

First occurrence of *Pampatherium* (Xenarthra: Pampatheriidae) from the El Cedazo creek, Aguascalientes, Mexico

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Abstract: The glyptodontid *Pampatherium* is currently known from Pleistocene and Pliocene deposits in the State of Mexico, Puebla, Jalisco and Guanajuato. Recently, from the Late Pleistocene locality of El Cedazo creek (Aguascalientes), has revealed fragmentary remains assigned by its anatomical characteristics to the genus *Pampatherium*. The recovered specimen consists of an articulated anterior left fragment of the carapace comprising 78 osteoderms, which display the diagnostic ornamentation of the genus including a depressed central area, attenuated ornamentation, reduced or absent marginal band, as well as a general rectangular shape. These morphological characteristics clearly support assignment to the genus *Pampatherium* and distinguish the material from *Holmesina*, which has been previously reported from the El Cedazo Local Fauna. However, the absence of cranial or dental material and the potential influence of ontogenetic variation preclude a confident species-level identification. Accordingly, the specimen is referred to *Pampatherium* sp. This finding represents the first confirmed record of the genus in the state of Aguascalientes and provides new evidence of the presence of pampatheriids in the El Cedazo Local Fauna.

Keywords: *Pampatherium*, Pleistocene, El Cedazo, Aguascalientes, Mexico

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INTRODUCTION

Pampatheriids are an extinct group of large cingulate xenarthrans, closely related to modern armadillos, that were widespread in South and North America during the Neogene and Quaternary. Their fossil record is primarily represented by dermal armor (osteoderms), cranial remains, and associated postcranial elements, which document a radiation of medium- to large-sized, heavily armored mammals occupying open and semi-open habitats throughout much of the Pliocene–Pleistocene (Edmund, 1987; Scillato-Yané *et al.*, 2005).

Within Pampatheriidae, the genus *Pampatherium* Ameghino, 1875 includes some of the largest and best-known forms of Xenarthra, characterized by a carapace divided into scapular and pelvic shields with movable bands, robust limbs adapted for digging, and a distinctive dentition with posterior molariforms displaying complex lobulation patterns that vary among pampatheriids, in contrast to the relatively simple peg-like cheek teeth of most extant armadillos (Bostelmann and Carlini, 2010).

Traditionally, three species are recognized within *Pampatherium*: *P. humboldtii* and *P. typum* from the Late Pleistocene of South America (mainly Brazil, Uruguay, and Argentina), and *P. mexicanum*, the only species documented in North America (Edmund, 1996; Scillato-Yané, *et al.* 2005). Species-level identification within *Pampatherium* relies largely on osteoderm morphology, including the development of the central figure, marginal and submarginal bands, and overall ornamentation patterns. These characters are particularly important when only carapace elements are preserved, as is commonly the case in extinct cingulates (Wolf *et al.*, 2012; Ferreira *et al.*, 2025).

In Mexico, pampatheres are a recurrent component of Late Pleistocene mammalian assemblages. *Pampatherium* has been reported from several localities in central and northern Mexico, including Sonora and Puebla, where it occurs in association with typical Rancholabrean faunas (Mead *et al.*, 2007; Tomas-Mosso *et al.*, 2024). Additional records from localities such as Chazumba (Oaxaca) further highlight the ecological and geographic distribution of the genus in the region (Viñas-Vallverdú *et al.*, 2017). Nevertheless, its distribution remains incompletely documented in several areas of central Mexico.

The El Cedazo Local Fauna, located near the city of Aguascalientes, represents one of the commonly recognized Late Pleistocene assemblages in central Mexico, including a diverse mammalian fauna composed of proboscideans, equids, camelids, cervids, carnivores, and small mammals (Mooser, 1958). Previous reports of armored xenarthrans from this locality assigned isolated osteoderms to *Holmesina septentrionalis*, but these identifications were not supported by detailed descriptions or illustrations (Mooser, 1958; Mooser and Dalquest, 1975). Consequently, the presence of *Pampatherium* in the El Cedazo deposits has remained uncertain.

Here, we describe an articulated anterior portion of a pampatheriid carapace from El Cedazo creek, comprising 78 osteoderms that exhibit diagnostic features of *Pampatherium*. Based on osteoderm morphology, the specimen is referred to *Pampatherium* sp. This finding represents the first confirmed occurrence of the genus in the state of Aguascalientes and provides new insights into the taxonomic composition of the El Cedazo Local Fauna and the biogeographic distribution of pampatheriids in central Mexico.

Institutional Abbreviations: PF = Catalogue prefix for specimens accessioned in the paleontological collection of the Instituto Nacional de Antropología e Historia.

GEOLOGICAL SETTING

The El Cedazo locality is situated on the eastern margin of the city of Aguascalientes, central Mexico, where Quaternary deposits are exposed along El Cedazo creek and its tributaries (Hernández-Láscars, 1981; Guzmán-Gutiérrez *et al.*, 1997) (Fig. 1). The area lies within the Aguascalientes Basin, a tectonic depression of the southern Sierra Madre Occidental, filled with Neogene–Quaternary volcanic and volcano-sedimentary deposits (Hernández-Láscars, 1981; Montellano-Ballesteros, 1992; Guzmán-Gutiérrez *et al.*, 1997).

The stratigraphic succession exposed at El Cedazo includes, at the base, the Zoyatal Tuff, an acidic pyroclastic unit. This unit is overlain discordantly by the Aguascalientes Sandstone–Conglomerate, composed of fluvial sediments derived from volcanic sources. These deposits are in turn covered by Pleistocene alluvial sediments, which constitute the main fossil-bearing horizons at the locality (Hernández-Láscars, 1981; Guzmán-Gutiérrez *et al.*, 1997).

The fossil assemblage from El Cedazo has been correlated with the Rancholabrean North American Land Mammal Age (Late Pleistocene), based on its mammalian composition (Hernández-Láscars, 1981; Guzmán-Gutiérrez *et al.*, 1997).

MATERIALS AND METHODS

The material described herein was collected by the first author during the 2004 field season at the El Cedazo locality, Aguascalientes, Mexico. The specimen consists of a partially articulated anterior portion of a pampatheriid carapace, preserved in situ within a reddish-brown sandstone layer. Due to the articulated condition of the osteoderms, the specimen was stabilized and extracted as a single block using standard field techniques. A plaster jacket was applied to prevent displacement or separation of the osteoderms during transport.

Mechanical preparation was conducted under a stereomicroscope using fine needles and soft brushes to remove the surrounding matrix. In areas where the bone was fragile, a consolidant solution of Paraloid B-72 diluted in acetone was applied to stabilize the osteoderms.

Morphological observations and measurements were carried out using a digital caliper. Osteoderm terminology and descriptive criteria follow Edmund (1996) and recent revisions of pampatheriid osteoderm morphology (e.g., Ferreira *et al.*, 2025).

The specimen is housed in the paleontological collection registered with the Instituto Nacional de Antropología e Historia (INAH) under catalog number PF-1332, under the curatorial responsibility of José Rubén Guzmán Gutiérrez, Aguascalientes, Mexico.

Photographic documentation was obtained using a Canon EOS Rebel T2i camera equipped with a Canon Zoom Lens EF 35–80 mm (f/4–5.6), with macro filters for close-up imaging.

SYSTEMATIC PALEONTOLOGY

Xenarthra Cope, 1889

Cingulata Illiger, 1811

Pampatheriidae Paula Couto, 1954

Pampatherium Gervais and Ameghino, 1880

Pampathierum sp.

Material. Anterior portion of articulated carapace (PF-1332-3201). The material is housed in the collection registered with INAH under the number PF-1332, under the responsibility of José Rubén Guzmán Gutiérrez, in Aguascalientes.

Horizon and Locality. Late Pleistocene (Rancholabrean) of El Cedazo creek, Aguascalientes, Mexico.

Description

The specimen corresponds to the anterior portion of the carapace, preserved in articulation, and composed of a total of 78 osteoderms, including 67 fixed central elements and 11 marginal plates (Fig. 2). The preserved fragment measures 32.1 cm in width and 26.2 cm in length, being notably wider than long. In dorsal view, the specimen exhibits a broadly U-shaped outline and a marked internal concavity, consistent with the morphology of the scapular buckler in pampatheriids.

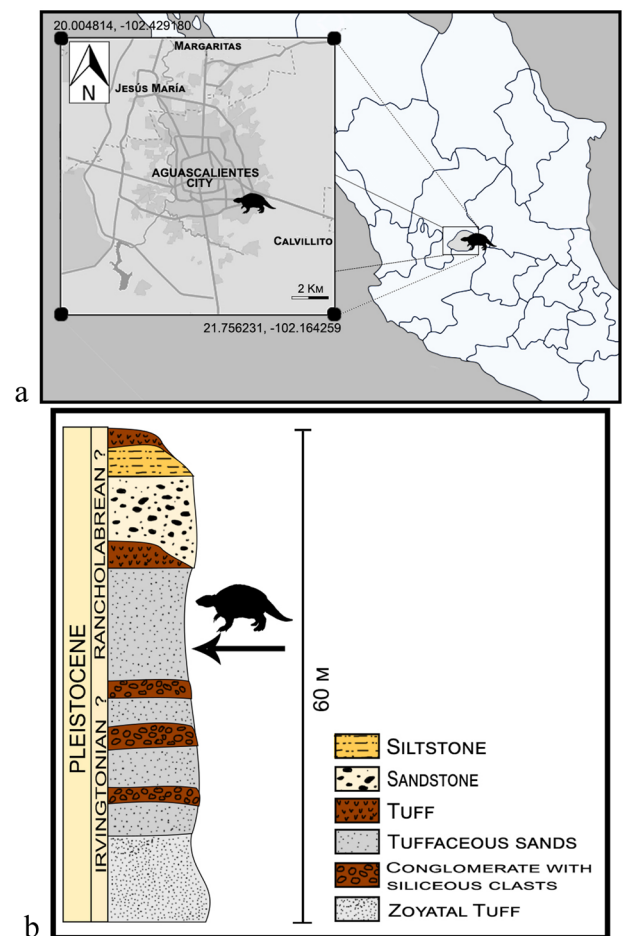


Figure 1. a) Locality map and b) stratigraphic column of the El Cedazo locality, Aguascalientes, Mexico, showing the lithological succession and the position of the *Pampatherium*-bearing level within Pleistocene deposits.

The osteoderms are polygonal in outline, ranging from pentagonal to hexagonal, and display thickness values between 7.85 and 8.93 mm, consistent with anterior fixed osteoderms of *Pampatherium* (Rincón *et al.*, 2008). The external surface is nearly flat, lacking a well-developed central figure or conspicuous ornamentation. The central figure, when present, is extremely low, broad, and does not rise posteriorly, a condition typical of the genus (Fig. 3).

A submarginal band is faintly developed in several osteoderms, appearing slightly elevated above the marginal region and delimiting a shallow sulcus of variable expression. This sulcus is weakly defined, consistent with the condition observed in *Pampatherium*, where it may be shallow or nearly imperceptible (Rincón *et al.*, 2008). The marginal band is narrow and poorly developed, becoming reduced or absent posteriorly in some osteoderms.

In the best-preserved marginal osteoderms, particularly on the right side, small follicular pits are visible, predominantly arranged along the anterior margin. These pits are shallow and numerous, matching the condition described for *Pampatherium*. Marginal osteoderms exhibit a more pronounced inward curvature, reflecting their position along the anterior edge of the carapace. In several cases, sutural contacts between marginal and adjacent central osteoderms are clearly preserved, forming angular junctions between plates.

The ventral surfaces of the osteoderms are smooth and lack ornamentation. Increased bone porosity is observed toward the distal margins of several plates, likely reflecting taphonomic processes. Based on osteoderm size and thickness, the specimen likely represents a subadult or adult individual.

Systematic remarks. The combination of characters observed in the specimen (including polygonal osteoderms, weak ornamentation, reduced marginal and submarginal bands, and a broad, low central figure) clearly supports assignment to the

genus *Pampatherium* and distinguishes it from *Holmesina*, which exhibits more robust ornamentation, well-developed marginal bands, and a higher, more prominent central figure.

However, the absence of cranial or dental material, together with the fragmentary nature of the carapace and the potential influence of ontogenetic variation on osteoderm morphology, precludes a confident assignment at the species level. Consequently, the specimen is conservatively referred to *Pampatherium* sp.

DISCUSSION

The specimen described herein exhibits a suite of osteoderm characters that are clearly diagnostic of the genus *Pampatherium*. These include a broad and low central figure, weak or absent ornamentation, a reduced marginal band, and an overall rectangular to subrectangular osteoderm outline. Such features are consistent with those described for *Pampatherium* by Edmund (1996) and subsequent studies, and contrast markedly with the more robust and highly ornamented osteoderms of *Holmesina*.

In *Holmesina*, osteoderms are typically characterized by a well-developed and elevated central figure, a broad and strongly expressed marginal band, and a conspicuous submarginal band delimiting a well-defined sulcus. In addition, ornamentation tends to be more pronounced, and osteoderms often exhibit polygonal outlines, commonly hexagonal (Edmund, 1985, 1987, 1996). These features are not observed in the El Cedazo material, which instead conforms closely to the morphology of *Pampatherium*.

Previous reports of pampatheriids from the El Cedazo Local Fauna assigned isolated osteoderms to *Holmesina septentrionalis* (Mooser, 1958; Mooser and Dalquest, 1975). However, these identifications were not supported by detailed descriptions or illustrations, and therefore remain difficult to evaluate. Given the clear morphological differences between *Holmesina* and *Pampatherium*, it is plausible that some of the material previously attributed to *Holmesina* may instead correspond to *Pampatherium*, or represent taxonomically indeterminate pampatheriid remains. This interpretation is supported by recent studies emphasizing the potential for misidentification when osteoderms are analyzed in isolation and without rigorous comparative frameworks (Rodríguez-Bualó *et al.*, 2014; Jiménez-Lara, 2020; Ferreira *et al.*, 2025).

Although the generic assignment is well supported, species-level identification remains uncertain. The absence of

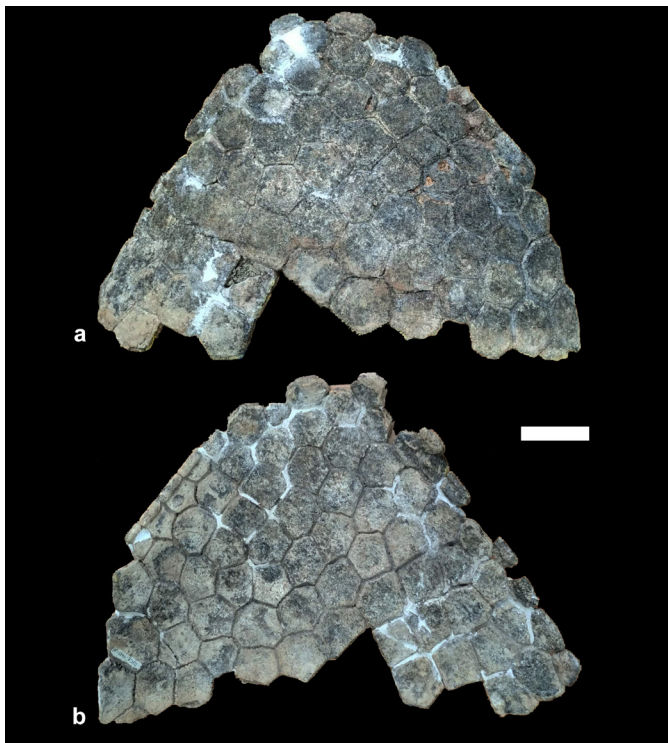


Figure 2. *Pampatherium* sp. carapace (PF-1332-3201) in: a) dorsal and b) ventral views. Scale = 5cm.



Figure 3. Close up of carapace in its dorsal view. Scale = 1cm.

cranial and dental material, combined with the fragmentary nature of the carapace, limits the availability of diagnostic characters. Furthermore, ontogenetic variation may influence key osteoderm features, including thickness, ornamentation, and the development of marginal and submarginal bands. The specimen described here may represent a subadult individual, and some observed characters may therefore not fully reflect adult morphology. Consequently, the material is conservatively referred to *Pampatherium* sp.

This finding represents the first confirmed occurrence of *Pampatherium* in the state of Aguascalientes and provides new evidence for the presence of pampatheriids in the El Cedazo Local Fauna. More broadly, it highlights the need for a systematic reexamination of previously collected material from the locality, incorporating detailed morphological analysis and updated taxonomic criteria. Such efforts will be essential for refining the composition and paleoecological interpretation of this important Late Pleistocene assemblage.

CONCLUSION

The material described herein represents the first confirmed record of *Pampatherium* in the state of Aguascalientes. Although species-level identification is not possible based on the available material, the specimen clearly demonstrates that the pampatheriid component of the El Cedazo Local Fauna includes *Pampatherium* rather than *Holmesina*, as previously suggested.

This record provides new evidence for the presence of pampatheriids in central Mexico during the Late Pleistocene and contributes to a more accurate understanding of the taxonomic composition of the El Cedazo assemblage. Furthermore, it highlights the need for a systematic reassessment of previously collected material from the locality, particularly isolated osteoderms, using updated morphological and comparative criteria.

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