DOMESTIC FLAKE PRODUCTION TECHNOLOGY OF THE EARLY BRONZE AGE IN UPPER MESOPOTAMIA: TELL GHANEM AL-ALI (SYRIA) AND TELUL ETH-THALATHAT V (IRAQ)

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Introduction

A multi-disciplinary research project led by Katsuhiko Ohnuma between 2006 and 2010 investigated the prehistoric processes of the "formation of tribal communities in the Middle Euphrates, Syria" [Ohnuma *et al*. 2010]. Drawing on various disciplines including archaeology, cuneiform studies, and ethno-history, this project successfully clarified the significance of the Early-to-Middle Bronze Age in understanding this important social transformation in Mesopotamian history.

As a part of this project, a series of field surveys was conducted in an area encompassing a 10 km radius from the settlement of Tell Ghanem al-Ali (hereafter Ghanem al-Ali), a medium-sized Early Bronze Age (EBA) site on the Middle Euphrates, excavated by Ohnuma [Nishiaki 2010a, 2014a]. Analyses of the survey materials, as well as the excavated ones from Ghanem al-Ali, revealed the presence of a distinct EBA lithic industry in the region, characterized by a unique technology for flake production [Nishiaki 2010b]. In addition, stratigraphic evidence from Ghanem al-Ali demonstrated diachronic changes in this industry, leading towards a strong emphasis on the production of naturally-backed flakes in the middle of the third millennium BC. On the basis of these finds, the abundant occurrence of naturally-backed flakes at survey sites in the hinterland of the Middle Euphrates was identified as a late EBA phenomenon, suggesting the intensive exploitation of steppe environments at this time [Nishiaki 2014b].

Those analyses have shown that the study of lithics can make a unique contribution to Bronze Age research in Upper Mesopotamia [see Rosen 1997]. In order to further characterize the EBA industry of the Middle Euphrates, this paper refers to its technological aspects in a regional context. While previous studies focused on chronology, the present study discusses geographic variability. By comparing the Ghanem al-Ali industry with that of a contemporaneous settlement in northern Iraq, Telul eth-Thalathat V (hereafter Thalathat V), the geographic distribution of the EBA industry of the Middle Euphrates is examined.

The EBA lithic industries of Tell Ghanem al-Ali, Middle Euphrates, and Telul eth-Thalathat V, northern Iraq

The Ghanem al-Ali site comprises a mound about 50 km to the east of Raqqa, on the right bank of the Middle Euphrates. The excavations between 2007 and 2010 revealed an EBA settlement encompassing a 12 ha area that rises approximately 9 m from the surrounding field. Of the eight excavation squares opened during field campaigns, Square 2 revealed the most important stratigraphic sequence: Phase 1 (levels 7 and 8) that encompasses the period between 3,100 cal BC and 2,900 cal BC, Phase 2 (levels 5 and 6) between 2,900 cal BC and 2,650 cal BC, and Phase 3 (levels 1–4) between 2,650 cal BC and 2,350 cal BC [Hasegawa and Ohnuma 2014]. These architectural phases were followed by Phase 4 dated to the period between 2,350 cal BC and 2,050 cal BC [Nishiaki 2014b]. This final phase, originally reported as the "topmost layer" (Nakamura 2010) or "topsoil" [Hasegawa and Ohnuma 2014], was not initially identified as an occupational phase because of the absence of standing architecture. Incorporating this phase, however, the Ghanem al-Ali sequence

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is thought to encompass the entirety of the third millennium BC.

The lithic assemblages from these four phases share a basic industrial structure, comprising local and non-local industries. The local industry is represented by flake production from flint pebbles available adjacent to the site, whereas the non-local industry consists of Canaanean blades alone, most likely manufactured at workshops in the Upper Euphrates valley of Anatolia. The most distinguishable feature of the local industry, the main subject of this paper, is the systematic production of short and thick flakes with a cortical butt (Fig. 1: 1–4), which was gradually developed through the third millennium BC [Nishiaki 2014b]. With a natural back provided by the cortical butt (Fig. 1: 3, 4), those flakes were mostly used immediately with no need for secondary retouching. This industry, comprising a simple but unique technology, was preliminarily termed "Shabutian" after the Wadi Shabut site where a flint scatter comprising these elements was identified for the first time [Nishiaki 2010b; Nishiaki *et al*. 2011].

The technology underlying domestic flake production during the Middle Euphrates EBA was not *ad hoc* and characterless. Albeit simple, this technology certainly followed a solid cultural tradition that changed over time. However, its regional context has not been discussed detail. One reason for this is the paucity of published accounts at other sites. Current research on EBA lithics has mostly focused on Canaanean blade production, especially in Upper Mesopotamia [see Chabot and Pelegrin 2012]. A cursory survey of the literature indicates, however, that a similar cortex-platform technology has been identified in Ninevite 5 assemblages from Tell 'Atji and Tell Gudeda in the Khabur basin, northeastern Syria [Nishiaki 2010b: 181; Chabot 2002], suggesting a potential of the further research.

In an attempt to explore the geographic distribution of this particular technology to the east, materials from the Ninevite 5 site at Thalathat V, northern Iraq, were examined for this study. The site was excavated by a team from the University of Tokyo in 1965 and the resulting collection is stored in the University Museum, the University of Tokyo [Fukai *et al*. 1974]. Although lacking reliable

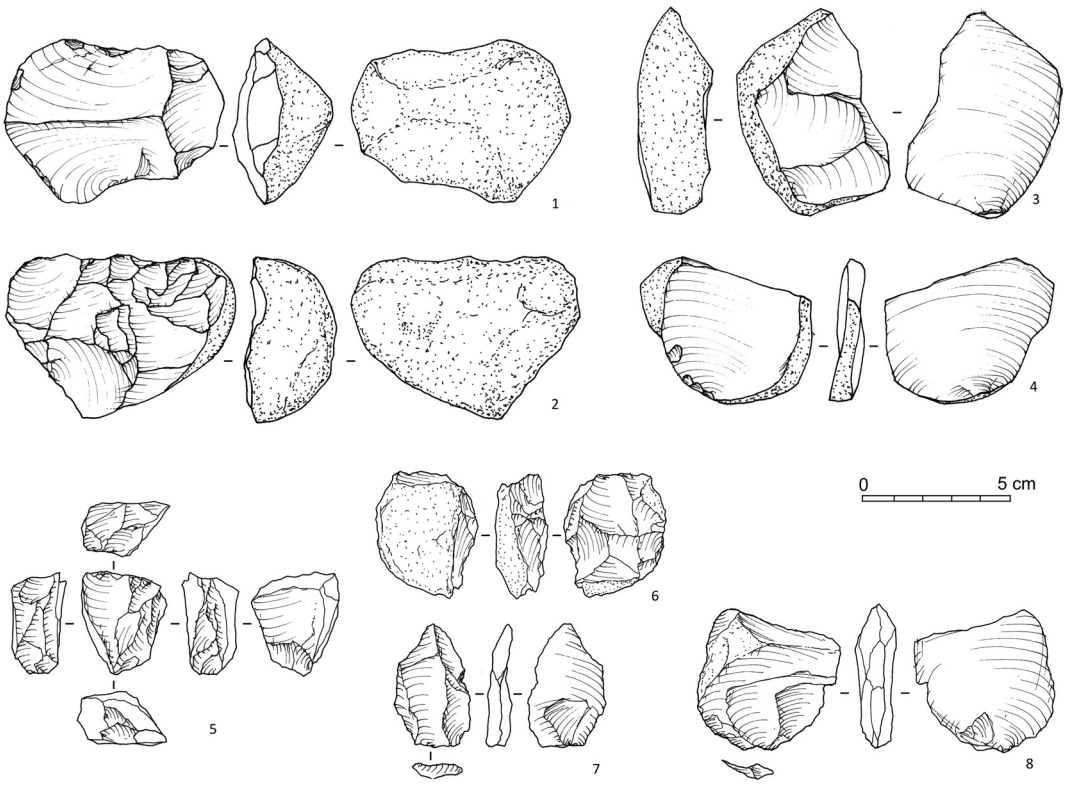

Fig. 1 Flint cores and flakes from Tell Ghanem al-Ali (1–4) and Telul eth-Thalathat V (5–8).

radiocarbon dates, typological study of the ceramics has dated this site to the early Ninevite 5 period of the first half of the third millennium BC [Numoto 1997], contemporaneous to Phase 2 of Ghanem al-Ali. The lithic assemblage of Thalathat V comprises three major components: obsidian blades, Canaanean blades, and flake artifacts. Excluding imported obsidian and Canaanean blades, the collection used for comparison with the materials from Ghanem al-Ali comprised 8 cores and 58 flake artifacts, all made on locally available flints (Fig. 1: 5–8). Four technological attributes were examined: core types, the proportion of cortical pieces, platform types, and the shapes of blanks.

A comparison of core types between the Ghanem al-Ali and Thalathat V collections is presented in Table 1. It shows that the cores from Thalathat V, although fewer in number, exhibit a more-or-less similar composition to those from the Ghanem al-Ali Phase 1 assemblage. However, they differ sharply from those of Phase 2, which overlaps chronologically with occupation at Thalathat V. Cortex-platform cores, very popular during this phase at Ghanem al-Ali (Fig. 1: 1, 2), are rare at Thalathat V. The cores at the latter site generally retain intentionally prepared platforms for blank production, thus often displaying a polyhedron shape with flake scars on different surfaces (Fig. 1: 5, 6). This core technology has never been popular in the larger assemblage at Ghanem al-Ali.

The rare use of cortex-platform cores is clearly reflected in the smaller proportion of cortical pieces at Thalathat V (Table 2). The larger number of cortical flakes at Ghanem al-Ali is derived from an intentional technological strategy to strike the cortical surfaces of cores to generate naturally-backed flakes with thick cortical butts (Table 3). Results of a multivariate correspondence analysis of butt (platform) types place the Thalathat V technology well away from the Middle Euphrates assemblages (Fig. 2), emphasizing its frequent use of faceted platforms. The technological differences between Ghanem al-Ali and Thalathat V resulted in contrasting product shapes (Fig. 1: 3, 4, 7, 8). Fig. 3 shows thickness/length ratios of flakes, which include materials from related sites of the Middle

Table 1 Core types at Tell Ghanem al-Ali (TGA) and Telul eth-Thalathat V (ThV). For the definition, see Nishiaki 2014b.

Core types	TGA 4	TGA 3	TGA 2	TGA 1	ThV
Core splits	0 (0.0)	0 (0.0)	2 (10.5)	1 (7.1)	1 (12.5)
Semi-flaked cores	0 (0.0)	2 (20.0)	1 (5.3)	2 (14.3)	0 (0.0)
Cortex-platform cores	8 (88.9)	4 (40.0)	5 (26.3)	2 (14.3)	1 (12.5)
Working surface-platform cores	1 (11.1)	3 (30.0)	7 (36.8)	4 (28.6)	2 (25.0)
Single-platform cores	0 (0.0)	0 (0.0)	2 (10.5)	2 (14.3)	1 (12.5)
Discoidal cores	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (12.5)
On flake cores	0 (0.0)	1 (10.0)	2 (10.5)	3 (21.4)	2 (25.0)
Total	9 (100.0)	10 (100.0)	19 (100.0)	14 (100.0)	8 (100.0)

Table 2 Local flake products* from Tell Ghanem al-Ali (TGA) and Telul eth-Thalathat V (ThV).

Debitage types	TGA 4	TGA 3	TGA 2	TGA 1	ThV
Core-edge flakes	0 (0.0)	2 (2.2)	4 (5.1)	0 (0.0)	4 (8.7)
Cortex flakes	4 (15.4)	7 (7.5)	13 (16.7)	16 (35.6)	5 (10.9)
Part-cortex flakes	18 (69.2)	64 (68.8)	43 (55.1)	23 (51.1)	20 (43.5)
Flakes	2 (7.7)	6 (6.5)	4 (5.1)	4 (8.9)	15 (32.6)
Part-cortex blades	0 (0.0)	0 (0.0)	1 (1.3)	0 (0.0)	1 (2.2)
Blades	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Chips & thermally fractured pieces	2 (7.7)	14 (15.1)	13 (16.7)	2 (4.4)	1 (2.2)
Total	26 (100.0)	93 (100.0)	78 (100.0)	45 (100.0)	46 (100.0)

* including tool blanks

Table 3 Platform types for flakes from Tell Ghanem al-Ali (TGA) and Telul eth-Thalathat V (ThV).

Platform types	TGA 4	TGA 3	TGA 2	TGA 1	ThV
Cortical	16 (72.7)	52 (77.6)	50 (72.5)	20 (39.2)	7 (18.4)
Cortical & Plain	2 (9.1)	2 (3.0)	2 (2.9)	0 (0.0)	2 (5.3)
Plain	1 (4.5)	9 (13.4)	13 (18.8)	26 (51.0)	17 (44.7)
Shattered	3 (13.6)	4 (6.0)	0 (0.0)	2 (3.9)	5 (13.2)
Dihedral	0 (0.0)	0 (0.0)	3 (4.3)	3 (5.9)	2 (5.3)
Faceted	0 (0.0)	0 (0.0)	1 (1.4)	0 (0.0)	5 (13.2)
Total	22 (100.0)	67 (100.0)	69 (100.0)	51 (100.0)	38 (100.0)

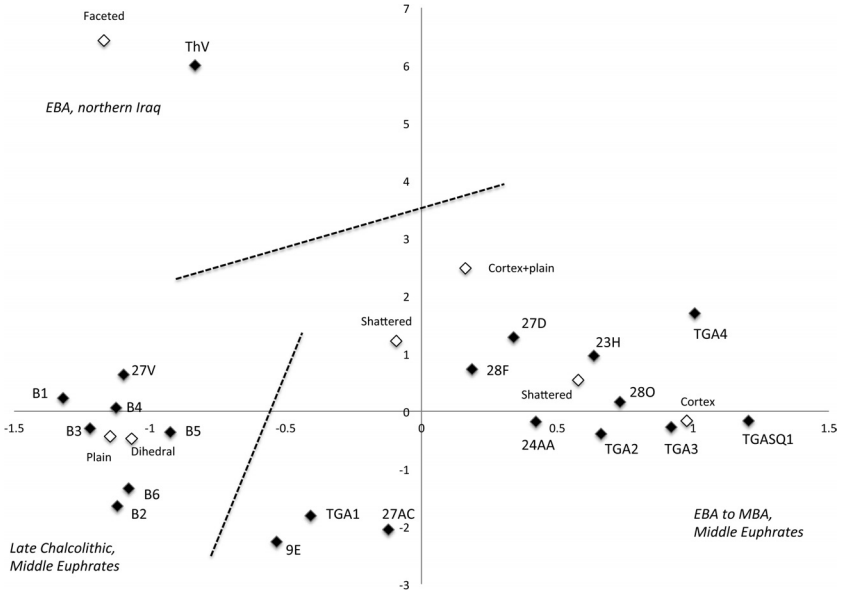

Fig. 2 Results of a correspondence analysis of flake platform types. ThV: Telul eth-Thalathat V; TGA: Tell Ghanem al-Ali; B1–7: Late Chalcolithic levels of Tell Kosak Shamali; others: selected survey sites on the steppe of the Middle Euphrates. Data on Middle Euphrates sites are from Nishiaki [2014b].

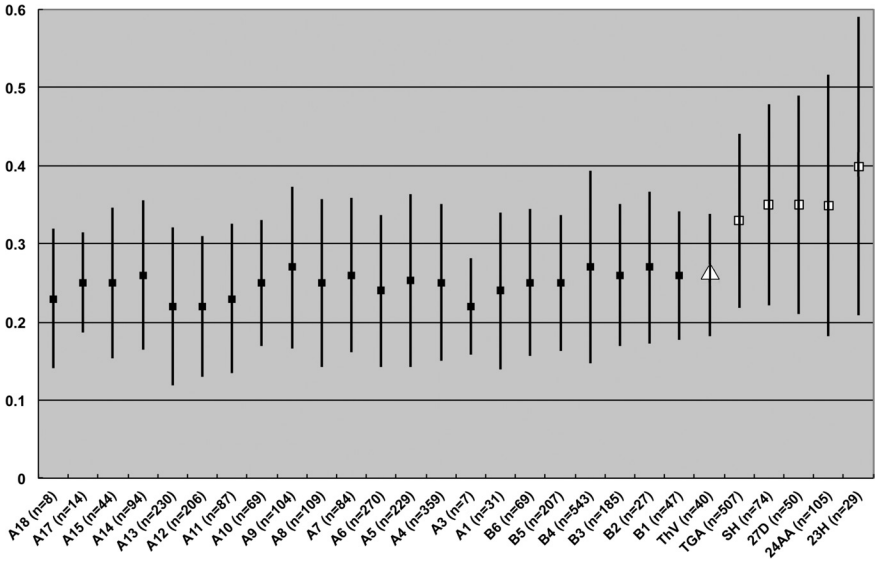

Fig. 3 Mean ratios of thickness/length for complete flakes. A1–A18: Early Chalcolithic levels of Tell Kosak Shamali. For other legends, see Fig. 2. Data on Middle Euphrates sites are from Nishiaki [2010b].

Euphrates to provide a wider chronological comparison. This analysis highlights the remarkably thick shape of the flakes from Ghanem al-Ali and other EBA sites of the Middle Euphrates, while showing the relatively thin flakes popular at Thalathat V.

Geographic variability of the EBA flake production in Upper Mesopotamia

The above comparisons demonstrate technological differences between Ghanem al-Ali and Thalathat V. It should be noted that the technological attributes examined in this study, including platform types and the proportions of cortical pieces, can vary easily as the result of differences in functional conditions, for example raw material availability and the occupational intensity at each site. At the same time, it should also be emphasized that significant diachronic changes in attributes have been identified in the same raw material environment on the Middle Euphrates both on intra- and inter-site scales (Figs. 2 and 3; Nishiaki 2014b). Given the present state of research, which would certainly benefit from data enrichment and further tests on more materials from other sites, it is suggested that the domestic lithic technology on the Middle Euphrates during the EBA belonged to a different tradition from that of northern Iraq. A geographic border may have been existent the east of the Khabur Valley, at least in the late third millennium BC [Nishiaki 2010b].

With this in mind, it will be useful to examine the distribution patterns seen across this region in a larger range of industrial elements. For example, patterns in raw material use for Canaanean blades provide an intriguing insight. These blades, mostly produced at production centers in Anatolia [e.g., Behm-Blancke 1992; Schmidt 1996], were distributed to consumer settlements like Ghanem al-Ali and Thalathat V. Judging from differences of flint raw materials, the production centers feeding these two settlements were probably different; the flints used for Canaanean blades of Ghanem al-Ali include fine-grained light and pinkish/brownish gray pieces, often with irregularly distributed whitish gray patches derived from a fossiliferous formation. Flints resembling this particular type were also used for Canaanean blades at Upper Khabur sites [Nishiaki 2012]. In contrast, the flints used for Canaanean blades recovered from Thalathat V are less fine in texture, even coarse-grained, while their colors are mostly gray, rarely light-gray to pale-pinkish. In addition, because Thalathat V samples do not include flints with large fossiliferous patches [Nishiaki 2012: 66], these two settlements, already distinguishable in their use of domestic flake production technologies, may also have differed in their use of procurement networks for Canaanean blades.

The possible relationship between the distribution patterns of specific domestic flake production technologies and other socio-economic elements in the EBA will be an interesting research area for the future. These patterns may not necessarily conform to one another; for example, the geographic distribution of the Middle Euphrates flake technology does not match that of ceramics. As stated above, although Ninevite 5 pottery is popular in the EBA of the Upper Khabur [Lyonnet 1998; Rova 2013], where comparable flake production technology has been reported, this pottery type has never been identified in the Middle Euphrates region. Comparable patterns should be detectable in other elements as research progresses. Identification of the factors contributing to these underlying patterns should enable a better understanding of the complex cultural landscape of the EBA in Upper Mesopotamia.

Conclusions

The present study shows that the EBA domestic flake production technology of the Middle Euphrates belonged to a different tradition from that of the northern Iraq. Most important technological differences were identified in the platform selection and the way of preparation of cores. Although the location of the geographic boundary, if present, remains to be determined, a preliminary survey of the literature suggests that the Khabur basin comprised part of the same group as the Middle Euphrates, at least during the mid-late third millennium BC.

Research on Bronze Age lithic technologies in Upper Mesopotamia has been directed mostly at the specialist production of Canaanean blades, without exploring local domestic flake production in details. The technologies identified at Ghanem al-Ali and Thalathat V are admittedly simple in comparison with those of the Canaanean blades. However, as suggested in this paper, careful analysis can reveal culturally determined features, which can supplement perspectives obtained from specialist products such as Canaanean blades and pottery. The incorporation of data on domestic flake production within material studies has the potential to enable a more thorough understanding of cultural phenomenon in the EBA.

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