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Presence of the bovid *Austroportax* in the upper Miocene fossil site of Batallones-1 (MN 10, Madrid Basin, Spain)

Presencia del bóvido Austroportax en el yacimiento mioceno de Batallones-1 (MN 10, cuenca de Madrid, España)

M. Sánchez¹, V. Quiralte¹, J. Morales¹

ABSTRACT

Bovid fossils constitute rare findings in the Cerro de los Batallones fossil sites. However, maxillar and mandibular remains of a juvenile individual of a large-sized bovid were discovered in Batallones-1. In the present work, we describe these fossils and assign them to the European genus *Austroportax* (Sickenberg, 1829). We name these fossils as *Austroportax* sp. due to the lack of more diagnostic additional material belonging to this form.

Keywords: Batallones, Bovidae, Cetartiodactyla, Madrid Basin, Pecora, Ruminantia, Vallesian.

RESUMEN

Los restos de bóvidos son excepcionalmente raros en los yacimientos del Cerro de los Batallones. Sin embargo, en Batallones-1 se han hallado restos mandibulares y maxilares de un individuo juvenil perteneciente a una especie de bóvido de talla grande. En el presente trabajo describimos estos fósiles y los asignamos al género europeo *Austroportax* (Sickenberg, 1829). Los fósiles quedan nombrados como *Austroportax* sp. debido a la ausencia de material diagnóstico adicional perteneciente a esta especie.

Palabras clave: Batallones, Bovidae, Cetartiodactyla, cuenca de Madrid, Pecora, Ruminantia, Vallesiense.

Introduction

Batallones-1 was the first of the 9 fossil sites discovered and excavated in the Cerro de los Batallones (Batallones butte), located in the South-Central area of the Cenozoic Madrid Basin. Cerro de los Batallones is constituted of a sedimentary sequence which comprises three units, all of them deposited in terrestrial environments during the early late Miocene. The fossil bones are included in a sedimentary matrix that cuts discordantly the three units of the butte (see Domingo *et al.*, 2011 for a thorough geological characterization of the fossil sites in the butte). This fact led to the proposal that the fossil accumulation was due to the presence of cavities formed as a consequence of a pseudokarstic

process known as piping (Pozo *et al.*, 2004; Domingo *et al.*, 2011).

Although Batallones-1 is remarkably famous for its spectacular carnivoran fossils (see e.g. Peigné *et al.*, 2005, 2008; Salesa *et al.*, 2005, 2006a, 2006b, 2008, 2009), other macromammalian taxa have also been recovered, i.e. perissodactyls (equids and rhinocerotids) and cetartiodactyls (suids and ruminants) (Morales *et al.*, 2000, 2004, 2008; Sánchez *et al.*, 2009). Nevertheless, non-carnivoran macromammalian fossils are far under-represented compared with the carnivoran remains (Morales *et al.*, 2000, 2004, 2008). The majority of ruminant fossils belong to the Moschidae (musk deer), which probably entered the cavity in the interior of their carnivoran predators (Sánchez *et al.*, 2009). As pointed

¹ Departamento de Paleobiología, Museo Nacional de Ciencias Naturales-CSIC, C/ José Gutiérrez Abascal, 2. 28006-Madrid.
Email: israelms@mncn.csic.es

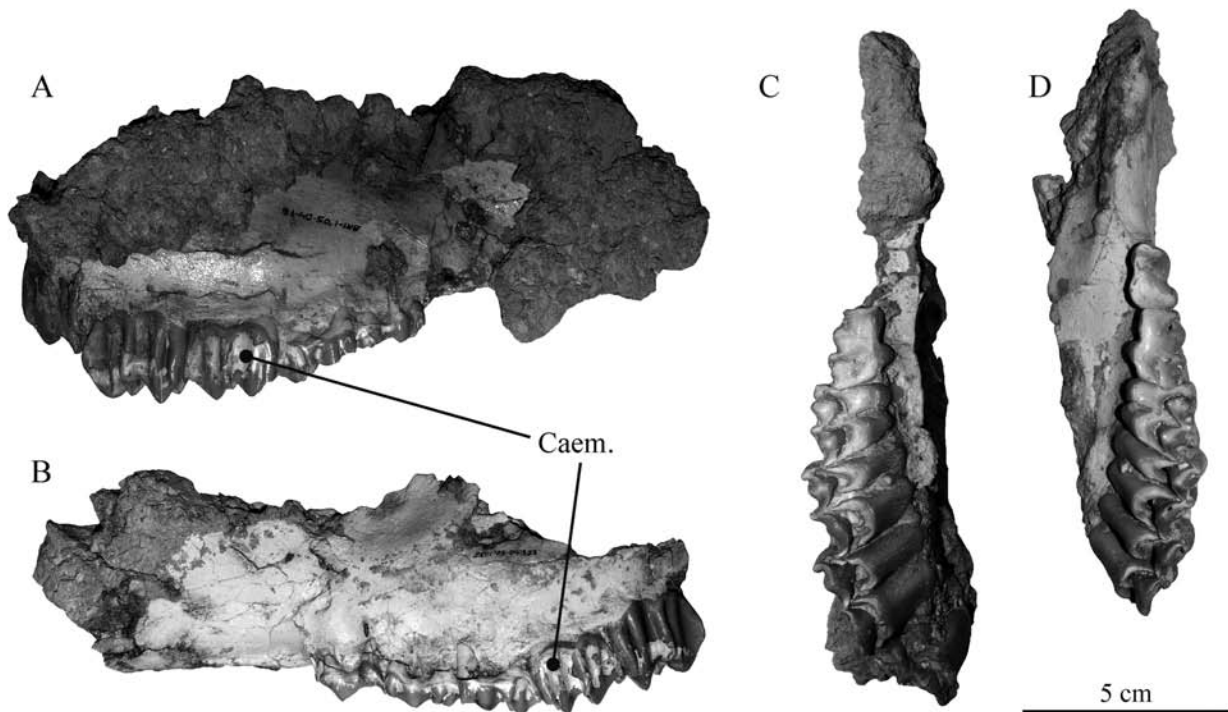


Fig. 1.—*Austroportax* sp. from Batallones-1 (Madrid Basin, upper Miocene, MN 10), maxillae and upper dentition. A, BAT1'05.D4-78, right maxilla, in buccal view; B, BAT1'03.D4-323, left maxilla, in buccal view; C, BAT1'05.D4-78, right maxilla, in linguo-occlusal view; D, BAT1'03.D4-323, left maxilla, in linguo-occlusal view. Abbreviations: Caem., caementum layer.

out by Morales *et al.* (2008), in spite of the fact that the Bovidae were diversifying in the later Miocene, they are not well represented in any of the sites in the Cerro de los Batallones. However, Batallones-1 has yielded well-preserved bovid remains that very probably belonged to a single individual. In this paper we describe these scarce remains, assigning them to the European genus *Austroportax* (Sickenberg, 1929).

Materials and methods

Materials: The studied material comes entirely from Batallones-1. It comprises the following specimens: BAT1'03.D4-323 (left maxilla with DP2-M2), BAT1'05.D4-78 (right maxilla with DP3-M2 and erupting M3), BAT1'04.D4-392 (left hemimandible with one incisor, dp3-m2 and erupting m3), and BAT1'03.D4-202 (right DP2). The discovery of all the fossils in the D4 square, and the anatomical and ontogenetic matching of the maxillar-mandibular remains, strongly suggests that all fossils belong to a single juvenile individual.

Measurements: BAT-1'04 D4-392: dp3 14,7 x 7,9; dp4 23,4 x 12; m1 20,3 x 14,8; m2 22,3 x 16, 5.

BAT-1'03 D4-323: DP4 17,9 x 11,5; DP3 19,7 x 13,6; DP4 19,1 x 18,3; M1 22,3 x 23,3; M2 24,4 x 25,3.

All measurements are given in mm.

Nomenclature: We use the terminology of Barone (1999) for the anatomical nomenclature of the cranial and mandibular skeleton, and that of Azanza (2000) for nomenclature of the dentition (English version in Sánchez and Morales, 2008).

Systematic paleontology

Mammalia Linnaeus, 1758

Cetartiodactyla Montgelard, Catzefflis and Douzery, 1997

Ruminantia Scopoli, 1777

Bovidae Gray, 1821

Austroportax (Sickenberg, 1829)

Austroportax sp. (Figs. 1-2)

Locality and horizon: Batallones-1, Madrid Basin, MN 10, local zone J, Vallesian, upper Miocene.

Referred material: BAT1'03.D4-323 (left maxilla with DP2-M2), BAT1'05.D4-78 (right maxilla with DP3-M2 and erupting M3), BAT1'04.D4-392 (left hemimandible with one incisor, dp3-m2 and erupting m3), and BAT1'03.D4-202 (right DP2).

Description

Maxilla and upper dentition

Most of the external side of both maxillae is preserved, including part of the broad and well developed facial crest from which the masseter muscle originates. The infraorbital foramen is relatively small, divided into two smaller foramina by means of a near-horizontal septum. The insertion crest for the buccinator muscle is very well marked, distally triangular and anteriorly narrow and elongated.

The deciduous premolars show a high degree of wear. The DP2 is elongated with well-marked labial cones that have a broad and deep valley between them. The DP3 is bi-lobed. It has a posterior lobe only slightly smaller than the anterior one, both the anterior style and the antero-labial cone are well developed, the mesostyle is strong, and both the postero-labial cone and style are small. The well-molarized DP4 has a strong antero-labial cone and style, well developed mesostyle and moderately developed labial cone and style. There is a deposit of caementum on the labial wall of both DP3 and DP4.

The permanent cheek teeth have a medium-low degree of wear, so their morphology can be thoroughly described. The M2 is clearly bigger and more hypsodont than the M1. As in the DP3-DP4, both molars have a layer of caementum on the labial wall. The M2 has a strong parastyle which develops prominently from the labial wall. Both M1 and M2 have a well-marked labial paracone rib which fuses basally with the parastyle. The column-shaped mesostyle is also strongly developed. Neither the pre-protocrista nor the post-protocrista contact the labial wall. However, in the distal lobe of the molars the pre-metacrista contacts the pre-paracrista, and the post-metacrista contacts the post-paracrista at a medium height in the crown. The M3 in BAT1'05.D4-78 can be observed through the mandibular bone, not-erupted yet. It is morphologically very similar to the M2 but has a more developed metastylid.

Mandible and lower dentition

The hemimandible BAT1'04.D4-392 is almost complete, with both the horizontal and vertical branches preserved. It has two mental foramina, being the anterior one sub-circular and much big-

ger than the posterior one, which is elliptic. The horizontal ramus is not too much high, but this could be a result of the juvenile condition of this individual. The masseteric fossa is shallow. The angular process is rounded and broad, well individualized. The tip of the coronoid process is fragmented, however the process appears to be relatively short and broad with a marked curvature. The processus condylaris has a slightly concave rectangular articulation surface, the medial ramus of which is more developed than the lateral one. The mandibular foramen is subcircular. The crest posterior to the mandibular foramen which marks the upper insertion border for the medial pterygoideus muscle is very well developed. The pterygoideus pit is shallow.

The right i1 is preserved, still un-erupted. As it was the case with the deciduous upper dentition, both the dp3 and dp4 of the hemimandible BAT1'04.D4-392 are heavily worn-out. The dp3 has a very developed mesolabial conid and a strong mesolingual conid. The anterior wing is double (well separated anterior stylid and anterior conid). The three lobes in the dp4 increase mesio-distally their bucco-lingual width. The buccal wall has traces of caementum. The antero-labial conid is separated from the meso-labial conid by a shallow valley, however the latter is strongly separated from the postero-labial conid. There is a faint 'metastylid' and a strong postero-labial stylid. The meso-lingual conid has two well developed stylids, both of them showing caementum deposits. The caementum covering is also present in the lingual and buccal walls of both m1 and m2. The m1 has a well developed mesial cingulid and a column-shaped ectostylid. The metastylid is moderately developed and the lingual separation between the metaconid and the entoconid is abrupt and wide, well marked. The m2 is larger and more hypsodont than the m1, with a less developed mesial cingulid and ectostylid. Both molars show flattened lingual cusps with non-aligned cristids. The post-protocristid fuses with the pre-entocristid and the pre-hypocristid. Although the m3 has not erupted yet, the non-aligned position of the lingual cusps is clearly visible.

Discussion

One of the most conspicuous features of the Batallones-1 bovid is its large size, which exceeds

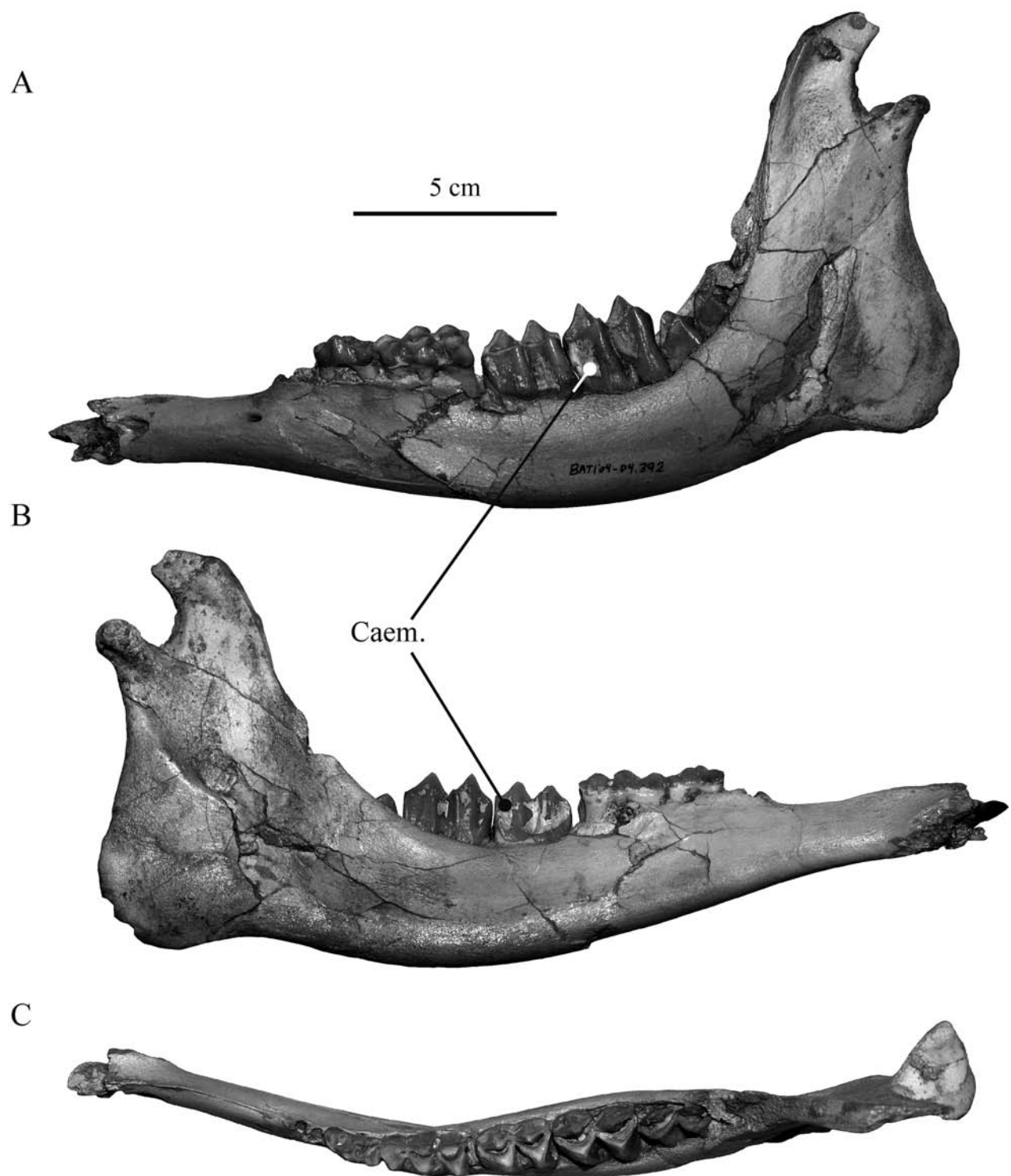


Fig. 2.—*Austroportax* sp. from Batallones-1 (Madrid Basin, upper Miocene, MN 10), hemimandible and lower dentition. A, BAT1'04.D4-392, left hemimandible, in buccal view; B, BAT1'04.D4-392 in lingual view; C, BAT1'04.D4-392 in occlusal view. Abbreviations: Caem., caementum layer.

that of the more common European bovids from the late Aragonian-Vallesian such as e.g. *Protragocerus chantrei* Deperet, 1887, *Miotragocerus monacensis* Stromer, 1928 and *Miotragocerus pannoniae* (Kretzoi, 1942). The exception is the large sized *Austroportax latifrons* (Sickenberg, 1929), from the Austrian site of Hollabrunn. Moyà-Solà (1983) included into this species additional fossils from the Spanish Vallesian, including dental material of equivalent size to that of the Batallones-1 sample. This material comes from the sites of Ballestar (MN 9), Hostalets de Pierola superior (MN 9) y Terrasa (MN 10) all from the Vallès-Penedès Basin in Spain. However, the Batallones-1 bovid is still larger than the cf. *Austroportax* from Ballestar and Hostalets de Pierola.

The dental morphology of the Batallones-1 bovid is a mixture of apparently conservative and advanced characters. As in basal forms such as *Eotragus*, Batallones-1 bovid has upper molars with well separated lingual lobes and well developed styles. Also, the lower molars have relatively strong ectostylids, the lingual cusps are not aligned, and the metastylids are well developed. In all these features it recalls a more hypsodont and very large version of *Eotragus*. However, the presence of the cementum covering in the permanent molars is an advanced feature hitherto not described in the genus, so it could be either an autoapomorphic feature of the Batallones-1 bovid or a preservation / preparation bias in the remaining *Austroportax* fossils. The dental morphology of the Batallones-1 bovid studied herein is very similar to that described by Moyà-Solà (1983) for his *Austroportax* sp. from Terrasa and Ballestar. Thus, taking this into account together with the large size, we decided to assign the bovid remains from Batallones-1 to the genus *Austroportax*.

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