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# 3D models related to the publication: An unpredicted ancient colonization of the West Indies by North American rodents: dental evidence of a geomorph from the early Oligocene of Puerto Rico

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## Abstract

This contribution provides the raw files for the  $\mu$ CT-scan data and renderings of the three-dimensional digital models of two fossil teeth of a geomyin geomorph rodent (*Caribeomys merzeraudi*), discovered from lower Oligocene deposits of Puerto Rico, San Sebastian Formation (locality LACM Loc. 8060). These fossils were described, figured and discussed in the following publication: Marivaux et al. (2021), An unpredicted ancient colonization of the West Indies by North American rodents: dental evidence of a geomorph from the early Oligocene of Puerto Rico. Papers in Palaeontology. <https://doi.org/10.1002/spp2.1388>

**Keywords:** Caribbean islands, Geomorpha, Paleobiogeography, Paleogene, Rodentia

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## INTRODUCTION

We present here the 3D digital models of two dental remains of a fossil rodent (Fig. 1; Table 1) that were recently unearthed in shallow marine Oligocene deposits ( $\sim$ 29.5 Ma; San Sebastian Formation) at locality LACM Loc. 8060, situated on the west bank of Río Guatemala, San Sebastián, Puerto Rico (Vélez-Juarbe et al., 2007, 2014; Vélez-Juarbe and Domning, 2014; Ortega-Ariza et al., 2015; Marivaux et al., 2020). These two specimens (a worn lower molar [LACM 162449; Fig. 1A-C] and a pristine deciduous lower premolar [LACM 162478; Fig. 1D-F]) have allowed the description of a new small-bodied geomyin geomorph (*Caribeomys merzeraudi* Marivaux et al., 2021). This discovery is the only evidence of the presence of this rodent group in the West Indies in the past. The same locality LACM Loc. 8060 had recently yielded dental remains of two distinct fossil species of chinchilloid caviomorphs of South American origin. The discovery of additional isolated teeth of a new rodent species documenting an ancient relative of North/Central American geomyoids (modern kangaroo rats, pocket mice, and pocket gophers; see e.g., Hafner, 1993; Korth, 1994; Hafner et al., 2007) reveals that the past Caribbean rodent diversity (at least during the Paleogene) also derived from North American source, and not exclusively from South America. These rodents (Geomyina and Chinchilloidea) from the early Oligocene of Puerto Rico are the oldest rodents to be found on the Caribbean archipelago thus far.

*Caribeomys* displays a suite of morphological specializations (e.g., very thick enamel layer, cuspids and stylids not well differentiated and interconnected) that makes this insular taxon distinct from known Paleogene mainland representatives of all

Inv nr. (model Id)	Description
LACM162478(M3#712)	Surface model of a right lower dp4
LACM162478(M3#714)	5 $\mu$ m $\mu$ CT data set
LACM162449(M3#713)	Surface model of a right lower molar (m1 or m2)
LACM162449(M3#715)	4.5 $\mu$ CT data set

**Table 1.** List of 3D surface and  $\mu$ CT scans of *Caribeomys merzeraudi*. Collection: Natural History Museum of Los Angeles County (LACM), Los Angeles, USA

so far recognized Geomyina families (Heliscomyidae, Florentiomyidae, Heteromyidae, Geomyidae, and Geomyoidea *incertae sedis*; see e.g., Flynn et al., 2008). As such, the possibility exists that *Caribeomys* is the representative of a separate insular geomyin geomorph lineage (i.e., a distinct West Indian branch). Morphological comparisons indicate that this island lineage diverged for some time from its coeval mainland geomyin counterparts, and likely dispersed toward the West Indies long before its appearance in the Puerto Rican fossil record (during the late Eocene/earliest Oligocene interval). This unexpected rodent adds to the few cases of Antillean terrestrial vertebrates of North American origins. Without clear subaerial land connections between both landmasses, an overwater dispersal probably occurred to explain the mid-Paleogene colonization of the West Indies by geomorph rodents (see Marivaux et al., 2021).

## METHODS

The LACM 162449 molar and LACM 162478 dp4 were scanned with a resolution of 4.5  $\mu$ m and 5  $\mu$ m, respectively, using a  $\mu$ CT-scanning station EasyTom 150 / Rx Solutions (Montpellier RIO

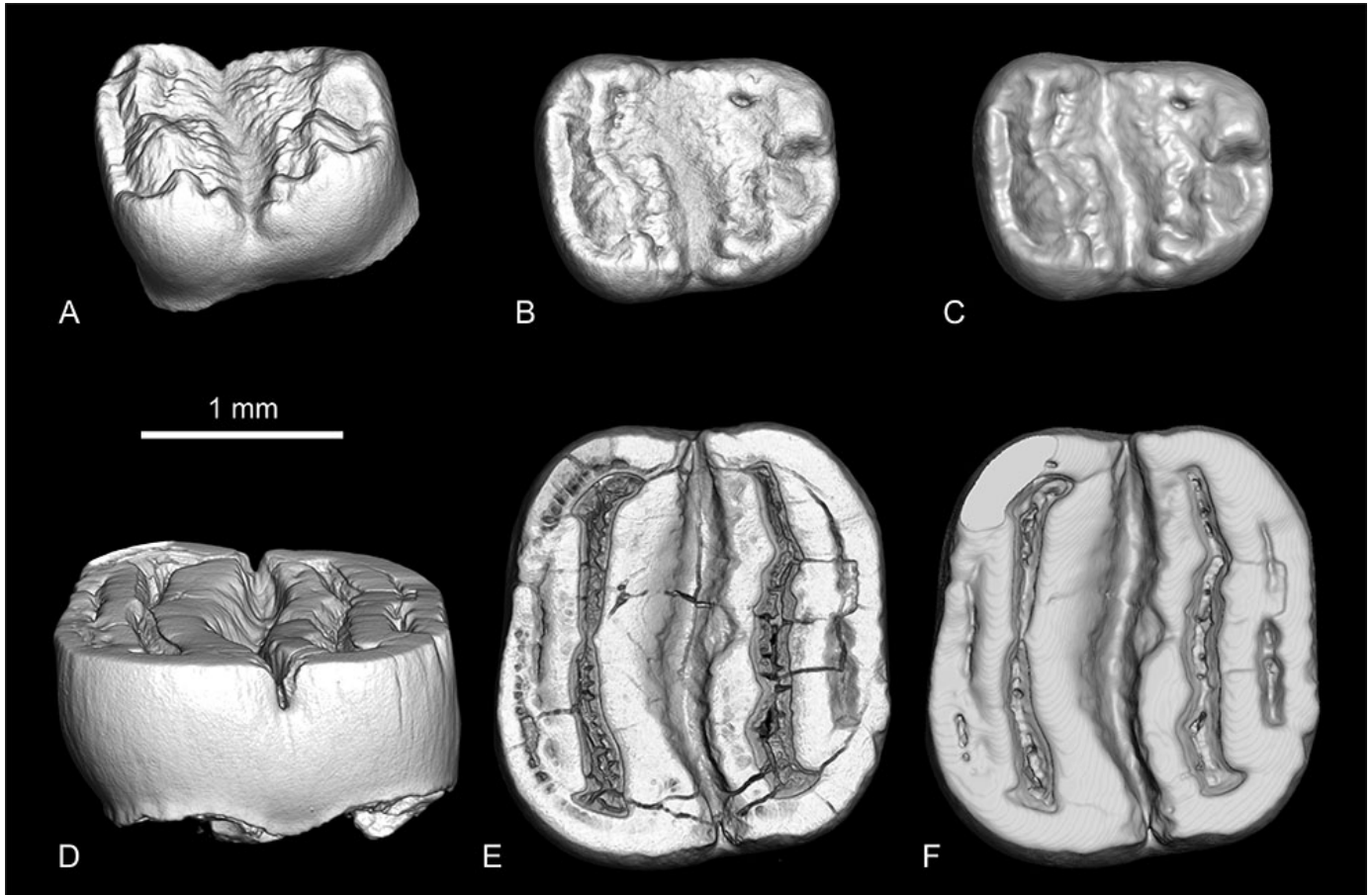
Imaging, ISEM, Montpellier, France). AVIZO 7.1 (Visualization Sciences Group) software was used for visualization, segmentation, and three-dimensional (3D) rendering. The isolated teeth were prepared within a “labelfield” module of AVIZO, using the segmentation threshold selection tool. The 3D models are provided in “.ply” format, and thus can be opened with a wide range of softwares (e.g., MorphoDig 1.5.3., an open-source 3D freeware; Lebrun, 2018; <https://morphomuseum.com/morphodig>).

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**Figure 1.** Fossil dental specimens of *Caribeomys merzeraudi* from the late Early Oligocene of Puerto Rico (San Sebastian Formation). A-C) LACM 162478, right lower dp4 in buccal (A) and occlusal (B-C) views; D-F) LACM 162449, right lower molar (m1 or m2) in buccal (D) and occlusal (E-F) views. Images are renderings of 3D digital models of the fossil specimens, obtained by X-ray micro-computed ( $\mu$ CT) surface reconstructions (A-B and D-E are volume renderings of  $\mu$ CT-scan data; C and F are renderings of segmented surfaces)