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***Oreopithecus bambolii* is still an "enigmatic anthropoid"**

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Oreopithecus bambolii lived in the Tusco-Sardinian archipelago between c. 8.3 and 6.7 Ma. Its evolution in an insular context was likely responsible for the development of a number of peculiar cranio-dental features which render the assessment of its phylogenetic relationships quite problematic compared to other late Miocene Eurasian catarrhines. Even if its dentition shows a blend of hominoid, cercopithecoid-like and unique features (such as the development of a molar centroconid), *Oreopithecus* is regarded by several researchers as a derived member of the dryopithecine subfamily.

By using high resolution X-ray microtomography, we detailed the inner structural morphology of three *Oreopithecus* lower permanent molar crowns (the M₁ FS1996#Fi98, the M₂ FS1996#Fi99 and the M₃ FS1996#Fi97) from the Sardinian site of Fiume Santo and compared their 3D enamel thickness (ET) topographic distribution and enamel-dentine junction (EDJ) morphology with those from representatives of some European fossil anthropoids (pliopithecoid taxa belonging to *Pliopithecus* and the hominoids *Dryopithecus* and *Ouranopithecus*), extant hominoids (*Homo*, *Pan*, *Gorilla*, *Pongo*, *Hylobates*), and *Papio*.

In *Oreopithecus*, the pattern of ET topographic distribution, where the thickest tissue is found along the mesiodistal axis of the crown, is unique among the taxa considered in this study. The results of the 3D geometric morphometric analysis (GMA) discriminate the relatively high dentine horns and EDJ conformation of *Oreopithecus* from the typical cercopithecoid condition, on the one hand, and from the fossil and extant hominoid patterns (including in *Dryopithecus*). *Oreopithecus* also differs from the pliopithecoid condition, except for the M₁ IPS41955 that closely resembles the former.

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