Quaternary International 398 (2016) 103–117

Contents lists available at ScienceDirect

Quaternary International

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

Spatial aspects as seen from a density analysis of lithics at Middle Pleistocene Qesem Cave: Preliminary results and observations

Avi Gopher*, Yoni Parush, Ella Assaf, Ran Barkai

Tel Aviv University, Israel

ARTICLE INFO

Article history:
Available online 19 November 2015

Keywords:
Late Lower Paleolithic
Acheulo-Yabrudian cultural complex
Qesem Cave
Lithic density

ABSTRACT

This paper focuses on the results of a preliminary study of flint items densities in different areas and different parts of the stratigrapahic column of Qesem Cave. Qesem Cave is a karst chamber cave with a ~10 m stratigraphic sequence assigned to the Acheulo-Yabrudian Cultural Complex (AYCC) of the late Lower Paleolithic in the Levant dated to 420–200 ka.

We first show the range of lithic densities in studied assemblages in the cave emphasizing significant differences in both the total number of lithic items per volume unit and/or for selected artifact categories within these assemblages. The results are used to suggest differential intensity of lithic-related activities in the cave and variability in synchronic (different areas of the cave within a similar stratigraphic level) distribution aspects of lithic categories of selected assemblages. We briefly note on the diachronic (assemblages belonging to different parts of the stratigraphic sequence) aspect of lithic densities in the discussion, yet this aspect is not is not central in this paper.

A comparison of densities to frequency compositions of selected techno-typological categories in the same assemblages/areas further emphasizes the importance of using more than one quantitative measure as a descriptor of lithic assemblages and the interpretative potential of the interplay between the two measures. In some analyzed aspects the differences between the two measures in the same assemblage are quite significant, enabling interpretation of activity areas and specific human behaviors.

Eventually, further research testing lithic densities against and/or incorporating them with other sets of density (and frequency) data from the same areas (e.g., faunal remains), or relating these densities to natural (such as a rock shelf) or human made features (such as a fireplace), may offer an elaborate and valuable landscape for reconstructing human behavior at the cave. Furthermore, the spatial distribution of specific techno-typological lithic categories within the assemblages studied as seen in densities augmented by available functional data (derived from use-wear analysis) enable another perspective on the subdivision of activity areas in some parts of the sequence.

One synchronic example of our preliminary results which we present relates to generally contemporaneous assemblages adjacent to a constructed fireplace in the center of the cave in the upper part of the lower stratigraphic sequence dated to ca. 300 ka. Both blade-dominated Amudian and Quina (and demi Quina) scrapers dominated Yabrudian assemblages are involved, indicating spatially differentiated, functionally related differences around the fireplace.

1. Introduction

This paper presents a preliminary study of the density of lithic artifacts at Qesem Cave and the spatial significance of density data of whole assemblages and specific lithic categories within these assemblages. Qesem Cave provides a noticeable variability in lithic densities including some highly dense areas and the case is similar for faunal remains (see Blasco et al., 2014; Blasco et al., 2016). Density studies in Paleolithic sites in general, especially in Lower Paleolithic sites, are rare although some studies have been published in recent years. This introduction thus presents Qesem Cave and its finds as a background for our study and briefly surveys the study of density in the framework of spatial analysis studies in early Paleolithic sites in the Levant.

* Corresponding author.
E-mail address: agopher@post.tau.ac.il (A. Gopher).

http://dx.doi.org/10.1016/j.quaint.2015.09.078
1040-6182/

1.1. Qesem Cave

Qesem Cave is located at elevation 90 masl on the moderate western slopes of the Samaria Hills some 12 km east of Tel Aviv (Fig. 1). This sediment-filled karstic chamber cave is part of a larger karstic system within Turonian limestone (Frumkin et al., 2009). The ca. 10 m stratigraphic sequence is divided into two parts – the lower sequence (over 5.0 m thick), consisting of clays, sediments with clastic content and gravel, and the upper sequence (ca. 4.5 m thick), consisting of cemented sediment with a large ash component (Karkanas et al., 2007). Intensive $^{230}Th/^{234}U$ dating on speleothems suggests human occupation starting ca. 420 ka and ending prior to 200 ka (Barkai et al., 2003; Gopher et al., 2010). This is supported by TL and ESR dating (Mercier et al., 2013; Falgueres et al., 2016).

The habitual use of fire is apparent throughout the sequence not only through burnt bones and flints (Stiner et al., 2009, 2011; Mercier et al., 2013; Blasco et al., 2014), but also through the presence of ash in the sediments (Karkanas et al., 2007). A large and thick fireplace was exposed in the central part of the cave (Shahack-Gross et al., 2014) (Fig. 2).

While this paper focuses on lithics, Qesem Cave has yielded rich assemblages of faunal remains, microverterbrates as well as human dental remains. Faunal remains are dominated by fallow deer (*Dama* cf. *mesopotamica*) comprising the main prey species in all strata (Stiner et al., 2009, 2011; Blasco et al., 2014). Of note are bone (tools) retouchers used for shaping stone tools found at the site (Blasco et al., 2013; Rosell et al., 2015). The Microvertebrates are especially abundant consisting of a large variety of micromammals species [(Maul et al., 2011) including six species of bats (Horáček et al., 2013)] and an unusual large proportion of reptile remains with a superabundance of a single species of *Chamaeleo* (Smith et al., 2013). The ecological preferences of these taxa and their close relatives indicate a paleoenvironment with a mosaic of open and woodland habitats (Maul et al., 2011, 2016). The isolated human teeth of Qesem Cave include permanent and deciduous teeth. Following a detailed description and a comparative study (Hershkovitz et al., 2011) we concluded that these teeth show no affinities with *Homo erectus* and that they mostly resemble the Skhul-Qafzeh samples of the Middle Paleolithic Levant (dated to ca. 100 ka). They also bear some Neanderthal traits or they may belong to an as yet unknown, local hominin population (see Hershkovitz et al., 2011; Weber et al., 2016; Fornai et al., 2016).

Qesem Cave is assigned to the Acheulo-Yabrudian cultural complex (AYCC) of the late Lower Paleolithic period in the Levant (e.g., Gopher et al., 2005; Barkai et al., 2009; Shimilmitz et al., 2011; Shimelmitz et al., 2011, 2016). Stratigraphically, the AYCC of the Levant repeatedly postdates the Lower Paleolithic Acheulian and predates the Middle Paleolithic Mousterian. The AYCC, as defined by Rust (1950), includes three major lithic industries (e.g., Garrod, 1956, 1970; Jelinek, 1990; Bar-Yosef, 1994; Goren-Inbar, 1995; Copeland, 2000; Ronen and Weinstein-Evron, 2000) of which two are present at Qesem Cave – the Amudian blade-dominated industry found throughout the cave's stratigraphic sequence, and the scraper-dominated Yabrudian which is at present known in distinct, well defined parts of stratigraphy.

The Amudian industry is characterized by systematic blade production and a major component of shaped blades and Naturally Backed Knives (NBKs). Blades reflect strict standards of raw material selection and an established and crystallized *Chaîne Opératoire* for blade production; blades sometimes constitute over half of the débitage and shaped items (tools) (Barkai et al., 2005, 2009; Shimelmitz et al., 2011). Use wear analyses indicates that blades, including NBKs were mostly used for cutting, butchering and defleshing soft tissues and were practically conceived as disposable tools (Lemorini et al., 2006).

The Yabrudian industry appears in only three stratigraphically and spatially distinct areas of the cave (Barkai et al., 2009; Barkai and Gopher, 2011; see Fig. 2). The Yabrudian assemblages are characterized by, first the dominance of scrapers in the shaped items (up to 50%), and second the scarcity of blades. Yabrudian scrapers are made on a variety of thick flakes including transversal and dejete flakes of quarried, especially selected flint (Boaretto et al., 2009) shaped by Quina and demi-Quina retouch. Resharpening and retooling of scrapers is evident both by typical removal scars found on some of the scrapers and by the presence of characteristic spalls (for results on the function of scrapers see Lemorini et al., 2016; Zupancich et al., 2016).

Another conspicuous aspect of the Qesem Cave lithic finds is the intense recycling of old flint "parent" flakes ('core-on-flake' – CoF-FF) to produce a type of minuscule flakes removed from the ventral face of parent flakes showing meat-cutting use wear signs (Barkai et al., 2010). Additional types of recycled items and products of recycling were recently described showing both use wear of meat cutting and working vegetal material (e.g., Parush et al., 2015, Parush et al., 2016; Assaf et al., 2015, Assaf et al., 2016; Lemorini et al., 2015). Bone was recycled too (Blasco et al., 2013; Rosell et al., 2015). The rarity of handaxes that dominated the preceding Acheulian, and the absence of the Levallois technique, characteristic of succeeding Mousterian industries is evident.

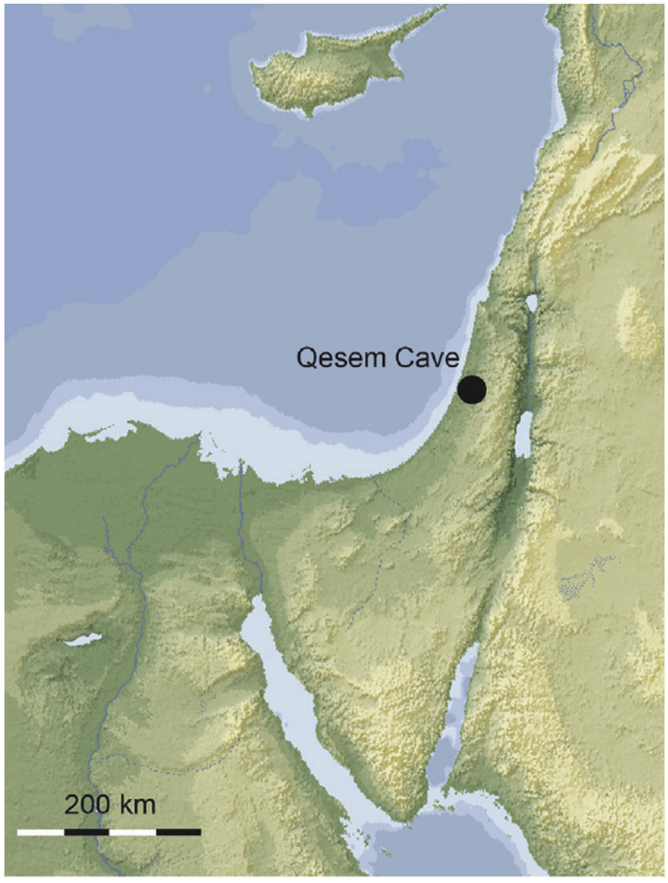

Fig. 1. Location map of the site.