
Functional analysis of stone balls (spheroids/polyhedron) from Middle Pleistocene Qesem Cave (Israel)

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Résumé

Macrolithic tools have been found at the Middle Pleistocene site of Qesem cave (420-200,000 ka, Acheulo-Yabrudian Cultural Complex). The presence of these artefacts, classified as stone balls - Spheroids / Polyhedrons - marks the latest appearance of this type of artefacts in the Palaeolithic period of the Levant, and represents the end of a long Palaeolithic tradition of producing and using such items. The functional interpretation of Palaeolithic stone balls is far from being resolved. We present here new results of a functional analysis of these items, and suggest that at Qesem, they were used in thrusting percussion activities of crushing fresh bones.

The repertoire of stone ball that has been analysed includes 30 limestone items, which were found mostly concentrated in particular locations within Amudian (blade dominated) contexts in the south-western part of the cave.

We studied them through trace analysis using low and high power approaches - by stereomicroscope and a metallographic microscope - in association with macroscopic residues analysis. The presence of functional traces on some macrolithics, related to thrusting percussion on organic material, led to the formulation of a specific experimental protocol.

The experimentation focused on the collection of raw materials similar to these characterizing the archaeological sample from the area surrounding the cave. We then photographed the samples before and after the experiments. The experiments included crushing bone for marrow extraction and treating tuber (*Asphodelus*). The choice of experimental activities was based on the presence of a rich assemblage of animal bone at the site and the presence of traces of plant foods in dental calculus, as shown by recent studies.

The functional analysis of the experimental samples, compared to the archaeological remains from Qesem cave, made it possible to establish that four of the stone balls exhibit traces related to the crushing of fresh bones through thrusting percussion activity. Especially the micro-traces and the polishes observed by the metallographic microscope are very characteristic and well preserved.

The faunal remains of Qesem show cut-marks, burning damage and damage caused during

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bone breakage on a significant number of the bones, indicating that butchering, roasting and marrow extraction activities were conducted at the site. The skeletal pattern of Qesem indicates a tendency to highly utilise body parts of high nutritional value implying that marrow was of importance in Qesem hominin transport decisions (Blasco et al. 2014, 2016). The significantly high proportions of burnt and fractured bones, which indicates a continuous fat-oriented use of prey at the site supports this too. The results of the functional analysis presented here emphasize that the stone balls may have played an important role in activities of marrow extraction.

Mots-Clés: Qesem Cave, use, wear, macrolithics, thrusting percussion, Paleolithic, experimentation