Journal of Archaeological Science 46 (2014) 292–310

Contents lists available at ScienceDirect

Journal of Archaeological Science

journal homepage: http://www.elsevier.com/locate/jas

Residue analysis and ornament suspension techniques in prehistory: cyprinid pharyngeal teeth beads from Late Mesolithic burials at Vlasac (Serbia)

Emanuela Cristiani [a,*], Ivana Živaljević [b,1], Dušan Borić [c,2]

[a] McDonald Institute for Archaeological Research, University of Cambridge, Downing Street, Cambridge CB1 3ER, UK
[b] Laboratory for Bioarchaeology, Department of Archaeology, Faculty of Philosophy, University of Belgrade, Čika Ljubina 18–20, 11000 Beograd, Serbia
[c] Department of Archaeology and Conservation, SHARE, Cardiff University, Colum Drive, Cardiff CF10 3EU, UK

ARTICLE INFO

Article history:
Received 16 December 2013
Received in revised form
6 March 2014
Accepted 12 March 2014
Available online 1 April 2014

Keywords:
Cyprinid pharyngeal teeth
Ornamental beads
Suspension technique
The Danube Gorges
Vlasac
Mesolithic
Use-wear traces
Residues

ABSTRACT

The authors discuss Late Mesolithic ornament suspension techniques on the basis of their analysis of 288 cyprinid fish pharyngeal teeth appliqués found in an infant burial at the site of Vlasac in the Danube Gorges region of the north-central Balkans. Our interdisciplinary approach includes archaeozoological and taphonomic analyses of archaeological cyprinid teeth ornaments, experiments on modern reference specimens, and the identification of use-wear traces and morphological and physicochemical signatures of residues on archaeological as well as comparative ethnographic ornaments from a selection of traditional hunter–gatherer societies worldwide. While focusing on one particular case study, the paper aims to provide an analytical and methodological framework for archaeological cases dealing with the reconstruction of materials and techniques used in prehistoric systems of ornamentation. Finally, our findings are compared to a strikingly similar set of cyprinid pharyngeal teeth ornaments from broadly contemporaneous Mesolithic sites found in the Upper Danube region, and a discussion is provided that attempts to account for this similarity.

1. Introduction

In this paper, we discuss results of an integrated approach in the study of ornament suspension techniques. We combine taphonomy, archaeozoology, use-wear and residue analyses with ethnographic and experimental comparisons. A particular focus is given to the study of residues as a unique source for reconstructing materials and methods of prehistoric ornament suspension techniques (e.g. Cristiani and Borić, 2012; Vanhaeren et al., 2013). Our case study is a sample of ornaments from the Late Mesolithic levels at the site of Vlasac situated in the Danube Gorges region of the central Balkans (Borić et al., 2014 and references therein). At this site, as well as at some other contemporaneous Late Mesolithic sites in the same region, osseous (cyprinid pharyngeal teeth and shell) ornaments were often found in association with skeletal inhumations, offering a rare opportunity to study their spatial patterning in burials related to the primary context of their deposition in adorning the deceased. Moreover, a recent excavation project at the site recorded the precise placement of various ornamental beads in relation to the body of the deceased. Elsewhere, two of us have already discussed two adorned burials from Vlasac—an adult and a child excavated in 2006 and 2007 respectively—with strikingly similar/standardized arrangements of ornaments in both burials (Cristiani and Borić, 2012).

Moreover, recently, Rigaud et al. (2014) published a study of carp pharyngeal teeth ornaments found in a Mesolithic secondary burial at the site of Hohlenstein-Stadel in the Upper Danube region that show striking similarities with pharyngeal teeth ornaments from the Danube Gorges in the choice of the raw material used for bead-manufacturing but with important differences in the way cyprinid teeth were modified. The two regions are more than 1000 km apart with no currently known examples of sites with carp pharyngeal teeth in between along the Danube valley, and it is unlikely that a simple convergence can account for this similarity.

* Corresponding author. Tel.: +44 (0)1223 333538; fax: +44 (0)1223 333536.
E-mail addresses: ec484@cam.ac.uk (E. Cristiani), ivana.zivaljevic@f.bg.ac.rs (I. Živaljević), boricd@cardiff.ac.uk (D. Borić).
[1] Tel.: +381 11 3206 120, +381 6389 41 820 (mobile).
[2] Tel.: +44 (0)29 208 76597; fax: +44 (0)29 208 74929.

http://dx.doi.org/10.1016/j.jas.2014.03.018
0305-4403/

In this article, we revisit our previous discussion in the light of additional use-wear and residue analysis of ornaments found in another Late Mesolithic burial (Burial 42a) from Vlasac, excavated during the first excavations at the site in 1970–1971. A good state of preservation of residues on some of these newly analyzed specimens allows us to discuss with more certainty the morphological and structural features of specific organic remains that might have been part of ornament suspension techniques, which included both sinew threads as well as a binding compound. Furthermore, these findings seem to corroborate the results of Rigaud et al. (2014) analysis regarding the binding compound used for ornament suspension at Hohlenstein-Stadel. The study of archaeological specimens is examined against the background of experimental and ethnographic data, and we provide further comparison with broadly contemporaneous cyprinid pharyngeal teeth ornamental beads found in the Upper Danube region. We believe that on methodological grounds this discussion is relevant for many other case studies worldwide where one finds prehistoric communities with evidence of personal ornamental beads.

2. Archaeological context

Vlasac is situated approximately 3 km downstream from the site of Lepenski Vir in the Lady Whirlpool's Gorge of the Danube, on the southern, Serbian side of the river (Fig. 1). It is one of the key settlements among a number of Mesolithic to Early Neolithic sites found along the Danube banks in this specific landscape zone. First excavations at the site were made in 1970–1971 as part of a rescue project (Srejović and Letica, 1978) across an area of 640 m^2. The site was excavated along the riverbank section that would be submerged and only selected areas of the river terrace were investigated. New excavations at Vlasac took place from 2006 to 2009 (Borić, 2006; Borić et al., 2008, 2009, 2014). The resumed work at Vlasac has covered an area of 326 m^2, investigating a 63 m stretch of the new riverbank section created after 1971 in the likely peripheral, southernmost part of the site. Spatially, this new work takes place upslope from the excavation area that was investigated in 1970–1971.

Radiocarbon dates from both old and new excavations suggest that the site was, probably discontinuously, inhabited since the Early Mesolithic, from ~9500 cal. BC, but the intensity of occupation, judging by the number of dates, was greatest from the mid-8th millennium cal. BC (Borić, 2011; Borić et al., 2008, 2009). This Late Mesolithic occupation/use of the site covers the period ~7400–6200 cal. BC. New research at Vlasac has indicated that the site was continuously used throughout the Mesolithic–Neolithic transition period (~6200–5950 cal. BC). Finally, there is clear evidence about the use of the site in the course of the regional Early/Middle Neolithic (~6000/5950–5500 cal. BC). During the Early/Middle Neolithic phase, the first pottery appears at Vlasac (Borić, 2011; Borić et al., 2014).

Late Mesolithic domestic features, such as at least five trapezoidal dwellings and 27 rectangular stone-lined hearths as well as burials were found at the site (Borić, 2007; Radovanović, 1996a; Srejović and Letica, 1978). The total number of formal burials at Vlasac excavated in 1970–1971 comprises 87 graves, containing either 119 individuals (Nemeskéri, 1978) or 164 individuals (Roksandić, 1999, 2000). Another 17 formally interred primary and secondary burials were excavated in 2006–2008, while the minimum number of individuals (MNI) for this recently acquired assemblage is 16 (Borić et al., 2014). Among the buried individuals from both excavation phases at the site are adults, children and neonates, all buried mostly as extended supine inhumations, although some semi-flexed and one seated burial in a lotus position were also found (Borić, 2006, 2007, 2011; Borić and Stefanović, 2004; Radovanović, 1996a; Srejović and Letica, 1978, 53–82).

Numerous fish remains were found at the site, including cyprinids (various carp species), catfish *Silurus glanis* and sturgeon species. Cyprinid pharyngeal teeth were commonly used for making ornamental beads (Borić, 2003; Borić et al., 2014; Cristiani and Borić, 2012; Radovanović, 1996b; Srejović and Letica, 1978). Numerous carp specimens were recovered both in the course of old (NISP = 6782: Bökönyi, 1978) and new excavations at the site (NISP = 6566, excluding carp pharyngeal teeth ornaments: Borić et al., 2014, Table 2). Cyprinid pharyngeal teeth were found as ornaments in 14 out of 82 burials excavated in 1970–1971 and in 10 out of 17 burials excavated in 2006–2009. Table 1 shows the

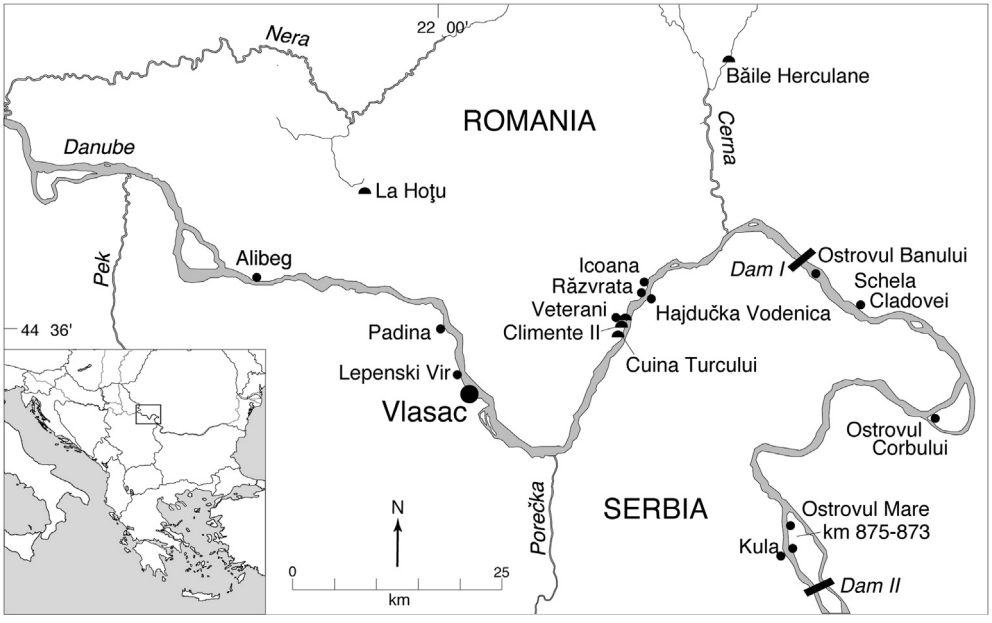

Fig. 1. Map of the Danube Gorges area showing the location of Late Mesolithic sites.