Accessing early-life record of early humans: New multi-modal analytical imaging techniques of fossil teeth

Renaud Joannes-Boyau*[1], Christine Austin[2], Ian Moffat[3], Anthony Dosseto[4], Marie-Hélène Moncel[5], Anja Scheffers[1], and Manish Arora[2]

[1]Southern Cross GeoScience – Southern Cross University, Military Rd, Lismore, NSW, 2480, Australie
[2]Icahn School of Medicine at Mount Sinai – 1 Gustave L. Levy Place, New York, NY 10029-5674, États-Unis
[3]Flinders University – GPO Box 2100, Adelaide 5001, South Australia, Australie
[4]Univ. Wollongong (UOW) – Northfields Avenue, School of Earth and Environmental Sciences, 2522 NSW, Australie
[5]Department of Homme et environnement, UMR7194–HNHP (CNRS – MNHN – UPVD – Sorbonne Universités) – UMR 7194 – France

Résumé

Early-life records are an essential aspect to understanding how different species of *Homo* have adapted over the past 2.8 million years (Ma) to changing environmental challenges or during their migration into new regions of the world. Yet, our current knowledge of the human evolutionary journey is largely based on the study of cultural material and the anatomy of adult hominin remains. Such studies reveal only limited aspects of the early-life record of extinct species, and struggle to decipher important factors such as nursing, dietary, stress, or mobility patterns, which represent paramount information to understanding the full spectrum of adaptive strategies by our ancestors. Dental tissues represent a unique temporal record of the paleoecology of the individual early-childhood development. The mineralization of dental tissues is extremely valuable for reconstructing early life records occurring during teeth formation. Each day the ameloblast and ondotoblast cells, responsible for the formation of enamel and dentine respectively, deposit a new layer of tissue, thus creating a sequential record. The elemental intake and mineralization pattern of the dental tissues are strongly influenced by the individual interaction with their immediate surroundings. Our advanced methodological framework that combines multi-modal analytical imaging techniques, allows us to obtain important early-childhood information of extinct *Homo* species, thereby gaining new perspectives on palaeoenvironmental conditions, health and social structure of our ancestors.

Mots-Clés: Human evolution, geochemistry, Homo, diet, trophic level, Neanderthal, nursing, breast-feeding, fossils, teeth

*Intervenant