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INTRODUCTION

1. STONE TOOLS

Stone tools, or lithics, are the least familiar artifacts archaeologists encounter in our research. Most of us have more than a passing acquaintance with artifacts made of ceramics or metal. We have household words for them, such as "bowl" or "nail," that transfer readily into archaeological analysis. Few students come to archaeology already familiar with stone tools. When and where preservation of organic remains is poor, however, stone tools may be the only remaining evidence of prehistoric human behavior. Because they are so well preserved – indeed, nearly indestructible – stone tools are common touchstones for comparisons of human and hominin behavior across vast expanses of time and space. Plio-Pleistocene sites in East Africa and Near Eastern Neolithic villages have little else in common with one another, other than a lithic archaeological record.

Stone tools were not necessarily the most important artifacts in the lives of prehistoric humans. Recent humans who make and use stone tools often did not give these artifacts a second thought after having made, used, and discarded them (Holdaway and Douglas 2012). Archaeologists, in contrast, devote vast amounts of time and energy to excavating, measuring, drawing, and analyzing lithic artifacts, all in the hope of reconstructing significant dimensions of prehistoric human behavior (Andrefsky 2005, Brézillon 1977, Inizan et al. 1999, Odell 2004). To understand the prehistory of any region, archaeology students have to learn to identify dozens of stone artifact-types.

Inevitably, questions arise. Why do we make so many measurements of Acheulian handaxes? Why do we recognize two dozen different kinds of Middle Paleolithic scrapers but only one type of denticulate? Were all Neolithic "arrowheads" actually projectile points? When students ask such questions, all too often the response merely invokes research traditions for a particular region and/or time period. ("That is what my professors taught me, and this is what you need to learn.") The assumptions of behavioral significance underlying our conventions for describing the lithic evidence are too rarely made explicit.

This book is a guide to the lithic archaeological record for the Paleolithic and the Neolithic periods in the Near East, or in less Eurocentric terms, the East Mediterranean Levant. This region encompasses Lebanon, Syria, Israel, Jordan, the Sinai, and parts of adjacent countries. To archaeologists working in the later phases or prehistory, this region is also known as the "western wing" of the "Fertile Crescent." The Levantine Paleolithic Period began more than 1.4 million years ago with early hominin migrations out of Africa and lasted until about 10,500 years ago. The Neolithic Period (10,500–6,000 years ago) witnessed the transformation of hunter-gatherers into village-dwelling farmers and herders. Archaeologists have been researching the prehistory of the Levant for more than a century. Few other parts of the world of equal size have so rich an archaeological record for human biological, behavioral, and cultural evolution. Stone tools are the most durable components of this record, and differing interpretations of the lithic evidence lie at the heart of many major issues in Levantine prehistory. Surprisingly, however, there is no single comprehensive reference for the Levantine lithic record.

Stone Tools in the Paleolithic and Neolithic Near East is intended as a reference work for those beginning their studies in Levantine prehistory and for experienced researchers seeking an efficient way to become familiar with the lithic record for this region. Chapter-by-chapter, this book identifies the stone artifacts that mark the periods of Levantine Stone Age prehistory and it reviews how archaeologists have organized the lithic record for each of these periods. This book is not a comprehensive prehistory of the Levant. The time has long since passed when prehistory was a story "written in stone." Nevertheless, stone tools have been, for better or worse, the principal documents of prehistory. To understand many of the current debates about human

evolution and prehistory, one needs to understand how archaeologists have organized the lithic record. This book focuses on the more utilitarian aspects of the lithic record (stone tools used by humans to interact with their physical environment): flaked stone and groundstone tools and vessels. The Levant's rich record of symbolic artifacts, which range from minute stone beads and statuettes to monoliths several meters high, lie beyond the scope of this work. Separating these symbolic artifacts from the present work does not imply that these beads, statues, and architectural structures are unimportant. The amount of labor invested in them clearly implies they were. Instead, excluding them merely reflects current archaeological practice in which "lithics" are generally understood to refer to utilitarian artifacts.

In writing *Stone Tools in the Paleolithic and Neolithic Near East*, I have tried to create the kind of reference work that I wish had been available when I began studying Levantine prehistory. The vast and complex body of literature on stone tool typology was one of the major obstacles I encountered in studying archaeological lithic analysis. The conventions for describing stone tools varied from region to region. The typologies I learned in courses on African archaeology were of little help in courses on the prehistory of the Eurasia. They also varied between time periods in the same region. Conventions for describing Levantine Middle Paleolithic stone tools differed widely from those used to characterize Upper Paleolithic and Neolithic tools. Becoming conversant about the lithic record for Levantine prehistory required me to track down a wide range of references written in several languages (mainly English, French, and German). Today, the Internet has made it vastly easier for students to find these publications, but synthesizing them remains a formidable challenge.

Archaeology is a constant dialog between the past and the present. The past gives us questions. Our experience of the present, guided by uniformitarianism and other scientific principles, furnishes us with answers and new questions. In practical terms, this means that archaeologists' life experiences color their perceptions about the past. If one has not tried to make stone tools, one could delude oneself that it is difficult. It isn't, and in fact, as this work will show again and again, much of the perceived complexity of the lithic archaeological record reflects archaeological theory, method, and practice, rather than the intrinsic underlying complexity of the stone tools themselves.

Because my experience with stone tools is atypical for an archaeologist, it is important to explain this to the reader at the outset. Long before I ever thought to study the prehistory of the Levant, I became interested in stone tools and other aspects of "primitive" technology. Learning how to make stone tools was a natural extension of the countless hours I spent as a child "playing Indian" in the woods of New England. Films showing Louis Leakey making and using stone tools in East Africa convinced me that I could do this too. Seeing the basic knapping techniques illustrated in F. Clark Howell's (1968) *Early Man* and Jacques Bordaz's (1970) *Tools of the Old and New Stone Age* increased my interest in lithic technology. Studying archaeology in college, I was surprised that few archaeologists who studied stone tools were also flintknappers. Nevertheless, I was happy to learn that many researchers valued insights gained by experiments making and using stone artifacts. Several of my professors encouraged me to become proficient at making and using stone tools. Flintknapping and stone tool use provided me with a wide range of contemporary experiences from which to derive hypotheses and tests of hypotheses about the past. It was tempting to think of these hypotheses as qualitatively better than those originating from other sources, but I also learned from several of those same professors that the value of a scientific hypotheses is not the source from which it is derived, but instead how well the hypothesis explains variability in the archaeological record.

The goal of this book is to provide a basic guide to the identification of stone tools from the Paleolithic and Neolithic periods in the East Mediterranean Levant. In trying to summarize this evidence I have had to focus on points of agreement among researchers and pay less attention to minor points of disagreement among specialists. Where necessary, I discuss these disagreements, but my emphasis is on those aspects of the lithic record that are accepted by most researchers. Specialists in one or another period will recognize that this work does not dwell much on controversies about how to measure particular stone tool types or which of the various typological and technological indices of lithic variability to use. In my judgment, the literature relevant to these topics is too vast and too contentious to cram into a basic reference work. Readers interested in these subjects will find guidance in the primary literature referenced in this work.

Stone tool analysis has a significant visual component. To make this book valuable as a reference, I drafted many artifact illustrations (more, indeed, than could be included in the book and still have it be an affordable publication). Cambridge University Press (CUP) has generously arranged for images that had to be cut from the final version of the book to be posted on their website at www.cambridge.org/9781107006980. In the text, these images will be cited and enumerated as "CUP Website Images."

II. CHRONOLOGY AND GEOGRAPHY

Stone Age Chronology

Most of the dates in this book are expressed in terms of years before the present (the International Radiometric Year, or 1950 AD). Dates in millions of years ago are abbreviated "Ma" (e.g., 2,500,000 years ago = 2.5 Ma). Dates less than 0.3 Ma and derived from methods other than radiocarbon are expressed in thousands of years ago, or "Ka" (e.g., 128,000 years ago = 128 Ka). When the given dates are calibrated radiocarbon dates, they are designated as "Ka cal. BP." Uncalibrated radiocarbon dates are written out (e.g., 25,000 bp). Chapter 7 on the Neolithic period also presents dates in terms of the Christian calendar, either as years bc (uncalibrated radiocarbon years) or BC (radiocarbon years calibrated into calendar years), because they are expressed this way in much of the archaeological literature for that period.

Prehistoric archaeologists use both geological and archaeological chronological frameworks. Geological time is organized in chronostratigraphic units called "epochs." These epochs are defined and subdivided on the basis of specific changes in rock stratigraphy that, in principle, can be detected on a global scale and accurately dated by more than one geochronometric method. All but the very earliest archaeological evidence dates to either the Pleistocene Epoch (2.5 Ma to 12.5 Ka) or afterward. The richness and variability of the archaeological record for the Holocene Epoch (<12.5 Ka) is so much greater than for any period of equivalent duration in the Pleistocene that it is nearly universally subdivided into archaeological periods.

Archaeological periods are defined on the basis of change and variability in the contents of archaeological assemblages thought to

reflect significant shifts in hominin behavior. Behavioral innovations take time to spread from one region to another, or may never take root beyond their area of evolutionary origin. Consequently, the nature of archaeological periods and their dates can vary between and within larger regions. (This can be seen most clearly in the Levantine Neolithic Period, covered in Chapter 7.)

Table 1.1 lists the major chronological periods discussed in this book and their dates for the Levant. These Levantine Stone Age prehistory divisions were defined late in the nineteenth century on the basis of the European lithic record. The Paleolithic was the period when stone was shaped mainly by fracture. The Neolithic Period saw abrasion (grinding and polishing) to shape stone tools. One could quibble about the continued utility of this periodization scheme, but it is so well entrenched in the archaeological literature that one has to employ it here.

The Geography of the Levant

The names this text uses for various aspects of Levantine geography are chosen for their precision alone, and not for any overt political purpose. Country and city names reflect their current American English spellings.

The modern-day Levant is the result of a collision of the African and Arabian plates that began around 24 Ma. Previously, Africa and Arabia/Eurasia were separated by a narrow oceanic passage, the Tethys Seaway. When the African, European, and Arabian plates closed off this seaway, they created the Mediterranean Basin. Limestone bedrock, the former sea bed, was thrust upward above sea level. Nodules of the flint that comprises so much of the lithic evidence for the Levant are derived from these limestone deposits. Caves formed in these limestone deposits as water percolated through them and dissolved them. Caves in karst limestone landscapes are frequent sources of spring activity, and thus magnets for human settlement. The favorable conditions caves afford for the preservation of organic remains are major factors in the richness of the Levant's archaeological record.

Beginning around 3–4 Ma, the east-west spreading of tectonic plates created two of the Levant's defining ecogeographic features,

Table 1.1. *Major Periods of Levantine Stone Age prehistory*

Period	Dates	Major Evolutionary Events
Lower Paleolithic	>1,400,000–245,000 BP (>1.4–0.3 Ma)	Origin of Genus Homo. Increased evidence for hominin carnivory. First hominin dispersals beyond Africa. Controlled use of fire begins.
Middle Paleolithic	245,000–45,000 BP (245–45 Ka cal. BP)	Origins of *Homo sapiens* and Neanderthals. *Homo sapiens* dispersal into southern Asia. First evidence of exosomatic symbol use (mineral pigments, personal adornments, burials). Evidence for systematic hunting of large game.
Upper Paleolithic	45,000–24,000 BP (45–24 Ka cal. BP)	*Homo sapiens* adaptive radiation into western Eurasia. Widening ecological niche including systematic collection of small game. Extinction of Neanderthals. First evidence of freestanding architecture.
Epipaleolithic	24,000–12,200 BP	Increasing sedentism and ecological intensification among hunter-gatherers. Increased use of groundstone tools for in-bulk processing of wild grasses. Domestication of the wolf/dog.
Neolithic	12,200–6500 BP	Monumental architecture. Domestication of cereal grasses (wheat, barley). Domestication of sheep, goat, cattle. First villages, ceramics. Regional patterns of symbolic artifacts suggest organized religion.

the mountains of Lebanon and the Jordan Rift Valley (Figure 1.1) (Horowitz 1979). Extrusive volcanic rocks associated with these rifting and mountain-building processes (mostly basalts) were often used as raw materials for stone tools. (Anatolian obsidian was produced by more recent volcanic processes.) Running north-south, the Lebanon and Anti-Lebanon mountains trap rainfall from cyclonic belts

traversing the Mediterranean Basin. Runoff from these mountains feeds a narrow but verdant strip of woodland habitats along the northern Levant coast. The subsidence of the Rift Valley created a series of lakes on the floor of the valley linked by the Jordan River. The higher and northernmost of these lakes (the Huleh and Kinneret basins) are freshwater, and thus attractive to plant and animal life, while those at lower elevations (e.g., the Dead Sea and its Pleistocene precursor, Lake Lisan) were, and remain, brackish.

For most of the past two million years, the Levant has enjoyed a broadly "Mediterranean" climate, characterized by long dry summers and short wet winters (Blondel and Aronson 1999). The decomposition of limestone and basalt bedrock under this climate regime led to the formation of clayey *terra rosa* sediments throughout much of the north and central Levant. In areas with more than 4,000–1,200 mm of rainfall per year, these sediments support woodland dominated by oak, terebinth, and pine (Figure 1.2). These woodlands' southern and eastern edges are ringed by "Irano-Turanian" steppe dominated by wormwood (*Artemisia*), various grasses, and Compositae. Further south, on more sandy substrates, *rendzina* and *loess* soils support sparse desert vegetation (Zohary 1973).

In much of the rest of Southwest Asia, woodland, steppe, and desert form broad, horizontally extensive vegetation belts. In the Levant, high topographic relief brings these ecozones into close conjunction. In some parts of Israel and Jordan, for example, it is possible to walk from dense woodland to steppe to desert in a few hours. This topographic effect formed extensive "ecotones" (transition zones between major ecogeographic communities) that would have been especially attractive to generalist feeders, such as early hominins. Populations living in such ecotones would have been able to minimize the logistical costs of simultaneously exploiting food sources in both woodland and steppe habitats.

The location and extent of the Levant's woodland, steppe, and desert ecotones varied widely through recent geological time. For most of recorded history, the northwestern Levant (Lebanon, coastal Turkey, western Syria, and northern Israel) has been persistently humid and hospitable to human habitation. Higher elevations in the southern Levant (the Negev, Sinai, and southern Jordan) have been steppe-desert and less supporting of prolonged and stable human settlement.

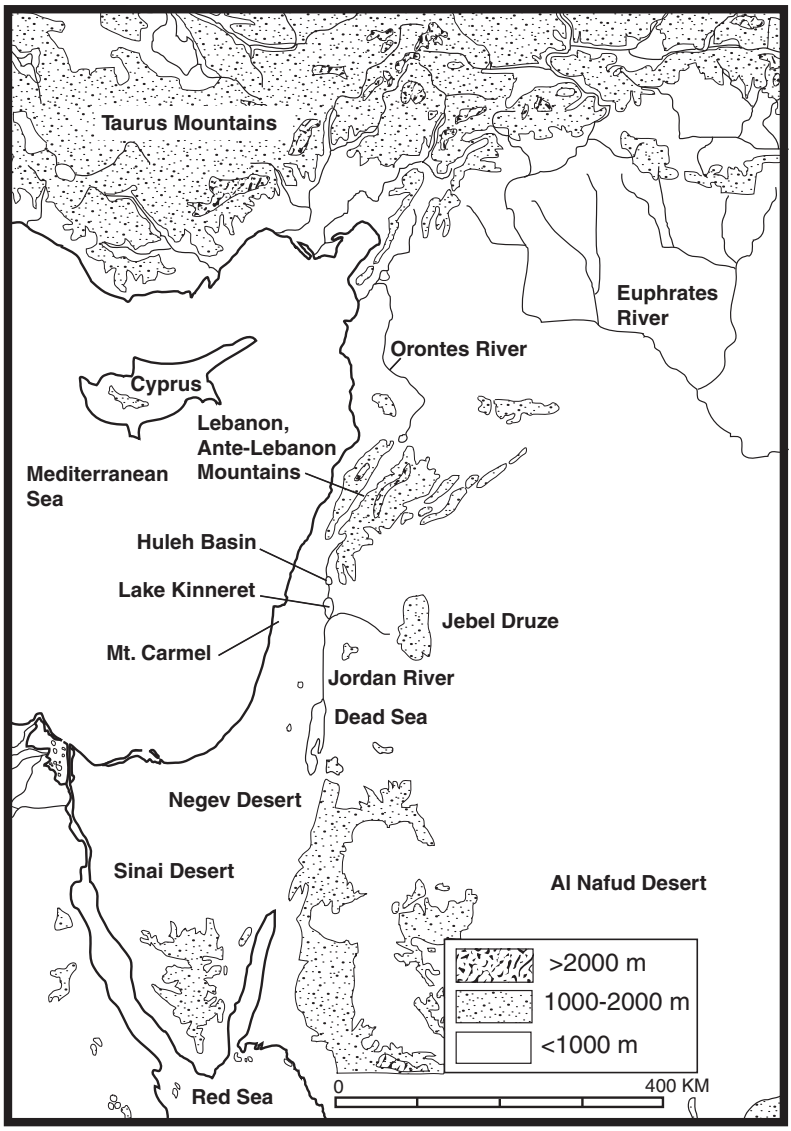

FIGURE 1.1. Topographic features of the East Mediterranean Levant.

Over the past 900,000 years, the Levant's climate has alternated along with Pleistocene glacial-interglacial cycles lasting roughly 120,000 years each. During short interglacial periods, the Levant was warm and humid, more or less like it is today. There is, however, considerable

disagreement among paleoclimatologists over whether the region was relatively wet or dry during glacial episodes (Frumkin, Bar-Yosef, and Schwarcz 2011, McGarry et al. 2004).

The animal community of the Levant is a complex combination of endemic species (ones unique to the Levant), species that have dispersed into the region from elsewhere, and seasonal migrants (chiefly birds) (Tchernov 1988). The recent mammal community of the Near East is dominated by Palearctic species (species found mainly in temperate and colder parts of Eurasia), but Early Pleistocene times and warmer episodes during the Pleistocene witnessed infusions of species originating from North Africa and southern Asia.

From an anthropological and historical standpoint, the Levant has long been a crossroad of the continents, a corridor connecting Asia to Africa and the civilizations of the Mediterranean Basin to their counterparts along the Indian Ocean. Transfers of people, goods, and ideas across the Levant are richly documented from historical times. It stands to reason that similar kinds of phenomena graced at least the most recent phases of Levantine prehistory.

III. STONE TOOL ANALYSIS IN LEVANTINE PREHISTORY

Historical changes in archaeologists' methods for studying stone tools have caused mismatches between older conventions for describing stone tools and newly emerging analytical objectives. These methods can be discussed in terms of three chronologically sequential approaches: culture-stratigraphic approaches, culture-historical approaches, and behavioral-strategic approaches.

Culture-Stratigraphic Approaches

In the early twentieth century, when Levantine prehistoric archaeology began, human evolution was envisioned as a stage-wise progression. Many early prehistorians were originally trained in geology and paleontology, and in studying the archaeological record they looked for artifactual equivalents of paleontological "index fossils" that could indicate earlier humans' evolutionary status. Because hominin evolution was thought to be a linear course through more or less