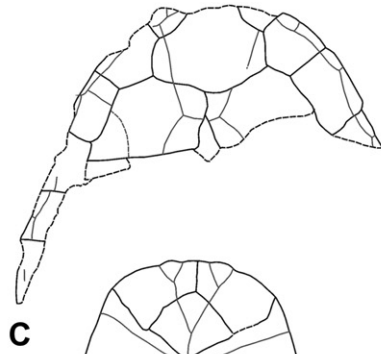
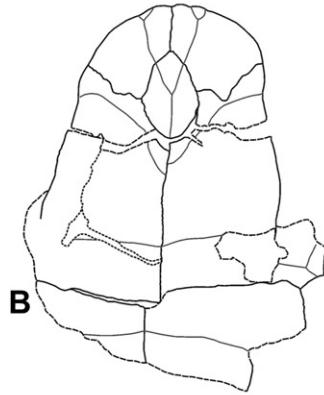
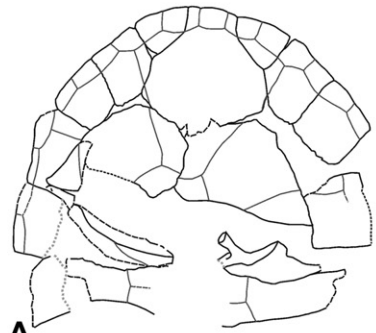
1. Introduction

The European pre-Campanian record of turtles is relatively abundant and diverse (Lapparent de Broin, 2001). However, the members of Pan-Pleurodira (sensu Joyce et al., 2004) are poorly represented. *Proterochersis robusta* Fraas, 1913, from the Upper Triassic of Württemberg (Germany), is considered by several authors to be a representative of that lineage of turtles (see Lapparent de Broin, 2001; Gaffney et al., 2006), while other authors identify it as a member of Testudinata outside the crown Testudines (e.g., Rougier et al., 1995; Joyce, 2007; Sterli and de la Fuente, 2011). Prior to the Santonian, two pan-pleurodiran groups are identified in Europe: Dortokidae and Platycheilyidae. Information on both taxa is very limited, being only based on postcranial material. Platycheilyidae is identified by the taxon *Platycheilus oberndorferi* Wagner, 1853, recognized in the upper Kimmeridgian–lower Tithonian of Kelheim (Germany) and Solothurn (Switzerland). It has been hypothesized that an indeterminate form of this group could be present in the Kimmeridgian of the Guimarota coal

mine (Leiria, Portugal) (Bräm, 1973; Lapparent de Broin, 2001). A review of the fragmentary material from this locality supports this interpretation, although bone histology and observation of its ornamental pattern revealed that some fragments, which were previously assigned to aff. *Platycheilus* sp., are remains of pleurosternid turtles (Scheyer and Anquetin, 2008). The Dortokidae, an endemic European group, is known from the Barremian by some fragments assigned to an indeterminate taxon from Vallipón (Teruel, Spain) (Murelaga Bereikua, 1998). The presence of isolated shell fragments of an indeterminate taxon, which shows affinities with Dortokidae, has been reported from the Santonian of Hungary (Rabi, 2009). Dortokidae are very abundant in Campano–Maastrichtian sites of the northern and eastern parts of the Iberian Peninsula, and in the southern and southeastern part of France (Lapparent de Broin et al., 2004), but it may also be present in other parts of Spain. The Mesozoic record of Dortokidae is especially abundant at the late Campanian–early Maastrichtian site of Laño (Treviño County, Burgos, Spain), the type locality of *Dortoka vasconica* Lapparent de Broin and Murelaga, 1996, a taxon that probably belongs to the same lineage as the turtle from Vallipón. Dortokidae are also present in the Maastrichtian of Romania, where “*Muehlbachia nopcsai*” (Vremir and Codrea, 2009) was defined, currently identified as “nomen nudum” (Vremir and Rabi, 2011);

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