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# 3D models related to the publication: The inner ear of caviomorph rodents: phylogenetic implications and application to extinct West Indian taxa.

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## Abstract

This contribution contains the three-dimensional models of the inner ear of the heptaxodontid rodents *Amblyrhiza*, *Clidomys* and *Elasmodontomys* from the West Indies. These specimens were analyzed and discussed in : The inner ear of caviomorph rodents: phylogenetic implications and application to extinct West Indian taxa.

**Keywords:** fossils, Heptaxodontidae, inner ear, rodents, West Indies

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## INTRODUCTION

The three-dimensional (3D) digital models of the inner ear presented here correspond to three subfossils from Quaternary sediments part of the Heptaxodontidae, an extinct family of giant caviomorph rodents endemic to the West Indies. This extinct family is a case study of insular gigantism (Foster 1964) and controversial from a systematic point of view, with many past and recent hypotheses concerning the reassessment of their assumed monophyly and their attribution to recognized superfamilies of Caviomorpha (MacPhee 2011). With the aim of providing answers to infer the phylogenetic affinities of this clade, we segmented the inner ear of three heptaxodontid specimens (Fig. 1 and Table 1) : *Amblyrhiza inundata* (AMNH 11842) found on the Anguilla Bank in Anguilla or St. Martin (MacPhee 2011), *Clidomys* sp. (AMNH collections, unnumbered specimen) found in Jamaica and *Elasmodontomys obliquus* (AMNH 17127) found in Puerto Rico (Anthony 1918). We also segmented 95% of the known genera of caviomorph rodents (Mammal Diversity Database 2022). This extensive sampling allowed us to report on the extent of the morphological diversity of caviomorphs inner ear by using geometric morphometrics and comparative anatomy methods. The inner ear has proven to be a suitable structure to characterize the relationships of caviomorph rodents and revealed a close-relationship between *Amblyrhiza* and *Clidomys* within the superfamily Chinchilloidea but *Elas-*

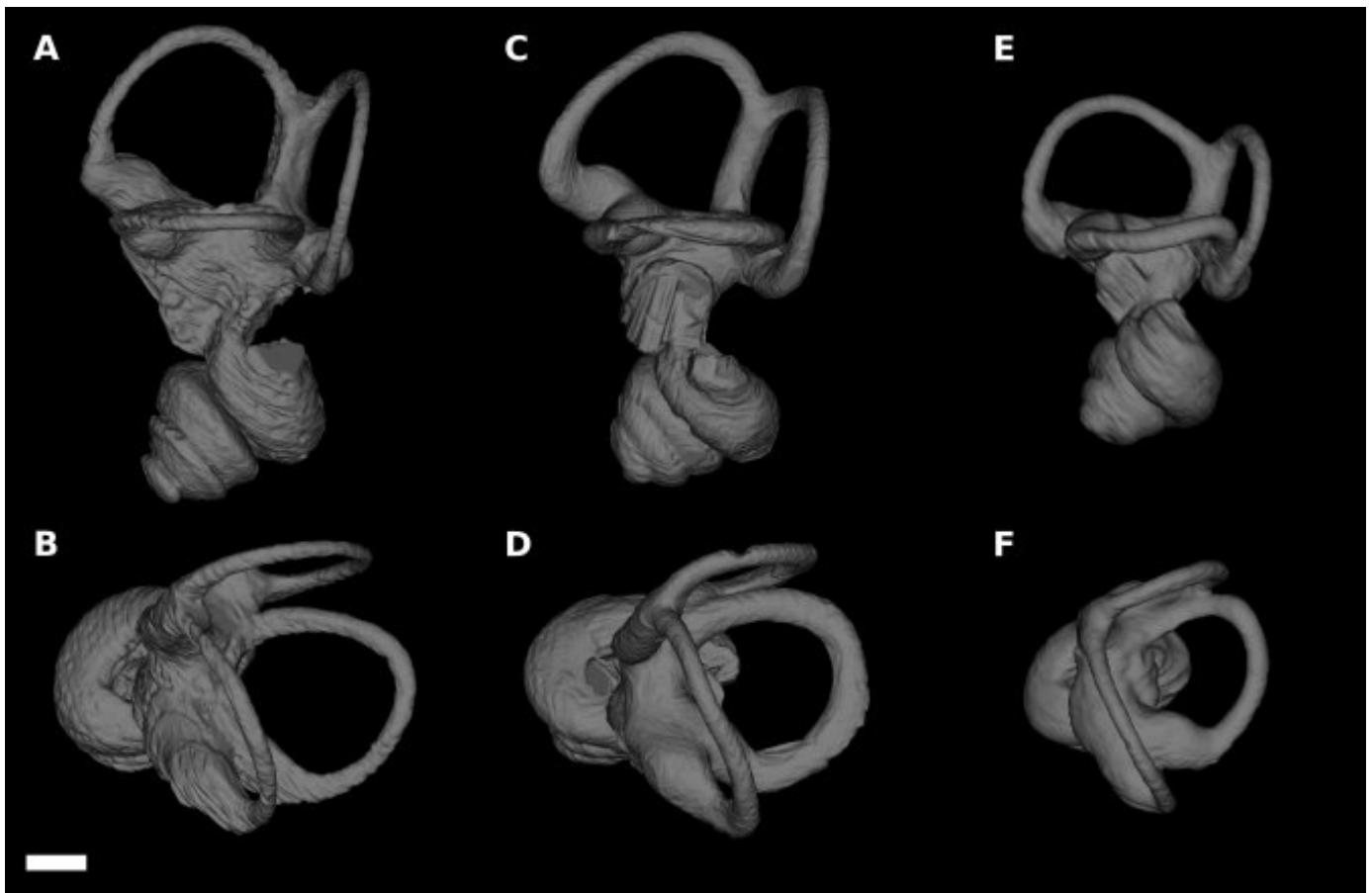
Inv nr.	Taxon	Description
AMNH 11842	<i>Amblyrhiza inundata</i>	Left labyrinth
AMNH unregistered	<i>Clidomys</i> sp.	Left labyrinth
AMNH 17127	<i>Elasmodontomys obliquus</i>	Left labyrinth

**Table 1.** List of heptaxodontid specimens. Collection: American Museum of National History (AMNH), New York, USA

*modontomys* displays a mosaic of characters that places this taxon in-between Chinchilloidea and Octodontoidea.

## METHODS

The specimens were scanned using the microtomograph GE Phoenix vtomex s240 hosted at the American museum of Natural History (AMNH) with a resolution of 37 µm, 25 µm and 51 µm, respectively. The AVIZO 7.1 (FEI) software was used to extract the surface of the inner ear: we manually segmented the structure using the brush tool every 5 slices then performed interpolation between slices to optimize data acquisition time. Once the segmentation was complete, we saved the surfaces in a .ply format in order to facilitate their use with a wide range of softwares (e.g. MorphoDig 1.5.6 ; Lebrun 2018; <https://morphomuseum.com/morphodig> ).



**Figure 1.** Three-dimensional model of the inner ear of Heptaxodontidae. Left-oriented inner ear of *Amblyrhiza inundata* (AMNH 11842) in lateral (A) and dorsal view (B), *Clidomys* sp. (AMNH unnumbered specimen) in lateral (C) and dorsal view (D), and *Elasmodontomys obliquus* (AMNH 17127) in lateral (E) and dorsal view (F). The scale bar represents 1 mm

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