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Impossible Neanderthals? Making string, throwing projectiles and catching small game during Marine Isotope Stage 4 (Abri du Maras, France)

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ABSTRACT

Neanderthal behavior is often described in one of two contradictory ways: 1) Neanderthals were behaviorally inflexible and specialized in large game hunting or 2) Neanderthals exhibited a wide range of behaviors and exploited a wide range of resources including plants and small, fast game. Using stone tool residue analysis with supporting information from zooarchaeology, we provide evidence that at the Abri du Maras, Ardèche, France, Neanderthals were behaviorally flexible at the beginning of MIS 4. Here, Neanderthals exploited a wide range of resources including large mammals, fish, ducks, raptors, rabbits, mushrooms, plants, and wood. Twisted fibers on stone tools provide evidence of making string or cordage. Using a variety of lines of evidence, we show the presence of stone projectile tips, possibly used in complex projectile technology. This evidence shows a level of behavioral variability that is often denied to Neanderthals. Furthermore, it sheds light on perishable materials and resources that are not often recovered which should be considered more fully in reconstructions of Neanderthal behavior.

1. Introduction

The arguments over Neanderthal behaviors and capabilities continue unabated. Recently, two competing threads have emerged within this debate. One emphasizes the relative inflexibility of Neanderthals from a cognitive (e.g. Wynn and Coolidge, 2004), behavioral (e.g. Fa et al., 2013) and technological perspective (e.g. Stiner and Kuhn, 2009). This line of argument often generally speaks of "Neanderthal" capabilities or behaviors as if this group of hominins always did the same things no matter the temporal or ecological circumstances (Brown et al., 2011). The other emphasizes an increasing recognition of the variability of Neanderthal behavior and the elucidation of previously unrecognized behaviors including personal ornamentation (Peresani et al., 2011; Morin and Laroulandie, 2012; Finlayson et al., 2012), a wide and varied diet (Henry et al., 2011; Blasco and Fernández Peris, 2012; Cochard et al., 2012; Salazar-García et al., 2013), and even maritime navigation (Ferentinos et al., 2012). This recognition of behavioral variability through space and time argues for adaptation of Neanderthal groups to local conditions (Clark, 2002; Hardy, 2010).

In both cases, much research effort is devoted to reconstructing Neanderthal subsistence. Influenced heavily by stable isotope analysis, Neanderthals are most often portrayed as top-level carnivores who derive the vast majority of their food from large terrestrial herbivores (Balter and Simon, 2006; Bocherens, 2009; Richards and Trinkaus, 2009). However, the relatively small number of Neanderthals sampled for isotope studies so far are from northern, interior areas of their range and should not be taken as indicative of the entire population (Pearson, 2007; Brown et al., 2011). Furthermore, analyses of this hypothetical high protein diet have suggested that it is unrealistic to support life in the long run (Hardy, 2010; Hockett, 2012).

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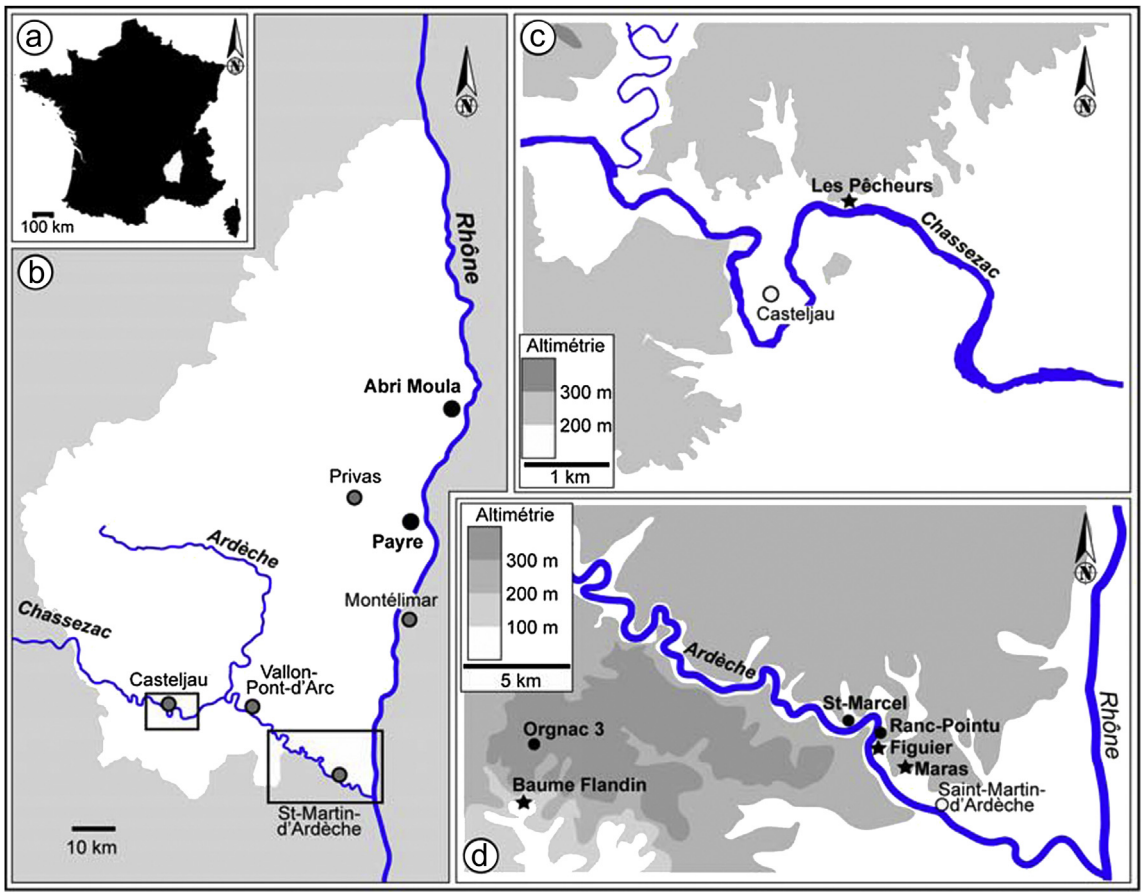

Fig. 1. Location of the site of the Abri du Maras.

Increasingly, evidence is emerging at some sites that Neanderthals exploited a wider range of smaller, faster prey including birds (Blasco and Fernández Peris, 2009, 2012), rabbits (Blasco and Fernández Peris, 2009, 2012; Cochard et al., 2012), and fish (e.g. Le Gall, 1990, 2000; Roselló-Izquierdo and Morales-Muñiz, 2005; Hardy and Moncel, 2011) as well as a detailed knowledge and use of plant foods (Hardy and Moncel, 2011; Henry et al., 2011; Salazar-García et al., 2013). This evidence goes against the widespread argument that the hunting of fast and agile prey such as birds, leporids, and fish as well as the exploitation of plant foods are defining features of "modern" behavior which only occurred systematically in the Upper Paleolithic (Stiner et al., 1999, 2000; Klein, 2001; Richards et al., 2001, 2005; Drucker and Bocherens, 2004; Klein et al., 2004; Balter and Simon, 2006; Richards, 2009). Recently, Fa et al. (2013) have gone as far as to suggest that Neanderthals' inability to switch to rabbit as prey factored into their extinction. This returns us to a picture of Neanderthals as inefficient foragers incapable of adapting to changing conditions (Klein and Cruz-Uribe, 2000; Klein et al., 2004). Such a view suggests that Neanderthals would have gone extinct well before they did (Sorensen and Leonard, 2001; White, 2006).

Other researchers offer a different view where some limited behavioral change takes place with Neanderthals but only post 50 kya (Langley et al., 2008; Stiner and Kuhn, 2009). In this scenario, behavioral complexity, as reflected by composite technology and evidence for symbolic thought, appears with some "late Neanderthals", most notably with the Chatelperronian (d'Errico et al., 1998, 2003). However, this is often presented as being too little, too late for Neanderthals.

Here, we present evidence for behavioral variability and complexity among Neanderthals at the beginning of Marine Isotope Stage 4 (MIS 4) at the Abri du Maras located above the Ardèche River in southern France. Using residue analysis of stone tools with supporting evidence from zooarchaeology, we show that Neanderthals at the Abri du Maras had a detailed knowledge of their surrounding environment, captured fast and agile prey (rabbits, fish and birds), exploited a range of plant species, and used composite technology such as hafted stone points and the manufacture of string and cordage. Overall, we present evidence which demonstrates that Neanderthals at the Abri du Maras were far from inefficient foragers.

2. Site background

The site of the Abri du Maras is located in a small valley less than 1 km from the Ardèche River, a tributary of the Rhône River and close to the Rhône Valley (Fig. 1). Its elevation is 170 m *a.s.l.* and 70 m above the Ardèche River. First excavated in the 1950's and 1960's, new excavations have taken place since 2006 in order to obtain more data on the oldest human occupations and open a large excavated area. This site was famous in the past for a Middle Paleolithic (MP) deposit with a Levallois laminar debitage (level 1) and covering seven distinct levels (levels 8–2) with MP assemblages (Combier, 1967; Moncel et al., 1994). Little is known of the bottom of the sequence due to reduced excavation during early fieldwork.

Geological study attests that the cave roof collapsed over time and the youngest occupations were settled under a shelter (Debard,