

The Neolithic-Chalcolithic Transition in Southwestern Iran: Examining Blade Production Technology at Tall-i Bakun B, Fars

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Abstract: The onset of the Chalcolithic period of Fars in southwestern Iran is marked by the introduction of distinct painted vessels of Bakun ware, supposedly accomplished through interaction with communities in the lowland plains to the west. This paper examines lithic core reduction technology in this period with reference to the materials excavated by a Japanese expedition at Tall-i Bakun B in 1956. The results, although based on a small sample size, elucidate that the Early Chalcolithic lithic industry at this site features typical characteristics known as the Post-Mlefaatian. More specifically, it exhibits the predominant use of unifacial cores for pressure blank production technology. This finding supports our previous view that proposed two phases for the Post-Mlefaatian: the early and late Post-Mlefaatian, characterized by the use of bullet cores and unifacial cores, respectively; each represents the Late Ceramic Neolithic and the Chalcolithic period. As comparable diachronic changes have been observed in the lowland plains to the west, careful research on the backgrounds of these pan-geographic lithic changes would provide a better understanding of the cultural dynamics of this period, explained solely based on ceramic evidence.

Keywords: Mlefaatian, Post-Mlefaatian, Pressure blade production, Chalcolithic, Painted pottery

چکیده: آغاز دوره مس‌وسنگ در فارس در جنوب غربی ایران با پیدایش سفال منقوش شاخص باکون مشخص می‌شود که از قرار معلوم از طریق برهم‌کنش با جوامع دشت‌های فرودست در غرب تحقق یافته است. در این مقاله به بررسی فناوری تراش سنگ‌مادر براساس موادی می‌پردازیم که در کاوش‌های هیئت ژاپنی به سال ۱۹۵۶م. در تل باکون ب به دست آمده‌اند. بررسی در مورد مجموعه‌ای کوچک انجام شده است؛ اما نشان می‌دهد که مصنوعات سنگی دوره مس‌وسنگ قدیم از این محوطه شاخص‌های دارد که به پسامعلقاتی شهرت دارند. به‌طور اخص، بین این مصنوعات سنگی استفاده از سنگ‌مادرهای یکسو در فناوری تولید با استفاده از فشار رواج دارد. این یافته‌ها دیدگاه قبلی ما را تأیید می‌کند که در دوره پسامعلقاتی دو مرحله قدیم و جدید وجود دارد که به ترتیب وجه مشخصه آن‌ها عبارت‌اند از استفاده از سنگ‌مادرهای فشنگی و سنگ‌مادرهای یکسو. این دو مرحله با دوره‌های نوسنگی جدید (با سفال) و دوره مس‌وسنگ مطابقت دارند. تغییرات در زمانی مشابه در دشت‌های فرودست غرب نیز به چشم می‌خورند، بنابراین با بررسی‌های دقیق فرامنطقه‌ای درباره این قبیل تغییرات می‌توان اطلاعاتی جدیدی درباره پویایی فرهنگی در اختیار ما نهاد که پیش‌تر فقط بر سفال متکی بود.

کلید واژگان: دوره مؤلفاتی، دوره پسامعلقاتی، فناوری تولید تیغه با استفاده از فشار، دوره مس‌وسنگ، سفال منقوش

Introduction

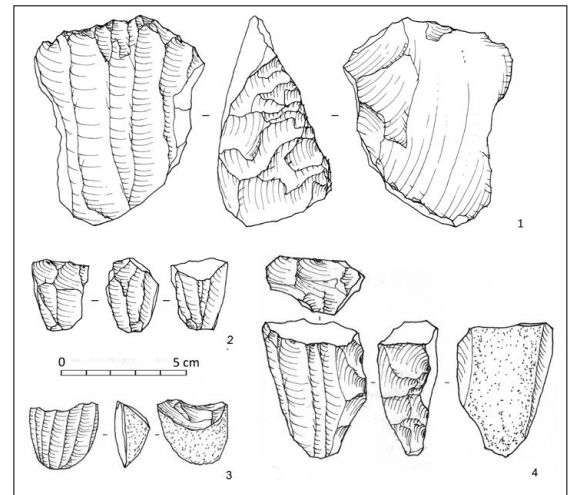
The Neolithic and Chalcolithic flaked lithic assemblages of the Zagros Mountains and its neighbouring regions are characterized by their common use of pressure débitage for blade production. This trend strongly contrasts with the contemporaneous assemblages from the Levant to the west, where the use of percussion blade débitage was predominant. Accordingly, two major

culture-historic provinces have been identified, namely, the “East and West Wings of the Fertile Crescent” (Kozłowski, 1999). While the Iranian Zagros belongs to the East Wing, maintaining the unequivocal use of pressure débitage, this vast province should have encompassed variability in technological details by region. At the same time, variability must also have existed in chronological terms. Consequently, the flaked lithic assemblages

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Fig. 1. Excavations by the University of Tokyo at Tall-i Bakun B in 1956.

Fig. 2. Lithic cores of Post-Mlefaatian in Fars. 1, 2: Jari B (Nishiaki, 2013); 3, 4: Mash Karim (Nishiaki et al. 2018).



provide a unique opportunity for exploring the Neolithic and Chalcolithic cultural processes in the Zagros from a consistent perspective in a single domain of the material culture, since lithic evidence is available almost irrelevant of regions or chronological units, such as the Aceramic and Ceramic Neolithic.

To elucidate how lithic evidence contributes to developing our understanding of the broader cultural processes, this paper examines flaked lithic assemblages during the 6th and 5th millennia BCE in Tall-i Bakun B in Fars, Southwestern Iran. The focus is particularly on assemblages excavated by the University of Tokyo at Tall-i Bakun B in 1956 (Fig. 1). Their study would provide fresh insights into the important cultural changes during the Neolithic-Chalcolithic transition, which have been discussed solely based on ceramic evidence (Alizadeh, 2006; Weeks et al. 2010; Carter and Phillips, 2010; Petrie, 2013).

The Neolithic and Chalcolithic blade core technology in Fars

Lithic assemblages during the 6th and 5th millennia BCE in Fars have been assigned to a single industry, known as Post-Mlefaatian, in the current literature (Kozłowski, 1999). This industry differs from its predecessor, Mlefaatian, in its production of wider blades and the more common manufacturing of sickle elements. Backed bladelets and geometric projectiles, widespread in the Mlefaatian, observed at Tape

Rahmatabad (Nishiaki et al. 2013) and Tall-i Mushki (Fukai et al. 1973), were no longer produced. Our previous studies on the Post-Mlefaatian assemblages from two sites in Fars suggest that this industry can be divided into at least two phases: the earlier phase, represented by the late Ceramic Neolithic site of Tall-i Jari B in the early 6th millennium BCE (Nishiaki, 2013), and the later phase reflected by the Chalcolithic Middle Bakun site of Tal-e Mash Karim in mid-5th millennium BCE (Nishiaki et al. 2018). A significant distinction was recognized in the blank production technology. The common use of conical and/or bullet cores for pressure blade production in the early Post-Mlefaatian (Fig. 2: 1, 2) was replaced by the almost exclusive use of unifacial, flat cores in the later phase (Fig. 2: 3, 4). This technological shift probably indicates the employment of a new core immobilization method for pressure flaking in the Chalcolithic. Considering that effective pressure blade production could have been undertaken in numerous different ways during the prehistoric times (Clark, 2012), the employment of one particular type probably signifies a cultural choice. On the other hand, in terms of typological changes, the later phase of Post-Mlefaatian displayed an even higher frequency of use of glossed blades than the earlier phase. In this case, the change likely reflects a functional aspect of subsistence, such as more intensive farming practices.

Table 1. Inventory of the Bakun B flaked stone artifacts excavated by the University of Tokyo in 1956.

	Surface	Topsoil	B2	B 1/2	B1*	Total
Blade core	2		3	1		6
Exhausted core				1		1
Core-edge flake			2	1		3
Core tablet				1		1
Core front				1		1
Cortical flake	1	1	1		1	4
Partially cortical flake	3	1	1	4		10
Flake	3	3	1	3		10
Partially cortical blade	2			1		3
Blade	6		1		1	8
Sickle element	7	1		2	1	11
Borer				1	1	2
Nibbled blade	2	1		3		6
Denticulate flake			1			1
Denticulate blade				1	1	2
Notched blade	2	1				3
Retouched blade				1		1
Scraper				1		1
Notched flake				1		1
Retouched flake			3	3		6
Total	29	8	15	26	9	87

* Note: Bakun B1 denotes the Shamsabad phase of the cultural sequence at this mound, which was reported as BII by the University of Tokyo's excavations in 1956 (Egami and Masuda, 1959). Similarly, the Early Bakun phase of B2 was described as BI in the 1956 excavations.

My suggestion for defining two phases in the Post-Mlefaatian was based on the analyses of the two chronologically separated assemblages. Therefore, it warrants being tested with more samples, especially during the in-between period. This paper, therefore, refers to such material from the late 6th to the early 5th millennia BCE from Tall-i Bakun B, Fars, to close the gap partially in tracing the technological development between the late Ceramic Neolithic and the Middle Bakun Period. Tall-i Bakun B is one of the twin mounds situated about 2.5 km south of Persepolis, covering a circular area of 140 m in diameter and with a height of about 5 m from the surrounding fields. Excavations of this mound have been conducted by different teams repeatedly since the early 20th century (Langsdorff and McCown, 1942; Egami and Masuda, 1959; Alizadeh, 2006). The excavation by the University of Tokyo was carried out between October 2 and 10

in 1956 (Egami and Masuda, 1959). Reflecting the small trench of 2 m by 6 m (Fig. 1), the recovered lithic materials were underrepresented (Table 1). Moreover, due to the unavailability of proper excavation records, the materials have not been fully classified into stratigraphic contexts. Nevertheless, considering that the materials from the much larger excavations in the 1930s by the team from the University of Chicago are missing (Alizadeh, 2006: 5), the University of Tokyo's collection provides a useful opportunity to understand the lithic industry of Tall-i Bakun B, the eponymous site of the Early Bakun.

The University of Tokyo's excavations confirmed the basic chronology of the two major cultural layers defined in the University of Chicago campaign. The lower layer belongs to the Shamsabad phase of the late Ceramic Neolithic and the upper one to the Early Bakun phase of the Chalcolithic. It is to be noted that the University of Tokyo's team divided the stratigraphy into BI and BII from top down (Egami and Masuda, 1959), while the excavations by the University of Chicago in the 1930s defined the two cultural phases from the bottom (B1) up (B2). The present study follows the latter stratigraphy because of its general acceptance in the current archaeological community (Alizadeh, 2006). Radiocarbon dates are available from Abbas Alizadeh's more recent sounding in 2004 (Alizadeh, 2006: 121). They indicate a date of 6234 +/- 72 BP (ca. 5300–5100 BCE) for Bakun B1 (Shamsabad) and 6160 +/- 40 BP (ca. 5250–4950 BCE) for Bakun B2 (Early Bakun).

The overall characteristics of the materials, stored at the University of Tokyo, indicate their affinity to the Post-Mlefaatian (Fig. 3). First, the common production of the pressure blades is incontestable. In addition, the blade blanks are between 9.5 and 16.1 mm in width, with an average of 12.54 mm (standard deviation=1.755 mm; n=24). This size range perfectly fits with the original dimensions of the Post-Mlefaatian blade width, which are wider than those of Mlefaatian centering on a range of 9–11 mm (Kozłowski, 1999: 78). Among the retouched tools, sickle elements are most common (Fig.

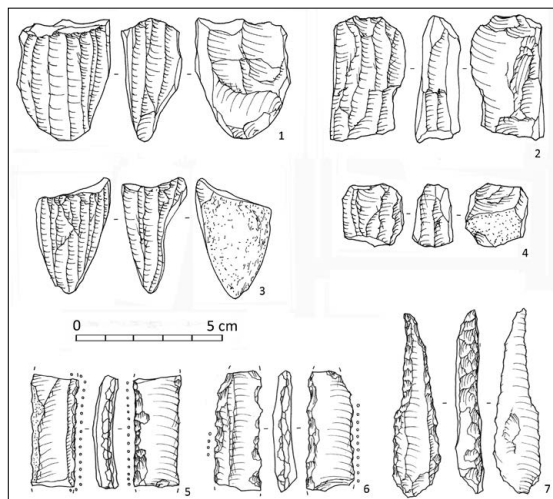


Fig. 3. Lithic artefacts from the excavations by the University of Tokyo at Tall-i Bakun B. 1–4: Cores; 5, 6: Glossed blades; 7: Borer (1, 2: Bakun B2; 3: surface; 4, 6: Bakun B1/2; 7: Bakun B1).

3: 5, 6), accounting for 17.4% (4/23) and 32.4% (11/44) of the excavated and sampled assemblages, respectively. This proportion is comparable or larger than that at Jari B (21.9%) (Nishiaki, 2013) but smaller than that at Mash Karim (42.2%) (Nishiaki et al. 2018). Other tools include well-retouched perforators (Fig. 3: 7).

With regard to the core morphology, which is supposed to serve as a chronological signature to distinguish between the early and late Mlefaatian, all the six blade cores from Tall-i Bakun B belong to the unifacial type (Fig. 3: 1–4). Blade blanks were detached from only one working surface leaving the back surface covered with either the core-preparation scars (Fig. 3: 1, 2) or the original cortex (Fig. 3: 3, 4). Importantly, three of these unifacial cores are securely assigned to the Bakun B2 (Table 1) (Egami and Masuda, 1959: 39). Therefore, the present collection, admittedly small, demonstrates that the technological diagnostics noted at the Middle Bakun of Mash Karim were already established in the Early Bakun phase. However, no cores of the Bakun B1 (Shamsabad) have been identified. In addition, the paucity of débitage products from stratigraphic contexts precludes it from detecting a difference in blank production technology between B1 and B2 at this site. Therefore, the present data do not identify when the exclusive use of unifacial pressure cores precisely began; a larger study collection is necessary to address this issue.

Nevertheless, the above results are important in providing a new dimension to interpret the emergence of the Bakun Culture in the highland plateau of Fars. The manufacturing of distinct painted ceramics of Bakun marks the advent of the Chalcolithic in the southwestern Zagros. Together with the manifestation of a range of cultural changes, including the increasing social complexity, the emergence of this culture in the highland plateau has been interpreted as a result of contacts with the Susiana lowlands, where the Neolithic-Chalcolithic transition took place earlier than in the highlands (Carter and Phillips, 2010; Petrie, 2013). Interpretations include the one that supposes the movements of potters from the lowlands to the plateau (Alizadeh, 2006; Weeks et al. 2010). In this context, lithic perspectives will shed new light on the current debate regarding the establishment of the Bakun Culture, which has thus far been discussed solely based on ceramic evidence.

Our literature survey revealed similar technological changes in the Susiana lowlands as well (Nishiaki et al. 2018). For example, the stratified settlement of Tepe Djaffarabad in the Khuzistan Plain displays a shift in core shape from conical to unifacial, between Levels 6–4 of the 6th millennium BCE and Levels 3–1 of the 5th millennium BCE (Dollfus, 1971; 1975). A similar change has also been noted in the Deh Luran, where a remarkable technological change is identified between the Sefid and Surkh phases of the Late Ceramic Neolithic (Hole et al. 1969; Hole, 1977). In these cases, the use of bullet cores rapidly gave way to the prevalent use of unifacial-type cores for blade production. The shared technological change across the lowlands and the highland plateaus of the Zagros, where different ceramic traditions were developed in the Neolithic period, indicate a need to investigate the Neolithic-Chalcolithic transition in Fars on a larger geographic scale. Given the current hypothesis that the ceramic change in Fars occurred through interaction with communities in the Susiana lowlands, incorporation of the lithic view will be particularly interesting in verifying the interpretation that the advent of the

Chalcolithic in Fars was a result of the movement of potters from the lowlands. However, how can this view explain the changes in lithic technology? The knappers were not necessarily the same as potters.

Conclusions

The present study demonstrates that the blade core technology of the Early Bakun at Tall-i Bakun B is typical of a late phase of the Post-Mlefaatian industry, characterized by the common employment of unifacial blade cores instead of the conical-bullet cores widely used in the earlier periods. While it still needs to be confirmed with a larger collection, the results of this study suggest that the predominant use of this technology began earlier than previously envisaged with the Middle Bakun materials of Mash Karim (Nishiaki et al. 2018). Moreover, the results confirm that the Post-Mlefaatian was divided into at least two phases, representing the late Ceramic Neolithic and the Chalcolithic.

The next question then is to elucidate whether the major technological change occurred in conjunction with the emergence of the Bakun culture itself, whose processes have been discussed using ceramic evidence from the Susiana as well as Fars. In the present state of research, however, it is premature to argue further on this point. First, the details of the lithic technology of the Shamsabad phase of the latest Ceramic Neolithic, between the late Ceramic Neolithic of Jari B and the Early Bakun, remain unknown. Second, the chronological framework of the changes in lithic technology has not been fully established, especially for the lowlands, where available information is limited to that obtained decades ago. As more data become available on these matters, we will be in a better position to interpret the significant cultural change of the 5th millennium BCE.

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