



New records of temperate mollusks in two Late Pleistocene terrestrial localities from northeastern Oaxaca, Southern Mexico



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ABSTRACT

The Mixteca Alta Oaxaqueña is in the state of Oaxaca, southern Mexico. This region is characterized by numerous Pleistocene fossiliferous localities. The objective of this study is to describe a diverse assemblage of Late Pleistocene freshwater and terrestrial mollusks in two localities from northeastern Oaxaca, Coixtlahuaca District. We identified 10 taxa of gastropods and one of bivalves. By the sedimentological characteristics and the mollusks assemblage, it is possible to relate the first locality with meandriform river deposits, without vegetation. The second locality was associated with a floodplain with short-lived associated vegetation. Five identified species constitute the most austral records of these taxa in Neartic Realm. In all the taxa, the Late Pleistocene occurrences constitute the last records of the identified mollusks in the study zone.

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1. Introduction

The state of Oaxaca, located in southern Mexico, is the Mexican state with the largest biological diversity in the country. In addition, it has an extensive fossil record due to its complex geologic history.

The Mixteca Alta Oaxaqueña is a unique area with a great diversity of fossiliferous continental deposits. The age of these deposits range from Jurassic to Late Pleistocene. The district of Coixtlahuaca is situated inside Mixteca Alta Oaxaqueña, in northwestern Oaxaca, Southern Mexico (17° 43' N, 97° 19' W) (Fig. 1).

In 2011, a vertebrate and invertebrate fossil assemblage from fluvial deposits in this zone and adjacent areas was preliminarily described (Jiménez-Hidalgo et al., 2011). This assemblage has several fossils of vertebrates, mainly from large and medium-sized mammals. Gomphoteres, horses, camels, proboscideans and bison species have been reported (Jiménez-Hidalgo et al., 2011, 2013). In addition to these large mammals, terrestrial and freshwater mollusks are also present, as well as diverse microvertebrates, like rodents and lizards. This local fauna was preliminary described as the Viko Vijin local fauna (Jiménez-Hidalgo et al., 2011). In that study, the authors identified eight families of terrestrial and freshwater gastropods, as well as one of freshwater bivalves.

After the first prospection, the area has been under continued exploration, resulting the collection of many specimens of invertebrate fossils. The objective of this study is to report the continental and freshwater assemblage of two localities in the Coixtlahuaca district, in the outskirts of Concepción Buenavista town. This is the first formal report of a Late Pleistocene continental molluscan faunule in Oaxaca State. The invertebrate fossils were taxonomically identified and an environmental interpretation is suggested. Their distribution ranges, in many cases, are extended geographically into southern Mexico.

2. Material and methods

2.1. Study area

Mixteca Alta is a political and economic territory established between eastern Guerrero, southwestern Puebla and northwestern Oaxaca States, in southern Mexico. This region is within a great mountain system named Complejo Oaxaqueño or Nudo Mixteco (González-Leyva, 2007). The Mixteca is divided into two areas, Mixteca Alta ("High Mixteca") and Mixteca Baja ("Low Mixteca"). The distinction between them is based on the altitude above sea level. Mixteca Baja Oaxaqueña includes areas less than 1500 m above sea level (masl) and Mixteca Alta is all the territory higher than 1500 masl.

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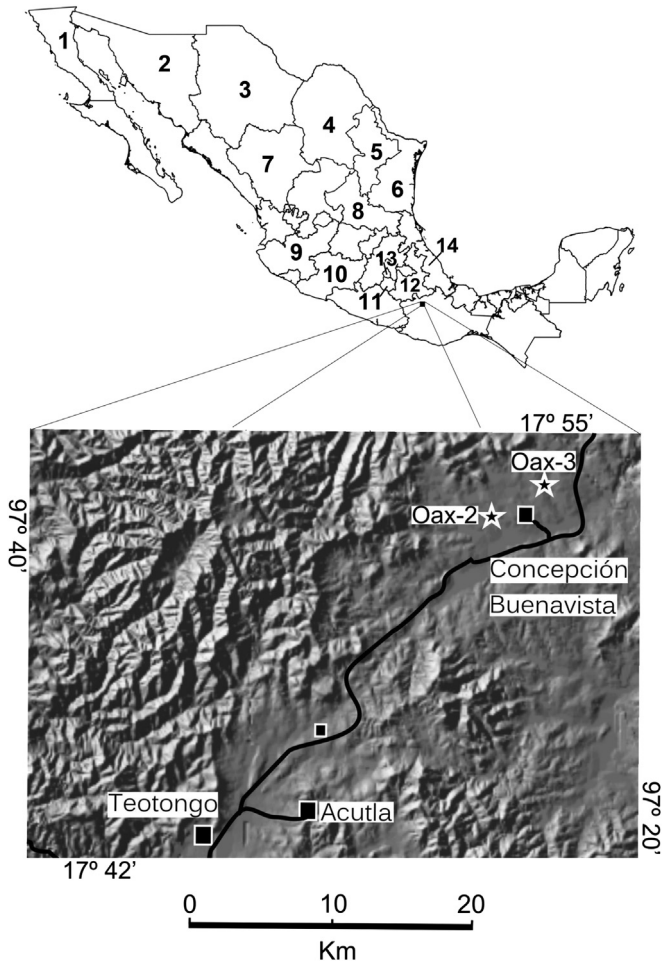


Fig. 1. Study area in Mixteca Alta Oaxaqueña, Southern Mexico. Mexico included the mentioned states in the text. 1) Baja California, 2) Sonora, 3) Chihuahua, 4) Coahuila, 5) Nuevo León, 6) Tamaulipas, 7) Durango, 8) San Luis Potosí, 9) Jalisco, 10) Michoacán, 11) Morelos, 12) Puebla, 13) Distrito Federal, 14) Veracruz. Description: Study zone and the referenced states in the text related to the species distribution.

Coixtlahuaca District is in the northwest sector of Mixteca Alta Oaxaqueña. Coixtlahuaca has 13 municipalities, and Concepción Buenavista is one of them. Concepción Buenavista covers 224.41 km² (OEIDRUS, 2012). The distance between Concepción Buenavista and Oaxaca City is 178 km (INAFED, 2005).

The vegetation in Concepción Buenavista is composed of semi-desertic vegetation in the lowest areas and temperate vegetation in the highest areas. The soils are composed of clay and hardplan; carbonate cambisol soils are also present. The main economic activity in the area is agriculture (INAFED, 2005). Fossiliferous outcrops are located in ravines and river deposits and consists of continental sediments of Tertiary and Quaternary age.

2.2. Geologic setting

The studied localities are Oax-2 El Pedernal and Oax-3 La Pedrera. Both are located in proximity of the Concepción Buenavista boundaries.

In locality Oax-2 El Pedernal, the stratigraphic sequence begins with a stratified olive green compact tuff. Above this level, a stratified stratum of brown-yellow siltstone appears discordantly, with an approximate height of 0.8 m. The Pleistocene fossiliferous beds discordantly overlay the siltstone level, with thickness of 3–4 m. The Pleistocene beds are composed of fine to medium

sandstone, with breccias and silt lenses. In the middle of the stratum there are caliche nodules. The fossils are in the lower part of the strata. At the top of the sequence, the sandstone appears like a massive bed. Above this bed, there is a bed of soil with a thickness of 0.4 m (Fig. 2).

In locality Oax-3 La Pedrera, the bottom of the sequence is made up of a yellow fine-grained laminated tuff-sandstone level. This 2.0 m stratum appears discordantly below a level of breccias composed of basalt clasts and a sandy matrix. Above this level, the Pleistocene fossiliferous strata lie discordantly. They are composed by a compact pale yellow clay-silty bed, with gravel and fine-grained sandstone lenses. The fossiliferous strata contain caliche nodules that are 3–5 m high. Above this level, there is a breccia stratum with basalt clasts and sandy matrix, with 0.5 m of height. Finally, at the top of the sequence there is a soil stratum of 0.3 m in height. (Fig. 3).

2.3. Sampling

The specimens were collected in two localities from 2009 to 2012 in different field seasons. In Oax-2 El Pedernal, the fossiliferous level was at the bottom of the sandy bed. In Oax-3 La Pedrera, the fossils are in the middle level of the silty sand bed.

The specimens that measured 0.75 cm or more were collected directly from fossiliferous levels by hand picking. Screen washing of

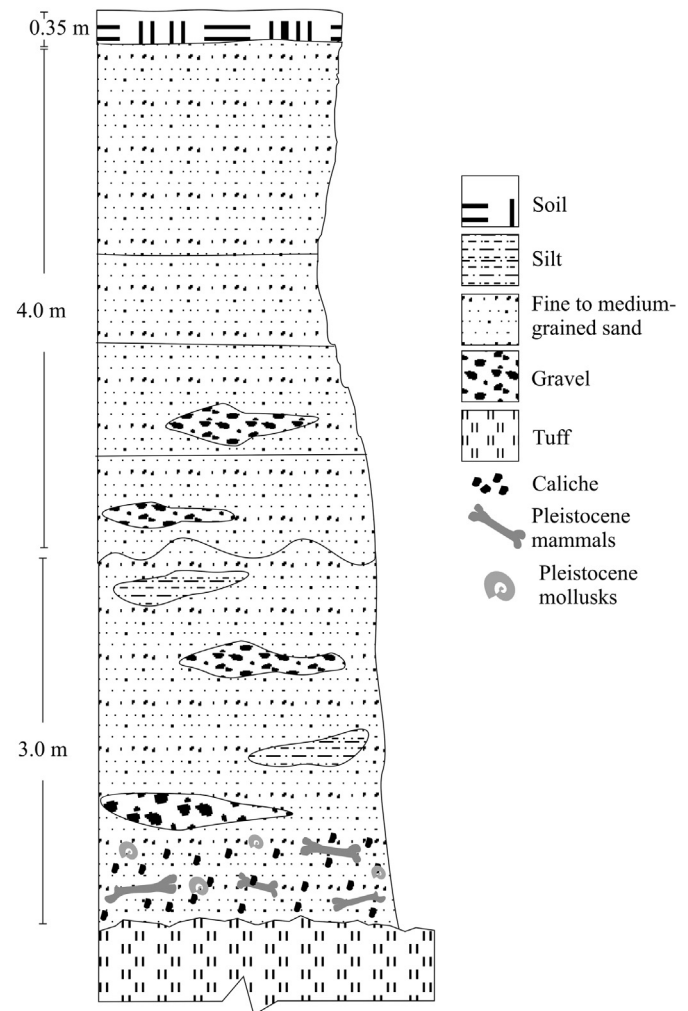


Fig. 2. Stratigraphical section of locality Oax-2 El Pedernal. Description: Section with main stratigraphic features of this locality.

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