

# GEOARCHAEOLOGICAL INVESTIGATIONS IN SOUTHWESTERN ANGOLA: MACRO AND MICRO-SCALE APPROACHES TO THE MIDDLE AND LATE PLEISTOCENE OF LEBA CAVE

**Daniela de Matos**

Abteilung Ältere Urgeschichte und Quartärökologie/ Institut für Naturwissenschaftliche Archäologie, Universität Tübingen, DE  
Instituto Terra e Memória/Centro de Geociências, Universidade de Coimbra, PT  
daniela.de-matos@uni-tuebingen.de  
Advisors: Nicholas J. Conard, Christopher E. Miller



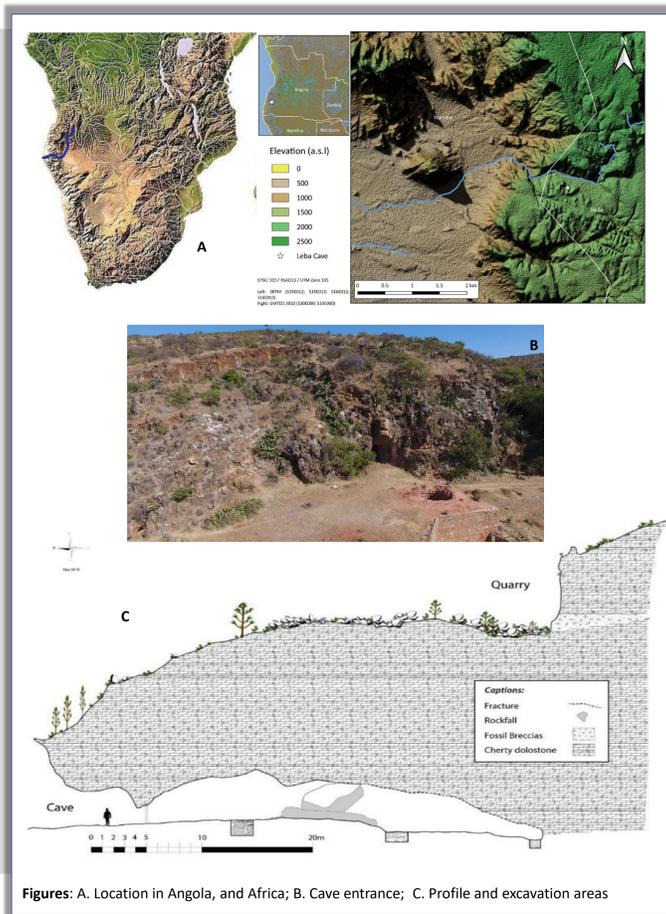
## Prehistory of Southern Angola

Paleoanthropological studies highlighted the importance of this ecological zone for our understanding of human adaptive strategies and culture. Despite the high concentration of cultural remains and archaeological sites including rock art, the area between the Namib desert and the woodland interior remains poorly understood and documented (for a review de Matos et al. 2021).

## The Escarpment of Southwestern Angola

The southern sector of the escarpment is particularly interesting because of the existence of karst features along the upper member of the Chela Group, the Leba-Tchamalindi Formation, outcropping in N-S transect between Humpata and Chibia, two main municipalities of the Huíla province at west.

The Leba area is characterized by a landscape of springs, caves and fissures with carbonated infillings yielding paleontological evidence for the Quaternary analogous to other karstic deposits of Northern Namibia and South Africa. Biostratigraphy is rare in this subtropical region due to high rates of decay of organic matter and the action of diverse erosional agents. Many sites yield Stone Age archaeological remains, overlain by recent historical deposits. As such, the caves and fissures of the Leba dolomites offered a unique opportunity to explore the environmental and geological framework of the archaeology of Southwestern Angola.



Figures: A. Location in Angola, and Africa; B. Cave entrance; C. Profile and excavation areas

## Leba Cave

The archaeological site is located at 1800 m a.s.l. in the dolomites at the border between the Namibe and Huíla Province. Leba Cave is a multi-component site with several solution chambers, the oldest completely filled with grey breccias and a main channel with 50m extension at lower depth. Infillings of the cave range from the Pleistocene to historical times, with a cultural sequence from the Middle and Late Stone Age (de Matos & Pereira 2020)

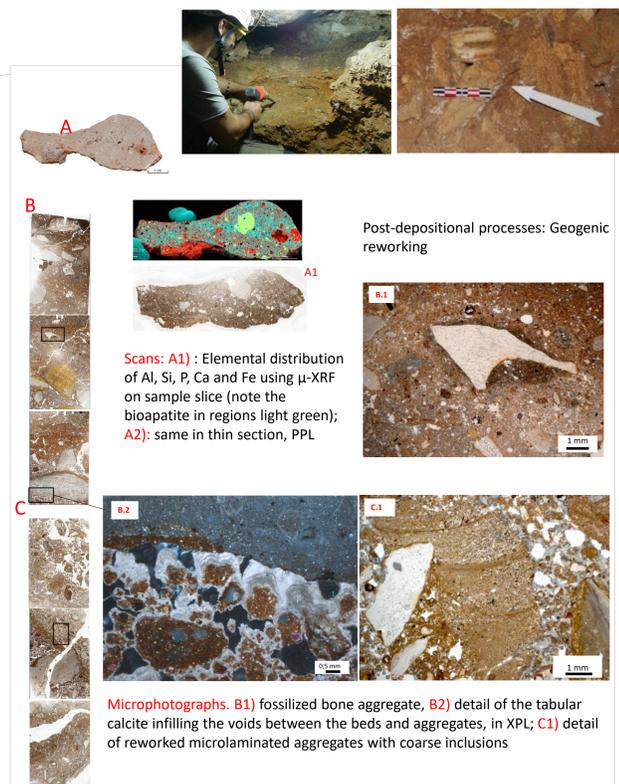
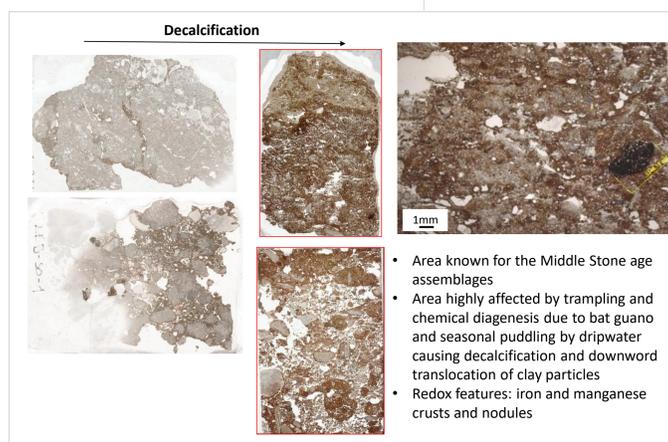
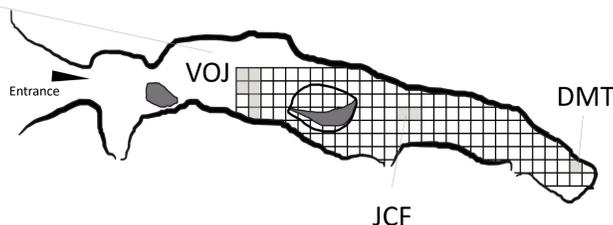
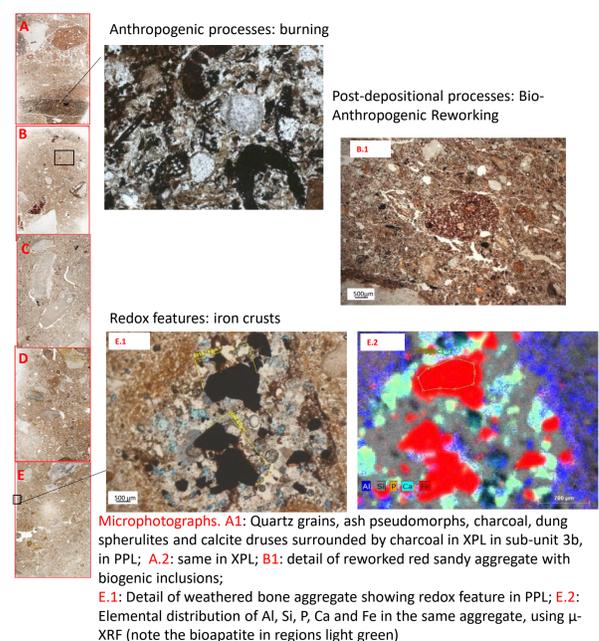
## Goals

Reconstruction of the archaeological site through:

- Analysis of bio-anthropogenic materials and features and their taphonomy;
- Application of the geoarchaeological matrix approach for site formation and post-depositional processes;
- Establishment of absolute dating and landscape proxies for Quaternary deposits at the Leba karst.

## Methodology

- Field: Limited re-excavation of the site in three areas targeting the remaining profiles of previous researchers (VOJ and JCF) and the cemented deposits in the back of the cave (DMT); Assemblage collection and sampling for interdisciplinary analyses;
- Laboratory: Analysis of cultural artifacts and taphonomic alterations; Petrographic microscopy of sediment thin sections combined with elemental and compositional analysis using XRF and FTIR.



## PRELIMINARY RESULTS

### Cave formation and stratigraphy

- Topography and mapping of chambers, Pleistocene fossil breccias and heterogenous deposits inside the cave;
- Depositional regime associated to local geologic and tectonic dynamics along regional climatic variation (denudation, scarp rebound, increased aridity);
- Aeolian and colluvial geogenic processes including aggregates from older beds and regoliths in the cave system increasing in anthropogenic input over time.

### Bio-Anthropogenic activity

- Occupational horizons with hearths, combustion features and abundant organic input by herding populations during the late Holocene;
- Intense action of humans, carnivores and rodents (trampling).

### Syndepositional and post-depositional processes

- Deformation and low range flows reworking deposits from different chambers contributing to highly heterogenous components
- Decalcification of matrix and coarse particles in areas exposed to high moisture and guano input;
- Formation of iron and manganese crusts (redox features relating to high seasonal rainfall and evapotranspiration);
- Cementation and phosphatic features in the inner cave strata.

## References

- de Matos, D., Martins, A.C., Senna-Martinez, J.C. et al. Review of Archaeological Research in Angola. *African Archaeological Review* 38, 319–344 (2021).  
de Matos, D., Pereira, T., Middle Stone Age lithic assemblages from Leba Cave (Southwest Angola), *Journal of Archaeological Science: Reports*, Volume 32 (2020)

## Acknowledgments

Fieldwork grants by Leakey Foundation, National Geographic Society.