

The tooth structural signature(s) of southern African early *Homo*: Implications for the assessment of human paleobiodiversity

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Plio-Pleistocene hominin diversity in southern Africa is revealing increasingly wider, with the inferred (co)existence of a number of species representing the three genera *Australopithecus*, *Paranthropus* and *Homo*. For the latter, up to four species have been recognized or suggested as distinct taxa: *H. habilis*, *H. erectus/ergaster*, *H. gautengensis* and, more recently, *H. naledi*, even if its chronological context remains unconstrained.

In mammal paleobiology, tooth morphology is considered a highly reliable tool for taxonomic diagnosis, but the outer crown original shape is often altered by occlusal wear and/or taphonomic processes. For this reason, the allocation of some hominin dentognathic remains is still controversial, even at the genus level. This is the case for a number of specimens from the sites of Kromdraai (e.g., KB 5223), Swartkrans (e.g., SK 15, SK 27, SK 45, SKX 257-258, SKX 21204) and Sterkfontein (e.g., Stw 80, Stw 151), variably allocated to *Homo*, but sometimes regarded as representing *Australopithecus* or *Paranthropus*. Such uncertainty affects the reconstruction of reliable taxon-specific evolutionary trajectories which, in turn, should rely upon solid taxonomic hypotheses.

We noninvasively characterized the structural signature of the post-canine dentition of some among the most debated specimens (KB 5223, SK 15, SK 27, SK 45, SKX 257-258, SKX 21204) and compared it with the endostructural features displayed by Early Pleistocene tooth remains from Africa and Asia undoubtedly representing the taxon *Homo*, as well as with the patterns expressed by some non-contentious *Au. africanus* and *P. robustus* representatives.

By crossing quantitative information from crown tissue proportions, enamel thickness distribution, enamel-dentine junction shape and root morphology, our results unambiguously discriminate at generic level all investigated specimens and enabled us to assess the probability of taxonomic attribution of some among the most contentious remains, notably of SK 27, which typically exhibits a combination of australopith- and *Homo*-like signals.