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Reconstructing projectile technology during the Pre-Pottery Neolithic B in the Levant: An integrated approach to large tanged points from Halula

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ABSTRACT

Large tanged points made on bidirectional blades constitute the most characteristic tool type during the Pre-Pottery Neolithic B in the Levant. Studies on projectile typology and on bidirectional technology have revealed important stylistic differences reflecting chronological and geographical patterning, contributing significantly to the understanding of early farming communities in the Near East. However, the reconstruction of the weapons these large tanged points were part of has not received the same attention. This investigation aims to fully characterize stone point production at Halula, a PPNB settlement in the middle Euphrates valley, and reconstruct the type of weapons and delivery mechanisms used. Our study also includes the analysis of various ballistic attributes using a series of recent morphometric methods and comparison with ethnographic and experimental data about projectiles of known use. Results indicate that Byblos points might have been used as dart-points propelled with the help of spear-throwers, indicating a shift —from bow to spear-thrower— in projectile technology associated with the appearance and expansion of bidirectional blade technology during the PPNB in the Levant and synchronous with the consolidation of agricultural systems in the region.

1. Introduction

Large tanged projectiles made on flint blades are a characteristic feature of lithic assemblages found in the western wing of the Fertile Crescent (Fig. 1) in the Pre-Pottery Neolithic B period (PPNB). They were made using a distinctive bidirectional blade technology that originated in the middle Euphrates valley around the mid-9th millennium cal BC, at the beginning of the Early PPNB (Abbès, 2003). This technology rapidly diffused throughout the Levant during the 8th millennium cal BC, being strongly associated with the emergence and consolidation of village farming in the region. However, little is known about the weapons (spears, darts or arrows) the manufactured stone points were part of. This study is based on a large assemblage of points from Halula (Syria), a large PPNB settlement in the middle Euphrates valley, and seeks to reconstruct the type of weapons and delivery systems used at the site.

Many studies have proved that bidirectional technology was oriented to producing large, robust, straight and naturally pointed central blades (e.g. Abbès, 2003; Barzilai, 2010; Borrell, 2011a; Nishiaki, 2000 and Quintero, 2010). Such targeted blades were used to produce a range of tools (e.g. sickle blades, scrapers, knives, etc.) but most of them were transformed into large, tanged projectile points (mostly of Byblos type but also Amuq, Ugarit, Jericho and other types). In this sense, large tanged projectiles are so abundant and specific to PPNB contexts that the term Big Arrowhead Industries (BAI) techno-complex was tentatively proposed as a chrono-cultural period instead of PPNB (Kozłowski, 1999).

Lithic studies focused on bidirectional technology have permitted the reconstruction of the reduction sequences and the technological skills and behavioural patterns of its users, identifying different chronological and regional variants across the Levant during the PPNB (e.g. Barzilai, 2010; Borrell, 2011b and Nishiaki, 2000). Intensive research has also contributed to a better understanding of different cultural attributes of the first farming communities in the Levant, such as social complexity, inter-site and

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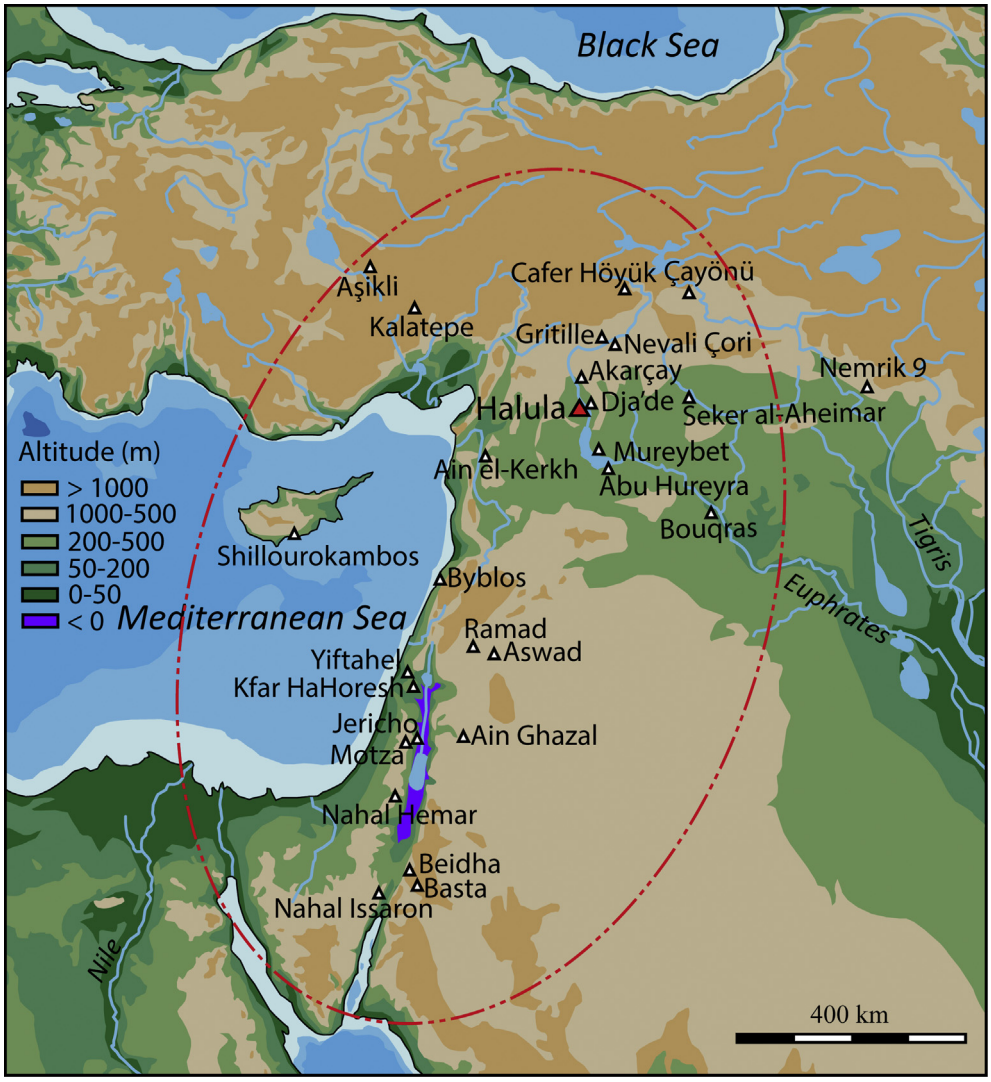

Fig. 1. Location of Halula and other key Neolithic sites in the Levant and approximate geographical expansion (red dotted line) of bidirectional blade technology during the PPNB. (For interpretation of the references to colour in this figure caption, the reader is referred to the web version of this article.)

intra-site social interactions, knowledge transfer, exchange networks and product circulation (e.g. Barzilai, 2010; Borrell and Molist, 2014; Quintero and Wilke, 1995 and Quintero, 2010). The points themselves have also been the object of specific typological and technological studies (e.g. Bar-Yosef, 1981; Borrell and Molist, 2007; Cauvin, 1974; Gopher, 1994; Kozłowski and Aurenche, 2005; Roodenberg, 1986; Schmidt and Beile-Bohn, 1996 and Shea, 2013). Such studies have provided abundant data related to projectile production, created different typologies (Byblos, Amuq, Ugarit, Jericho, etc), and indicated regional and chronological differences. Use-wear analyses are scarce and the total number of artefacts analyzed is small (e.g. Moss, 1983 and Coşkunsu and Lemorini, 2001). In general terms, these studies confirm that large points were used as projectiles, even though in some cases they were also used for other purposes (boring, cutting, etc.) mostly once they had been rejected as projectiles, but they have not provided evidence of the different weapons used during the Pre-Pottery Neolithic.

In sum, there is little doubt about the economic significance of bidirectional technology and of the large quantities of tanged projectiles produced in Neolithic settlements during the emergence and consolidation of agricultural systems in the Levant. However little is known about the weapons (spears, darts or arrows) that the large stone tips were part of or the delivery mechanisms used (bow, spear-thrower). Specific morpho-metric analyses devoted to such topics are abundant in other parts of the world where large projectiles dominate lithic assemblages (e.g. Shea, 2006; Shott, 1997 and Riede, 2009) but, in contrast, they are almost absent, though there is one notable exception (Roodenberg, 1986), in the archaeological literature of the Levant.

Our research is aimed at filling this gap by reconstructing the type of weapons and delivery mechanisms used during the PPNB at Halula. Our multi-disciplinary study integrates a techno-typological approach to the production of tanged points at Halula, evidence from hafting techniques at the site, and the analysis of various ballistic attributes using recent morpho-metric methods, which compare archaeological data with available ethnographic and experimental data. The investigation is based on a large assemblage of points from Halula (Syria), a large PPNB settlement in the middle Euphrates valley. The results constitute a preliminary but reliable approach to weaponry during the PPNB as a first step to 1) reconstructing hunting and/or warfare technologies during the Pre-Pottery Neolithic and 2) evaluating the socio-economic significance of bidirectional technology and of the massive production of