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LA MAIN ET L'OUTIL
MANCHES ET EMMANCHEMENTS PRÉHISTORIQUES

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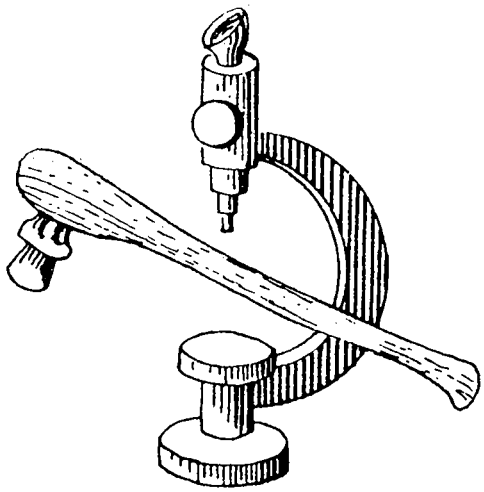

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DIRECT AND INDIRECT EVIDENCE FOR HAFTING IN THE EPI-PALAEOLITHIC AND NEOLITHIC OF THE SOUTHERN LEVANT

Ofer BAR-YOSEF

RÉSUMÉ :Les rares preuves directes d'emmanchements dans l'Épipaléolithique du Levant Sud sont fournies par la présence de matières adhésives calcaires sur les trapèzes rectangles d'un site Kébarien géométrique et sur des lames faucilles natoufiennes. On connait deux spécimens de faucilles emmanchées natoufiennes. Au Néolithique des objets mieux conservés ont été retrouvés, notamment une faucille complète provenant de la grotte de Nahal Heimar (PPNB). Du bitume adhérant encore à des lames faucilles indique un emmanchement sur des corps droits ou courbes. Les preuves indirectes d'emmanchement sont plus nombreuses pour ces époques mais moins probantes. La comparaison avec des périodes historiques (Période *Early Dynastic* d'Égypte) et les premières études de microtraces permettent d'avancer des hypothèses qui seront présentées ici.

ABSTRACT: The scanty direct evidence for hafting in the Epi-Palaeolithic in the southern Levant includes calcareous adhesive on trapeze-rectangles from a Geometric Kebaran site and Natufian sickle blades. Two examples of fragmentary hafted sickles are known from the Natufian. Better preserved artefacts were found in Neolithic sites including a complete sickle from Nahal Hemar cave (PPNB). Sickle blades covered with bitumen indicate either straight or curved hafting. Indirect evidence is more abundant from this time span but is undoubtedly less conclusive. The figures illustrate some optional hafting methods as based on historical (Early Dynastic period in Egypt) comparisons and preliminary microwear examinations.

INTRODUCTION

Hafting, like many prehistoric activities can be learned about from indirect and direct evidence. Ethnographic comparisons usually serve as the main source for suggested reconstructions when only the forms of lithic objects are known. Residues of adhesives on stone artefacts as well as visible sheen enable tentative restorations. This line of research has been enhanced during the last decade when use-wear studies (of either micro-wear or edge damage) demonstrated the potentials for more precise reconstructions. However, it is the actual examples of hafted objects, rarely found, which exhibit the exact decisions or choices made by prehistoric artisans. Studying these implements indicates what was known intuitively –that hafting itself is a more time and energy consuming activity than the mere knapping of lithics.

The following pages will not offer the reader a complete survey of the available data from the southern Levant, as the title of the paper might imply. Rather, it is an eclectic résumé of both published and as yet unpublished data along with some thoughts and queries about the implications of hafting methods for the more general field of chrono-cultural sequence in this region.

The prehistoric research of the Near East and more specifically that of the Levant, was not lucky enough to have frequent discoveries of entire prehistoric tools as were found in Egypt, Switzerland or the Scandinavian world. Therefore, the reliance on micro-wear or edge

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damage analysis, the microscopic research for the minute residues of adhesives and the use of ethnographic records, will remain important sources of information for the Levantine prehistorian, though occasionally, with a little bit of luck, the archaeological investigations in dry caves will increase the number of entire composit objects. Such is the case of Nahal Heimar Cave (that will be described below).

Before presenting information concerning the later periods let us mention a few examples from the Levantine Upper Palaeolithic in which hafting stone tools in shafts or handles was suggested on the basis of experimental work or observations of specific edge damage.

There is at least one well-explored case in which impact fractures on early Upper Palaeolithic points from Ksar Akil are interpreted as resulting from their use as arrowheads or dart tips (Bergman and Newcomer, 1983). The use of darts or arrows requires, quite often, the use of « shaft straighteners », either made of perforated antlers or grooved stones. A well polished limestone « shaft straightener » was found in the Aurignacian layer at Hayonim cave (Western Galilee) (Belfer-Cohen and Bar-Yosef, 1982, fig. 7 : 4).

Other suggestions for hafting stone artefacts are based merely on intuition. Such is the case of the retouched bladelets in Ahamarian sites in Northern Sinai (the « Lagaman ») and the Negev. Signs of utilization on their sharp cutting edges seem to indicate that they were inserted in wooden handles. Another example are the antler and bone bi-points, which occur frequently in the Aurignacian deposits at Hayonim cave and could have been mounted as parts of spears or arrows (see Bergman, this volume).

THE EPI-PALAEOLITHIC PERIOD

Under current definitions this period lasted for about nine or ten thousand radiocarbon years (*ca.* 18000-8500 B.C.). Its chrono-cultural sequence is described by an increasing number of studies in which some other aspects such as subsistance activities, geographic distribution of sites, site size and contents, etc. have been examined (Bar-Yosef, 1981 ; M.C. Cauvin, 1981 ; Henry, 1983). Most of the discussions concerning the definitions of the archaeological entities relied upon the techno-typological studies of lithic assemblages. These were analysed as to their technological characteristics, morphological typology of retouched pieces and the spatial and diachronic distribution of stylistic attributes. In reporting the results some intuitive observations about the use or hafting of various tool types were offered. However, only during the last decade have systematic studies concerning these aspects commenced with the pioneering work of G. Kukan (1978). Kukan's tentative reconstructions for the various ways in which Levantine Epi-Palaeolithic microliths might have been hafted were based on numerous metric studies of several samples. His approach differed from the one previously adopted by scholars who based their reconstructions on ethnographic evidence and the visible lustre on pieces such as sickle blades (Curwen, 1941 ; Cauvin, 1973 ; Cauvin, 1983). Therefore it is interesting to note that Kukans's predictions were later confirmed by the use-wear studies done either by high or low magnification (Anderson-Gerfaud, 1983 ; Tomenchuk, 1983 ; Tomenchuk, 1984).

The introduction of systematic examination of lithics under the microscope resulted in the discovery of adhesive remains which heretofore had passed unnoticed when inspected by the naked eye (Anderson-Gerfaud, 1983 ; Tomenchuk, 1984). The proposed reconstructions demonstrated that the tentative propositions concerning the use of microliths, and especially those which exhibit a pointed end, were correct. Their use as the lead-part of a projectile, either a spear (atlatl) or an arrow, was indicated by the placement of the adhesive in relation to the microliths and the micro-polish or stress signs on the pointed or sharp end. While this conclusion refers to types such as the obliquely truncated backed bladelets, elongated scalene triangles and small lunates, other microlithic types exhibit hafting signs as knives (which could be used for scraping, shredding and shaving). Figure 1 represents the author's efforts in compiling the various versions of hafting microliths from the available literature.

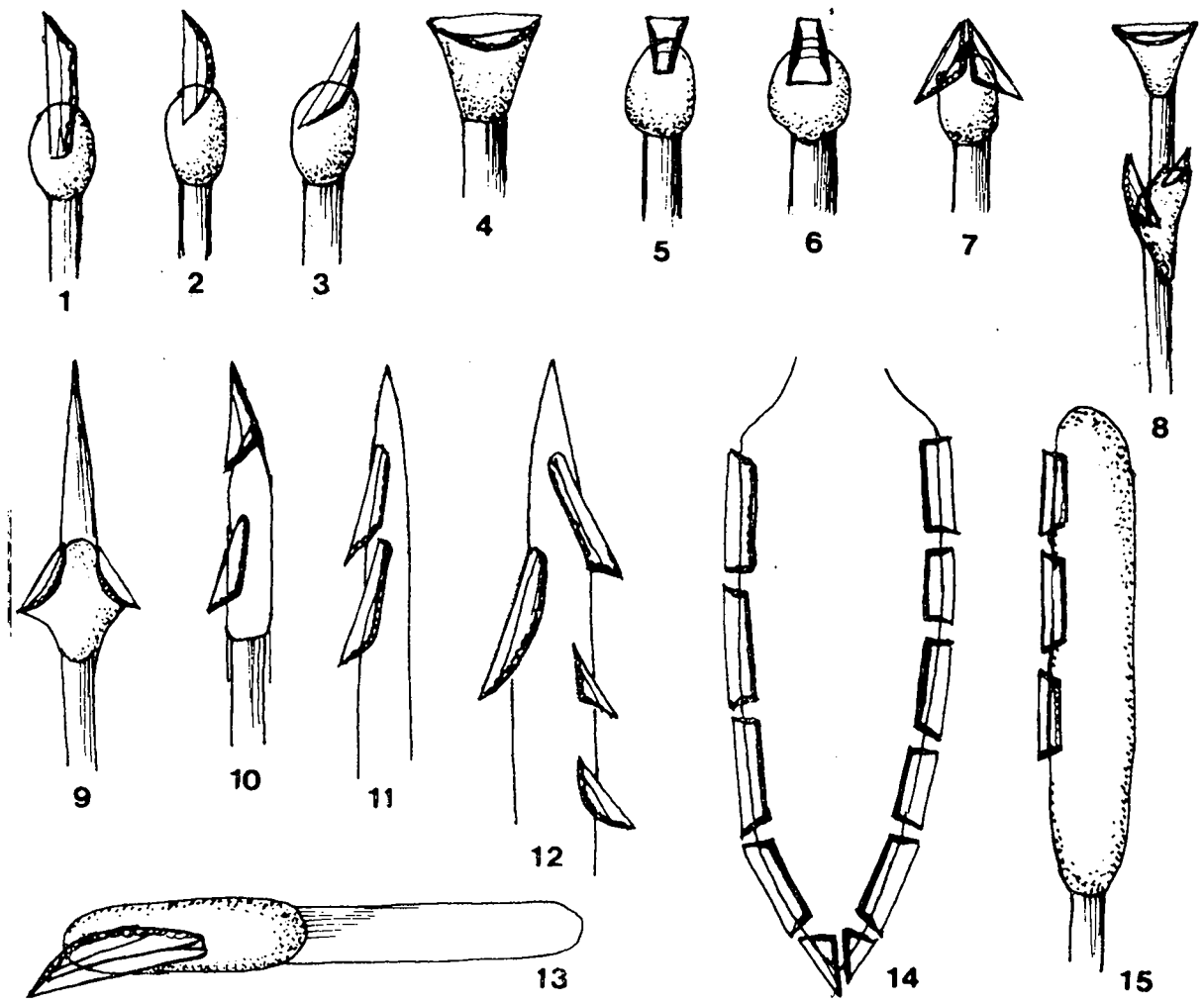

Fig. 1 Suggested reconstructions of various microliths as dart tips, barb and cutting tools, based on the works of Kukan (1983), Tomenchuk (1983, 1984), Anderson-Gerfaud (1983) and the Egyptian finds (Clark et.al., 1974).

The study of these two types –the obliquely truncated backed bladelet (sometimes called the Kebara or Jiita points) and the lunates, takes care of the most frequent types in Kebaran, Natufian and « Negev Kebaran » assemblages. It might imply by way of comparison that the arched backed bladelets, common in early Mushabian assemblages were hafted in the same way. But strangely enough it leaves out the most frequent microlith of the wide-spread Geometric Kebaran sites, *i.e.*, the trapeze-rectangle. In other words, while the « dart heads » or « barbs » of the Kebaran, Mushabian and Natufian, were distinctly shaped pointed microliths which form at least 60% of the microlithic (blade) component of the various assemblages, it is not clear what microliths could serve the same purposes in the Geometric Kebaran.

Direct evidence for hafting the Levantine trapeze-rectangles (which are generally narrower than their Mesolithic European equivalents) comes from the site Lagama North VIII, in Gebel Maghara, northern Sinai (Bar-Yosef and Gorring Morris, 1977). There, in a large heap of ashes mixed with sand, adjacent to a hearth, a large concentration of trapezes-rectangles was found. A good number of pieces preserved a calcareous adhesive which covered one half

to two thirds of each piece along its main longitudinal axis indicating that the retouched back was inserted in a wooden handle. A large sample of trapeze-rectangles exhibited a light sheen parallel to the sharp edge of the microlith and a dimmed colour on the other half of the artefact. The specimens were examined by J. Tomenchuk who briefly reports the results in his thesis (Tomenchuk, 1984, Ch. 14). His main conclusion was that these trapeze-rectangles were hafted in a « knife » shaped form with limestone-based mastic which was sometimes metamorphosed, possibly by baking.

This situation implies that the commonest microlith in the Geometric Kebaran is not, as in earlier or later cultural complexes, the lead part of a projectile. Usually, among the microlithic component of this archaeological entity one finds other types, such as triangles, which occur in low frequencies and could have served this purpose. An additional reconstruction is having a projectile made of wood with a sharpened tip using microliths as barbs. Whatever the real shape of the projectile was, it apparently did not make a substantial change in game acquisition techniques as the faunal spectra shows (Bar-Yosef, 1981, fig. 11).

Another tool type which has received considerable attention was the sickle. Since the early finds of prehistoric sickles and the discovery of Natufian sickle blades generally defined by the presence of sheen along their sharp edges, scholars attempted in reconstructing the forms of the various sickles and their function (Garrod, 1932 ; Curwen, 1941 ; Braidwood, 1952 ; J. Cauvin, 1978 ; M.C. Cauvin, 1983 ; Anderson-Gerfaud, 1983 ; Unger-Hamilton, 1984, to mention only a few references). The few complete and broken bone handles found in Kebara cave, El Wad, Erq el Ahmar, Oum ez-Zoueitina, Eynan (Ain Mallaha), Hayonim and Nahal Oren demonstrate that Natufian sickles were possibly of a straight form. The number of inserted blades is estimated (due to the lack of direct evidence) as 3-5 per sickle. The numerous recovered lustred blades in the known Natufian sites indicate the use of wooden handles, long decayed.

The hafted blades were either unretouched like those in the fragment of a sickle found in El-Wad (Garrod and Bate, 1937, Pl. XIII : 1) or retouched like the Helwan bladelet in Oum ez-Zoueitina (Neuville, 1951, 124). The use of unretouched blades, routinely defined among the debitage products, exemplifies the limits of our traditional morphological classificatory system.

Since hafting, as mentioned above, is a time consuming task it is not surprising that provisions were made in order to save time and energy when such an activity was pursued. As organic substances (such as wood and resin) are often not preserved in Levantine sites located within the Mediterranean climatic belt, no stored materials are expected to be found. However, in one instance at Hayonim cave a small well built cache which contained sawn bovid ribs was found near the cave wall. Among them one rib was already carved along one edge to form a narrow flat platform into which a groove could later be incised.

The adhesive used during Natufian times was probably resin or limestone-based adhesive like the one mistakenly described by Garrod in the El-Wad specimen as secondary calcareous deposit (Tomenchuk, 1984). Most of the observed sickle blades in Natufian sites were not reported to bear the small black dots that typify badly preserved asphalt hafting which is so commonly seen in later millenia.

The earliest stone projectile points with an aerodynamic configuration are the Harif point and its predecessor, the « Mushabi » point (known in North Africa as « Columnata point »). Both were shaped in the tradition of backed microliths. They have a blunted back wich converges to a point with the sharp edge. The base (proximal end) was shaped in a rounded, triangular or a tang-form, mainly by flat retouch (*Fig. 2* **1-3**). The latter form is also known as the Ounan point in North Africa and Egypt. There are no clear signs as to what materials were used in mounting them on a shaft. Some kind of mastic was probably an adequate adhesive such as those found on Egyptian Proto-Dynastic and Early Kingdom transverse arrows (Clark *et al.*, 1974). The same is implied for the Abu Madi points as yet known only from southern Sinai (*Fig. 2* **4-5**).

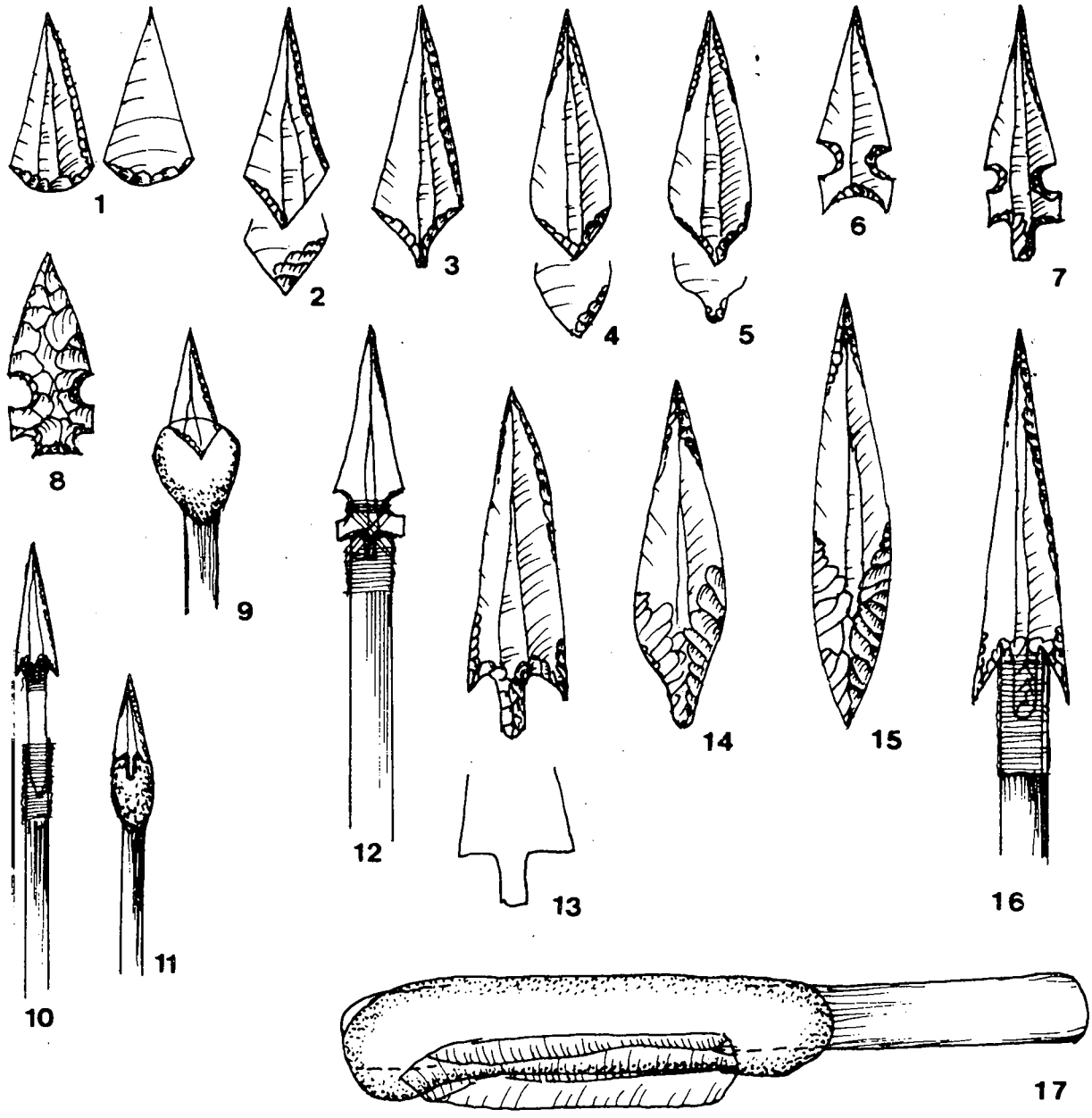

*Fig. 2 Various Epi-Palaeolithic and Neolithic arrowheads or dart tips (***1-8**; **13-15***) and their hafting as suggested by the comparisons with Egyptian finds, ethnographic parallels (***9-11**, **16***) and remains of bitumen on Khiamian lustered blade (***17***).*

THE NEOLITHIC PERIOD

In discussing hafting methods from this period, I will focus in this chapter on two tool-groups alone: the arrowheads and the various knives.

The earliest arrowheads, shaped of plain blades, indicate by the presence of bi-lateral notches a different hafting technique. Various ways for hafting the Khiam and Helwan points (*Fig. 2* **6-8**, **12**) were already proposed by F. Burian and E. Friedman (Noy, 1976). The use

of sinews and/or vegetal threads is possibly indicated by the presence of the bilateral notches. The reliance on the tang alone in mounting the arrowhead, as postulated for the later Jericho, Byblos and Amuq points (*Fig. 2* **10-11, 13-16**) might be explained as an improved technique. Considering the average size and weight of these flint points which are heavier and longer than the former ones, we might expect that the bow had been modified as well.

That the hafting of these types of arrow-heads (Byblos and Amuq points) was not imaginary, was neatly demonstrated by microwear analysis of projectiles from Abu Hureyra, most of which, originally were mounted on shafts and used for hunting (Moss, 1983).

Unfortunately, no use wear examination is as yet available for the small, generally pressure flaked arrowheads which characterize the Sixth and Fifth millenia B.C. These types were used even later, during the Fourth and Third millenia B.C. in the desertic regions of the Near East (Zarins, 1981 ; Edens, 1982 ; Bar-Yosef *et al.*, in prep.). Altogether, it would not be surprising if the hafting method used for the transverse arrowheads which spans an almost similar time period, had been the same for the small tanged and winged arrowheads. The transverse arrowheads (whether it was of triangular, trapezoidal or lunate shape) was hafted with mastic (made of various mixtures) as shown by the numerous Egyptian examples (seen in Clark *et al.*, 1974) (*Fig. 1* **5-6, 8**).

In hafting sickles the Epi-Palaeolithic tradition prolonged into the Neolithic period. Because no bone handles are known and the rare wooden ones were found in sites in arid areas such or Fayum, the reconstruction of the various forms of sickles are consequently derived from observations made on the flint sickle blades. In each case the extension of the sheen on the cutting edge relatively to the overall form of the blade is taken into account. Residues of bitumen (asphalt) on the dorsal, ventral or the retouched back of the blade demarcate the area of the blade which was covered with adhesive.

In the « Khiamian » site of Salibiya IX (Jordan Valley) or the « Sultanian » (PPNA) mound of Netiv Hagdud, elongated unretouched plain blades or Beit Ta'amir knives were found partially covered with asphalt. Their suggested reconstruction is as a single element mounted in a wooden handle (*Fig. 2* **17**).

The frequent occurences of short sickle blades in deposits from this period (*ca.* 8300-7500 B.C.) in Nahal Oren, Jericho, Gilgal and Netiv Hagdud, suggest the possible use of a Natufian-type straight sickle which contained 3-5 inserted elements. These lustred short backed blades became rare during the PPNB times (*ca.* 7500-6000 B.C.) and were replaced by a two-edged, tanged-hafted sickle (M.C. Cauvin, 1983, fig. 5). However, short elements were used again in the following period (Sixth millenium B.C.) for which the Sha'ar-Ha-Golan (« Yarmukian ») and the Byblos specimens are the best examples. One might conclude, while examining figure 5 in M.C. Cauvin's paper of 1983, that curved sickles were not common or even present in this region before the end of the Seventh millenium B.C. The recently discovered sickle from Nahal Heimar cave, serves as a cautionary remark.

Nahal Heimar cave is located about 10 km west of Sodom, in the Judean Desert, about 250 m above sea level, on the right bank of the *nahal* (wadi) which descends to the Dead Sea basin. Large collections of organic objects dated to the Seventh millenium B.C. were retrieved recently (June 1983) from this small, dry cave. Among the finds was a sickle, 28,5 cm long, made of horn (?) with three blades inserted in a groove and held in place with resin (*Pl. I*). The handle is decorated on one side with a zig-zag motif finely incised in a double line. No lustre is visible on the exposed edges of the three blades (note that the proximal one was damaged during the excavation !). Microwear examination has not yet been done. Each of the blades (which seem to be unretouched) is separated from the next one by a patch of asphalt, thus creating a discontinuous cutting edge. An example from south-western Australia of a saw knife exhibits similar features (Mulvaney, 1975, pl. 27 ; Curwen, 1941, fig. 24).

The sickle from Nahal Heimar cave cautions against reconstructions where each lithic element touches the next one. In many cases it appears that the retouch of the ends of each sickle blade meant to fit the neighbouring elements, it is not certain that they in fact did so.

Pl. I Sickle from Heimar cave (Judean Desert, Israel). **1-2** *: views of both faces, note the incised zigzag on the handle (2).* **3** *: close up view of the inserted blades and the asphalt filling. Scale in cm.*

The lack of visible sheen on the blades of that sickle is perhaps not surprising. Given the intensive use of flax for producing linen, evidenced in the remains of fragmentary bags and strings, the observation already made by Anderson-Gerfaud (1983, 89) that cutting flax does not leave any sheen comes to mind.

Another find from Nahal Heimar cave throws some light on the hafting of blades. On one elongated pointed blade with bi-lateral large notches near the proximal end, threads of vegetal substance were found still in place. Unfortunately the handle was not attached to the blade. Blades of similar size but having a tang and covered with sheen on both edges and faces, are known as the typical PPNB sickle knives (mentioned above). In technical terms this means that similar hafting methods served for mounting tanged arrowheads, tanged blades and the notched varieties.

The above discussion of Neolithic hafting is obviously incomplete. Tool groups such as axe-adzes and perforators were omitted. The reconstructions of their handles (or at least of several sub-types) was recently suggested and their use was examined by microwear (Roodenberg, 1983 ; Keeley, 1983). Although these examples do not consider the entire range of morphological variability known in the southern Levant, they indicate some avenues for future research.

CONCLUSIONS

In this short paper I have discussed a portion of the available evidence for hafting in the southern Levant. Like most prehistorians I feel that the more we know about hafting the better we may understand past activities in terms of energy expenditure. In the case of the Levantine Epi-Palaeolithic and Neolithic sequence such as knowledge will enable us to comprehend the changes that took place during this time when several populations shifted their economic basis from one pattern to another. Such as shift necessarily caused changes in labour allocations, a situation from which craft specialization emerged. This end product of the « Neolithic Revolution » is exemplified by the fact that those tools, like arrows and sickles which possibly were made by Kebarans, Natufians and Early Neolithic people on household level, became in the course of the Fifth, Fourth and Third millenia B.C. objects obtained from artisans.

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