



Paleolithic recycling: The example of Aurignacian artifacts from Kebara and Hayonim caves



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ABSTRACT

This is a short account of recycling observed in Levantine Aurignacian assemblages in Kebara and Hayonim cave sites in Israel. It appears that the makers of the Aurignacian industries made use of flint pieces collected outside the caves, to modify them a new. Thus Upper Palaeolithic morphotypes were modified either on Mousterian tools or Mousterian blanks produced by the Levallois technique. Though quite distinct, this behavior portrays an exception rather than the rule, as most of the modified flint recovered in both caves was collected from resources of local flint, located in the general vicinity, some 2–15 km away, of the sites. Moreover, while recurring (though to a degree) recycling of Mousterian items was observed in other Levantine Aurignacian assemblages, this was not the case for the local Ahmarian assemblages, including the ones underlying the Aurignacian levels in Kebara Cave. Speculations as regards the reason(s) for this behavior should await further studies and a better database of its extent and recurrence.

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1. Introduction

Trying to understand the phenomenon of recycling observed in the Aurignacian assemblages in Israel as detailed below, requires a brief discussion of some general assumptions that may explain this behavior. One can assume that prehistoric humans (just like their modern equals) were pragmatic and when in urgent need for a piece of hard rock for making a usable tool, may had picked up items found on the surface in or close to their camp, be it a cave or an open-air locality. Thus it seems quite natural that Palaeolithic people should have collected and ‘recycled’ older objects lying around. Those could be products of earlier camping by the same band or generations apart, modified by people long bygone. One may even suggest that ‘left over pieces’ were the result of ‘site provisioning’.

It is only lately that study of lithic recycling became a prominent topic of research as evidenced from the articles in the present volume, and while it is clear that the phenomena of flint recycling existed all through the Levantine Prehistoric sequence (e.g., the articles by Agam et al., Assaf et al., Parush-Glikman et al.,

Shimelmitz, Summer and Malinsky-Buller, Zaidner and Grosman, herein), most of the information available until quite recently stems from cursory observations in various reports with but a few detailed studies (e.g., Belfer-Cohen, 1980; Barkai, 1999).

Following is a short presentation of ‘recycling’ observed in the tool categories of Aurignacian assemblages recovered at the Hayonim and Kebara caves. The items defined as ‘recycled’ are Upper Palaeolithic morpho-types modified on Mousterian blanks: flakes, blades and tools which are predominantly products of the Levallois technique with faceted butts, consistently showing double patina. Thought usually denoted as ‘double patinated’ items, the double patina alone is not enough to define recycling, since patina can accrue during a relatively short time span - several weeks on the surface of open-air sites. This phenomenon, also known as ‘varnish’ in geological studies, was researched in depth in the Negev (Ganor et al., 2009; Goldsmith, 2011). Therefore, what archaeologists referred to as ‘patina’ was formed by a complex process involving mainly clay minerals enriched with manganese (Mn). The formation of patina inside Levantine caves where sunlight does not penetrate was not studied. Patinated pieces may occur in rockshelters where sunlight reach the back wall as well as on the terraces in front of the caves or in the talus below the cave entrance.

The Aurignacian entity in the Levant represents a relatively short-time span in the Upper Palaeolithic sequence (dated to ca. 37–33 ka cal BP). Most probably it represents a cultural intrusion

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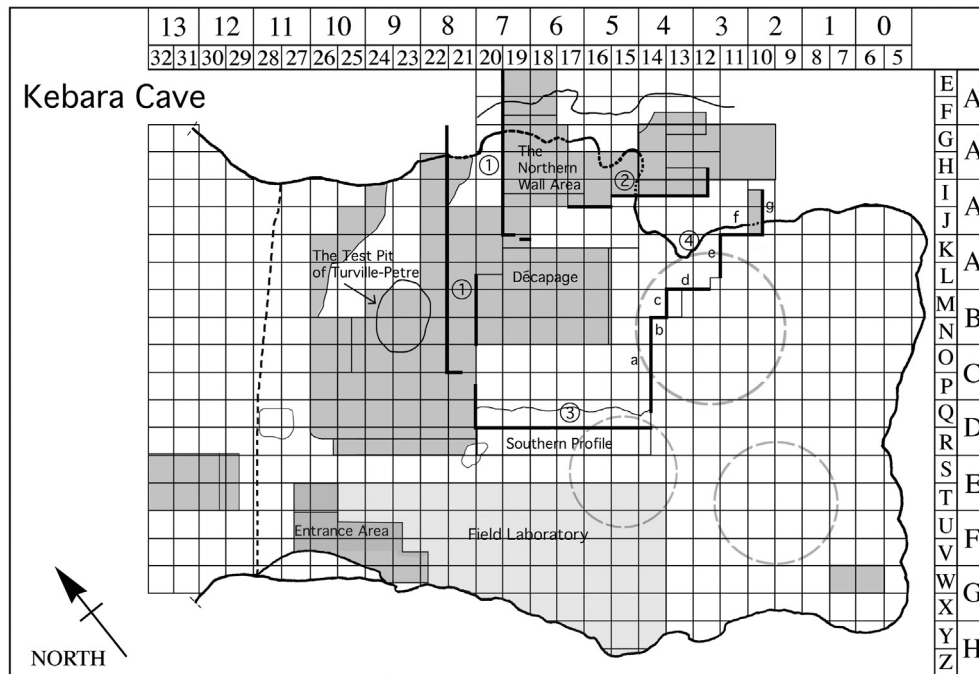


Fig. 1. Map of Kebara Cave indicating the place of the Southern Section (named Profile) and marked as No.3. (The Entrance Area is indicated near the cave's drip line where the fence was built).

between the Early and Late Ahmarian, which are the 'endemic' and predominant Upper Palaeolithic cultural entities in the Levant. To date, Aurignacian assemblages *sensu stricto* were recovered only from some ten cave-sites, all of which are located in the Mediterranean phyto-geographic belt (for more details see Bar-Yosef and Belfer-Cohen, 2010; Belfer-Cohen and Goring-Morris, 2014). They differ significantly from the Ahmarian techno-complex, most obviously attested through the dominant typological morphotypes: nosed, shouldered, and frontally carinated endscrapers, and Aurignacian retouched items, which are missing from or extremely rare in Ahmarian assemblages. The technological attributes of the Levantine Aurignacian chipped-stone industry are quite complex in that, while most tool blanks are made on blades and, to a lesser degree, (twisted) bladelets, the vast majority of the debitage items comprise flakes. Aurignacian bone and antler tools number far more than the very few worked bone items reported from Ahmarian contexts. Two split-base points, a hallmark of the Early Aurignacian in Western Europe, were reported from Kebara and Hayonim caves (Belfer-Cohen and Bar-Yosef, 1999). A third split-base point was discovered in the site of Mazraq en Nag, excavated by Beduoin who worked with R. Neuville in the Judean

Desert (Perrot, 1955). However the excavated context from where this pieces was derived is unknown and the site does not contain an Aurignacian industry.

2. The Aurignacian recycled tools from Kebara Cave (Figs. 2–4)

The present discussion refers only to the assemblages excavated during the last series of excavations in the cave, namely seasons 1982–1990. The items were recovered from two areas in the cave: Unit I–II, in the Southern Section (SS) and the Upper Unit from the Entrance Area (Fig. 1). The stratigraphy of the SS (Goldberg et al., 2007, fig. 4.27) section was dated through two series of dating though the 2nd series of dating did not incorporate the dating of



Fig. 2. Endscrapers on Mousterian 'blanks' from the Aurignacian levels, Kebara Cave.

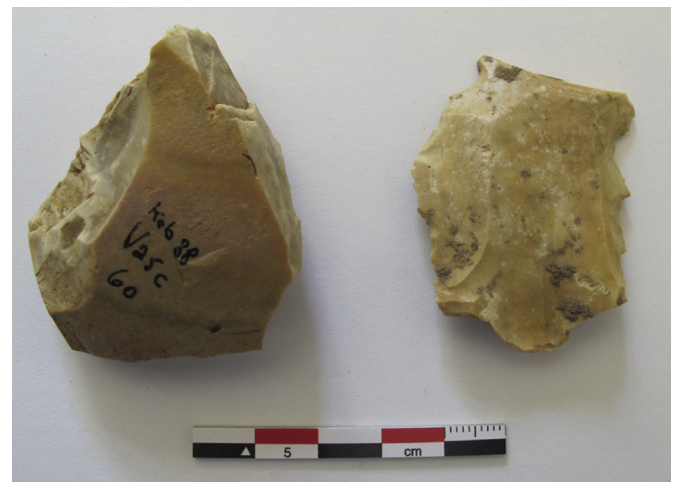


Fig. 3. Nosed end-scrapers on recycled pieces from the Aurignacian levels, Kebara Cave.



Fig. 4. A burin and a denticulate on recycled pieces from the Aurignacian levels, Kebara Cave.

the Aurignacian layers. The age of the Aurignacian occupation ranges from $34,300 \pm 1100$ through $32,200 \pm 630$, calibrated as ca. 39.0–36.7 ka BP (Bar-Yosef et al., 1996). Datable materials were not recovered in the Entrance Area and thus its subdivision was based on techno-typological criteria in correlation with the Upper Palaeolithic Units of the Southern Section.

The cultural affiliation of the Southern Section (SS) units is more clearly defined than that of the Entrance Area ones, where the delineation between the upper (above 360 cm) and the lower (below 360 cm) units is to a degree arbitrary. In both cases, the Aurignacian assemblages overlie a different archaeological techno-complex, clearly Early Ahmarian in the Southern Section and some kind of a bladey industry, Ahmarian *sensu lato*, in the Entrance Area. The frequencies of the 'recycled' tools in all Upper Palaeolithic units excavated in the cave are presented in Table 1.

Table 1

Frequencies of 'recycled' tools in the Aurignacian and Ahmarian Units, Kebara Cave (present are the tool categories with recycled items double patinated items and total number of tools in each category).

	Southern section				Entrance area	
	Unit I	Unit II	Unit III	Unit IV	360>	360<
Total tools	(176)	(138)	(274)	(53)	(371)	(621)
Tool category						
Endscrapers	5/48	7/31	3/49	2/12	15/98	9/101
Burins	2/18	–	–	–	2/33	7/46
Borers	–	–	–	–	–	1/30
Truncations	–	–	–	–	–	1/18
Denticulates	–	–	–	–	4/18	–
Composites	–	–	–	–	1/5	–
Ret. & Back.	1/38	2/22	–	–	–	2/259
Varia	3/28	3/36	1/29	–	2/49	4/61
Total	11	12	4	2	24	24
Percentage	6.3%	8.7%	1.5%	3.8%	6.5%	3.9%

If we combine the assemblages of Units I–II (SS), as both are Aurignacian, the recycled items comprise 7.5% of the tools. The discussion of recycled items in the Ahmarian assemblage is valid only for Unit III (SS) (1.5%) as the small assemblage of Unit IV (total tool $N = 53$) makes it unfit for a coherent comparison. The difference between the upper and lower units from the Entrance Area is less pronounced but portrays the same trend: 6.5% in the Upper Unit and 3.9% in the Lower one. Most of those items are modified Mousterian pieces, though at least in the Southern Section, Units I–II are separated from the Mousterian levels by the Ahmarian

Units III–IV. It seems that the Aurignacians preferred, in addition to the exploitation of natural exposures of flint in the area of the western Mt. Carmel, Mousterian pieces collected on the terrace and the talus in front of the cave. These patinated artifacts served as raw material due to their relative thickness rather than the generally thinner Ahmarian items.

3. The recycled tools from the Aurignacian at Hayonim Cave

The Aurignacian assemblages recovered from Layer D at Hayonim Cave (for detailed discussion of stratigraphy and material culture, see Belfer-Cohen, 1980; Belfer-Cohen and Bar-Yosef, 1981) directly overlie the Mousterian layers in the cave and exhibit a more pronounced tendency of recycling. Bone dates (Bar-Yosef, 1991) indicate ^{14}C ages of $29,980 \pm 720$ to $27,200 \pm 600$, calibrated as ca. 34.2 through 31.9 ka, later than the Aurignacian at Kebara. Undoubtedly, additional dates are needed before the age ranges of this culture will be better determined.

Table 2

Frequencies of 'recycled' tools in the Aurignacian levels of Hayonim Cave (present are the tool categories with recycled items and total number of tools in each category)

Total tools	D1-2 (N = 430)	D3 (N = 313)	D4 (N = 101)	DTot (N = 844)
Tool category				
Endscrapers	32/149	19/109	6/41	57
Burins	17/67	8/48	5/14	30
Borers	1/4	–	–	1
Truncations	1/2	–	–	1
Denticulates	11/37	6/19	2/8	19
Composites	3/13	4/12	2/2	9
Ret. Pieces	2/51	3/20	1/9	6
Varia	3/65	7/47	4/23	14
Total	70	47	20	137
Percentage	16.3%	15.0%	19.8%	16.2%

Of the entire assemblage, 16.2% have been recycled (and bear double patina). Those are mostly endscrapers and burins with a small number of denticulates.

4. Discussion

Information on double patina/recycled items in Levantine UP is quite scarce. It does not appear in the most recent reappraisals of new (and old) assemblages (e.g., Williams and Bergman, 2010), but one can find references in older literature. Both Rust (1950) who dug Yabrud II rockshelter, and Ziffer (1978) who studied the lithics from the site, stated that there are many double patina items among the tools in the assemblages of layers 6 and 7 therein. Ziffer considered most of them as Mousterian items but in the upper layer 6 they are mainly endscrapers, clearly of what is considered Upper Palaeolithic morphotypes. Neuville (1951) had observed double patina tools in the Upper Palaeolithic layers at Erq el Ahmar, in both Layer F (which lies above a sterile level separating between the Middle and Upper Palaeolithic levels) and Layer B which he assigned to Phase IV in his UP scheme. He did not specify numbers but most interestingly stated that the majority of these items were found among the endscrapers, burins, and denticulates. Moreover, he actually writes that at least a third of the tools bear double patina. In retrospect, patinated artifacts in Layer F indicate that even during the Early Ahmarian older pieces were used. In addition, Erq el Ahmar is an elongated rockshelter open to the radiating sunshine and thus, as in the cases of open-air sites mentioned above, patina on tools lying on the surface could be created locally.

Perrot (1955) was more specific describing the double patina tools from his excavations at el-Quseir. He reported that out of 270

tools recovered from Layer C, the upper of the two Upper Paleolithic layers at the site, 174 (64.4%) were with double patina, including all the denticulates recovered ($N = 21$). Perrot believed that most of those denticulates were actually tools discarded while being shaped, i.e., incomplete, for one reason or another. He wrote that many of them seemed to him as nosed endscrapers in process of modification.

Similar observations were made by Ronen (1984) in Sefunim cave where recycled items were observed also in the Neolithic layer 7, but mostly in the Aurignacian assemblage of layer 10. He stated: "... a limited use was made of Middle Palaeolithic blanks, which were secondarily retouched and exhibit a double patination ... Glossy and somewhat abraded, they clearly originated outside the cave" (p.262).

The Upper Palaeolithic layers in Ksar Akil present another interesting picture of Levantine Aurignacian 'recycling'. No double patinated items are mentioned in the study of Ohnuma (1988) of the assemblages from Layers XXV–XIV. They do appear in the publication of the later layers at the site by Bergman (1987), but only among the tools of Layers XI–VI. Though the actual number of those items is quite low, they are obviously much more apparent in the Aurignacian assemblages of Layers VIII–VII. Usually those are end-scrapers, including carinated items, and to a lesser degree – burins. Indeed, Bergman observes in the discussion (p.143) that 'recycled' tools made on old, patinated blanks in those upper levels are relatively common. Interestingly, he noticed the absence of similar items from the Negev assemblages assumed at that time to belong to the Levantine Aurignacian tradition as well, and explained the difference as stemming from Ksar Akil being a cave site while those Negev assemblages derived from open-air camps. There are no double patinated tools, with a very few exceptions, from those layers in Ksar Akil attributed currently to the Ahmari tradition (Williams and Bergman, 2010).

Recently, a more detailed account had been given in the report on the Raqefet Cave Upper Palaeolithic assemblages by Lengyel (2007). It was stated that in the Aurignacian assemblage of Layer III, heavily patinated Mousterian Levallois and ordinary flakes were used as tool blanks. As the author explains, the retouch on these specimens cut the patinated surface, indicating a deep time gap between the debitage and the retouching. There are 52 tools, mostly endscrapers, notches and denticulates, which belong to this group (Lengyel, 2007, table 5.9.), comprising 5.5% of the total assemblage, 7.6% of the endscrapers and 6.5% of the notches and denticulates, values similar to those of Units I–II in Kebara Cave. No double patinated tools were reported from the earlier Upper Palaeolithic, non-Aurignacian assemblage of Layer IV.

5. Concluding remarks

'Recycling' was apparent in every period of human history. The reasons for doing it could have been very different in various contexts, cultures, or regions. The study of 'how' and 'why' people recycle add another aspect to our understanding of past behaviors. Although our studies refer to particular cases, site specific or industry specific, it will be interesting to consider the question of recycling, reflecting awareness of raw material potential in discarded items lying around. Was it an individual initiative, or perhaps rather a common practice stemming from habitual behavior of a particular society? Thus, trying to explain the recycling of older pieces in the Levantine Aurignacian assemblages, one wonders whether this had to do with the fact that these were incoming foreigners who upon arrival, and before getting

acquainted with local hard rock resources, used older pieces for tool making. This is just a speculation which should be tested through more extensive research of these and other Upper Palaeolithic assemblages. New insights deriving from the growth in recycling studies may promote such a research into as yet little explored domains of human behavior.

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