

The Genus *Cantius* and the Phylogenetic Importance of North American Primates

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Introduction

During the Eocene Epoch (54 to 33 million years ago), the world experienced a period of global warming with temperatures ranging from 9 to 23 degrees Celsius higher than today. The rise in average temperatures created an environment suitable for nonhuman primates to inhabit North America. One of the most common groups of primates during the Eocene Epoch were the Notharctine primates. The Notharctine primates had five primary genera: *Cantius*, *Pelycodus*, *Copelemur*, *Smilodectes*, and *Notharctus*.

Purpose

This project focuses on the dental morphology of *Cantius* in order to i.) better understand its evolutionary relationships to the other Notharctine primates and ii.) its relationship to extant primates. *Cantius* exhibits a distinct anterior dental morphology that can be observed in extinct and extant strepsirrhine primates, including modern-day Malagasy lemurs.

Materials and Methods

1. Study Site: The specimens for this project were collected from Tim's Confession, a rich fossil vertebrate locality located in the Great Divide Basin of Southwest Wyoming.

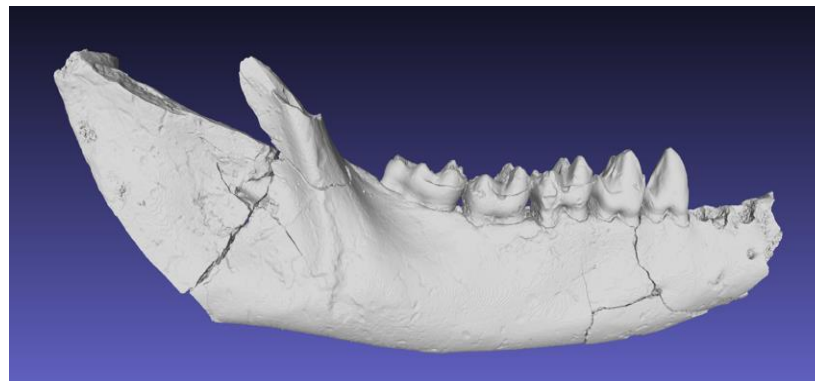
2. Specimens: Fourteen *Cantius* specimens were examined for this project. All specimens were collected by Professor Robert Anemone (University of North Carolina at Greensboro).

3. Micro CT Scanner: The *Cantius* specimens were scanned using a micro computed tomography (CT) scanner located at the Shared Materials and Instrumentation Facility at Duke University. Once scanned, the images were imported into Avizo, a 3D visualization software, for further analysis of the occlusal surfaces of the teeth. The occlusal surfaces are important because the cusps of the teeth are visible, and the cusps of the teeth are the key to unlocking the evolutionary history of this genus.

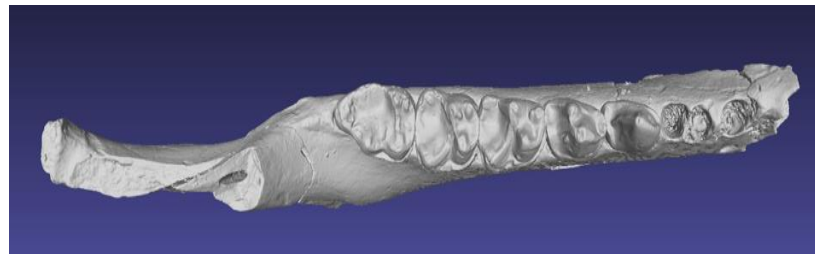
Results

Avizo-generated 3D images of *Cantius* teeth revealed the following distinctive traits:

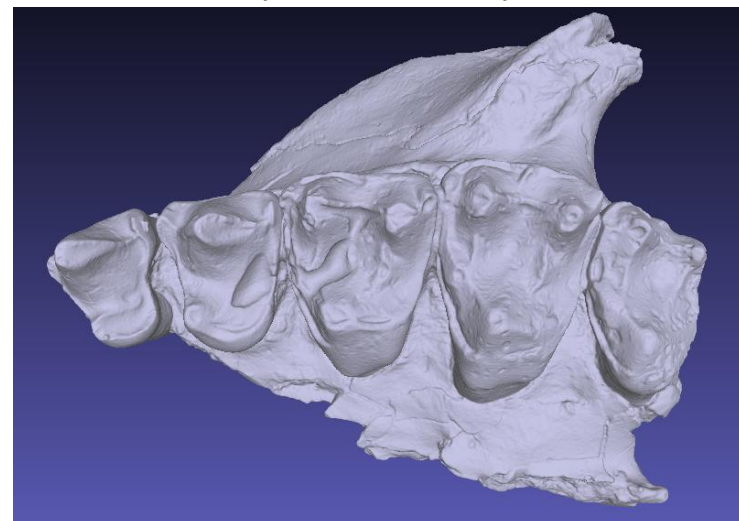
- Well developed, mesially positioned paraconids on lower molars.
- Conical shaped molars
- Comparatively short and wide upper molars
- Unfused mandibular symphysis



CT Scan of UNGC 12120 - Right Mandible (Robert Anemone)



Occlusal Surface of UNGC 12120 (Robert Anemone)



CT Scan of UNGC 8904 – Left Maxilla (Robert Anemone)

Discussion

1. Project Status:

- This project began in July of 2020.
- Currently ongoing

2. Currently: These data further support the hypothesis that *Cantius* was the first Notharctine primate to evolve. After *Cantius*, there appear to be two major lineage splits within the Notharctine primates:

- Split 1: *Pelycodus* and *Copelemur* (Wasatchian North American Land Mammal Age – Early Eocene).
- Split 2: *Smilodectes* and *Notharctus* (Bridgerian North American Land Mammal Age – Middle/Late Eocene).



Extant dental toothcomb; ring-tailed lemur (*Lemur catta*)

The dental morphology of *Cantius* suggests this genus is ancestral to modern-day Malagasy lemurs. The primary evidence for this is based on the distinct morphology of the incisors and molars of these primates:

- Incisors positioned outward at a 45-degree angle.
- Evidence of little wear when compared to the molars.
- Evidence for frugivorous feeding ecology on molars.

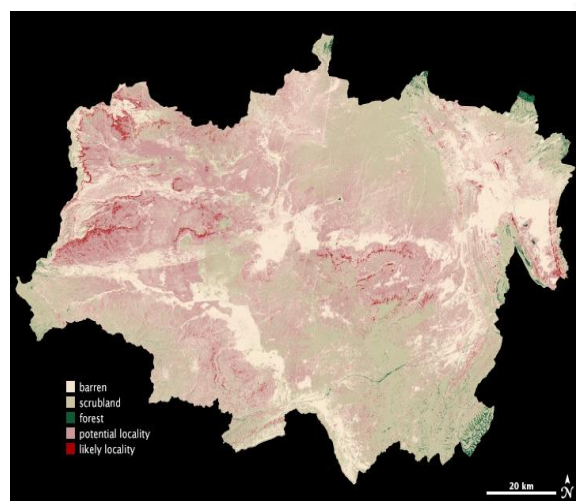
These distinctive dental characteristics suggest that *Cantius* was in the process of developing a toothcomb, a trait observed in extant strepsirrhine primates.

Acknowledgements

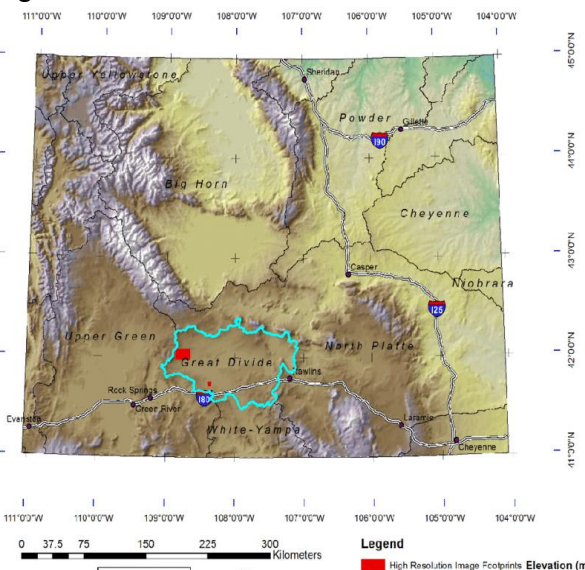
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References

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The Great Divide Basin. NASA Earth Observatory, 2002.



Geographic Location of the Great Divide Basin. Nachman and Anemone, 2015.