

Taphonomic reassessment of the early *Homo* mandible from Garba IVE, and questioning the diagnosis of an ancient case of *amelogenesis imperfecta*.

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MK 81 GAR IVE 0043 (henceforward GAR IVE) is a juvenile early *Homo* represented by a fragment of mandible and a partial mixed dentition. It has been unearthed at Garba IV (Melka Kunture, Upper Awash, Ethiopia), in layer E, dated to ~1.8 Ma. This is one of the very few juvenile fossils of Early Pleistocene age. It is also one of the not many hominin remains discovered during archaeological digging in association with faunal remains and lithic artefacts, namely those of the late Oldowan [1]. Following modern human standards, GAR IVE was estimated to be 2-3 years of age [2]. The specimen was recently reassessed regarding its macroscopic dental development and tooth tissue proportions [3]. This juvenile early *Homo* has been published as being affected by a group of developmental conditions known as *amelogenesis imperfecta* (AI) [4], with a prevalence ranging from 1:700 to 1:14 000 in recent modern humans. This was mainly based on the observation that pitting defects were affecting the outer enamel surface of its erupted deciduous second molar and of the partially exposed unerupted germ of its permanent first molar. Whether this juvenile was affected or not by AI may have strong implications regarding the interpretation of its dental morphology, overall development and, by extension, taxonomic status. Zilberman et al. [4] conclude that the pathology is evidence of a direct genetic link between *Homo erectus* and modern humans. Here, we re-assess the likelihood of the specimen being affected by such a genetic disorder by combining observations of its external and internal morphology using multiscale synchrotron propagation phase contrast scans acquired at the ESRF (ID19 beamline, Grenoble, France). We use 2D and 3D techniques of virtual paleohistology (e.g., [5]) to explore the outer and inner structure of GAR IVE bone and teeth. Based on the clinical literature available to describe the different forms of this disease in recent modern humans, we test whether the various criteria required to reach a diagnosis of AI can be found in GAR IVE. This concerns pitted, hypoplastic defects, but also what teeth are affected, the occurrence of taurodontism, and enamel thickness. Furthermore, a fine examination of the bone and tooth surfaces in light of the individual's young age and of the potential action of taphonomic agents leads to question the developmental origin of the defects observed on the outer surface of the exposed teeth. Taphonomic analysis of the associated faunal assemblage enabled the identification of massive bone alteration, suggesting the activity of necrophagous insects (dermestid beetles). Among other features, pupal chambers were identified in some of the faunal remains. This multidisciplinary approach provides a set of arguments to refute the hypotheses that the defects observed on the mandible were pathological, and that the GAR IVE juvenile was affected by AI.

We want to thank the Università di Roma Sapienza, the Ministero degli Affari Esteri e della Cooperazione, the Max Planck Society, the ESRF and Paul Tafforeau, and the Römisch-Germanisches Zentralmuseum.

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