Sedimentary ancient DNA as a proxy of Pleistocene–Holocene French Guiana animal and plant biodiversity

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Résumé

The Labex CEBA project PASTeDNA focuses on sedimentary ancient DNA as an unexpected proxy for characterizing the Quaternary paleobiodiversity (plant and animal taxa) of French Guiana, in order to understand the organism and ecosystem dynamics (extinctions/dispersals/turnovers) in response to interglacial and glacial climate changes. The idea behind PASTeDNA is to create a synergy between complementary metabarcoding and paleontological approaches. In particular, we expected to unravel a new avenue for reconstructing French Guianese's paleoenvironments with the discovery of organisms for which taphonomic processes are not favorable to fossil preservation over time or for which taxonomic identification to the genus or even species level is not made easy with morphological characters. We also expected to document extinct taxa for the first time in the Guianas, especially regarding mammalian megafauna, that was mostly extirpated 8-12 ka ago in South America.
DNA was extracted in a lab dedicated to ancient DNA extraction, from sediment collected at the *Eremotherium*-yielding Atouka site (Maripasoula) in 2021. A two-step PCR method was used for the amplification of mitochondrial (12S, 16S) and chloroplastic (trn$L$) molecular markers, and to finalize the library constructions. Illumina sequencing was performed, and a DADA2 / BLAST+ pipeline was used for bioinformatics treatment.
Preliminary tests yield promising results for the last 20 ka (i.e., from the Last Glacial Maximum onward) at Atouka, with faunal and floral elements not yet suspected through the

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French Guianese fossil record or palynological studies. Among the most salient Operational Taxonomic Units retrieved is an extinct camelid, potentially referable to *Palaeolama.* This extinct genus was known from fossil remains in a wealth of Late Pleistocene localities over northern South American lowlands, and its geographic range so far excluded the Guiana Plateau.

Mots-Clés: environmental DNA, plant and animal DNA, fossil record, Pleistocene, Holocene, past and current climate change