Journal of Archaeological Science: Reports xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Journal of Archaeological Science: Reports

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

Lower Magdalenian lithic raw material provisioning: A diachronic view from El Mirón cave (Ramales de la Victoria, Cantabria, Spain)

Lisa M. Fontes [a,b,*], Lawrence Guy Straus [b,c], Manuel R. González Morales [c]

[a] EcoPlan Associates, Inc., 701 West Southern Avenue, Suite 203, Mesa, AZ 85210, USA
[b] Department of Anthropology, University of New Mexico, MSC01-1040, 1 University of New Mexico, Albuquerque, NM 87131, USA
[c] Instituto Internacional de Investigaciones Prehistóricas de Cantabria, Universidad de Cantabria, Avenida de los Castros s/n, 39005 Santander, Spain

ARTICLE INFO

Article history:
Received 2 November 2016
Received in revised form 4 March 2017
Accepted 8 March 2017
Available online xxxx

Keywords:
Upper Paleolithic
Cantabrian Lower Magdalenian
Spain
Lithic technology
Mobility
Landscape use

ABSTRACT

Paleolithic archaeologists have a longstanding interest in temporal change in prehistoric human behavior, and have often identified changes *between* archaeological periods based on sampling limitations. This analysis focuses on the Cantabrian Lower Magdalenian period in El Mirón cave, where archaeologists have been able to subdivide the ~33 cm thick Level 17 palimpsest into 13 comparable units that provide insight into human behavioral change *within* an archaeological period. The authors focus on lithic raw material provisioning as a window into changing human-landscape relationships. The Level 17 sublevel lithic assemblages testify that hunter-gatherers decreased their use of presumably local (based on El Mirón project surveys) mudstones and quartzites in favor of regional flint resources. Additionally, portions of exotic flints from southern France and the Ebro Basin increase over the course of the Lower Magdalenian, possibly indicating gradually intensifying social contacts. Microstratigraphic units provide insight into dynamic "Magdalenian" landscapes and how lithic provisioning related to hunter-gatherers' territories, site catchments, regional mobility, and social relationships.

1. Introduction

Paleolithic prehistorians have a longstanding interest in understanding human resilience and adaptation to Late Glacial landscapes and environmental conditions. Much of the Upper Paleolithic archaeological record in western Europe is known from cave and rockshelter settings, where the remnants of human occupations that archaeologists unearth have been influenced by both cultural and natural formation processes (Bailey, 1983, 2007; Straus, 1979). These palimpsest deposits have influenced both archaeological knowledge of long-term human behavioral trends and archaeological understanding of time in Paleolithic archaeology (Bailey, 1983, 2007; Foley, 1981). Palimpsest deposits can be incredibly complex archaeological layers where single occupational surfaces are effectively lost in a buildup of microstratigraphic lenses (e.g., El Mirón), or multi-occupation surfaces sealed by fortuitous formation processes (e.g., La Garma, Pincevent, or Verberie) (Arias et al., 2011; Bailey, 2007; Leroi-Gourhan and Brézillon, 1972; Straus and González Morales, 2012a; Zubrow et al., 2010). As the former type dominates the Upper Paleolithic archaeological record, one of the biggest challenges facing Upper Paleolithic archaeologists is developing ways to dissect and understand palimpsest archaeological deposits so that they may more precisely investigate human behavioral adaptations to complex and varied Late Glacial landscapes.

How archaeologists understand time in prehistory is based on the temporal scale at their disposal and the resolution that timescale has (Bailey, 2007). Upper Paleolithic research concerning human behavioral change generally focuses on relatively coarse stratigraphic units, (i.e., archaeological levels that are temporally assigned to particular cultural technocomplexes based on diagnostic artifact types, usually lithic or osseous industries or portable art items), which are then compared to each other. In some regions, archaeologists have been able to define sub-periods, (e.g., "Lower Magdalenian" and "Upper Magdalenian"), though the number and nature of these subdivisions varies in relation to local cultural histories, which inform regional cultural trajectories within broader archaeological periods (Straus, 2015). Recently, researchers have modeled behavioral change between the major Upper Paleolithic archaeological periods, particularly in relation to climatic and environmental factors (Cascalheira and Bicho, 2013; Schmidt et al., 2012). These studies have advanced archaeological understanding of the roles that climate change may have played in how humans reorganized their adaptive systems, however, these studies provide information about how behavioral change occurred *between* archaeological periods, rather than *within* them. Most Upper Paleolithic archaeologists would agree that what they recognize as the difference between "Solutrean" or "Magdalenian" was probably not the result of a sudden human behavioral change, but rather the culmination of

* Corresponding author at: EcoPlan Associates, Inc., 701 West Southern Avenue, Suite 203, Mesa, AZ 85210, USA.
E-mail address: fontes.lisa.marie@gmail.com (L.M. Fontes).

http://dx.doi.org/10.1016/j.jasrep.2017.03.015
2352-409X/

gradual shifts in human behavioral systems. Focusing on human behavioral change within archaeological periods can help archaeologists pinpoint the nature and timing of Upper Paleolithic cultural transitions.

This paper presents a case study from El Mirón cave (Ramales de la Victoria, Cantabria, Spain), which contains an exceptionally well-dated and meticulously excavated Cantabrian Lower Magdalenian (CLM; c. 17,000–14,000 uncal. years BP) palimpsest that provides an ideal context to examine human behavioral change over the course of an archaeological period. This analysis subdivides Level 17 into 13 heuristic units that are then compared to assess how lithic raw material provisioning, and by proxy, landscape use strategies, developed and changed over the course of the Late Last Glacial.

2. The Lower Magdalenian at El Mirón cave

The CLM period was first identified at Altamira cave (Cantabria), and later at other sites in modern day Cantabria and eastern Asturias provinces on the northern Atlantic Spanish coast, including El Rascaño, El Juyo, El Castillo, and El Mirón (Barandiarán et al., 1985; Freeman and González Echegaray, 2001; González Echegaray, 1960; González Echegaray and Barandiarán, 1981; Straus and González Morales, 2012b; Utrilla, 1981). This regional Lower Magdalenian archaeological "culture" is identified based on dense palimpsest deposits with unique artifact assemblages that include diagnostic lithic industries rich in bladelets and so-called nucleiform endscrapers (González Echegaray, 1960; see also Domingo et al., 2012 and Straus et al., 2016), antler points (*sagaies*) with tectiform engravings, and emblematic portable art—striation engraved red deer scapulae with depictions of red deer hinds (González Morales and Straus, 2009). The latter are also associated with similar engravings that were made on the ceilings and walls of several caves in the region, including Altamira and El Castillo (Alcalde del Río, 1906; Breuil and Obermaier, 1935). Archaeologists believe that CLM sites contain remains left by a distinct regional hunter-gatherer band that may have organized their settlements among residential bases and outlying, short-term (?), specialized camps in order to exploit the varied terrestrial and aquatic resources in the environmentally diverse, geographically circumscribed Vasco-Cantabrian region (Fontes et al., 2016; González Morales and Straus, 2009; Straus, 1986, 1992; Straus and González Morales, 2012b). Recent analyses of lithic raw material conveyance among four major CLM palimpsests (Altamira, El Juyo, El Mirón, and El Rascaño) indicate that the groups who occupied these sites shared an economic system, providing further evidence that the hunter-gatherers who occupied CLM sites were indeed a distinct regional group or related local bands (Fontes et al., 2016).

El Mirón cave is located in the Río Asón drainage of eastern Cantabria province, c. 255 m a.s.l. and 150 m above the valley floor at the confluence of the Ríos Calera and Gándara with the Asón, within the western cliff-face of Monte Pando in a foothill range of the Cantabrian Cordillera (Fig. 1; Straus and González Morales, 2012a; Straus et al., 2015a). The cave is surrounded by >1000 m peaks and is only some 20 km inland from the modern coastline, illustrating one of the major geographic features that characterizes the Vasco-Cantabrian region: substantial elevation change within short distances (Straus, 1992). The archaeological site has been the subject of continuous investigation led by L.G. Straus and M.R. González Morales since 1996, and is known for its Lower Magdalenian occupations, which include the human burial discovered in 2010 (Straus et al., 2015a). The cave vestibule is capacious, and Straus and González Morales have conducted excavations in several areas, including the outer vestibule "Cabin", mid-vestibule trench, rear vestibule "Corral", and the small area behind an engraved block, where the burial was unearthed (Fig. 2).

The CLM deposit in El Mirón cave has been identified in each excavated area in the cave, indicating that these occupations were intensive and spanned the length of the cave vestibule. In the outer vestibule the CLM Level 17, which is the subject of this analysis, is a thick, "chocolate" brown, highly organic layer with no sterile breaks in the palimpsest (Fig. 3; Straus and González Morales, 2012b). The deposit includes: massive quantities of highly fragmented faunal remains, especially red deer and ibex; abundant lithic and osseous (*sagaies*, needles, awls, etc.) artifacts, including evidence of in situ manufacture; fire-cracked rocks and hearths; charcoal and ochre lenses; perforated ungulate teeth and shells; and extraordinary portable art objects, including an engraved red deer scapulae (González Morales and Straus, 2009; Nakazawa et al., 2009; Straus and González Morales, 2012b; Straus et al., 2015b). These archaeological remains indicate that CLM hunter-gatherers' undertook a diverse array of activities while they occupied El Mirón cave, including: animal butchery, tool manufacture, marrow and grease extraction, cooking, sewing (for making clothes, moccasins, etc.), producing ornaments and art objects, and a ritualized burial (Straus et al., 2015b). This deposit and its evidence for rich and varied residential activities mirrors similar horizons at other CLM hub sites in the region, including Altamira, El Castillo, El Juyo (all in Cantabria), and Santimamiñe (Vizcaya) (Straus et al., 2015b).

Level 17 is dated by five radiocarbon assays to:

- 15,370 ± 80 uncal. BP (GX-32654);
- 15,450 ± 160 uncal. BP (GX-27115);
- 15,470 ± 240 uncal. BP (GX-24466);

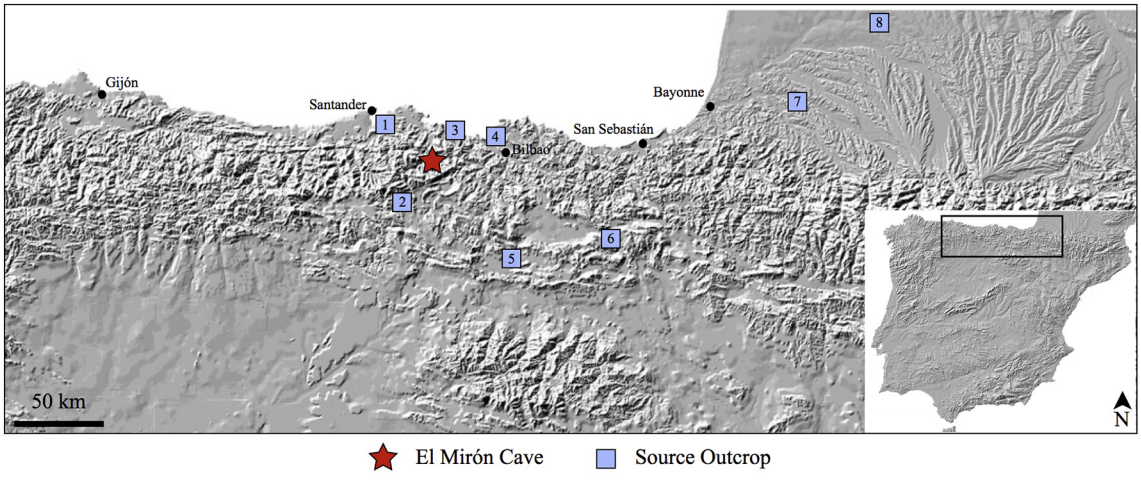

Fig. 1. The location of El Mirón cave and geographically known flint outcrops within the Vasco-Cantabrian region of north coastal Spain. El Mirón is indicated by a red star. Geographically known lithic source outcrops are indicated by numbered purple squares, as follows: (1) Llaranza, (2) Ojo Guareña, (3) Sonabia, (4) Barrika, (5) Treviño, (6) Urbasa, (7) Bidache, and (8) Chalosse. Locations are approximate. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Please cite this article as: Fontes, L.M., et al., Lower Magdalenian lithic raw material provisioning: A diachronic view from El Mirón cave (Ramales de la Victoria, Cantabria, Spai..., Journal of Archaeological Science: Reports (2017), http://dx.doi.org/10.1016/j.jasrep.2017.03.015