Quaternary International 398 (2016) 86–93

Contents lists available at ScienceDirect

Quaternary International

journal homepage: www.elsevier.com/locate/quaint

# A scraper's life history: Morpho-techno-functional and use-wear analysis of Quina and demi-Quina scrapers from Qesem Cave, Israel

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ARTICLE INFO

*Article history:*
Available online 26 July 2015

*Keywords:*
Quina scrapers
The Acheulo-Yabrudian Cultural Complex
Morpho-techno functional analysis
Use-wear analysis

ABSTRACT

A sample of Quina and demi-Quina scrapers from the Yabrudian levels at Qesem Cave has been studied through an integrated approach, combining techno-morpho-functional and use-wear analyses. The potential of this approach is shown using the data obtained and discussed in this paper. Quina and demi-Quina scrapers at Qesem Cave were shaped from blanks originating in different production sequences and were most probably imported to the site as ready-made blanks or as shaped scrapers. In some cases, scrapers and blanks for shaping scrapers were collected from the outside of the cave as is indicated by the patina affecting their surfaces, which was subsequently retouched. At the site, Quina and demi-Quina scrapers were used and re-used (multiple uses on the same edge) and evidence of a long cycle of re-sharpening was recorded as well. The activities carried out with these tools were varied, mostly oriented towards cutting and scraping (both animal materials and plants). Nevertheless, use-wear analysis underlined some distinction between Quina and demi-Quina scrapers: the Quina seem more suitable for working hard and medium-hard materials and the demi-Quina for working softer materials, especially through cutting activities. The different edge morphologies obtained by Quina and demi-Quina retouch are well suited for such functions.



## 1. Introduction

Scrapers are one of the most common lithic tool types found in Lower and Middle Paleolithic contexts in the Old World. Despite their definition that seems to suggest a functional homogeneity, the actual use of this tools has to be reconsidered in light of technological, morpho-functional (Lepot, 1993; Bourguignon, 1997, 2001; Boëda, 1997; Bonnilauri, 2010; Iovita, 2014) and, the still too few, use-wear analyses (Beyries and Walter, 1996; Lemorini et al., 1998–1999, 1999, 2000; Texier et al., 1998; Hardy, 2004; Rots, 2009; Claud et al., 2012) performed on scrapers from Lower and Middle Paleolithic contexts. These technological and morpho-functional analyses show that tools that had been used for several different tasks are often classified as scrapers when traditional lithic typologies are employed. Scrapers may have complex "life-cycles" and the function of the tools may change over time. The results of use-wear analyses of Paleolithic scrapers indicate that these tools were used on a variety of materials and for different activities.

Quina scrapers are a well-known tool category in Middle Palaeolithic European lithic typologies. Quina scrapers and Quina débitage, define a specific *facies* of the Mousterian Cultural Complex (Bordes and Bourgon, 1951; Bordes, 1981; Dibble, 1987; Bourguignon, 1997; Turq, 2000). Beginning with L. Bourguignon's "Le Mousterien de Type Quina: nouvelle definition d'une entitée technique" (1997), a techno-morpho-functional approach has been applied to the study of the production of Quina scrapers and their distinctive retouch system (Bourguignon, 1997, 2001; Hiscock et al., 2009). This approach highlighted how the Quina retouching technique produced very strong edges with an extremely high cutting potential, here intended as the overall sharpness of the produced edge.

An identical system of *débitage* and retouch appeared hundreds of thousands of years earlier than the European Quina technique, in the Levantine Late Lower Palaeolithic Acheulo-Yabrudian Cultural

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http://dx.doi.org/10.1016/j.quaint.2015.05.013
1040-6182/

Complex (AYCC, see Bordes, 1955, 1984; Hours et al., 1973; Copeland and Hours, 1983), which includes the site of Qesem Cave. This Middle Pleistocene cave site has been dated by various methods (U-series, TL and ESR) to the Late Lower Paleolithic, 420–200 ka. Qesem Cave has rich and well preserved lithic and bone assemblages that have been assigned to the Acheulo-Yabrudian Cultural Complex (AYCC). In addition, several human teeth were recovered from AYCC contexts (Hershkovitz et al., 2011). The cave provides a rare opportunity to study a time period of important biological and cultural changes (Barkai and Gopher, 2013). Qesem Cave displays innovative lithic tool kits, hunting and butchering behaviors, and the habitual use of fire. There is evidence for hearth-centered activities and other functionally distinct activity areas have been documented (e.g. Stiner et al., 2009, 2011; Barkai and Gopher, 2013; Shahack-Gross et al., 2014; Blasco et al., 2016). Given the outstanding state of preservation of the materials unearthed at Qesem Cave, we have a unique opportunity to study the Levantine Quina scraper phenomenon with a morpho-techno-functional approach that is integrated with use-wear analysis.

Considering the fact that at Qesem Cave the Quina and demi-Quina scrapers are more conspicuous in the Yabrudian levels than the Amudian ones (for details see Parush et al., 2015), this preliminary work focuses on a sample of scrapers originating from Yabrudian assemblages with the aim of 1) defining the use of the scrapers in relation to their technological features, and 2) documenting the relationship between the tool's edge morphology and its use/uses.

## 2. Regional setting

Qesem Cave is located 90 m a.s.l. in the western foothills of the Samaria Hills, 12 km east of Tel Aviv, Israel (Gopher et al., 2005). The sediments are 10 m deep, and the stratigraphic sequence is assigned to the AYCC. The dominant lithic industry in the sequence is the blade-dominated Amudian, while the scraper-dominated Yabrudian was found in three distinct levels within the stratigraphy of the cave (Barkai et al., 2009; Parush et al., 2015). The speleothems from the cave were dated by U/Th to ca. 420–200 ka (Barkai et al., 2003; Gopher et al., 2010) and a similar range was obtained by TL and ESR dating methods (Mercier et al., 2013; Falgueres et al., 2015).

The stratigraphy is generally divided into a lower sequence (~5.5 m thick) deposited when the cave was closed, consisting of sediments with clastic content gravel and clays and an upper sequence (~4.5 m thick) deposited when the cave was more open. It is characterized by cemented sediment with a large ashy component (Karkanas et al., 2007).

Many burnt bones and flint items were found at Qesem Cave. In addition, ash was found in the cave's sediments. It appears that the use of fire was common throughout the sequence (Karkanas et al., 2007) including a repeatedly used, superimposed central hearth (Shahack-Gross et al., 2014) dated to ca. 300 ka (Falgueres et al., 2015).

The faunal assemblage includes (*Dama cf mesopotamica*) (which dominates the assemblage), *Bos primigenius* (Auroch), *Sus scrofa* (Wild Boar), *Testudo cf. graeca* (Tortoise), and *Cervus elaphus* (Red Deer). The absence of some body parts indicates that carcasses were first processed outside of the site and only selected parts were brought to the cave. Furthermore, cut marks were abundant (Blasco et al., 2016) indicating butchering on-site.

Quina and demi-Quina scrapers are found in all excavation areas of Qesem Cave, both in Yabrudian and Amudian assemblages (Parush et al., 2015). Yabrudian tool kits are dominated by the Quina and demi-Quina scrapers (Barkai et al., 2009; Parush et al., 2015), while there are significantly lower frequencies of these scrapers in the Amudian assemblages.

The entire production sequences for all of the scrapers at Qesem Cave cannot be reconstructed from débitage found in the cave. This contrasts with the case of the Amudian blades that were knapped *in situ* and have all stages of their reduction sequences represented in the cave. Flake blanks or the ready-to-use scrapers were imported to the site. They were made of flint from different sources than the sources of the raw material that were exploited for blade production (Buaretto et al., 2009; Wilson et al., 2016).

Following Bordes' definition, Quina and demi-Quina scrapers are characterized by a scalar retouch that is more or less developed (Bordes, 1961; Verjoux and Rousseau, 1986). The different degree of development is directly related to the thickness of the blank (Bourguignon, 1997, 2001). At Qesem Cave, this retouching process was applied to various types of blanks produced during different production sequences and not only related to Quina *debitage* (Bourguignon, 1996, 1997).

## 3. Materials and methods

A combined approach integrating morpho-techno-functional and use-wear analysis was applied to a sample of 11 Quina and 8 demi-Quina scarpers from various contexts of the cave. The morpho-techno-functional approach (Lepot, 1993; Bourguignon, 1997) is based on the assumption that every object is composed of two complementary parts, a prehensive (or hafting) area and an active area. Each area is characterized by specific morphological features suitable for prehension or hafting and for working on other materials. These two areas can be shaped when the tool is knapped

**Table 1**
Technological groups of Quina and demi-Quina scrapers identified by L.Bourguignon.

| Group | Definition | Description | Use wear analysed tools |
|---|---|---|---|
| Group I | Recycling (Quina + Other) | Objects characterised by the presence of clactonian notches and/or other detachments on their ventral surface | 2 |
| Group II | Long Cycle of Quina Resharpening | These objects retain the most complete Quina retouching sequence characterized by a series of Quina cycles on the same edge | 4 |
| Group III | Short Quina Cycle or Regular Cycle | These scrapers are characterised by an edge exhibiting at least a complete Quina cycle | 5 |
| Group IV | Demi-Quina I | These scrapers retains a sequence of lightly stepped retouches made on thinner blanks than Quina scrapers. Group IV does not exhibit a Quina retouch on their entire edge | 3 |
| Group V | Demi-Quina II | Scrapers made on relatively thin blanks and featuring a more scalar type of retouch than demi-Quina I along with more retouch registers on their edge | 5 |
| Group VI | Not Quina with a single sequence of concave detachments | Not scalar retouches creating an edge less than 1 cm | |
| Group VII | Not Quina really thin | Scalar retouches really thin almost flat | |
| Group VIII | Not Quina really thin Edge Mashed | Tool with a mashed edge which could belong to Group III or VI | |
| Group IX | Re-shaping Detachment | Any type of re-shaping detachment | |