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The inner craniodental anatomy of the *Papio* specimen U.W. 88-886 from the Early Pleistocene site of Malapa, Gauteng, South Africa

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Cercopithecoids represent an essential component of the Plio-Pleistocene ecosystem [1]. However, despite the abundance of the cercopithecoid fossil remains in African Plio-Pleistocene deposits, the chronological and geographic contexts from which the modern baboon lineage (i.e., *Papio hamadryas* ssp.) emerged are still debated or simply unknown [2]. The recently discovered U.W. 88-886 *Papio* (*hamadryas*) *angusticeps* specimen from the *Australopithecus sediba*-bearing site of Malapa, Gauteng, South Africa, may represent the first modern baboon occurrence in the fossil record [3]. Given the implications of U.W. 88-886 for our understanding of the evolutionary history of the *Papio* lineage and of cercopithecoids in general, we use micro-focus X-ray tomography in this study to investigate the inner craniodental anatomy of this critical specimen and provide additional evidence to discuss the origins of modern baboons.

U.W. 88-886 was scanned by X-ray microtomography at the Palaeosciences Centre of the University of the Witwatersrand in Johannesburg (South Africa) with a spatial resolution of 44.4 μm. As comparative material, we investigated 7 fossil papionin taxa (N=10) selected from different stratigraphic units at Kromdraai, Makapansgat, Sterkfontein, Swartkrans and Taung, currently housed at the University of the Witwatersrand in Johannesburg and at the Ditsong National Museum of Natural History in Pretoria (South Africa) [4, 5]. Additionally, we considered a representative sample of 12 extant species from the American Museum of Natural History in New-York (USA), the Muséum d'Histoire Naturelle of Toulouse (France), the Muséum National d'Histoire Naturelle of Paris (France), the Royal Museum for Central Africa in Tervuren (Belgium). Because of their potential for providing taxonomic and phylogenetic-related information, we explored (i) the sulcal imprints from the endocranial surface and (ii) the tissue proportions and the topographic distribution of the dentine in the distobuccal root of the right upper third molar. The endocast and the root of the right upper third molar were virtually reconstructed by combining semi-automatic and manual segmentation techniques. The sulcal imprints were automatically detected from the endocast [5]. We computed absolute (ADT) and relative (RDT) dentine thickness and virtually rendered the topographic distribution of the dentine by using color maps.

The sulcal pattern in U.W. 88-886, including the occipito-temporalis, subcentralis anterior and temporalis medius anterior and posterior sulci, is similar to the pattern revealed in the endocasts of extant *Papio* and extant *Theropithecus* specimens. The ADT (2,76 mm) and RDT (187,88 mm) values fall within the variation observed in extinct (2,34-3,59 mm) and extant (150,47-224,09 mm) *Papio* specimens, respectively. In terms of dentine thickness distribution, the relatively thick mesiobuccal aspect is compatible with the condition reported in this study for extinct *Papio* specimens.

Consistent with the description and metrical analyses of the external cranial morphology by Gilbert et al. [3], the overall inner craniodental anatomy of U.W. 88-886 approximates the condition of Plio-Pleistocene and modern *Papio*, thus supporting an attribution to *Papio* (*hamadryas*) *angusticeps*. Interestingly, the absolute dentine thickness and distribution in U.W. 88-886 fit more closely the condition of extinct *Papio*, while the sulcal pattern and relative dentine thickness are more similar to the condition of extant *Papio*. Besides providing additional evidence for characterizing the South African fossil papionin craniodental anatomy, our study sheds new light on the polarity of craniodental features in the papionin lineage.

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