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Nubian technology in northern Arabia: Impact on interregional variability of Middle Paleolithic industries

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ABSTRACT

Since 2013, the authors have conducted archaeological surveys across the Al-Jawf province in northern Saudi Arabia. In the past two seasons, 48 sites were mapped and characterized by the presence of Levallois technology and, therefore, attributed to the Middle Paleolithic of Arabia. Preferential Levallois reduction using different methods of dorsal core preparation have been found at these sites. The technological variability includes Nubian Levallois methods, preferential Levallois with centripetal preparation, as well as recurrent centripetal reduction methods. In Arabia, sites with Nubian Levallois reduction are known from southern Oman, eastern Yemen, and central Saudi Arabia, while in Africa this reduction method has been identified across much of the northeastern continent. Preferential Levallois with centripetal preparation and recurrent centripetal Levallois methods have been found across Saudi Arabia, Yemen, Oman, and the United Arab Emirates. Outside of Arabia, these methods have been found in many regions across the Old World. In this paper, we present the results from technological analyses on the Middle Paleolithic assemblages from the newly discovered Al-Jawf sites. The technological data are used to place these sites into a wider regional framework, assessing whether connections with known lithic industries from across the Near East and northeastern Africa can be surmised.

1. Introduction

The study of complex events that unfolded as Anatomically Modern Humans (AMH) groups spread out of Africa has long been one of the utmost aspirations of Paleolithic archeology (Cameron and Groves, 2004; Klein, 2009). This endeavor, however, is hampered by the fragmentary character of the archaeological record and the lack of research in many of the most pertinent regions related to this question. This is particularly true for the early stages of the AMH expansion, approximately 100–40 ka. Until now, two distinct routes out of Africa had been postulated: a) through the Levantine Corridor (e.g. Bar-Yosef, 1987; Derricourt, 2005) and, b) across the Red Sea via the Southern Dispersal Route (e.g. Lahr and Foley, 1994; Quintana-Murci et al., 1999; Macaulay et al., 2005; Armitage et al., 2011; Ghirotto et al., 2011), both irrevocably leading across, or close to, the Arabian Peninsula. The ability to track routes of expansion, however, is highly dependent upon hominid fossil remains, which are absent in the Pleistocene archaeological record of Arabia, in addition to long and well-dated Paleolithic sequences, which are extremely rare across the Peninsula.

The importance of the Arabian Peninsula as one of the stepping-stones for modern human expansions out of Africa and as the possible southernmost range of the Neanderthal occupation in the Near East is becoming increasingly obvious, as more publications on these subjects become available (e.g. Petraglia and Rose, 2009; Armitage et al., 2011; Petraglia, 2011; Rose et al., 2011; Delagnes et al., 2012, 2013; Petraglia et al., 2012; Crassard et al., 2013). Furthermore, some of the lithic assemblages found across the Arabian Peninsula hint at the existence of regionally specific developmental trajectories (Marks, 2009). These aspects make the study of the Arabian Prehistory exceedingly fascinating and crucial for reconstructing prehistory on a wider scale. In the absence of hominid fossil remains, however, prehistorians have relied on lithic evidence, in order to track population expansions. Far from claiming that lithics equate to biological species, we uphold the notion that they do represent the cultural activities of populations within a given geographic and chronological frame (e.g. Richter et al., 2012; Marks and Rose, 2014). The presence of Nubian Complex sites in

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Arabia, therefore, is one of the scarce snippets of evidence for an African lithic industry found outside of the continent (Rose et al., 2011; Crassard and Hilbert, 2013; Usik et al., 2013).

The Afro-Arabian Nubian Complex (Rose et al., 2011) is a Middle Stone Age (in Africa) and Middle Paleolithic (in Arabia) technocomplex primarily distinguished by the use of the Nubian Levallois method, which is a highly specific approach to point manufacture. Nubian core technology is a regional variant of the preferential Levallois method of point production (e.g. Guichard and Guichard, 1965, 1968; Bordes, 1980; Van Peer, 1992; Crassard and Thiébaut, 2011; Crassard and Hilbert, 2013; Usik et al., 2013). Cores are characterized by their prepared preferential striking platforms, triangular/sub-triangular shapes, and a specific opposed platform preparation of the core working surface (Crassard and Hilbert, 2013; Usik et al., 2013). While classic centripetal and recurrent Levallois production methods are generally spread across Africa and Eurasia throughout the MSA/Middle Paleolithic, presenting a wide chronological range, as well as being species transgressive, the Nubian Levallois reduction method has, thus far, presented a relatively concise temporal and geographic range. Sites are known from North and East Africa, as well as South and Central Arabia, while absolute ages are rare, sites displaying Nubian technology fall chronologically between 120 and 55 ka BP (reviews on the Nubian Complex are given in Rose et al., 2011 and Crassard and Hilbert, 2013).

Further advancing this debate and touching upon the roll of the Afro-Arabian Nubian Complex in an interregional context, Rose and Marks (2014) have proposed that the Early Upper Paleolithic (EUP) in the Levant may have arisen, in part, from technological influences found in the Arabian Nubian Complex. The authors hypothesize that the EUP in the Levant arose from technological developments that originated in Arabian and the Levant, which is to say that a fusion of technological elements identified in these areas is the basis from which the Emirian culture, the root of the EUP, sprung. The technological elements highlighted by the authors encompass the bidirectional preparation of cores, the development of crest preparation and the shift from a preferential production system to a serial bidirectional production of elongated points and blades. Rose and Marks (2014) highlight southern Jordan and northwestern Arabia as possible areas where such a fusion may be detected. Here we present results of our survey and analysis from the Al-Jawf sites located in northern Saudi Arabia. The sites and data presented here will add to the growing Arabian Paleolithic record and help evaluate: a) cultural connections with surrounding areas, namely northeastern Africa and the Near East; b) Rose and Marks's (2014) Middle Paleolithic to Upper Paleolithic transition and fusion hypotheses; and finally c) the northernmost distribution of the Nubian technology within the Arabian Peninsula.

2. Geographical and geological setting

The Al-Jawf province is located in the north of Saudi Arabia. The archaeological investigations were concentrated around the city of Dumat al-Jandal, about 200 km south of the Jordanian border, and located in the north–central part of the province. The landscape is marked by a turbulent topography with many grabens, faults, and folds. This is in part a result of the rifting activities of the Arabian Shelf and the area's orientation relative to the Hail arch's axis (northern section of the Central Arabian Graben System). The Wadi as-Sirhan fault, which trends west-northwest, is the most defining of the countless faults and graben systems in the region (Fig. 1). Except for the plateaus and escarpments created by the tectonic and erosional activities in the area, eolian sediments cover a great part of the Al-Jawf province. To the south of Dumat al-Jandal, the barkhanoid ridge-type dunes of the Nefud Desert tower up to 200 m in height. The majority of these dunes are stabilized as the Nefud contains more perennial vegetation than the surrounding rocky desert (McKee, 1979; Meissner et al., 1989; Wallace et al., 1997).

In the north of Al-Jawf a set of semi-parallel treading faults and minor graben systems, oriented slightly perpendicular to the Wadi as-Sirhan graben, have greatly influenced local topography and exposed lithologies. The block faulting has segregated the study area into a set of micro regions with highly variable terrain. In this area, the exposed bedrock consists of continental to marine clastics, fine to medium-grained sandstone, with thin shales of interbedded layers. The region also has stromatolithic creamy limestone and yellowish semi-consolidated limestone rocks with interbedded layers of shale, silt or gypsum (Wallace et al., 1997). A great range of siliciferous minerals, mostly chert and flint, are found within the different limestone units across the sector. During the survey activities these areas were targeted and in the majority of cases proved to be of archaeological interest. Within the Tertiary rock units, four lithologies have suitable lithic raw materials. These occur either as dispersed chert nodules or continuous chert bands within the Paleocene to Eocene rock strata (Meissner et al., 1989; Wallace et al., 1997).

The sites presented in this paper come from three different areas sampled during the 2013 and 2015 field campaigns. Areas 1 and 2 are located in the north of the Al-Jawf quadrangle and are situated on the Jol Ajrubah, a large horizontal plateau dissected by minor faulting and small drainages. Survey area 1 encompasses the sandstone portion of the plateau, which is characterized by a large, now dry, drainage system that cuts through the soft sandstone. The topography on top of the sandstone plateau is variable; the highest zones are composed of flat surfaces, while towards the drainage system topography becomes increasingly rough and surfaces are composed of large sandstone blocs found on moderate to steep slopes. Area 2 is located to the north of area 1 (still on the Jol Ajrubah) and is situated some 100 m higher and shows a different lithology. In this area beige bioclastic limestone forms the predominate portion of the exposed bedrock. Low step zones with flat surfaces characterize the topography on the limestone plateau; slopes are very steep and generally coincide either with drainage systems or faults in the area. Area 3 is located in the At-Tawil escarpment situated within the Nefud desert. Sandstone ridges and inselberg chains surrounded by large eolian plains dissected by small drainages characterize this escarpment. Survey activities in area 3 targeted the top of one sandstone ridge in the southeast of the At-Tawil escarpment.

3. Methods

Prior to this study, the Al-Jawf province had undergone only cursory surveys (Adams et al., 1977; Parr et al., 1978). In the present study, surveyed locations were chosen based on analyses of satellite imagery that helped assess obstacles along the terrain and accessibility by car, as well as geological maps, which helped identify chert/flint beds and raw material outcrops in the area. Walking transects were placed along prominent landscape features such as drainage systems, grabens, plateaus and stable surfaces in general. Lithic scatters found along those walking transects were recorded using a handheld GPS and named by the acronym DAJ (for 'Dumat al-Jandal'). Information on site location and distribution, artifact density, raw material availability and the presence of, and proximity to, outcrops was recorded. Information on the artifacts weathering and size were recorded, as well as a preliminary attribution to one of the broad Paleolithic chronological units (Lower, Middle or Upper). Artifact sampling methodology at the sites consisted either of collecting all visible archaeological material,

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