Applications of Synchrotron Imaging for Evolutionary Anthropology

== Abstract ==

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The rise of phase contrast synchrotron imaging has created a revolution in non-destructive investigations of fossil samples, including the documentation of key craniodental features relevant for studies of hominin taxonomy and the evolution of the human life course. Studies of teeth make up the bulk of previous anthropological work, as they contain microscopic daily growth lines that can be recovered from hominin fossils that are millions of year old. One of the most exciting applications is the non-destructive detection of the neonatal (birth) line, allowing precise age estimates for ancient children, including the oldest-known infant in the hominin fossil record. These studies have provided the earliest evidence for the modern human life history pattern in a 300,000 year old early *Homo sapiens* individual from Morocco, and allowed assessments of brain size and development in early hominins, australopithecines, and Neanderthals. Ongoing applications of synchrotron X-ray fluorescence have the potential to provide similarly impactful insights into ancient hominin diets and seasonal behaviors.