

The Juvenile Cranium and Upper Deciduous Dentition of *Megaladapis Madagascariensis* (Lemuroidea, Strepsirrhine, Primates)

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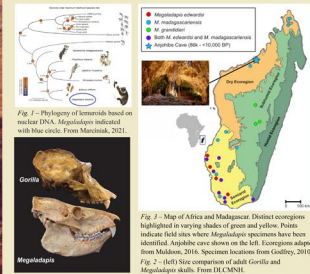


Abstract

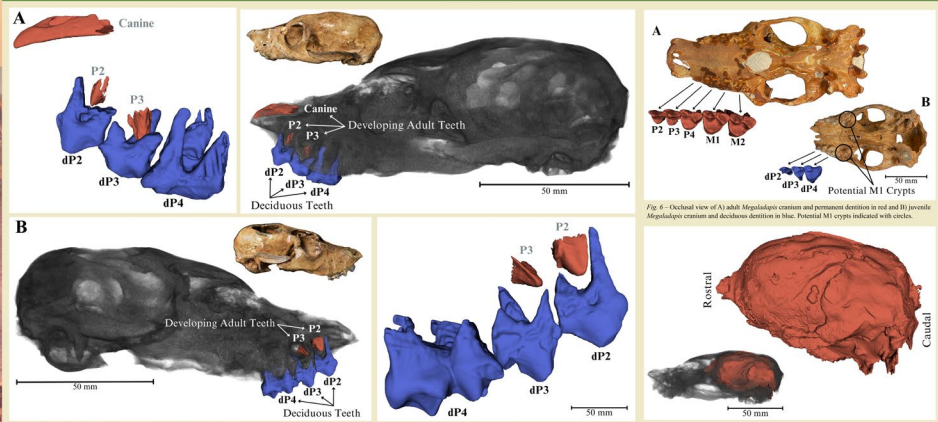
- Megaladapis madagascariensis* is an extinct, large-bodied (~46 kg) folivorous lemur.
- M. madagascariensis* can provide an important perspective on different life history strategies between small-bodied strepsirrhine and large-bodied haplorhine primates.
- We describe the first complete juvenile cranium of *M. madagascariensis*, found in Madagascar.
- The specimen preserves its complete deciduous premolar row and intact braincase.
- Comparisons of dental development with *M. edwardsi* suggest this *M. madagascariensis* specimen was less than one year old at time of death.
- Overall, this juvenile cranium supports previous observations that – adjusted for its large body mass – *Megaladapis* life history was consistent with the relatively accelerated life history of other strepsirrhines.

Introduction

- Late Pleistocene and Holocene subfossil records from Madagascar reveal 17 extinct species of lemurs, all larger than the over 100 extant lemur species (Fig. 1).
- Nicknamed the “koala lemur” for their tapered snout and squat build, *Megaladapis* is an extinct giant lemur that grew to the size of a modern-day gorilla (Fig. 2).
- The genus consists of three species, the smallest of which is *M. madagascariensis*. *Megaladapis* ranged across Madagascar, with a high preference for wooded habitats.
- This specimen was discovered in Anjohibe cave in northwestern Madagascar (Fig. 3).
- Megaladapis* went extinct roughly 600 years ago. Their extinction coincides with human population and agricultural expansion in Madagascar.

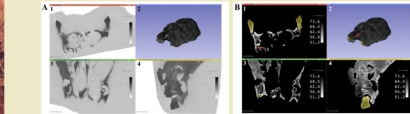


Results



Methods

- This specimen was scanned using a Nikon Metrology XT H 225 ST micro-CT scanner at Duke University's Shared Materials Instrumentation Facility.
- The three-dimensional reconstructions were rendered in the open-source and freely available software, 3D Slicer (5.2.1) (Fig. 4).



Special thanks to Dr. Anne Kört (The Virtual Palaeontology) for her informative 3D slicer tutorials.

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Discussion

Micro-CT scans reveal the developing paracones of the canine, P2, and P3 are present in the crypts between the roots of the deciduous dentition (Fig. 5). The crypt of M1 is preserved, though the crown is absent and the M1 alveoli are not fully developed (Fig. 6).

The entire cranium is about 55% the total length of an adult cranium from Anjohibe cave. As expected in such an immature individual, the rostrum is relatively short, post-orbital constriction is limited, and the nuchal crest is relatively small compared to the adult.

As this is the first juvenile *Megaladapis* cranium to be described, our models facilitate future morphometric comparisons between *Megaladapis* and extant lemurs at comparable developmental stages (Fig. 7). Endocasts of the intact braincase and dentition also allow future comparison of juvenile and adult *Megaladapis* specimens.

These models provide context and model parameters for exploring the impact of the very recent extinction of *Megaladapis* and other large-bodied lemurs in Madagascar.

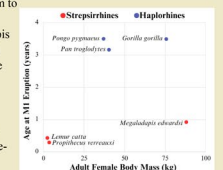


Fig. 7 – Graph showing age at M1 eruption relative to average adult female body size. M1 eruption is used as an indicator of juvenile development across genera. Extant strepsirrhines are characterized by small body size and fast development. Extant haplorhines have larger bodies and slower development. Data from G.T. Schwartz et al., 2005.