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## Mammoths in Central America: New records from Guatemala

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### ABSTRACT

The remains of the Columbian Mammoth, *Mammuthus columbi*, are reported from four localities in Guatemala based on seven dental records. These localities are widely separated and include one specimen from Río La Pasión, Sayaxché, Departamento de Petén in the northern part of the country, one specimen from Chinautla, Departamento de Guatemala in the southwest and four specimens from the vicinity of Estanzuela, Departamento de Zacapa and one from Teculután, Departamento de Zacapa in the southeast. Based on the known records the distribution of *Mammuthus* in Central America tends to be concentrated on the Pacific side of the isthmus and suggests the former presence of a savanna corridor that formed during an interval of decreased precipitation.

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### RESUMEN

Los primeros vestigios de Mamuts, *Mammuthus columbi*, se han reportado de cuatro localidades en Guatemala, muy distantes entre ellas: uno procedente de Río La Pasión, Sayaxche Departamento de Petén, en la parte septentrional del país, otro de Chinautla, Departamento de Guatemala en el suroeste, y cuatro de Estanzuela, y uno de Teculután, Departamento de Zacapa, en el sureste. Estos nuevos registros brindan un número total de siete basados en las evidencias dentales conocidas de *Mammuthus* de Guatemala. Basados en el conocimiento de la distribución de Mamuts, en America Central, los registros se centran en la vertiente del pacifico del Itsmo, sugiriendo la presencia de un corredor seco de sabana.

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## 1. Introduction

While mammoths are widely distributed in North America from Canada through the United States (Agenbroad, 2005) and into Mexico (Arroyo-Cabrales et al., 2003) their record in Central America is minimal with only a few scattered records in five of the seven countries. In Mexico mammoths have been studied in more detail (Arroyo Cabrales et al., 2010; Pérez-Crespo et al., 2012; Gutiérrez-Bedolla et al., 2016) but much less is known about them in Central America.

The presence of *Mammuthus* in Central America was first reported by Leidy (1886) as part of a small Pleistocene fauna from

Nicaragua and the genus has subsequently been found in Guatemala, El Salvador, Honduras, and Costa Rica (Laurito and Aguilar, 2007; Lucas and Alvarado, 2010). The recovery of additional mammoth remains in Guatemala provides a stronger geographic link between Mexico and these more southern records and improves our understanding of the southernmost portion of the genus' distribution. As there are other Pleistocene proboscideans, *Cuvieronius* and *Mammot*, present in Central America (Arroyo-Cabrales et al., 2007; Lucas and Alvarado, 2010) and *Cuvieronius* is known from Guatemala (Mead et al., 2012), we have only considered those records of mammoth based on dentition. We recognize that other records of mammoth may exist represented by only the post-cranial skeleton, such as the specimen from Las Banderas, Nicaragua, reported by Lucas (2004). We do not consider these here given the lack of detailed anatomical studies of differences in the post-cranial skeleton of mammoths and the other genera of proboscideans present in Central America and the uncertainty related to taxonomic identifications based on post-cranial

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specimens.

The taxonomic assignment to species of specimens of *Mammuthus* has varied in the past and often reflected the changing opinions on the valid species of North American *Mammuthus* based on both morphological or molecular criteria (Lister and Sher, 2015; Enk et al., 2016). Based strictly on tooth morphology, records of *Mammuthus* from Central America can be referred to *M. columbi*, although some earlier records were referred to the species *M. imperator* (Gutierrez, 1963) and Lucas and Alvarado (2010) recognize a record of *M. meridionalis* from El Salvador. Based on the limited available stratigraphic and chronologic information available for most specimens it seems most likely that most of the *Mammuthus* records in Central America can be considered to be late Pleistocene in age. The new specimens from Guatemala have the meristic and morphological features currently used to diagnose *Mammuthus columbi* and are assigned to this species.

## 2. Abbreviations

INGUAT – Instituto Guatemalteco de Turismo

ME – Museo de Estanzuela, Estanzuela

MUSHNAT – Usac – Museo de Historia Natural de la Universidad de San Carlos de Guatemala, Guatemala City

MNHN – Museo Nacional de Historia Natural (Estatul). Guatemala, City

While some workers use a system of identifying mammoth dentition as M/m 1–6 for the teeth to distinguish them based on the sequence of eruption, we have identified the teeth according to their inferred homology as a premolar or molar. All measurements are in millimeters.

## 3. Description of material

Order Proboscidea Illiger, 1811

Family Elephantidae Gray, 1821

*Mammuthus* Brookes, 1828

*Mammuthus columbi* (Falconer), 1857

### 3.1. Guatemala

The area around Estanzuela is perhaps the richest in Pleistocene vertebrates for Guatemala in terms of the number of specimens of Pleistocene fauna known from a restricted location within the country. However, despite the large number of specimens the species richness is low and limited to megafauna. Along with the mammoth, *Cuvieronius hyodon*, *Eremotherium laurillardii*, *Glyptotherium* cf. *G. floridanus*, *Neochoerus* sp., *Mixotoxodon larensis* and *Equus* sp. are known from the area. All of these taxa are known from the Pleistocene and each one has a long chronological range limiting more precise age assessment of the fauna at this time. While exact locality information is not available, there are four specimens of *Mammuthus* known from the general vicinity of Estanzuela, making it the largest concentration of mammoth from a general area in Central America.

Specimen: Right upper second molar, ME 121 (INGUAT PV-H-36), housed in the Museo de Paleontología y Arqueología “Ingeniero Roberto Woolfolk Saravia”, Estanzuela, Zacapa, (Fig. 1).

Locality: 10 Recado talud de casa Héctor Enrique Pinto, Estanzuela, Departamento de Zacapa, Guatemala. The general location of Estanzuela is 14.9989° N, 89.7078° W, elevation 189 m. (Locality 5, Fig. 7).

Description: The tooth, collected by Benjamin Cabrera and donated to the museum is complete and retains part of the attached

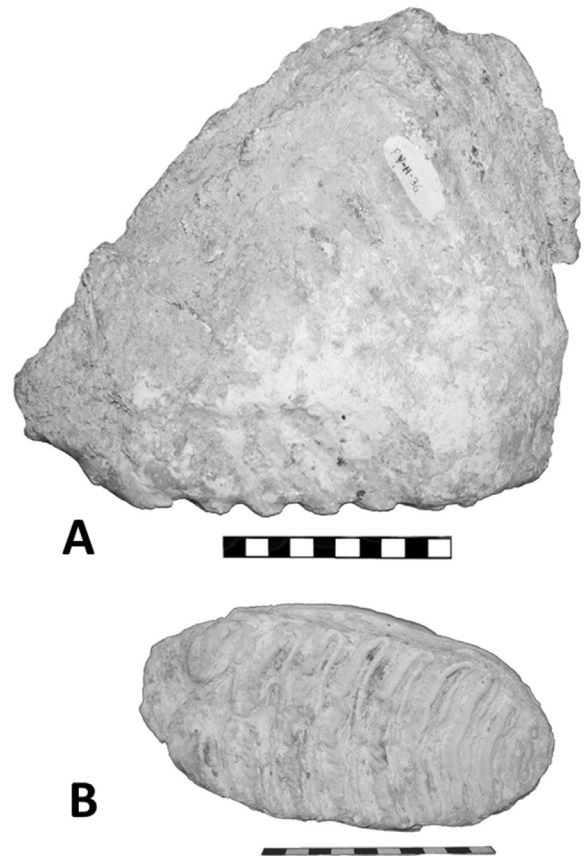


Fig. 1. *Mammuthus columbi*, right upper second molar. Estanzuela, Departamento de Zacapa. ME 121 (INGUAT PV-H-36) in A. lingual, B. occlusal view.

maxilla (Fig. 1). The occlusal surface includes all of the plates comprising the tooth and the entire tooth was erupted with slightly greater wear of the anterior part of the tooth. The total number of plates is 10 and the number of plates per 10 cm is 6. The length of tooth's occlusal surface is 203.7 mm and the width is 93.5 mm. Plate width varies between 8.5 and 11 mm and enamel thickness of the plates between 2.9 and 3.9 mm. Identification of the tooth as a second molar is based on the criteria outlined by Graham (1986) utilizing the number of plates, and the length and width of the tooth.

Specimen: Tooth fragments with the occlusal surface, INGUAT PV-H-36 3, housed in the Museo de Paleontología y Arqueología “Ingeniero Roberto Woolfolk Saravia”, Estanzuela, Departamento de Zacapa.

No locality information, possibly from the vicinity of Estanzuela. (Locality 5, Fig. 7).

Description: The fragments preserve parts of the occlusal surface of a mammoth tooth. The lack of associated locality data limits their usefulness. Based on their preservation, they most likely came from near Estanzuela, Departamento de Zacapa.

Specimen: upper left fourth premolar or first molar (Fig. 2), MNHN Fs-001, identified as molar in the Museo Nacional de Historia Natural. The specimen was collected by Barnum Brown in 1950 and donated to the museum.

Locality: The tooth was collected in the vicinity of Estanzuela, Departamento de Zacapa. but specific locality information was not provided. The general location of Estanzuela is 14.9989° N; 89.7048° W, elevation 189 m. (Locality 5, Fig. 7).

Description: The specimen is complete and has 10–11 plates, with 10 plates exposed and worn. The number of plates in

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