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Beads, pigments and early Holocene ornamental traditions at Bushman Rock Shelter, South Africa

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ABSTRACT

Beads and pigments represent compelling evidence that humans decorated their bodies and used them to convey complex social messages. While the manufacturing process of ostrich eggshell and marine shell beads is firmly established, their common association with pigment residues still remains poorly understood. Here, we focus on various types of beads from the early Holocene of Bushman Rock Shelter (Limpopo, South Africa), namely ostrich eggshell, giant land snail (*Achatina* sp.) shell and marine shell (*Nassarius kraussianus*) beads. We propose a new approach combining a technological and use-wear study of the beads with chemical analyses (SEM-EDS and Raman analyses) of the coloured residues they bear. Together with the discovery of marine beads, of particular interest since they originate more than 240 km away from the site, our detailed study of the beads and associated pigment residues demonstrates a complex system of ornamental representation. We identified a minimum of two types of red compound 'recipes', with evidence that one was employed as adhesive while the other one might be consistent with the production of a pigment. Non-local minerals were recognised in adhesive recipes, namely chromite and ilmenite in one case, and graphite in the other. We further discuss ornamental traditions, their social implications and their increasing importance at the onset of the Holocene in southern Africa.

1. Introduction

The use of beads and, to a lesser extent, the use of pigments, represent the most compelling archaeological evidence that humans decorated their bodies and used them to convey complex social messages. Early evidence for bead use is documented as far back as ca. 100 ka in the Levant and North Africa, and 75 ka in southern Africa (Henshilwood et al. 2004; d'Errico et al. 2005; Vanhaeren et al. 2006, 2013; Bouzzougar et al. 2007). What is less known about early personal ornaments is their regular association with pigment residues. Despite the potential informative power of such association, its functional and sociocultural significance remains poorly understood. Beads bearing pigment residues are commonly recovered from archaeological deposits of various chronological and geographic contexts, from the early Late Pleistocene to the mid-Holocene, in regions including Europe, Turkey, China, southeast Asia, North and South Africa (d'Errico et al. 2005; Bouzzougar et al. 2007; Guan et al. 2012; Stiner et al. 2013; Rigaud et al. 2014; Cristiani et al. 2014; Langley and O'Connor, 2015). Several hypotheses have been put forward to explain how mineral pigments were deposited on the beads. It has been proposed, for instance, that the red residues found on the Still Bay shell beads from Blombos Cave, South Africa, dated back to 75 ka, may have been deposited during the manufacturing process by a red stained tool, during the rubbing of the beads against 'ochred' skins or threads, or by deliberate staining of the beads (d'Errico et al. 2005). The hypothesis of rubbing against red stained matters (e.g., human skins, hides or strings) has also been suggested as the most plausible explanation for the occurrence of red mineral residues on 80 kya-old shell beads from Taforalt, Morocco (Bouzzougar et al. 2007). At two Mesolithic sites in Europe, namely Vlasac (Serbia) and Hohlenstein-Stadel (Germany), the presence of a red ferruginous pasty compound on the top of fish teeth used as ornaments is interpreted as residual adhesive used to attach the beads

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on a string (Rigaud et al. 2014) or on clothes (Cristiani et al. 2014). In the ethnographic record, the occurrence of red residues inside grinding scars of beads suggests the use of a red mineral material ('ochre'), or the secondary use of grindstones covered by it for grinding the edges (Orton 2008).

In all the above mentioned examples, interpretations are essentially functional. The occurrence of pigment residues adds a level of complexity to the manufacture and use of personal ornaments that is rarely explored. The presence/absence of such residues, the recipe employed to make them, their function, and distribution on the beads are all valuable lines of information that can help to identify differences in ornamental systems, along with the more classical features usually considered (e.g., type of raw materials and processing steps adopted to produce the beads). Regarding bead studies, it is of particular interest to evaluate both intra- and inter-site diversity in terms of ornamental traditions. Hence, it might allow one to discuss the social status of a buried individual or the organization of a group on the one hand (see Vanhaeren and d'Errico 2003, 2005), and to distinguish possible ethnic groups across a wide area (Vanhaeren and d'Errico 2006; Rigaud 2011) and changes through time (Vanhaeren et al. 2013) on the other. Two elements that might explain the scarcity of interpretation of bead and residue associations at the social scale are (1) the apparent uniformity of beads in the studied assemblages, and (2) the rarity of detailed analyses of the coloured residues.

In southern Africa, beads, mostly – although not exclusively - made of ostrich eggshell, have been recovered from many early Holocene sites (Jacobson 1987a; Plug 1982; Mitchell 1993; Kandel and Conard 2005; Orton 2008; see Lombard et al. 2012 for a synthesis). This widespread tradition of bead use may have originated during the late Pleistocene with evidence from Border Cave extending back to 40 ka BP and was shared at a broader scale by populations from eastern Africa (McBrearty and Brooks 2000; d'Errico et al. 2012). Bead assemblages from South African early Holocene societies therefore represent an ideal case for in-depth analysis of ornamental traditions, based on the combined study of beads and coloured residues coating them. In this paper, we present technological and functional analyses of the bead sample from previous and current excavations of the Later Stone Age deposits of Bushman Rock Shelter, Limpopo Province, South Africa. We used classical technological and use-wear studies along with chemical analyses in order to identify raw materials and processing steps, the way the beads were worn, and pigment recipes. Results allow us to discuss the diversity in ornamental traditions developed by early Holocene groups at the site and the possible social implications of the patterns observed in bead use.

2. Early Holocene occupations in southern Africa and at Bushman Rock Shelter

2.1. The early Holocene in southern Africa: overview and chronological background

The end of the Pleistocene and the beginning of the Holocene is considered as a period of growing population levels owing to an increase in environmental productivity (Mitchell 1997; Mitchell et al. 1998). After a cool episode the climatic conditions became warmer and wetter in South Africa between about 12,000 PB and 8000 BP (Lancaster 1989; Wadley 1993; Mitchell 1997). Temperatures and summer rainfall are estimated to be very similar to today's conditions. In the summer rainfall band drier and wetter conditions seem to have alternated with the wettest conditions being observed approximately around 10,000 BP (Smith et al. 2002; Norström et al. 2009; Truc et al. 2013; Roberts et al. 2013). The spectrum of hunted prey seems to have changed accordingly to these climatic variations (Mitchell et al. 1998; Barham and Mitchell 2008). From 12,000 BP, techno-complexes rich in microliths and characterized by bladelet production (Robberg-like industries) are locally replaced by lithic assemblages oriented towards flake production and the use of scrapers (Oakhurst-like industries, e.g. Smithfield or Albany), the latter being well-established between ca. 10,000 to 8000 BP (Deacon, 1984; Mitchell et al. 1998; Wadley 2000; Lombard et al. 2012). In parallel, an increased frequency of bone tools is noticed in South Africa and Lesotho (Lombard et al. 2012). These changes are not uniform across the South African territory making difficult to describe the transition. A similar shift in lithic technology and tool typology is observed in Zimbabwe (Plug 1981; Walker 1995). Another significant change from the late Pleistocene to the early Holocene is the appearance, in the archaeological record, of the first human burials (Pearce 2008), and an increased production of beads (Mitchell 2002). Ostrich eggshell (OES) beads are the most common type of ornaments found, although they seem less abundant in some regions (Mitchell 1996, 2002; and see Lombard et al. 2012 for a more recent synthesis). The occurrence of marine shell beads at sites far from the sea coast suggests long-distance interactions (Mitchell 1996). While the use of 'ochre' and pigments is regarded as very common in the Holocene (see Kaplan 1990) very little is actually known regarding their exploitation during the early Holocene.

2.2. Bushman Rock Shelter: excavation and Later Stone Age sequence

Bushman Rock Shelter (hereafter referred to as 'BRS') is located in the Ohrigstad district, on the south-eastern corner of Limpopo Province, close to the border with Mpumalanga (Fig. 1A). The shelter sits on the edge of the Great Escarpment in the Drakensberg chain and is carved in the dolomites of the Malmani Subgroup, Transvaal Supergroup. A.W. Louw, from the University of the Witwatersrand, was the first to investigate BRS in 1965 (Plug 1978). J.F. Eloff undertook a second excavation at the site in July 1967, leading a team from the University of Pretoria (Eloff, 1969). A review of Eloff's notes shows that dry sieving at 12 and 3 mm was conducted at BRS, a protocol that was favourable to the collection of very small elements such as beads (Porraz et al. 2015). New excavation started in 2014 with the aim of clarifying the chrono-cultural sequence. In 2015, the Later Stone Age (LSA) deposits were excavated until the top of layer 3 of Eloff, on the southern profile (Fig. 1B, C; Table 1). Systematic dry sieving of sediments was performed using 3 and 1 mm screen meshes, allowing for the recovery of the smaller elements.

The LSA lithic assemblage was subdivided by Plug (1981) into an upper phase containing quartz backed elements (Eloff's layers 2 to 5) and a lower phase rich in bone tools (layers 6 to 14). Radiocarbon dates range from ca. 9.5 ka BP to 12.5 ka BP (Table 1) and are, together with the lithic component, in agreement with the attribution of the sequence to the Oakhurst techno-complex. One striking element of the site is the remarkable degree of organic preservation. In LSA units, abundant botanical remains, including charcoals, corms and seeds, were collected together with numerous faunal remains of both vertebrates and invertebrates (Plug 1978; Wadley 1986; Porraz et al. 2015). The discovery of a consistent sample of beads bearing coloured residues during the 2015 excavations was the starting point of this study.

3. Material and methods

3.1. The bead assemblage and selected sample

The LSA sample of personal ornaments from Eloff's excavation is composed of 227 beads, seven tube-shaped ornaments, and a disk that is partly drilled. Another set of six beads was found in layer 28, dating from the Middle Stone Age (MSA) (Plug 1982). According to the study of I. Plug (1982), the bead assemblage is composed of three different raw materials: giant land snail (*Achatina* sp.) shells, bone and OES (Plug 1982; Badenhorst and Plug, 2012). Seven complete and broken beads of thick pearly shell, as well as one disk, were identified by Plug as made in *Achatina* shell. *Achatina* snails are very common in summer rainfall biotopes (Herbert and Kilburn 2004). The species represented at BRS is