

3D model related to the publication: On Roth's "human fossil" from Baradero, Buenos Aires Province, Argentina: morphological and genetic analysis

Lumila Paula Menéndez^{1,2*}, Idalia Guadalupe López Cruz³, Thomas Schmelzle⁴,

¹Department of Anthropology of the Americas, University of Bonn, Bonn, Germany.

²Department of Evolutionary Biology, University of Vienna, Vienna, Austria.

³Escuela Nacional de Antropología e Historia, Mexico City, Mexico.

⁴Department of Paleontology, University of Zurich, Switzerland.

*Corresponding author: lumilam@gmail.com

Abstract

The present 3D Dataset contains the 3D model analyzed in the publication: On Roth's "human fossil" from Baradero, Buenos Aires Province, Argentina: morphological and genetic analysis. The "human fossil" from Baradero, Buenos Aires Province, Argentina, is a collection of skeleton parts first recovered by Swiss paleontologist Santiago Roth and further studied by anthropologist Rudolf Martin. By the end of the 19th century and beginning of the 20th century it was considered as one of the oldest human skeletons from the southern cone. We studied the cranial anatomy and contextualized the ancient individual remains. We discuss the context of the finding, conducted an osteobiographical assessment and performed a 3D virtual reconstruction of the skull, using micro-CT-scans on selected skull fragments and the mandible. This was followed by the extraction of bone tissue and teeth samples for radiocarbon and genetic analyses, which brought only limited results due to poor preservation and possible contamination. We estimate that the individual from Baradero is a middle-aged adult male. We conclude that the revision of foundational collections with current methodological tools brings new insights and clarifies long held assumptions on the significance of samples that were recovered when archaeology was not yet professionalized.

Keywords: 3D cranial reconstruction, anthropology collections, Argentinean Pampas, Holocene, Santiago Roth

Submitted:13/06/2023, published online:06/10/2023. <https://doi.org/10.18563/journal.m3.202>

Inv nr.

PIMUZ A/V 4217 3D virtual reconstruction of the skull

Description

Table 1. Involved specimen of *Homo sapiens*. Collection: Department of Paleontology, University of Zurich, Switzerland.

INTRODUCTION

The Baradero skeleton was found in 1887 in a trench that was opened for the construction of railroad tracks from the "Ferro-carril General Bartolomé Mitre" connecting the cities of Zárate and San Pedro in the north of Buenos Aires Province, Argentina (Figure 1, Table 1). The Swiss Argentine paleontologist Santiago Roth, who at the moment was living in Baradero, very close to the place of the finding, was immediately given notice. He recovered it, and interpreted it to be one of the oldest human skeletons in South America, what started a large debate in relation to its antiquity (Roth, 1888; Lehmann-Nitsche, 1907; Hrdlička, 1912). The Baradero skeleton was sold in 1890 to the Institute of Technology in Zurich, and later transferred to the Department of Paleontology of the University of Zurich, where it is currently housed (Collection number: PIMUZ A/V 4217). We conducted new analysis on the skeleton including genetic analysis, radiocarbon dating, and a 3D virtual reconstruction aiming at restoring the skull shape (Figure 2; Menéndez et al., 2023).

METHODS

The skull belongs to a middle-aged adult male (Menéndez et al., 2023). It is completely fragmented into 19 pieces that were micro-CT-scanned during a single scanning session using the high-resolution computer tomography Nikon X TH 2255T in the Departments of Paleontology and Anthropology at the University of Zurich (Figure 3). 3D surfaces were extracted semi-automatically within AVIZO 9.2 (FEI) using the segmentation threshold selection tool. The 3D surface model is provided in .ply format, and can therefore be opened with a wide range of freeware. A total of 17 out of 19 fragments have been identified and placed in their anatomical position using a transparent template of the complete skull of an individual coming from a nearby areas. Diagnostic anatomical features as well as thickness, breakage patterns, and matching edges have been used as criteria for placing and orienting the skull fragments. The reconstruction was performed by TS and IGLC, and supervised by LPM. The Baradero skull presents post-depositional alterations and is poorly preserved, thus, we do not recommend its use in comparative morphometric analysis.

ACKNOWLEDGEMENTS

Grant Sponsor: SNF. Grant number: IZSTZ0_208545 Grant Sponsor: German Research Foundation (DFG). Grant Number: 415489479



Figure 1. Map of South America (a) showing the approximate location of the site “Rincón del Baradero” where the Baradero skeleton was found (indicated with a star) next to the Paraná River (b).

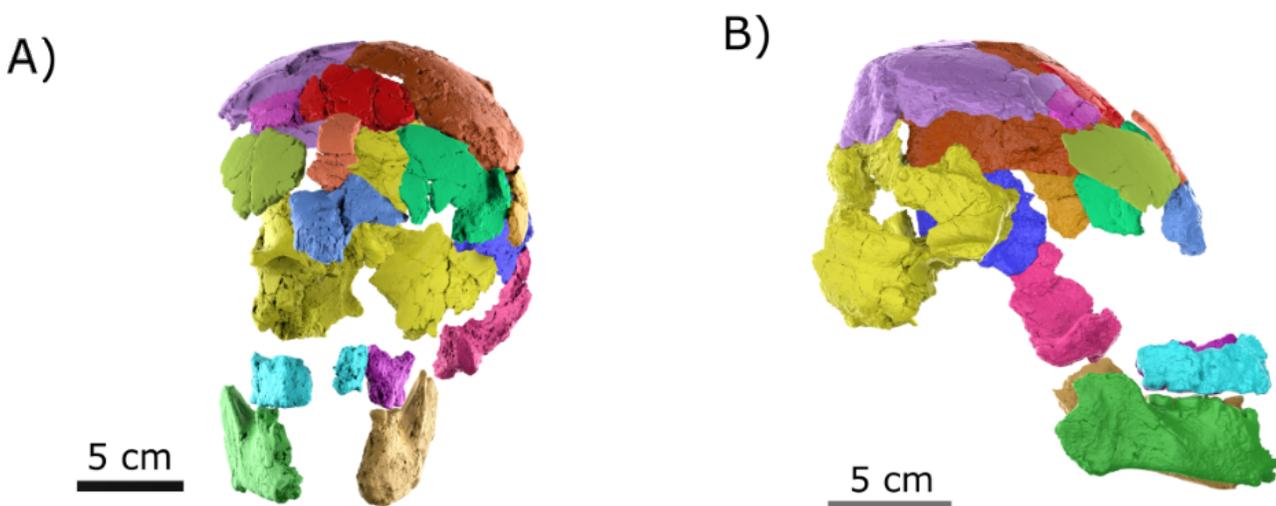


Figure 2. 3D virtual cranial reconstruction of the Baradero skull in frontal (A) and right lateral (B) views.



Figure 3. Skull fragments from the Baradero skull that were used scanned and then employed for conducting the 3D virtual reconstruction. Fragments 1-16 were used in the 3D reconstruction. Since fragments 17-18 were not identified, they were not employed.

BIBLIOGRAPHY

Hrdlička, A. (in collaboration with Holmes, W. H., Willis, B., Wright, F. E., & Fenner, C. N. (1912). *Early man in South America*. Bureau of American Ethnology, Bulletin 52. Washington D.C.: Smithsonian Institution.

Lehmann-Nitsche, R. (1907). Nouvelles recherches sur la formation pampéenne et l'homme fossile de la République Argentine. *Revista del Museo de La Plata*, 14(1), 143–479.

Menéndez, L.P., Barbieri, C., López Cruz, I.G., Schmelzle, T., Breidenstein, A., Barquera, R., Borzi, G., Schuenemann, V., & Sánchez Villagra, M. 2023. On Roth's "human fossil" from Baradero, Buenos Aires Province, Argentina: morphological and genetic analysis. *Swiss Journal of Paleontology*. <https://doi.org/10.1186/s13358-023-00293-3>

Roth, S. (1888). Beobachtungen über Entstehung und alter der Pampasformation in Argentinien. *Zeitschrift der Deutschen geologischen Gesellschaft*, 40, 375-464. <https://doi.org/10.5962/bhl.title.15801>