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Abstract	In the last decades the debate on the origin, time and spreading of the Levallois method and its relation with the Acheulean have been implemented and assumed increasingly importance, simultaneously to the proliferation of archaeological evidence throughout Europe. In the same way, the significance of the typical Acheulean elements apparition is subject of numerous scientific interpretations. Unfortunately, the spatial and chronological fragmentation of the archaeological evidence and the rarity of sites in a good chronostratigraphic context, constitute a serious limit in order to establish a reliable chronological framework þÿ a n d t o r e c o n s t r u c t t h e e v of Middle Pleistocene lithic industries. In this article we will discuss the contribution brought by two Lower Paleolithic sites located in Central-Southern Italy (Isernia La Pineta and Guado þÿ S a n N i c o l a) t h a t s h o w s a arrival of handaxes shaping and an early evidence of Levallois debitage.
Keywords	Lower Paleolithic, Italian Peninsula, Guado San Nicola, Isernia La Pineta, Levallois, Acheulean

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Ferrara, March 24th 2016

Dear Editor,

We submit an Article to *Quaternary International,* special issue "Prehistoric hunter-gathers and farmers in the Adriatic and neighbouring regions", titled "**Between "vintage" and "Avant-guard", the Lower Palaeolithic settlements in Molise region (Italy)**"

The paper, presented in the conference "Prehistoric hunter-gathers and farmers in the Adriatic and neighbouring regions", aims to contribute to the debate about the origin, time and spreading of the Levallois method and about the significance of Acheuleans "innovations".

Sincerely Yours,

Marta Arzarello

Between “vintage” and “Avant-guard”, the Lower Palaeolithic settlements in Molise region (Italy)

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Abstract

In the last decades the debate on the origin, time and spreading of the Levallois method and its relation with the Acheulean have been implemented and assumed increasingly importance, simultaneously to the proliferation of archaeological evidence throughout Europe. In the same way, the significance of the typical Acheulean elements apparition is subject of numerous scientific interpretations.

Unfortunately, the spatial and chronological fragmentation of the archaeological evidence and the rarity of sites in a good chronostratigraphic context, constitute a serious limit in order to establish a reliable chronological framework and to reconstruct the “evolution” of Middle Pleistocene lithic industries.

In this article we will discuss the contribution brought by two Lower Paleolithic sites located in Central-Southern Italy (Isernia La Pineta and Guado San Nicola) that shows a “tardive” arrival of handaxes shaping and an early evidence of Levallois debitage.

Keywords: Lower Paleolithic, Italian Peninsula, Guado San Nicola, Isernia La Pineta, Levallois, Acheulean

1. Introduction

The multidisciplinary aspect of the prehistoric sciences has allowed to better understand the origin and the different migrations of human population. Nevertheless, it is not easy, so far, to trace a detailed panorama in terms of time and modality which has bring to the first peopling of particular area such as the Italian peninsula. It is even more difficult to define clearly which were the mechanism of cultural diffusion/replacement/emergence, are they correlated to change in terms of population or did the population “evolved” in terms of culture? This question is at the centre of the debate about the diffusion of Acheulean culture, the appearance of the Levallois method and, consequentially, the beginning of Middle Paleolithic. The principal hypothesis suggests that the Acheulean and the Levallois methods have replaced the pre-existent culture or have evolved from the previous technical manifestation: Oldowayan for the Acheulean and Acheulean for the Levallois, implying a multiregionalism appearance. Nevertheless, the available data are rarely integrated together which often brings to a lack of a global vision. The period corresponding to the arrival of the Acheulean in Western Europe is also marked by a progressive deterioration of the climate, already started at the beginning of the Early Pleistocene and due to climatic cycle (temperate-warm, humid-arid) more and more accentuated (Bertini, 2003; Shackleton, 1995). Such changes have brought to a turnover in terms of vegetation and fauna with the substitution of woodland species by other, more adapted to open environment (Bertini, 2003; Gliozzi et al., 1997; Masini and Sala, 2011).
In this environmental context, the Italian peninsula became, for some taxa, a refuge during the episode of maximum climatic cooling. These climatic oscillations were fundamental factors for the migration and isolation of human population in opening and closing new ways through, among others, the fluctuation of the sea level.

At 600-700 Ka in Europe we see the coexistence of sites “typically” Acheulean and sites with any typical Acheulean elements. Unfortunately, some of the sites dated around 700 Ka have not a clear chronology however it is possible to trace a general overview.

In Italy, the Latium sites of Colle Marino, Fontana Liri and Arce (dated to 700 Ka on the basis of regional correlations) are characterized by short reduction sequences (unipolar and multidirectional debitage) aimed to the production of flakes and by the absence of shaping reduction sequences (Bidittu, 1972; Cauche et al., 2001; Mussi, 1995; Segre and Biddittu, 2009).

The site of Notarchirico (Level F), in southern Italy, is dated to 670 Ma (Pereira et al., 2015) and attests the first occurrence of handaxes in Western Europe (Nicoud, 2011; Piperno, 1999).

In the rest of Europe, in the same chronological interval, we have sites with lithic assemblages only finalized to flake production and sites with the presence of handhaxes (Bernal and Moncel, 2004; Carbonell et al., 1999, 1995; Despriée et al., 2010; Falguères et al., 1999; Moncel et al., 2013; Parfitt et al., 2010; Scott and Gibert, 2009; Tuffreau and Lamotte, 2010).

Around the considered chronological interval, the prehistorical sites have been often considered as Acheulean, Tayacian or Clactonian but we have to underline that, beyond the shaping component (suddenly attested by few pieces), the common substratum of the debitage have to be considered as an important yardstick.

The Levallois emergence is today attested in several European sites chronologically situated around the MIS 9 (Ashton and Scott, 2015; Fontana et al., 2013a; Lamotte and Tuffreau, 2015; Ollé et al., 2016; Peretto et al., 2015b; Santonja et al., 2014; Terradillos-Bernal, 2013; White et al., 2006). By the geographical point of view, they are distributed in Northern and Southern Europe and the characteristics of the lithic production seems to be independent from the exploited raw material and the site typology (open air, rock shelters, caves). The Italian peninsula, before the recent founding of Guado San Nicola (Peretto et al.,2015c), was

considered as a separate land, characterized by a late emergence of the Levallois phenomena because of the geographical barrier represented by the Alps (Picin et al., 2013). We propose in this work to discuss appearance/replacement theories of cultural transition/evolution at the end of the so called Acheulean and the first testimony of Levallois methods from two Lower Palaeolithic sites in south-central Italy: Isernia la Pineta and Guado san Nicola. These two sites, situated in the Molise region at few kilometres one to the other, has been systematically excavated and radiometrically dated giving a clear idea of the archaeological and chronological context.

2. Isernia la Pineta

The site of Isernia la Pineta (Isernia, Molise) is situated in the Upper Volturno Valley (Fig. 1). It is an extensive open-air site, excavated since more than 40 years, and dated to about 583-561 Ka by $^{40}Ar/^{39}Ar$, at the end of the MIS 15 (Coltorti et al., 2005; Peretto, 2013, 2005; Peretto et al., 2015a; Shao et al., 2011).

The lithic industry is made on local raw materials (flint and limestone) collected nearby the site (Longo et al., 1997). The reduction sequences are finalized to the flakes production and two knapping techniques have been used: the direct percussion by hard hammer and the bipolar percussion on anvil. This last technique has been employed mainly for the production of small flakes from flint slabs with several internal tectonic fractures.

For the debitage, three main methods have been applied: multifacial unidirectional (c.f. S.S.D.A Forestier, 1993), discoid (Boëda, 1993; Terradas, 2003) and a surface exploitation by centripetal debitage. The only finality of the debitage seems to be the production of small to medium sized flakes (Gallotti and Peretto, 2015). The modification of cutting edges by retouch is attested for implements produced by all methods, and the retouched instruments are mainly denticulates, notches and sidescreapers.

In a general point of view, Isernia La Pineta is characterized by relatively long reduction sequences showing a high degree of planning, in terms of researched implements.
In 2014, a human deciduous tooth has been discovered in the archaeological level 3 coll which add new insight to the Early Middle Pleistocene Italian human fossil record. The age-at-death of the young individual is 5/6 years old, based on the low degree of root resorption. The preliminary results of the comparative study of the tooth highlight the presence of a unique combination of morphometrical and morphological features, among them some polymorphs traits observed in *Homo cf. heidelbergensis (Peretto et al., 2015a)*. Considering the scarcity and the variability of European Middle Pleistocene juvenile human remains, making difficult a consistent comparison, the tooth has been assigned to an undetermined species of the genus *Homo*, i.e. to *Homo sp*. (Peretto et al., 2015a).

3. Guado San Nicola

The site of Guado San Nicola (Monteroduni, Molise) is located near the top of the oldest Middle Terrace in the Upper Volturno Valley (Brancaccio et al., 2000, 1997; Coltorti and Cremaschi, 1981) (Fig. 1). This open-air site, under excavation since 2008, is dated to 379 ±8 Ka (MIS 11/MIS 10) by radio-isotopic dating methods ($^{40}Ar/^{39}Ar$ and ESR/U-Th) (Bahain et al., 2014; Nomade and Pereira, 2014; Peretto et al., 2015b; Sala et al., 2014).
The lithic industry, mostly obtained from different types of flint locally available near the site, is characterised by the coexistence of bifacial shaping and debitage reduction sequences, with the use of different methods (S.S.D.A., discoid and Levallois) that lead to the exhaustive exploitation of raw material (Peretto et al., 2015b). It is recognizable a full mastery of the discoid method and an improving mastery of the Levallois method along the stratigraphic sequence.

Secondary reduction sequences are rarely attested, as well as retouched tools (sidescrapers, denticulates, notches). The numerous handaxes (n = 142) are obtained at the expense of slabs of flint and only very rarely from flakes. Although characterised by a morphological and dimensional heterogeneity, handaxes generally display common characteristics: presence of the cortex in the basal part; greater accuracy in the shaping of the distal part; bifacial and bilateral asymmetry or only partial symmetry.

The Levallois debitage is attested by all phases of the reduction sequence (20 cores and 96 flakes). The flint has been taken in a secondary position as cobbles or quadrangular slabs. Unlike that for the other methods of debitage and for the shaping, the raw material has been carefully selected with a predilection of very homogenous blocks without internal tectonic fractures. Cores exploitation has been done by a preferential and a recurrent (centripetal and unipolar) modality (Boëda, 1994, 1993) and the management of the convexities, at the end of each *plein débitage* phase, has been mainly performed by the extraction of backed flakes. The cores have been deeply exploited and this is also shown by the variability, in terms of dimensions, of Levallois flakes. The flakes have mainly a quadrangular or triangular shape when issued from a recurrent centripetal and lineal methods and a rectangular shape when issued from a unipolar recurrent method.

The striking platforms are prepared by abrasion of the *corniche* in the first phase of the preparation and with a rougher gesture in the successive preparations.

Only 5 Levallois flakes have been retouched and transformed in sidescrapers, notches and denticulates. Two flakes, coming from a phase of plain debitage with a centripetal recurrent method, have been refitted.

4. Discussion

The European Lower Paleolithic is characterized by a mosaic of lithic productions and Human populations. In the current state of research, we have evidences of a first peopling of Europe

around 1.3-1.5 Ma (Arzarello and Peretto, 2010; Arzarello et al., 2016, 2012; De Lumley et al., 1988; Despriée et al., 2011; Duval et al., 2011; Oms et al., 2000; Parés et al., 2006; Peretto et al., 1998; Rosas et al., 2001; Toro- Moyano et al., 2011) and at 1.8 Ma in Georgia (Baena et al., 2010; Gabunia, 2000; Vekua, 2002). Subsequently to this first wave of peopling, there is only few archeological evidences until ~650 Ka. In the same way, we have evidences of chronological gaps between the appearance of the first Acheulean typical elements (mainly handaxes) and the apparition of the Levallois method and their diffusion.

Considering the chronological range characterized by the first apparition, in Europe, of handaxes, as underlined in the introduction, we are facing to a “sharing” of debitage methods but also to the apparition of new elements issued by shaping reduction sequences (Aureli et al., 2015; Gallotti and Peretto, 2015; Nicoud, 2011, 2013; Rocca, 2013). In this context, Isernia La Pineta is characterized by complex reduction sequences but by the total absence of shaping elements. Moreover, the recent discovery of a human deciduous teeth (Peretto et al., 2015a) seems to endorse the evidence of the presence of an archaic population in Southern Italy (Manzi et al., 2011). Trying to evaluate the importance and characteristic of the debitage implements that characterize the lithic production around 1 Ma and 700 Ka, we can observe a high degree of continuity in the utilization of a unidirectional method (one or more striking platforms exploited by unipolar debitage). Concerning the centripetal exploitation, instead, we have no discoid production in the most ancient sites, but this method is largely used in sites dated around 600 Ka. The variability of the discoid/centripetal method, however, can have a deep signification (Mourre, 2003; Terradas, 2003) and the underlined differences between those debitage methods may have been overestimated.

Starting by the definition of a common substratum it is, at present facts, very hard to give a precise meaning to the handaxes production, also because of the great variability highlighted

(Nicoud, 2013; Rocca, 2013), but if we consider them as a technological innovation subject of a diffusion, we can imagine that this diffusion has not followed a single road.

The Levallois emergence has been interpreted under different points of view: diffusion of a new human species and consequently a single emergence (Foley and Lahr, 1997); multiregional evolution from a common technological substratum, primarily intended as the handaxes shaping (Adler et al., 2014a; Rolland, 1995; Tuffreau, 1995; M. J. White and Ashton, 2003).

In several cases geographical barriers has been invoked as a possible explanation for the tardive appearance of the Levallois debitage (Picin et al., 2013). However, the presence of this method, at the MIS 9, in Northern, Southern, Western and Eastern Europe can be considered as an evidence of “rapid expansion” (if we agree with the single emergence theory) or of a rather simultaneous appearance (if we agree with the *in situ* emergence).

Most part of the first European sites with Levallois flakes (Fig. 2) and cores have no radiometric dates which makes difficult to trace a diffusion route going from the earliest to the most recent sites. Considering the dates of Guado San Nicola at 379 Ka (Peretto et al., 2015b), the one of Botany Pit at 324 Ma (Ashton and Scott, 2015) and the one of Nor Geghi at 308 Ma (Adler et al., 2014b) it seems that the emergence of Levallois is more a simultaneous process than a diffusion result.

Therefore, on the basis of available data, we cannot affirm that the Levallois is arrived from West Europe or from Africa and neither make a relation between a new *Homo* species and the *in situ* emergence of this technology. Around 300 Ka, indeed, in Europe we have a phylogenetic transition between *H. heidelbergensis* and *H. neanderthalensis* (the first Neanderthal being attested in Europe at the MIS 7 Hublin, 2009; MacCurdy, 1915; Rougier, 2003). To consider the ecological factors as a driving force for technological “evolutions”, in another hand, cannot be the answer to the “Levallois understanding” because the oldest site

characterized by the coexistence of shaping element and Levallois methods are located at very different latitudes.

Last but not least, we have to underline that almost all sites attesting a precise appearance of the Levallois method are characterized by a typical Acheulean culture. Around 300 Ka, all sites attesting Levallois reduction sequences have a simultaneous production of handaxes. This last consideration goes in the direction of the hypothesis that the Levallois technology is strictly connected, in terms of filiation, to handaxes shaping (Rolland, 1995; Tuffreau, 1995; M. White and Ashton, 2003).

5. Conclusive remarks

The Molise region appears to be a key area for the discussion about the significance of cultural changes/transitions. In a restricted area, indeed, there are evidences of an early appearance of a new technology (the Levallois method) while there is a “delay” on the typical Acheulean elements arrival. This “delay” has been highlighted also in a paleoanthropological point of view in Isernia La Pineta. We could tentatively correlate the characteristics of the lithic assemblage of Isernia La Pineta with the persistence of an archaic population originated from the first peopling of Europe.

By the other side, Guado San Nicola shows an early emergence of a new technological feature that can be related to two opposite scenarios: the local technical evolution or the precocious arrival of a new population/culture.

The “delay” in Isernia La Pineta and the “Avant-guard” aspects of Guado San Nicola could be a clue of two different human groups which probably did not have linear phylogenetic relation.

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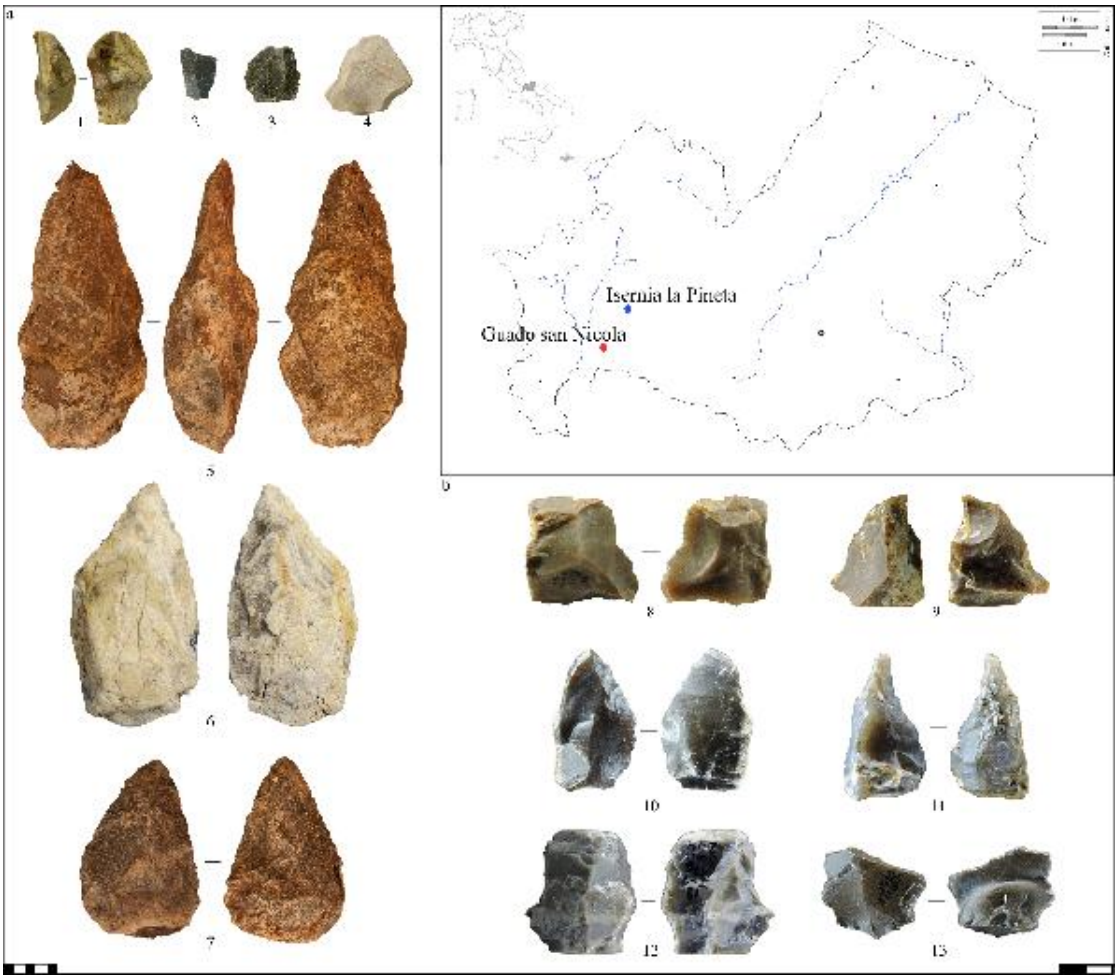
Figures

Fig. 1: Isernia La Pineta and Guado San Nicola localization in the Molise Region and examples of the lithic assemblages. a) Guado San Nicola; 1- Levallois core; 2-4- Levallois flakes; 5-7 – handaxes. b) Isernia La Pineta (Photos L. Lopez); 8-9- cores; 10 - retouched flake, 11-13 – flakes.

Fig. 2: Distribution map of the oldest sites attesting a Levallois debitage in Europe. 1) Cagny la Garenne (Lamotte and Tuffreau, 2015); 2) Guado San Nicola ((Peretto et al., 2015b); 3) AT Gran Dolina TD10 (Ollé et al., 2016); 4) Ambrona (Terradillos-Bernal, 2013); 5) Cuesta de la Bajada (Santonja et al., 2014) ; 6) Organc (Fontana et al., 2013b; Michel et al., 2013) ; 7) Botany Pit (Ashton

and Scott, 2015; Pettitt and White, 2012; White et al., 2006). Lithics implements not in scale. Map source Becker et al., 2015.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