Quaternary International 361 (2015) 238–250

Contents lists available at ScienceDirect

Quaternary International

journal homepage: www.elsevier.com/locate/quaint

Assessing the exploitation of double patinated artifacts from the Late Mousterian: Implications for lithic economy and human mobility in northern Italy

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ARTICLE INFO

Article history:
Available online 22 December 2014

Keywords:
Recycling
Stone artifact
Surface alteration
Mousterian
Italy

ABSTRACT

The finding of recycled lithic artifacts in the Mousterian stratigraphic sequences of Grotta Fumane, Grotta San Bernardino and Grotta Broion in the southern Alps has stimulated investigations into the economic behavior and technology of Neanderthals during the Late Pleistocene. These three archives preserve remarkable evidence, dated from 90 ka and 40 ka, and show distinct signatures in terms of lithic technology, settlement and the provisioning of flint. A study has been carried out with the aim to detect the possible differentiation of tools between expedient/opportunistic vs. curated/planned and to identify the diverse aspects of tool-kit provisioning to thus infer mobility and provisioning strategies. From the identification of double patinae and from comparisons between these three sites, it has been possible to identify occurrences of recycling consisting of the collection and exploitation of old cores and flakes in expeditious or curated procedures. The evidence suggests that the recycling of old artifacts played a variable role in the Neanderthal economic strategy.

The final Middle Palaeolithic in northern Italy is recorded in a handful of sheltered sites and very few open-air settlements, that were visited for short-term occupations or that were repeatedly used to accomplish complex tasks, mostly aimed at the exploitation of mineral, non-mineral and subsistence resources. Huge quantities of lithic raw material as well as the geomorphic and ecological variability in the belt between the upper alluvial plain and the pre-Alps depict the context in which Neanderthals lived and circulated in accordance with a model of low residential mobility.

1. Introduction

The practice of recycling, particularly of lithic artifacts, always existed amongst Palaeolithic populations and in the societies of modern and sub-actual hunter-gatherers (Binford, 1977; Amick, 2007; Holdaway and Douglass, 2011) where it generally takes on a subordinate role in the principal economic system, with diverse implications for the cost/benefit balance (Vaquero, 2011). At the present state of archaeological research, its variability is identified in the economic (Baker, 2007) and religious spheres (Chiotti et al., 2009). In the economic sphere, the rationalization of the various forms of recycling is to be investigated through analysis of the reduction sequences, which enables the identification and outline of the spatial and temporal production, management, defunctionalization, and the recycling of stone tools (Leroi-Gourhan, 1971, 1973; Schiffer, 1976; Balfet, 1991; Bleed, 2002). Recycling and curation, therefore, are two diametrically opposed behavioral issues, the first situational and expeditious/opportunistic, typically associated with a residential setting, and the second planned in personal gear or tool kit, associated with different forms of mobility (Kuhn, 1994). These two aspects, however, are combined in order to obtain maximum benefits in terms of time investments and results achieved (Bamforth, 1986; Holdaway and Douglass, 2011), in one case by distorting the object from its original context and by possibly changing its original function, in another by optimizing efficiency and maintaining its intended use. This variability provides data and analytic elements for the reconstruction of formation processes (Vaquero, 2008), the disentangling of palimpsests (Bailey, 2007), and investigations into the planning depth and organization of production activities.

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http://dx.doi.org/10.1016/j.quaint.2014.10.058
1040-6182/

In these scenarios, possible differences in recycling incidences observed between sites within the same geographic environment can represent an analytical element when compared to the distribution of raw lithic material, the settlement system, and the cultural context. The evaluation may provide interesting implications on the diachronic plane, as well, whereby it is possible to infer changes in the practice and magnitude of recycling as a function of ecological or behavioral factors. Should these differences be significant, it could be argued that recycling was a practice rooted in the Palaeolithic economy, but which could assume ephemeral/random to high/systematic frequencies with changes in certain surrounding conditions.

To assess these phenomena together, we propose taking into consideration the practice of recycling patinated lithic artifacts (flakes, retouched tools, cores) and their subsequent modifications by means of retouch or re-shaping for the production of new blanks (Baker, 2007; Thiébaut et al., 2010; Turq et al., 2013; Vaquero, 2008, 2011; Vaquero et al., 2012). The late Middle Palaeolithic of the southern Alps provides viable conditions for approaching the notion of territory and mobility, especially considering the dramatic geographic and ecological changes occurring in the course of the Upper Pleistocene. The investigative framework of this topic is most frequently tackled through the study of lithic materials, using petroarchaeological and routine methods such as the reconstruction of core reduction and tool shaping and use sequences.

2. Geographic and ecological context

The eastern Italian Alps represent a physical and environmental threshold where in the late Middle Palaeolithic ice fields and alpine glaciers developed during cold stages and temperate vegetation was restored during warm phases. The southernmost fringe, the pre-Alps, which separates the Alps from the alluvial plain, is a succession of short chains and mountain groups. Its summits reach 2000 m, and the karst high plateaus, elevated at 1000–1600 m, are cut by gorges, large valleys and wide basins occupied by lakes. The Alpine foreland is a large alluvial plain that mostly originated during the Middle and Late Pleistocene from the main rivers like the Po, the Adige and the rivers of the Friulian–Venetian plain. This region also includes hills of different origins, such as the Berici karst-plateau and the cone-shaped volcanic reliefs of the Euganean Hills, which are separated by the spreading outwash of the aggrading plain.

The morphological and sedimentary evolution of this part of the Po valley and the shoreline displacements that occurred during this period have been assessed in several works (Mozzi, 2005; Fontana et al., 2008; Zecchin et al., 2008; Antonioli, 2012). Before the last glacial–interglacial cycle, the penultimate glacial maximum (150 to ca. 140 ka) severely impacted the landscape of the eastern southern Alps and the Piedmont plain (Pini et al., 2009), which was then steppe and dry meadows with scattered pine, birch and larch trees. Large glaciers reached the valley outlets (Monegato et al., 2011) and the aggradation of the outwash rivers exceeded 25 m in the lower plain. This period was followed by the last interglacial, when the Tyrrhenian transgression in the northern Adriatic reached the border of the Euganean Hills (Ferranti et al., 2006), enhancing water table elevation along the western part of the plain and, supported by rainfall, favored the development of wetlands and temperate oceanic forests in the lower plain. Subsequently, the sea-level fall at the glacial inception (−40 m, Waelbroeck et al., 2002; Lambeck and Purcell, 2005) triggered erosion of the near-shore sediments and the incision of the lower reaches of the rivers, probably affecting the entire Venetian foreland as well as the Alpine and Berici foothills (Monegato et al., 2011). During the time span of 65 ky from the Early to Middle Würm, no signs of fluvioglacial or significant aggradation are recorded. Rivers flowed within stable trenched paths, and relatively low sedimentation rates (Monegato et al., 2011) in both lacustrine and alluvial successions indicate water table stability. Sea-level changes were minor and had very limited influence on alluvial sedimentation (Surić and Juracić, 2010). Persistent afforestation with some temperate trees, notably *Tilia* and *Abies,* have been recorded throughout the entire early and middle part of the last glaciation, with only moderate forest withdrawals during early DO events (Pini et al., 2010). The Middle Würm records a prevailing zonal vegetation on the plain that includes open birch-conifer forests, xerophytic scrubs and steppe, and phases of contraction of conifer forests and expansion of steppic communities alternating with mixed conifer (*Pinus* and *Picea*) − *Betula* forests (Pini et al., 2009). Soil formation affected aeolian deposits (Cremaschi, 1987, 1990). During a late phase of this period (about 38.2 ± 1.45 cal ka BP according to Pini et al., 2010) aggradation of the alluvial fans in the western Venetian Plain occurred, in coincidence with the establishment of long-lasting marshes in the Venetian–Friulian Plain (Fontana et al., 2008).

3. Economic context at the regional scale: distribution and properties of the lithic sources

The Middle Palaeolithic settlement system of north-eastern Italy is represented by some 60 sites, located within caves and rock shelters and in the open. However, the visibility of the settlement is reduced due to morpho-dynamic processes in the mountain belt and primarily by erosion during the glacial advances; sites are only preserved within some zones, including ancient palaeosurfaces with palaeosols, valley slopes or hillsides, and stable glacial deposits, fluvial and fluvioglacial terraces. Similarly, on the alluvial plain sites are sealed by thick, coarse, and fine deposits, and for this reason they are hidden to archaeological survey.

At these camps, stone tool design was almost exclusively performed using flint raw materials, a rock that shows variable properties and differences in its regional distribution as a function of the arrangement of the palaeosedimentary basins across the southern Alpine slope. Moreover, tectonic activity was responsible for dislocating, deforming, and fissuring limestone and other rocks. Primarily in the pre-Alps, limestone containing huge amounts of finely-textured flint was exploited for its excellent mechanical properties and abundance. Many zones are considered suitable for supplying finely-textured flint. These extend from the western bank of Garda Lake to the Baldo Chain, the Lessini Mounts Plateau, the Asiago Plateau, the Grappa–Pallon Massif, the Cismon Valley and its surrounding area including Avena Mount, and the left slope of the Piave Valley to the Alpago Basin. In the alpine foreland, only the Euganean Hills were attractive sources of flint material (Fig. 1). These are separated from the western or northern flint areas by a vast sector where suitable rocks range from very low to absent across large zones, such as the eastern sector of the Lessini Mounts, the alluvial plain, and the Berici Plateau (Antonelli et al., 1990). Although abundant, not all flint was exploitable at the same optimal degree due to the cobble size, uneasy access, dense fissures that affect the flint beds and nodules, and the distribution of the primary exposures, often scattered across high mountain ridges and far from the main river valleys (Bertola, 1996, 2001; Peresani and Bertola, 2010). Loose deposits originating from the weathering of the bedrock are also varied and variably distributed. They should be considered as possible flint supply localities that include blocks, nodules, pebbles, and rounded flint cobbles that could be extracted from Oligocene–Miocene and Pleistocene clastic deposits, palaeosols and reworked soil sediments, such as within the karst depressions at the top of the Berici Plateau (Cavinato, 1963), river and stream gravel beds, and glacial and fluvioglacial deposits.