

Stone Tools in the Ancient Near East and Egypt

Ground stone tools, rock-cut installations and
stone vessels from the Prehistory to
Late Antiquity

edited by

Andrea Squitieri and David Eitam



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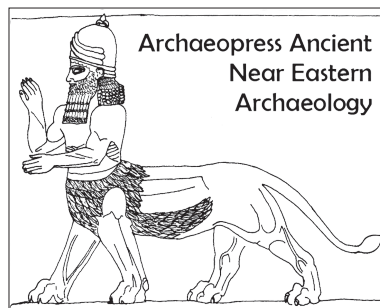
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Cover illustration: Threshing floor with many rock-cut cupmarks and 4 shallow basins. Tel Bareqet (Israel). Photo by David Eitam.



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*To Karen Wright,
for establishing a new approach to
the study of ground stone tools*

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Introduction

David Eitam and Andrea Squitieri

1. Aims and scope of the book

This book deals with groundstone tools, rock-cut installations and stone vessels in the Ancient Near East and Egypt from the Prehistory to the Late Antiquity, with the aim of exploring various aspects of these objects, from raw material procurement to uses and their socio-economic and cultural meanings.

In the first decades of the archaeological research in the Middle East, these categories of objects have often been overlooked (with some exception, e.g., Macalister 1912; Petrie 1917, 1937). They were rarely published in the excavation reports, or, when published, the information provided about their morphology, raw material, tool marks and contexts was in most cases incomplete or even missing. The main reason for neglecting this material was that it was considered self-explanatory with trivial chronological meaning, providing the archaeologists with little information about historical and cultural aspects, two of the aspects which were the main focuses of the archaeological research in that time (see Albright 1938: 84 vs Childe 1943: 19).

As the archaeological research extended beyond historical and cultural aspects towards broader issues on anthropological and socio-economic aspects of past societies, a new era for stone tool research has opened up since the 90s, especially after the pioneering works by K. Wright, R. Frankel, D. Eitam and others (1992; 1999, 1979; 1996 respectively).

Their works and the many studies that have followed have shown that stone tools can be used effectively to tackle questions regarding the organisation of everyday activities such as food preparation and industrial activities (e.g., Ebeling and Rowan 2004; Ben-Yosef 2012); patterns of access to raw materials (e.g., Rosenberg *et al.* 2014); regional and interregional trade in both raw materials and finished goods (e.g., Milevski 2005; Squitieri 2017); gender issues (e.g., Abadi Reiss *et al.* in this volume); wealth distribution (Wright 2014); discard behaviour (e.g., Mudd in this volume), and rituals of communal meals (e.g., Wright 2000). Being involved in most of the key everyday activities of past societies, stone tools can represent the embodiment of socio-economic and anthropological aspects that informed those activities and that can be decoded by means of effective methods of analysis.

Thanks to recent and more accurate methodologies, stone tools have also proved to be in fact in constant change both diachronically and cross-culturally, and to be a valid source of information to better understand the changing political and socio-economic landscapes of the Near East and Egypt, especially in critical moments during the prehistory and history of these regions, such as the transition from hunter-gatherer to agricultural societies, the first urbanisation process at the beginning of the Bronze Age, the collapse of the Late Bronze Age civilisations, the takeover of large multi-national empires in the course of the Iron Age and the Persian period, the transition from the classical era to the Byzantine periods, and from the early Arab period until the beginning of the Ottoman empire.

Naturally, much remains to do in the field of stone tool research. Some key issues are still seldom tackled also in the most recent studies of stone tools. Likewise, the methodology to effectively study at least some stone tool categories (i.e., rock-cut installations) is still not fully established. The aim of this book is to shed light on these issues and pave the way to a fruitful debate on them. Six key issues were selected to deal with in the current volume:

1. The essence of any stone tool is determined by its usage. Consequently, a systematic study focused on the tools' functional aspect is essential. Generally, this issue is answered by random suggestions, like ritual uses of stone tools (Dietrich *et al.* 2012: 687-689; Hayden *et al.* 2013; Nadel and Lengyel 2009), or tackled solely through experimental studies of usewear (Dubreuil 2004); or through residue analysis applied on tool's working surface(s); but generally, not through a technical analysis. Since stone devices are in fact 'machines' that operated according to physical laws studied by material science and engineering, investigating the uses of stone tools requires some degree of technical knowledge. Hence, the collaboration with industrial and mechanical engineers or physicists is especially necessary while conducting experimental studies (e.g., Eitam 1979; Eitam *et al.* 2015). For a better understanding of the many factors involved in the study of stone tools and for avoiding blunders (e.g., Grosman and Goren-Inbar 2007), a research project of stone tools may also include expert/s in other fields who can provide essential insights to

fully understand the uses of stone tools, like geomorphologist and in other cases, agronomist, food specialist, or metallurgists.

2. A second key issue is the need for a classification system of stone tools. Wright's classification system (1992) of ground stones from the Epipaleolithic to the Chalcolithic, including a precise terminology and typology classes, criteria and morphological terms, has been well accepted for 26 years by archaeologists studying prehistory, as well as by those investigating ancient history. Eitam has added to Wright's ground stone classification system the installations cut in bedrock and chiselled in stone blocks, as many of the rock-cut installations are the same devices as the ground stones (such as cupmarks, grinding devices, mortars, conical mortars and basins, see Eitam 2009). Eitam also added some stone objects forming separated typological systems for different cultures (e.g., Natufian and PPNA, and Iron Age stone tools, Eitam 2013, and see Eitam in this volume). Sparks (2007) and Squitieri (2017) established the stone vessel typology for the Bronze and Iron Ages respectively; while Frankel has built up a classification system of improved oil and wine rock-cut installations (1999) and mills for producing flour (see Frankel in this volume).

Some researchers have recently challenged the need for a stone tool typology, suggesting drastic alterations (e.g., by determining the types of Natufian rock-cut installations based on stone assemblages of two sites; e.g. Nadel *et al.* 2009). It seems that, for some scholars, typology is not a strong means for the investigation of stone tools (e.g., Dubreuil 2002), and in particular rock-cut installations (e.g., Nadel and Rosenberg 2010). Other researchers establishing ground stones typology solely on morphology avoiding usewear (Rosenberg 2011).

This claim, however, seems to be contradicted by the fact that certain morphological features of stone tools are in fact the result of their specific intensive use (for example, the narrow cylindrical shaft at the end of some conical mortars; the deep concave shape of grinding stones called 'saddle querns'; and the pierced bottom of some cupmarks, mortars and querns). Therefore, specific morphological patterns constituting a typological system can be found among stone tools and be connected to their functions.

Also, the trend of defining the usage of a stone tool exclusively by means of residue analysis, without the background of comparative morphological studies, does not always achieve conclusive results (see e.g., the claim that bread was prepared 32,000 years ago

only based on wheat and barley phytoliths found on a 'grinding stone' without examining the stone tool, compare Piperno *et al.* 2004 to Eitam 2009: Fig. 9 stone tool type I.E1 vs. type I.E2; see also Dubreuil and Nadel 2015; and see the limitations of usewear analysis, Dubreuil *et al.* 2015; 146-147).

In our opinion, stone tools, as other ancient findings (such as lithics, pottery sherds, metal or even artistic objects), should all be studied in a classification system as this can help comparative studies both within and across regions as well as periods. Such a classification system should be defined according to morphological (that is raw material, shape and manufacturing marks) as well as technological features (such as usewear, although sometimes it is hard or even impossible to distinguish between usewear and manufacturing marks). To this aim, employing a consistent terminology and typology, which avoids some long-established errors and confusions, is essential for advancing in the field of stone tool studies.

3. The third key issue concerns the geographical scope of stone tool research. Stone tools do generally show strong similarities across faraway areas such as the Near East, Egypt, Europe, and the Americas, but comparative studies among faraway regions are often problematic. Two cases may reinforce our point: **A.** Grinding of maize in Central America is different from grinding wheats in the Near East and Egypt because of many factors involved, such as the raw material of the device, its shape and the ways of use (compare adding water while grinding corn, see Hayden 1987, vs dry grinding of wheats). Therefore, the suggestion that loaf-shaped handstones in Iron Age Israel were used for grinding on both the front and the bottom surfaces, and sometimes also on left and right edges (Liebowitz 2008) should be taken with caution. While this assumption finds some support in how maize tortillas in Central America are prepared (Liebowitz 2008), local ethnographical parallels of cereal processing are preferable, given the conservative nature of food preparation methods. **B.** It has been suggested that acorns were part of the Natufian diet (Nishiaki 1998; Olszewski 2004), while Rosenberg also proposed that the pounding and processing of acorns were done in the numerous Natufian bedrock mortars (2008). Acorns consumption is a well recorded in archaeological findings and in historical documents in both Europe and the Americas. A rich variety of oak species have been growing in the wild for tens of thousands of years in the New World, Europe and Turkey (253 species in Mexico, 84 in North America, and 32 in Europe), in contrast to only five species of oak grow in the Near East and Western Asia. While examining this suggestion, one may stress that the

Southern Levant oak acorns are woody and hardly nourishing, unlike in other parts of the world where oak species produce nutritious acorns that are widely eaten (e.g., Mason and Nesbitt 2012). The nutritional values of local acorns vary among species (265/172 kcal in 100 g of Common Oak acorns) and they are rarely found in large amounts in ancient south Mediterranean sites (e.g., Meson 1996). Only in Early Epipalaeolithic Ohalo II, thousands of acorns were found (Weiss 2002), which they were possibly used as fuel and in tanning animal hides (the Tabor oak has an especially high ratio of non-edible acid, Avitsur 1975, 1976; Araf 1975). Second, acorns consumption in pre-Israel Palestine was limited to famines and other harsh times (Avitsur 1976), unlike in European North America where the practice of eating acorns, also said balanophagy, is well documented. Third, by far most of the Natufian mortars have pointed inner bottom and therefore they do not seem to be suitable for pounding acorns as the mash would have been difficult to extract from the narrow bottom. It seems, therefore, that in the Late Epipalaeolithic Levant, acorns were probably only marginally consumed. Hence, despite being in many cases very insightful, cross-cultural comparisons should always be used with cautions.

4. Another issue concerning stone tool research is the dearth of detailed published data, especially concerning some regions within the Near East and Egypt, and periods. The publications of some of the major sites offer reports about ground stone tools in the form of a catalogue accompanied by illustrations of only selected tools (e.g., Megiddo, Lachish and Hazor: Sass 2000, 2004; Sass and Cinamon 2006; Sass and Ussishkin 2004; Ebeling 2012; Rosenberg 2013, respectively, but see Yadin *et al.* 1958, 1960, 1961). Moreover, these reports are rarely followed by subsequent more in-depth studies on the stone tools (as, for example, in Ebeling and Rosenberg 2015). The present volume, therefore, hopes to stimulate both the publication of more detailed reports about stone tools from sites, and more of in-depth studies on stone tools by publishing stone tool assemblages from several sites.
5. Typological dating of ground stones and of rock-cut installations is still not fully accepted by many archaeologists, as it is for pottery sherds and lithic assemblages. Nonetheless, during the more recent research projects of stone tools some types have revealed to be exclusively related to one period or culture (such as the 8th-9th centuries BCE oil press, Eitam 1979; the Late Natufian narrow conical mortar, Eitam 2009; and the Early Bronze four-handed basalt vessel, Rosenberg and Chasan 2017). On the other hand, many stone tools existed through thousands of years. The rock-cut grinding

devices, for example, (parallel to the lower grinding slabs), are first to be seen in the Late Natufian, and occasionally re-appeared across later periods until the Roman period. Cupmarks are another example, which first appeared in the Late Palaeolithic, and continued to exist consecutively until the Early Arab period.

Both devices emerged in the Southern Levant in a large quantity in a particular period, becoming there a landmark of that culture: grinding devices in the late Chalcolithic-Early Bronze I (Eitam 2008; Van Den Brink 2008), and cupmarks, in various forms, in the PPNA (Noy 1979; Rosenberg and Gopher 2010). Their appearing in large quantities bear great significance: the clusters of numerous grinding devices is evidence for joint or communal making of bread, while the standard simple food processor, that is the cupmark with pestle, points towards a returning to cereal groats and porridge meals vs the previous Natufian bread making.

Furthermore, while carefully examining the same type of stone tool along the periods, one would notice variations in measures, ratio and style. The development of an archetypal device through a long timespan in a specific geographical area is another characteristic of stone tools. A good example of this is a special olive oil device typical of the Central Hills of Israel, probably invented in the Chalcolithic period. Initially, this was a small deep, round basin; subsequently, in the Iron Age I a wide shallow basin was added, surrounding a similar small deep basin, thus enabling crashing the olives in more efficient way prior to the extraction of the oil into the deep basin (Eitam 2003). The common Iron Age II lever and weights oil-press with a central collecting vat was probably a development of the prototype devices. Later on, the improved large presses with a central collecting vat became in the Roman time exclusive to Judea and were transferred to the Golan and the Galilee (as a lever and screw and direct screw presses) during the deportee of the Jewish population from Judea (Frankel 1999).

6. Finally, and most importantly, there is the socio-economic and anthropological implications of stone tools. Stone tools became key measures for processing plant staple food from the Late Epipalaeolithic onwards, and a major means of production of large scale manufacture from the Iron Age II period onward. Consequently, the study of stone tools can reveal or clarify the subsistence economy of early societies as well as socio-economic and cultural aspects of historical communities. Two examples may clarify this point. A survey of about 1000 Natufian rock-cut installations revealed an agro-technological system for processing wild

cereals and producing cereal-food, including barley bread, which implies that the Natufian became a food producing society (Eitam *et al.* 2015; Eitam in this volume). Another example is the study of the Iron Age rock-cut installations, which revealed to be numerous same type of improved oil-presses (previously defined by Albright as dye vats, Albright 1938). This technological improvement enabled a large-scale production of olive oil in the 9th-8th centuries BCE by farmers, also organised, possibly as royal large-scale production, concentrated in small fortified industrial villages (Eitam 1987, 1997), and in the 7th century BCE the establishing of a vast enterprise of oil production, possibly initiated by the Assyrians, in the Kingdom of Ekron (Eitam 1996).

2. Structure of the book

The book is divided into six sections. The first section 'Methodology and classification' tackles some broader issues concerning methodological aspects of the study of stone tools based on case studies; the following section 'Documentation: non-archaeological and archaeological sources in comparison' show some case studies in which a diverse range of sources, namely written, ethnographic and archaeological sources, is used to shed light on various aspects on stone tools' functions and their anthropological meanings; the section 'Raw material and manufacture' focuses on the very first steps of the stone tools' life-cycles that is the raw material procurement and the manufacture process; 'Function and uses' present several case studies showing the diverse uses of stone tools, from food production to industrial and economic activities; finally, the section 'Sites and tools' offers detailed reports of so-far unpublished material from some key sites of the Near East and Egypt.

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