RESEARCH PROPOSAL: E Discamps, Postdoctoral Research Fellow, University of Bergen Norway.
TRACSYMBOLS Project.

Is there variability in Stillbay subsistence strategies? Higher-resolution zooarcheological and spatial analyses of Blombos Cave faunal material

The site of Blombos Cave (BBC), Western Cape, helped establishing the antiquity of important aspects of complex human behavior, such as early symbolism (Henshilwood et al., 2002, 2004, 2009, 2011) and pressure flaking (Mourre et al., 2010). Previous studies of the faunal material from BBC contributed to the understanding of linkages between behavioral innovations and changes in subsistence strategies (Henshilwood et al., 2001; Thompson and Henshilwood, 2011, 2014a, 2014b). However, these studies only discussed differences between main stages of the BBC sequence: material from different layers where lumped together in main phases (M1, M2, M3), so that potential variability in subsistence strategies could not be recognized.

The aim of this project is to assess faunal patterns in the BBC sequence with a higher resolution, in order to evaluate the variability of subsistence strategies in the M1 Stillbay phase (layers CA, CB, CC, CCC, CD and CDB). After carefully examining the excavations' notes, bones from 3 quadrates excavated in 2011 (H6d, H7a and G7b) were sampled. During fieldwork at BBC in 2011, each excavated surface was digitally scanned with a Trimble total station. The 3D high-resolution scans, associated with bucket volumes, provide detailed spatial data that allows us to analyze faunal patterns across the sequence with a higher resolution.

Zooarchaeological and taphonomical analyses of the faunal material will be complemented by spatial and refitting analyses in order to provide finer spatial and chronological distinctions of the occupations at BBC, as well as a verification of the coherence, relevance and integrity of the assemblages. Spatial analyses allow for the chronology of cave occupations to be more accurately reconstructed compared to what is possible to observe during fieldwork. This approach is useful to fully understand the taphonomic history of multilayered sites. It aims to establish subdivisions of the deposits with different criteria (e.g. lithostratigraphy, archaeostratigraphy, biostratigraphy) independent from each other (e.g. the geological layers do not necessarily correspond to the archeostratigraphic assemblages, cf. Texier, 2000; Delpech, 2007). It also permits the homogeneity and integrity of deposits to be discussed, and can, in certain cases, complement data acquired through geological analyses of site formation processes (e.g. Bordes, 2002; Mallye, 2007). This type of approach is still rarely applied to Paleolithic sequences, even if it has shown great potential for the interpretation of the occupation sequencing in multilayered archeological sites (for a review, see Villa, 2004 or Discamps, 2011). Based on already developed methodologies (Discamps, 2011; Discamps et al., 2012), our analyses will be carried out in four main steps:

- Bones from each context will be counted, measured and weighed. Then, the general spatial organization of the remains will be described with three-dimensional plots and density histograms. Density surfaces will be computed with GIS statistical tools.
- Cortical surfaces will be observed under a low-angled light using a stereomicroscope. Hominid and carnivore modifications will be recorded alongside several other taphonomic alterations (root etching, concretions, abrasion, dissolution, weathering, black deposits, color and hue, etc.). An õobservable indexò will also be recorded in order to estimate the number of remains that can be considered as õobservableò for zooarchaeological analyses (i.e. remains that have cortical surfaces sufficiently well-preserved such that they may have preserved finer marks such as cut-marks). This will allow the spatial repartition of key

features to be analyzed through GIS. Numerous complementary criteria will be investigated spatially; e.g. type of material (e.g. fauna, stone tools), or taphonomic alterations of cortical surfaces (e.g. black deposits, root etching).

- Post-excavation assemblages will be identified based on results from the first two steps. The relevance of these assemblages will then be assessed through the systematic search for refitting faunal fragments within and between layers. The three-dimensional plotting of these refits will allow us to discuss the existence of chronological and behavioral links between different levels or sectors of the site (e.g. the spatial organization of butchering activities).
- In the end, the coherence of the results achieved with computer simulations will be verified in the field and discussed with colleagues working on the site. Such interactions render it possible to efficiently compare and integrate data from the spatial, faunal, lithic, dating and geoarchaeological analyses in order to more fully appreciate the chronologies of the occupations at BCC. These chronologies will hopefully be useful for faunal analysts, but also for others colleagues working on the site.
-

Spatial analyses will be realized with the DataDeskÊ and ArcGIS (©ESRI) software suites, programs that can be easily tuned to efficiently process archaeological spatial data. Our analyses will be useful for augmenting the chronological resolution of Blombos faunal analyses and complementing previous discussions on the stratigraphic integrity of the MSA deposits (Henshilwood, 2005).

Preliminary observations of the sampled faunal material suggest that an important variability exists throughout the Stillbay M1 phase when considering the fire processing of animal resources. Following Costamagno et al. (2009), burnt specimens will be encoded in the faunal database according to their combustion stage. Combining data on the intensity of combustion, the frequency of cancellous portions and the intensity of fragmentation will make it possible to distinguish if burned bones correspond to accidental burning, to the use of bone as fuel or to grease extraction practices.

Identified bones were already analyzed and observed in South Africa earlier in 2014, but the rest of our sample would need to be transported to the University of Bergen for further analyses. Our analyses require important lab space (e.g. for systematic refitting) and are extremely time-consuming, so that space must be specifically attributed to the researcher for several months. Adequate microscopic equipment is also necessary for taphonomical observations. Both these conditions are for the moment only met in the AHKR department at the University of Bergen.

The material concerned by this permit would be transported by airplane to Norway by Prof. Christopher Henshilwood. Our analyses are non-destructive. The material will then be brought back to South Africa at the end of the study, by the end of 2014.

References

Bordes, J.-G., 2002. Les interstratifications Châtelperronien/Aurignacien du Roc de Combe et du Piage (Lot, France)ؘ; analyse taphonomique des industries lithiques, implications archéologiques. PhD dissertation, Université Bordeaux 1.

Costamagno, S., Théry, I., Castel, J.C., Brugal, J.P., 2009. Combustible ou non? Analyse multifactorielle et modèles explicatifs sur des ossements brûlés paléolithiques. In: Théry, I., Costamagno, S., Henry, A. (Eds.), Gestion Des Combustibles Au Paléolithique Et Au Mésolithique: Nouveaux Outils, Nouvelles Interprétations, British Archaeological Reports -

International Series 1914. Archaeopress, pp. 65ï 84.
Delpech, F., 2007. Le grand abri de la Ferrassie, source de réflexion sur la biostratigraphie dôun court moment du Pléistocène. In: Arts Et Cultures De La Préhistoire. Editions du CTHS, Paris, pp. 303ï 314.
Discamps, E., 2011. Hommes et hyènes face aux recompositions des communautés dôOngulés (MIS 5-3)ز éléments pour un cadre paléoécologique des sociétés du Paléolithique moyen et supérieur ancien dôEurope de lôOuest. PhD dissertation, Université Bordeaux 1.
Discamps, E., Delagnes, A., Lenoir, M., Tournepiche, J.-F., 2012. Interdisciplinary analysis (spatial, faunal and lithic data) as a tool for investigating Pleistocene sites with co-occurrences of humans and hyenas: the cases of Camiac and La Chauverie. Journal of Taphonomy 10 (3-4), 291-316.
Henshilwood, C.S., 2005. Stratigraphic integrity of the Middle Stone Age levels at Blombos cave. In: Backwell, L., DôErrico, F. (Eds.), From Tools to Symbols. From Early Hominids to Modern Humans. Witwatersrand University Press, Johannesburg. pp. 441ï 458.
Henshilwood, C.S., Sealy, J.C., Yates, R., Cruz-Uribe, K., Goldberg, P., Grine, F.E., Klein, R.G., Poggenpoel, C., van Niekerk, K., Watts, I., 2001. Blombos Cave, southern Cape, South Africa: preliminary report on the 1992ï 1999 excavations of the Middle Stone Age levels. Journal of Archaeological Science 28, 421ï 448.
Henshilwood, C.S., dôErrico, F., Yates, R., Jacobs, Z., Tribolo, C., Duller, G.A.T., Mercier, N., Sealy, J.C., Valladas, H., Watts, I., Wintle, A.G., 2002. Emergence of modern human behavior: Middle Stone Age engravings from South Africa. Science 295, 1278ï 1280.
Henshilwood, C.S., dôErrico, F., Vanhaeren, M., Van Niekerk, K., Jacobs, Z., 2004. Middle Stone Age shell beads from South Africa. Science 304, 404ï 404.
Henshilwood, C.S., dôErrico, F., Watts, I., 2009. Engraved ochres from the Middle Stone Age levels at Blombos cave, South Africa. Journal of Human Evolution 57, 27ï 47.
Henshilwood, C.S., dôErrico, F., van Niekerk, K.L., Coquinot, Y., Jacobs, Z., Lauritzen, S.E., Menu, M., García-Moreno, R., 2011. A 100,000-year-old ochre-processing workshop at Blombos Cave, South Africa. Science 334, 219ï 222.
Mallye, J.-B., 2007. Les restes de Blaireau en contexte archéologiqueز Taphonomie, archéozoologie et éléments de discussion des séquences préhistoriques. PhD dissertation, Université Bordeaux 1.
Mourre, V., Villa, P., Henshilwood, C.S., 2010. Early use of pressure flaking on lithic artifacts at Blombos Cave, South Africa. Science 330, 659ï 662.
Texier, J.-P., 2000. À propos des processus de formation des sites préhistoriques. Paléo 12, 379ï 386.

Thompson, J.C., Henshilwood, C.S., 2011. Taphonomic analysis of the Middle Stone Age larger mammal faunal assemblage from Blombos Cave, southern Cape, South Africa. Journal of human evolution 60, 746ï 767.
Thompson, J.C., Henshilwood, C.S., 2014a. Nutritional values of tortoises relative to ungulates from the Middle Stone Age levels at Blombos Cave, South Africa: Implications for foraging and social behaviour. Journal of Human Evolution 67, 33-47.
Thompson, J.C., Henshilwood, C.S., 2014b. Tortoise taphonomy and tortoise butchery patterns at Blombos Cave, South Africa. Journal of Archaeological Science 41, 214-229.
Villa, P., 2004. Taphonomy and stratigraphy in European prehistory. Before Farming 1, 1ï 20.