NEOLITHIC SICKLE ELEMENTS FROM THE BALIKH VALLEY, NORTH SYRIA

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Introduction

Sickle elements, believed to have been used for cutting plants, represent one of the most common tool types of the Near Eastern Neolithic. Numerous studies have been devoted to them from a number of viewpoints, notably in connection with the study of the origins and development of agriculture and early farming communities. This paper focuses on one of the less explored subjects, the manufacturing technologies of sickle elements. With reference to the material from Tell Damishliyya, North Syria, two aspects of the technology of sickle elements will be examined: one is the manufacturing methods of sickle elements themselves, and the other is concerned with hafting techniques. The material presented here was obtained from the final Pre-Pottery Neolithic to the early Pottery Neolithic levels. The chronological change of sickles in this time period will also be discussed.

It is my great honor to give this paper on the occasion of the commemoration of Professor Hideo Fujii's continuous and innovative contribution to the archaeology of Mesopotamia.

Excavations at Tell Damishliyya

Tell Damishliyya is one of numerous prehistoric sites discovered by the University of Amsterdam mission's survey in the Balikh valley (Akkermans 1990). It is a small mound on the west bank of Balikh, about 60 km north of Raqqa (Fig. 1: 9). The mound covers an area of about 70 × 60 m, with a height of 5 to 6 m, and is situated on a protruding remnant of a terrace. Details of the 1984 excavation have been published in Akkermans (1988). The excavated areas consist of two 10 × 10 m squares and four narrow trenches 1.5 m wide stretching over five squares. Excavation exposed seven successive stratified Neolithic deposits from the earliest Stratum 1 to the latest Stratum 7, each containing part of mud-walled buildings. Bedrock was not reached in either of the two areas. In the uppermost deposits, a remarkably large pit with a diameter of about 15 m was found which the excavator suggests can be assigned to the later Neolithic phase, perhaps to Strata 5–7. The use of this pit is as yet unknown, although Akkermans (1988) notes its similarity to modern quarry pits used to exploit mud for building material.

Archaeological objects collected from the Neolithic strata include various pieces common to this period: flint/obsidian artifacts, shards, bone tools, ground and grinding stone tools, stone vessels, clay objects, stone beads and so on. The shards which were found in the later five strata only, were most numerous in the latest strata (Stratum 7 and Pit; Table 3 in Akkermans 1988). The typological characteristics closely resemble those of the shards from Tell Assouad, a nearby mound excavated by J. Cauvin (1972) in 1970 and 1971. The two earliest strata (Strata 1 and 2) were entirely aceramic, and have therefore been ascribed to the Pre-Pottery Neolithic. Three radio-carbon dates from later strata (5970±110BC, 5720±60BC, and 5750±90BC) and the absence of a break in the stratigraphic sequence led Akkermans (1990: 116; 1991) to suggest that a gradual transition took place from the Pre-Pottery (his Balikh I) to the early Pottery Neolithic (Balikh IIA) at Damishliyya, at around 6000BC.

A collection of nearly one thousand lithic artifacts, including 759 flints and 80 obsidian pieces from in-situ contexts, was available for this study. The techno-typological descriptions have been presented

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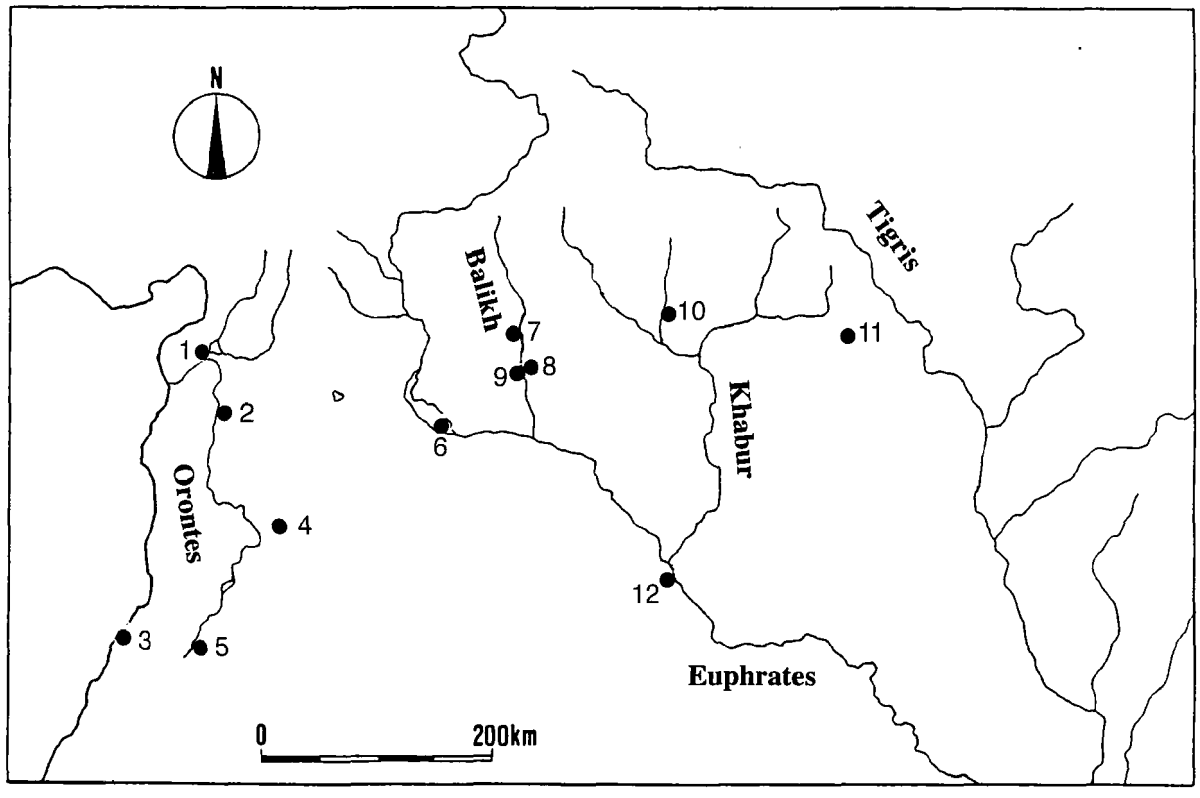

Fig. 1 Map showing Neolithic sites mentioned in the text. 1: Amuq basin sites, 2: El-Rouj basin sites, 3: Byblos, 4: Apamée, 5: Tell Nebi Mend, 6: Tell Abu Hureyra, 7: Tell Assouad, 8: Tell Sabi Abyad I, II, 9: Tell Damishliyya, 10: Tell Kashkashok II, 11: Telul eth-Thalathat II, 12: Tell Bouqras.

in detail elsewhere (Nishiaki 1992, 1993a). Since the analysis shows little inter-stratum variability, all the artifacts from different archaeological levels are treated together in the following analysis.

Sickle elements from Tell Damishliyya

The flint collection from Damishliyya contains 241 retouched tools and 40 retouch spalls. Most common are burins comprising nearly one third of the total tools (32.8%), followed by sickle elements which form about one fifth of the total (22.0%). The 40 retouch spalls are all from burin manufacture. Other tool classes which are rather rare, include retouched flakes (12.9%), retouched blades (8.7%), scrapers (5.8%), and notches (4.2%). There are only six tanged points forming less than 3% of the tool assemblage (2.5%). Obsidian artifacts include 20 retouched pieces, of which nearly half are corner-thinned blades (8/20 or 40.0%). The remainder are miscellaneous retouched/ edge-damaged blades, a notched blade, a splintered piece and so on. These blade tools, especially corner-thinned blades, could have been used as sickle elements (Nishiaki 1990), but the present study will concentrate on flint sickles alone.

The sickle element is usually defined in terms of function; it is identified by sickle gloss resulting from its use for cutting plants. However, in the course of the recent development of microwear studies, it has become clear that pieces without gloss visible to the naked eye may also have been used as sickle elements (Unger-Hamilton 1988). Accordingly, pieces displaying morphological similarities to those with visible gloss should also be considered as sickle elements, hence shape-defined sickle elements (Copeland and Verhoeven 1995). In the Damishliyya collection, forty five sickle elements with gloss and eight shape-defined ones are present.

(1) Manufacture of sickle elements

The sickle elements from Damishliyya, excluding three badly preserved ones, can be classified into

three different types on morphological grounds.

Type 1: Crescent-shaped sickle-elements (Fig. 2: 1–4; 40 pieces). These represent the most popular type at Damishliyya, amounting to 80% (40/50) of the classifiable sickle elements. The side opposite the working edge is steeply retouched to produce a curved back. All eight examples of shape-defined sickle-elements belong to this type (Fig. 2: 4).

Flakes (27/40 or 67.5%) were preferred as blanks to blades (13/40 or 32.5%). Partially cortical pieces were not uncommon but no entirely cortical flakes were used (Table 1). Metric data are presented in Table 2. Pieces between 30 and 35 mm long and 15 and 20 mm wide are most common. Dorsal scar patterns on the blanks are mainly unidirectional, originating from the proximal end. The bi-directional pattern is very rare, implying that the double-platform core technology of the Naviform type was not employed for blank production.

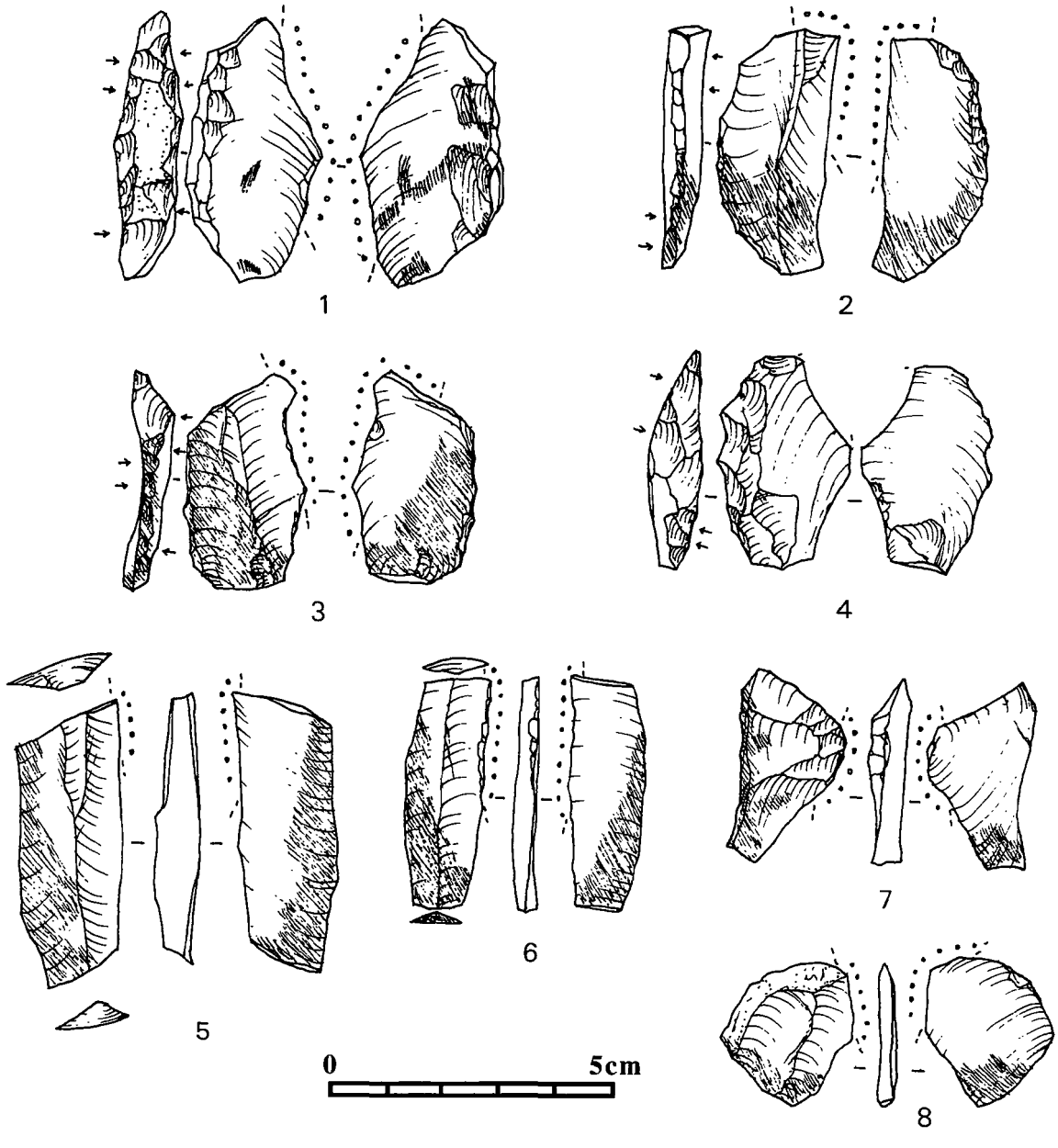

Fig. 2 Sickle elements from Tell Damishliyya. 1–3: Type 1, 4: Shape-defined sickle element of Type 1, 5, 6: Type 2, 7, 8: Type 3.

Table 1 Blank types of sickle elements from Tell Damishliyya (%).

	Part-cortical blades	Blades	Cortical flakes	Part-cortical flakes	Flakes	Total
Type 1	6 (15.0)	7 (17.5)	0 (0.0)	7 (17.5)	20 (50.0)	40 (100.0)
Type 2	0 (0.0)	5 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (100.0)
Type 3	2 (40.0)	0 (0.0)	0 (0.0)	2 (40.0)	1 (20.0)	5 (100.0)
Total	8 (16.0)	12 (24.0)	0 (0.0)	9 (18.0)	21 (42.0)	50 (100.0)

Backing retouch was made mostly from the ventral surface (27/40 or 67.5%), but bifacial retouch is also evident in some cases (11/40 or 27.5%), and inverse retouch was occasionally applied (2/40 or 5.0%). Most probably, retouch was achieved by direct percussion. No clear bias can be detected in the selection of an edge to be retouched; the frequency of retouch on the left (22/40 or 55.0%) and the right (18/40 or 45.0%) edges is almost equal.

Working edges were rarely retouched although about one quarter do exhibit some retouch scars, but these could in fact represent utilization damage. No definite intentional retouch such as denticulation is found along the edges.

Type 2: Elongated blade segments (Fig. 2: 5, 6; 5 pieces). These sickle elements have more or less parallel lateral edges, manifesting the use of more controlled flaking in blank production. No intensive retouch such as backing was made to their edges. One or both ends were truncated.

Type 2 blanks were by definition exclusively blades, on which no cortex was left. Length and width are between 26 and 49 mm, and between 12 and 18 mm respectively (Table 2). Type 2 sickle elements are generally longer than Type 1 pieces. The dorsal scar pattern is again predominantly unidirectional. The distal or proximal ends of the blades were truncated by the snapped truncation method, leaving no clear positive or negative bulbs on the surface. Side-blow and burin-blow truncations were not utilized.

Type 3: Unmodified sickle elements (Fig. 2: 7, 8; 5 pieces). These pieces are unretouched flakes and blades which exhibit sickle-gloss. The shape varies from oval to more or less crescent, and from flake to blade (Table 1). Blank forms and the general size of Type 3 pieces are quite similar to those of Type 1 (Table 2).

Table 2 Measurements of sickle elements from Tell Damishliyya (mm).

		No.	Mean	S.D.	Min.	Max.	Median
Type 1	Length	40	32.73	7.278	16	53	33
	Width	40	18.23	3.574	12	25	17
	Thickness	40	6.774	2.345	2.6	12.0	6.95
	L/W	40	1.851	0.506	0.875	2.250	1.799
	W/T	40	2.954	0.875	1.768	5.600	2.707
Type 2	Length	5	N.A.	N.A.	26	49	41
	Width	5	N.A.	N.A.	12	18	15.5
	Thickness	5	N.A.	N.A.	2.4	8.1	3.9
	L/W	5	N.A.	N.A.	1.444	3.154	2.769
	W/T	5	N.A.	N.A.	2.099	5.042	3.939
Type 3	Length	5	N.A.	N.A.	24	35	31
	Width	5	N.A.	N.A.	12	20	16
	Thickness	5	N.A.	N.A.	3.2	5.2	4.6
	L/W	5	N.A.	N.A.	1.250	2.458	1.789
	W/T	5	N.A.	N.A.	2.553	6.250	3.636

(2) Hafting

Sickle-elements from Damishliyya were almost undoubtedly used hafted, although a handle has not survived in the archaeological assemblages. Many of these pieces indeed retain clearly visible remains of adhesive substances (bitumen) on the part opposite to the working edge. M.-C. Cauvin (1973) has reconstructed a way of hafting the sickle elements excavated at Tell Assouad, the upper levels of which were contemporaneous to the occupations excavated at Damishliyya. Combining evidence on the location of sickle gloss and adhesive material, both visible on the sickle elements with the naked eye, she proposed that sickle elements of Tell Assouad were probably hafted obliquely in succession to a curved handle. In view of the close morphological and microwear similarity of sickle-elements from both sites, her reconstruction could be applied to the Damishliyya material as well (Nishiaki 1992).

Theoretically, at least two possible types can be distinguished depending on the location of sickle gloss and adhesive materials, as illustrated in Fig. 3. In Type A traces of gloss and hafting are oblique to the longitudinal axis of the element, while in Type B they are parallel. The sickle elements from Damishliyya are exclusively of Type A, identical to those reported from Tell Assouad. Although our Type 2 sickle elements are clearly morphologically different from Types 1 and 3, the distribution of gloss-bitumen traces is the same, demonstrating that these pieces were also hafted in a similar way to the others.

On even closer examination, four subtypes of Type A can be identified based on the location of hafting traces and the direction of the blank (Types A1-A4; Fig. 3; cf. Fig. 3 in Fujii 1983). All the schematic sickle-elements in Fig. 3 are placed with their sickle gloss at the top. Types A1 and A2 exhibit gloss along the right edge when seen from the dorsal surface. The gloss is wider at the distal end on Type A1, and the opposite is the case on Type A2. Types A3 and A4 show gloss along the left edge. In Type A3 the gloss is wider at the distal end, while in A4 it is more extensive at the proximal end. These four subtypes represent the different directions in which each element was inserted into a handle. Types A1 and A2 were likely to have been hafted in the way shown as Type X in Fig. 3, and Types 3 and 4 were as Type Y. The left edge of a sickle element was inserted into a handle in Type X hafting, and the right edge in the case of Type Y hafting.

Table 3 presents the result of the application of this classification scheme to the sickle elements from Damishliyya. Types A1 and A2 evidently outnumber others, showing that Type X hafting was popular at Tell Damishliyya. It is not necessary, however, that all the elements of a single sickle were hafted in the same way. As indicated by the presence of a small number of Type 3 and 4 specimens, a single Type X sickle may have contained a few pieces inserted in the way of Type Y. Nevertheless, it should be emphasized that more than 80% of sickle elements were hafted in the same way, that is Type X hafting with their left edges in the handle; a strict regularity existed in the selection of the right-left direction of elements in the handle.

It appears however that the inhabitants did not worry about which end of a sickle element pointed toward the top or bottom as long as its dorsal surface faced up. No difference can be seen between the frequencies of A1 and A2, or those between A3 and A4 (Table 3).

Flint sickles of the Balikh Neolithic

The above analysis revealed that the technology of sickles at Damishliyya is characterized by the manufacture of crescent-shaped elements on flakes and their hafting in an oblique manner to a handle with bitumen. A few straight blades were also utilized as elements. Despite their distinct morphology however, those blades were probably hafted in the same way as the crescent-shaped flakes.

Two excavated assemblages from the Balikh valley are available for comparison: one from Tell Assouad (M.-C. Cauvin 1972, 1973), and the other from a recent excavation at Tell Sabi Abyad II by P.M.M.G. Akkermans (Copeland and Verhoeven 1995). Both sites produced late PPNB materials,

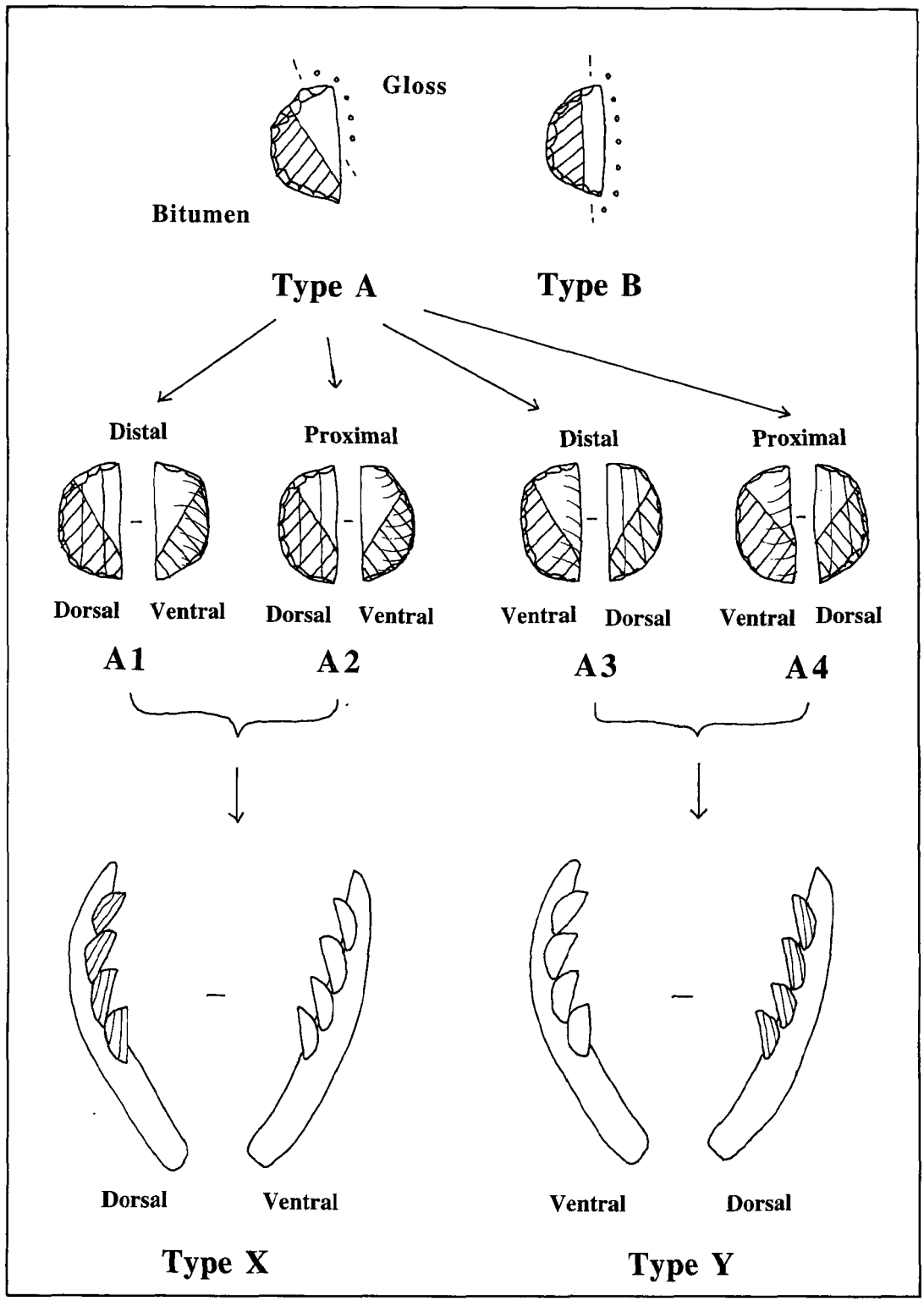

Fig. 3 Schematic presentation of gloss-bitumen patterns on sickle elements (Types A1 to A4) and the possible hafting methods (Types X and Y).

slightly earlier than the assemblages from Damishliyya, while Tell Assouad yielded early Pottery Neolithic assemblages as well. Comparison between these two sites and Damishliyya reveals an interesting pattern.

Table 3 Hafting types of sickle elements from Tell Damishliyya (%).

	Type X		Type Y		Total
	Type A1	Type A2	Type A3	Type A4	
Type 1*	14 (43.8)	12 (37.5)	3 (9.4)	3 (9.4)	32 (100.0)
Type 2	1 (20.0)	3 (60.0)	0 (0.0)	1 (20.0)	5 (100.0)
Type 3	1 (20.0)	4 (80.0)	0 (0.0)	0 (0.0)	5 (100.0)
Total	16 (38.1)	19 (45.2)	3 (7.1)	4 (9.5)	42 (100.0)

* excludes shape-defined sickle elements.

The morphological types of sickle elements defined at Damishliyya are basically shared by these two sites, but a few differences exit in technological details. Firstly, the crescent-shaped sickle elements (Type 1) from Assouad and Sabi Abyad II tend to be manufactured on blades rather than flakes as at Damishliyya. Secondly, the extent of retouch is limited and resembles truncation more than the backing that is common at Damishliyya. Copeland and Verhoeven (1995) write that the sickle elements from Sabi Abyad II rarely exhibit retouch. Thirdly, sickle elements on unmodified blade segments (Type 2), of which a few were recovered only from earlier levels at Damishliyya, seem to have been more common at Assouad and Sabi Abyad II. These differences are most likely a reflection of the collections from Tell Assouad and Tell Sabi Abyad II which contain materials earlier than those from Tell Damishliyya. In other words, they indicate chronological changes in the habit of sickle element manufacture; it appears that the co-use of Type 1 and 2 blade sickle elements in the late PPNB was gradually replaced in the early Pottery Neolithic by the dominant use of Type 1 sickle elements made on flakes.

Despite these differences in manufacturing techniques, the manner of hafting sickle elements appears to have remained generally unchanged in this time period. The way of hafting reconstructed at Damishliyya is, as demonstrated in the previous section, entirely comparable to that at Tell Assouad and at Sabi Abyad II. Even details such as the dorsal/ventral and the right/ left direction of elements against the handle wholly match each other. According to the drawings of M.-C. Cauvin (1973) and Copeland and Verhoeven (1995), Type A1 and A2 sickle elements with gloss, and Type X hafting were also popular at Assouad and Sabi Abyad II. This striking similarity in sickle manufacturing over several hundred years reinforces the uninterrupted cultural transition that occurred from the late Pre-Pottery to the early Pottery Neolithic in the Balikh valley. It should be noted, however, that a different hafting method seems to have been practiced occasionally in the earlier periods. Sickle elements collected at Tell Assouad contained a small number of pieces exhibiting Type B sickle gloss (Fig. 5.19: 7, 8 in Nishiaki 1992), hinting at the use of parallel hafting (Type B) as well. This may indicate that the mixed use of oblique and parallel types of hafting was rather common in the earlier late PPNB.

The oblique hafting of crescent-shaped sickle elements came into popular use in the Balikh during the late PPNB becoming dominant by the beginning of the Pottery Neolithic. Examination of the published drawings shows that a similar method was also practiced in other areas of Syria, for example, at the Amuq plain sites (Braidwood and Braidwood 1960), Tell Apamée (Otte 1976) and the el-Rouji basin sites of Northwest Syria (Iwasaki et al. 1995). At these sites crescent-shaped sickle elements and small blades were both put to use, and it is almost certain that at least the former include pieces hafted in the same way as at the Balikh sites. On the middle Euphrates, similar sickle elements have been reported from the late PPNB levels of Tell Abu Hureyra (Moore 1975). In the lower valley, the late to final Pre-Pottery Neolithic levels of Tell Bouqras produced similar specimens, consisting of crescent-shaped elements on blades (our Type 1) and long truncation blades (Type 2; Roodenberg 1986). The latter are far more common at Bouqras (39/53 or 73.6%), confirming the chronological trend conjectured from the comparison between Tell Assouad and Tell Sabi Abyad, and Tell Damishliyya.

Crescent-shaped sickle elements were thus quite commonly manufactured in the north Syrian region. On the other hand in the Khabur basin, eastern Syria, flint sickles themselves were apparently not very common. Instead sickle elements made of obsidian may have been more popular in this region. Corner-thinned blades, although without visible gloss due to the nature of obsidian, are possible candidates as sickle elements in this region. Their morphology and manufacturing technology differ considerably from crescent-shaped elements, but the method of hafting was probably similar to that popular at the Balikh sites (Nishiaki 1990). In southwestern Syria, another type of sickle element was commonly used at the beginning of the Pottery Neolithic. Small blades with fine denticulation along the edges seem to be more common, as illustrated by examples from Tell Nebi Mend and Byblos (Nishiaki 1992). Moreover, the parallel method of hafting which was used was radically different.

From this short review of the literature we may conclude that sickle elements of the late PPNB to the early Pottery Neolithic are characterized by their regional diversity. Simple sickle blades, made on large blades produced from Naviform cores during the earlier PPNB (M.-C. Cauvin 1983), were no longer popular by this period. They were replaced by a variety of localized types: the elements were either crescent-shaped flakes in North Syria, small denticulated blade segments in West Syria, or imported obsidian blades in the northeastern region. The flowering of such regional traditions in sickle element technology probably reflects the larger cultural change that was in progress, when the relatively uniform PPNB culture collapsed in a number of spheres (Nishiaki 1993b). The regional diversity of sickle technology could reflect the result of population growth, increased sedentism and more intensive adaptation to regionally specific raw material environments, as well as the preceding local traditions.

In the regional perspective of the Balikh, the particular sickle of the early Pottery Neolithic appears to have been passed onto the next stage, or the Pre-Halaf and early Halaf periods. The lithic analysis by Copeland (1989) at Tell Sabi Abyad I confirms that the techno-typology of the middle to late sixth millennium BC levels shows a general similarity to that of Damishliyya, such as in flake production methods and flake tool types. Particularly, sickle elements used at Sabi Abyad I include precisely the same type in both manufacturing and perhaps hafting methods as defined at Damishliyya. Our Type 1 sickle elements with sickle-gloss Type A were, along with new elements, still used in the middle to late 6th millennium contexts at Sabi Abyad I (Fig. VII.6: 5-7 in Copeland 1989). This way of hafting (Type X) seems to be an important cultural trait of the late prehistory of northern Syria.

This particular method of hafting appears to have come into popular use in northern Mesopotamia during the Ubaid period. Recent re-examination of Ubaid sickle elements from Telul eth-Thalathat II, in northern Iraq, clearly demonstrates the prevalent use of Type X sickles in the Ubaid 3 period (Nishiaki 1994). The significance of the widespread occurrences of this method in the Chalcolithic period is as yet unknown. Was it diffused from the northern Syria? If so, we may consider that one of the factors relating to the background of the region was the possible continuous contacts between northern Syria and Mesopotamia through trade of raw materials, including bitumen which was probably imported from Mesopotamia to the Balikh (Copeland and Verhoeven 1995).

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