



First record of *Bison antiquus* from the Late Pleistocene of southern Mexico

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ABSTRACT

In Mexico, just 54% of the reported Pleistocene *Bison* material has been identified to species. Current paleontological research in northwestern Oaxaca, southern Mexico, has allowed collection of several specimens of *Bison antiquus* that are part of the Viko Vijin Local Fauna. *B. antiquus* had a very wide geographic distribution, from lowlands to mountainous landscapes of North and Central America. The *B. antiquus* record from southern Mexico links their former records from central Mexico and middle Central America and confirms this wide geographic distribution. The univariate mesowear score of the *B. antiquus* specimens from Oaxaca is in the lower extreme of grazers and the upper end of mixed-feeders, suggesting that they had a less abrasive diet than the modern plains *Bison*, as has been observed in other samples of this species from diverse parts of North America. The presence of *B. antiquus* in the Viko Vijin L. F. constrains the age of this fossil assemblage within a range from 60 Ka to 11.7 Ka.

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1. Introduction

One of the most conspicuous artiodactyls in the Late Pleistocene faunas from North America is *Bison* Smith, 1827. It is so common that it represents the mammalian index fossil of the Rancholabrean North American Land Mammal Age below 55° Lat. N (Bell et al., 2004). The genus originated in Asia during the late Pliocene and dispersed into North America by the early late Pleistocene (McDonald, 1981).

Because the taxonomic level of subspecies implies a degree of phylogenetic precision that is rarely found from the fossil record (Scott and Cox, 2008) we preferred to use specific names for the diverse *Bison* taxa. At present, there are six *Bison* species recognized in the Quaternary of North America: *Bison latifrons*, *Bison antiquus*, *Bison occidentalis*, *Bison alaskensis*, *Bison priscus* and *Bison bison*; the last one still is present in North America, represented by two subspecies: *B. bison bison* (the plains bison) and *B. bison athabascae* (the wood bison) (McDonald, 1981; Meagher, 1986; Pinsof, 1991).

In Mexico there are several records of Late Pleistocene *Bison* remains in the northern states of Baja California Norte, Baja California Sur, Sonora, Chihuahua, Coahuila and Nuevo León, as well as

in the central states of Jalisco, Nayarit, Guanajuato, Aguascalientes, San Luis Potosí, Morelos, Hidalgo, Estado de Mexico, Puebla and Distrito Federal. In southern Mexico there are few reports of *Bison* from the states of Chiapas and the Yucatán Peninsula, whereas in Oaxaca there are just two reports of the genus (Ferrusquía-Villafranca, 1970; Quevedo-Robles and Quevedo de Henell, 2001; Arroyo Cabrales et al., 2005; Carbot-Chanona and Vázquez-Bautista, 2006). Detailed records of Pleistocene *Bison* species and associated fauna are available in Arroyo Cabrales et al. (2005) and were summarized in Ferrusquía-Villafranca et al. (2010).

Just 54% of all these Mexican *Bison* records have been assigned to any of the Quaternary species: *B. antiquus* is known from some localities in northwestern and central Mexico, *B. alaskensis* is recorded in several localities from central Mexico, *B. latifrons* is known from some localities in northwestern and central Mexico and *B. bison* has been recorded in northern, northwestern, central and southeastern Mexico (Arroyo Cabrales et al., 2005; Ferrusquía-Villafranca et al., 2010). This, together with the meagre record of this genus from southern Mexico, indicates its poor knowledge in the country, especially in the southern Mexican states.

Ongoing research of the Pleistocene faunas from northwestern Oaxaca, southern Mexico, has allowed us to discover several localities with fossil *Bison* material. The purpose of this paper is to describe these cranial and postcranial specimens and to discuss the paleobiological significance of these new records from Oaxaca, southern Mexico.

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2. Geologic setting

The study area is within the Sierra Madre del Sur physiographic province and the Tierras Altas de Oaxaca sub-province, between 17°26'–17°55'N and 97°20'–97°40'W, within the Mixteca Alta region (Fig. 1).

The fossil specimens were collected from silty clay, silty sand, and fine- and medium-grained sands that were deposited as

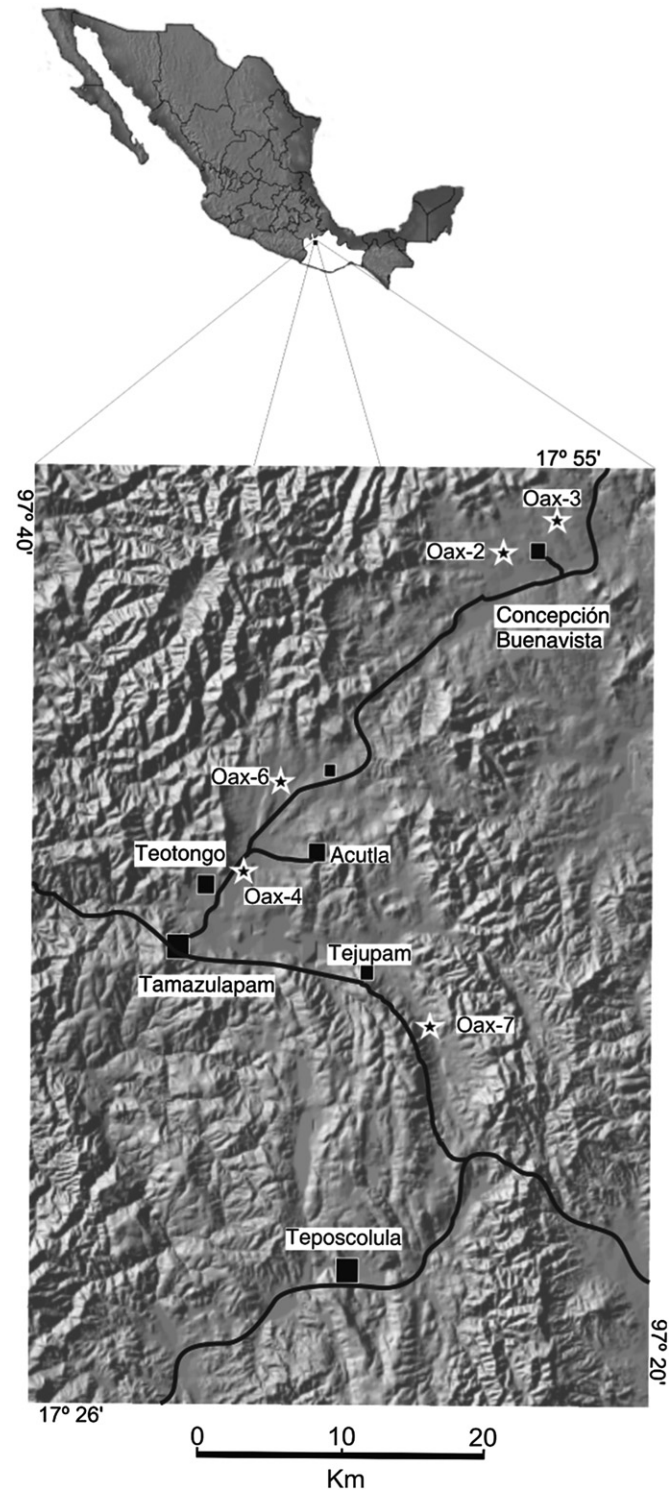


Fig. 1. Relief map of the study area in northwestern Oaxaca showing the main towns and the *Bison antiquus* localities Oax-2, Oax-3, Oax-4, Oax-6 and Oax-7.

floodplain and fluvial bar sequences. These sediments overlie Eocene and Oligocene rocks and Paleogene rocks that unconformably overlie Cretaceous limestones. The fossiliferous beds are overlain by Quaternary silty to sandy sediments with gravel lenses (Jiménez-Hidalgo et al., 2011).

The associated fauna from the same beds where the *Bison* fossils were collected includes ostracodes, gastropods, bivalves, amphibians, lizards, snakes, glyptodonts, rodents, camels, cervids, equids and proboscideans, which together constitute the RanchoLabrean Viko Vijin Local Fauna from the Mixteca Alta of Oaxaca, which has been broadly described (Jiménez-Hidalgo et al., 2011; Jiménez-Hidalgo and Guerrero-Arenas, 2012).

3. Materials and methods

The fossil specimens described in this paper consist of isolated upper and lower teeth, a cranium, a partial horn core and several isolated postcranial elements. The isolated specimens were collected through surface pickup while the larger ones were collected in situ with plaster jackets.

The fossils were prepared at Laboratorio de Paleobiología, Instituto de Recursos, campus Puerto Escondido, Universidad del Mar, using standard paleontological techniques. The *Bison* specimens are housed in the Colección Científica del Laboratorio de Paleobiología, campus Puerto Escondido, Universidad del Mar, with the acronym UMPE.

To identify the *Bison* bone elements we used the *Bison* osteology web-pages from the University of Wyoming and the Colorado State University (Todd, 2012; Virtual Bison, 2012).

Taxonomic identification of the studied specimens was based on the character states and measurement ranges described in McDonald (1981), McDonald and Lammers (2002) and Wilson et al. (2008).

Cranial measurements follow McDonald (1981); postcranial measurements follow von den Driesch (1976). The dental nomenclature follows that of Bärmann and Rössner (2011).

The measurements of teeth were taken with a caliper as maximum lengths and widths at the occlusal surface. Upper and lower teeth are represented by upper and lower case: P/p (premolar), M/m (molar).

All measurements are expressed in millimeters (mm). In the molars and premolars measurement abbreviations are: L, length; W, width. Vertebral measurement abbreviations are: GLc, greatest length of vertebrae centra; GLPa, greatest length from the prezygapophyses to the postzygapophyses; BPacr, greatest breadth across the prezygapophyses; BPacd, greatest breadth across the postzygapophyses; BPtr, greatest breadth across the transverse processes; HFcr, greatest height of the facies terminalis cranialis; HFcd, greatest height of the facies terminalis caudalis; BFcr, greatest breadth of the facies terminalis cranialis; BFcd, greatest breadth of the facies terminalis caudalis; APs, anteroposterior diameter at the base of spine.

Humerus measurement abbreviations are: L, length; AP min, minimum diameter of diaphysis; Trans min, minimum transverse diameter of diaphysis; RD3, greatest proximal transverse diameter; RD4, transverse breadth of proximal articular facet; RD9, greatest proximal anteroposterior diameter.

Abbreviations of measurements of the pelvis are: GL, greatest length; SB, smallest breadth of the shaft of the ilium; SBI, smallest breadth across the bodies of the ischia; SH, smallest height of the shaft of the ilium; SC, smallest circumference of the shaft of the ilium; LA, length of the acetabulum including the lip.

Additional abbreviations include: C5, fifth cervical vertebra; C7, seventh cervical vertebra; Ka, kiloannum; L. F., Local Fauna; MMMN V, Manitoba Museum of Man and Nature, Vertebrates; UF, Florida

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