

## Stone Technology in Arabia

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### The Importance of Arabia in Prehistory

Prehistoric research in the Arabian Peninsula is in its infancy, and it has long been treated as an empty spot on the archaeological world map. While information about Arabian prehistory is still relatively scarce, archaeological sites are, in fact, abundant. Archaeological sites are found in many places across Arabia, usually represented by stone tool industries. Arabia is a key geographic zone of the Old World, as it lies at the crossroads of three continents: Africa, Europe, and Asia. The Peninsula therefore plays a leading role for studying the worldwide expansion of early humans.

Archaeological surveys have been carried out in Arabia for more than half a century, revealing the existence of prehistoric sites spanning over a long time period, some perhaps extending back to more than one million years ago. Stone tools (also called lithics) represent the main kind of material objects found in archaeological sites. Based on the typology of stone tools, archaeologists working in Arabia have constructed a chronological and cultural framework that was modeled after the technological stages known elsewhere, such as the Lower Paleolithic (Oldowan, Acheulean) and the Middle Paleolithic (sometimes labeled as Mousterian or Middle Stone Age). All archaeological site discoveries made in Arabia were adapted to this broad typological and chronological framework. Prehistoric research in Arabia is currently progressing, as Paleolithic sites have now been radiometrically dated and systematic site excavations have been conducted.

Having today a somewhat better picture of the chronological framework of prehistoric Arabia, lithic industries are currently being compared with better-established neighboring stone tool assemblages, such as those of northeast Africa and the Levant. Comparisons are important in this case, as there is a desire to determine the regional source of Arabian populations. Stone tool industries in Arabia can therefore provide an opportunity to examine cultural influences and interconnections and human migrations and dispersals.

Paleoenvironmental research has been growing in Arabia over the past few years, situating prehistoric activities in ecological context. Studies include study of satellite images to identify paleohydrological features (lakes, rivers), analysis of riverine and lacustrine (lake) deposits themselves, and study of cave speleothems which provide an accurate picture of climate change history. All of these studies contribute to the reconstruction of past environmental conditions, providing a framework to understand prehistoric occupations and activity.

### The Peopling of Arabia

The oldest archaeological sites identified in Arabia are not well dated, but based on interregional analysis and stone tool typology, they comfortably belong to a Lower Paleolithic tradition known as

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the Acheulean, dated between 1.7 million years ago and 200,000 years ago. Lithic industries typed as Acheulean typically contain large bifacially made artifacts, called handaxes and cleavers, as well as simpler tools, called choppers. These large bifacial tool forms are hand-held implements, probably used in a variety of tasks, such as butchering animal carcasses.

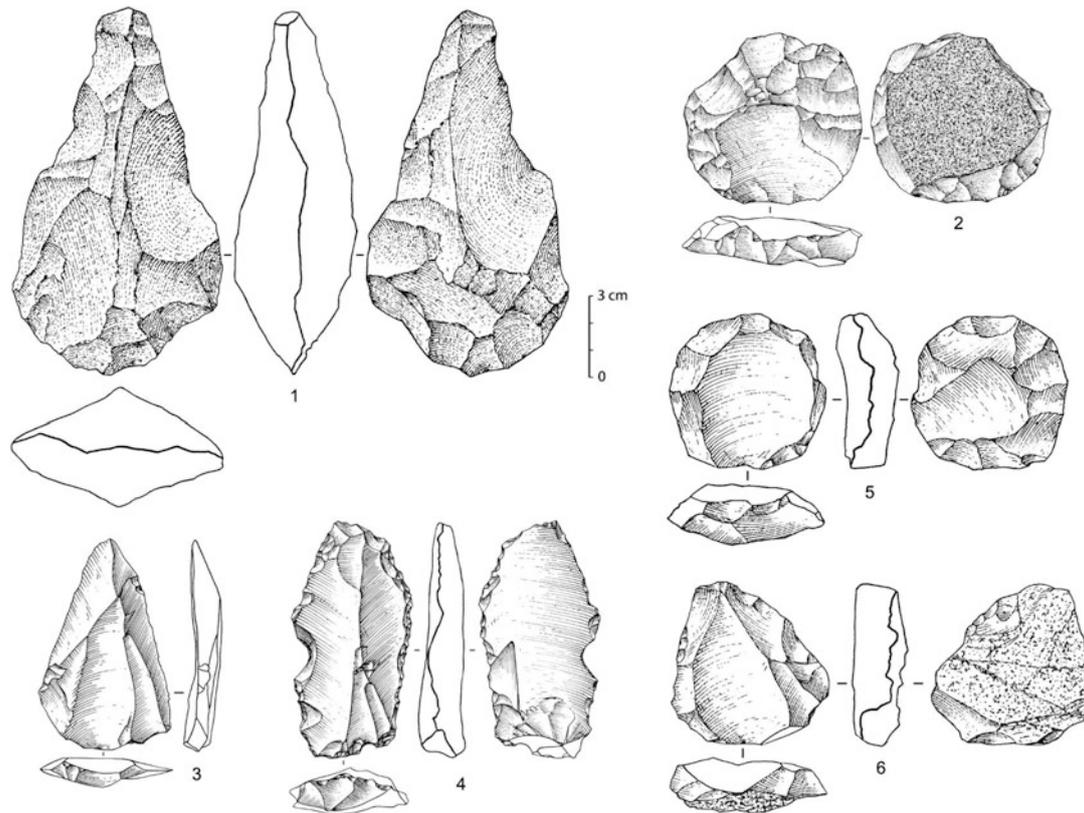
Middle Paleolithic stone tool industries are better known in Arabia in comparison to Lower Paleolithic industries (Fig. 1). In Europe, the Levant and Africa, the Middle Paleolithic is generally characterized by Levallois flaking methods, which begins in the late phases of the Acheulean. Levallois technology is characterized by a hierarchical system of flaking, including predetermined forms of flaking products. Middle Paleolithic industries in Arabia are also characterized by Levallois tool methods. The key innovation is the use of flakes for tipping spears, thus providing advantages to prehistoric hunters who were able to kill prey from a distance more efficiently.

Middle Paleolithic sites are found all across the Arabian Peninsula, thanks to numerous surveys by archaeologists. In recent years, archaeologists have identified sites with stone tools in stratigraphic context and in association with absolute dates ranging between 125,000 and 55,000 years ago. The main sites are Jebel Faya (Marine Isotopic Stage (MIS) 5e, United Arab Emirates; Armitage et al., 2011), the Nubian Complex of Arabia (MIS 5c, South and Central Arabia; Crassard & Hilbert, 2013; Rose et al., 2011), the Jubbah paleolake localities (MIS 7 to MIS 5c, northern Saudi Arabia; Petraglia et al., 2012), the Mundafan paleolake localities (MIS 5, southern Saudi Arabia; Crassard et al., 2013), and Wadi Surdud (MIS 3, southwestern Yemen; Delagnes et al., 2012). The episodic peopling of Arabia during the Middle Paleolithic is associated with well-established humid phases in which increased rainfall facilitated the expansion of both freshwater systems and mammal populations (Groucutt & Petraglia, 2012). Conversely, during arid or hyper-arid periods, the Arabian environment may have presented a substantial obstacle to human survival, at times resulting in population contraction into refugium zones [areas of relatively unaltered climate that are inhabited by plants and animals during a period of continental climatic change]. The Nubian sites in south and central Arabia were only formerly known in southern Egypt and northern Sudan; hence recovery of them raises questions as to whether these tool industries represent an early expansion out of Africa by our species *Homo sapiens*).

## The Late Prehistory of Arabia

Stone tool industries dating to 50,000 years ago and later are characterized by the use of blade technology. Blade tool industries, called Upper Paleolithic in the Levant and Europe and Late Stone Age in Africa, are still extremely rare in the Arabian Peninsula. The absence of these blade industries in Arabia raises the question as why the Peninsula was uninhabited during this period. Alternatively, the absence of these industries in Arabia may, in part, be due to preservation conditions, or perhaps a product of the lack of research. Though rare, recent discoveries in southern Oman could help to fill the gap in our knowledge about such sites, as blade tool assemblages have been found that may date back to 20,000 years ago (Hilbert, 2014). From the information available today, it is also possible to suggest that some regions of Arabia were sparsely inhabited, explaining the paucity of Upper Paleolithic sites, whereas in other more favorable ecological settings, foraging populations may have been continually present.

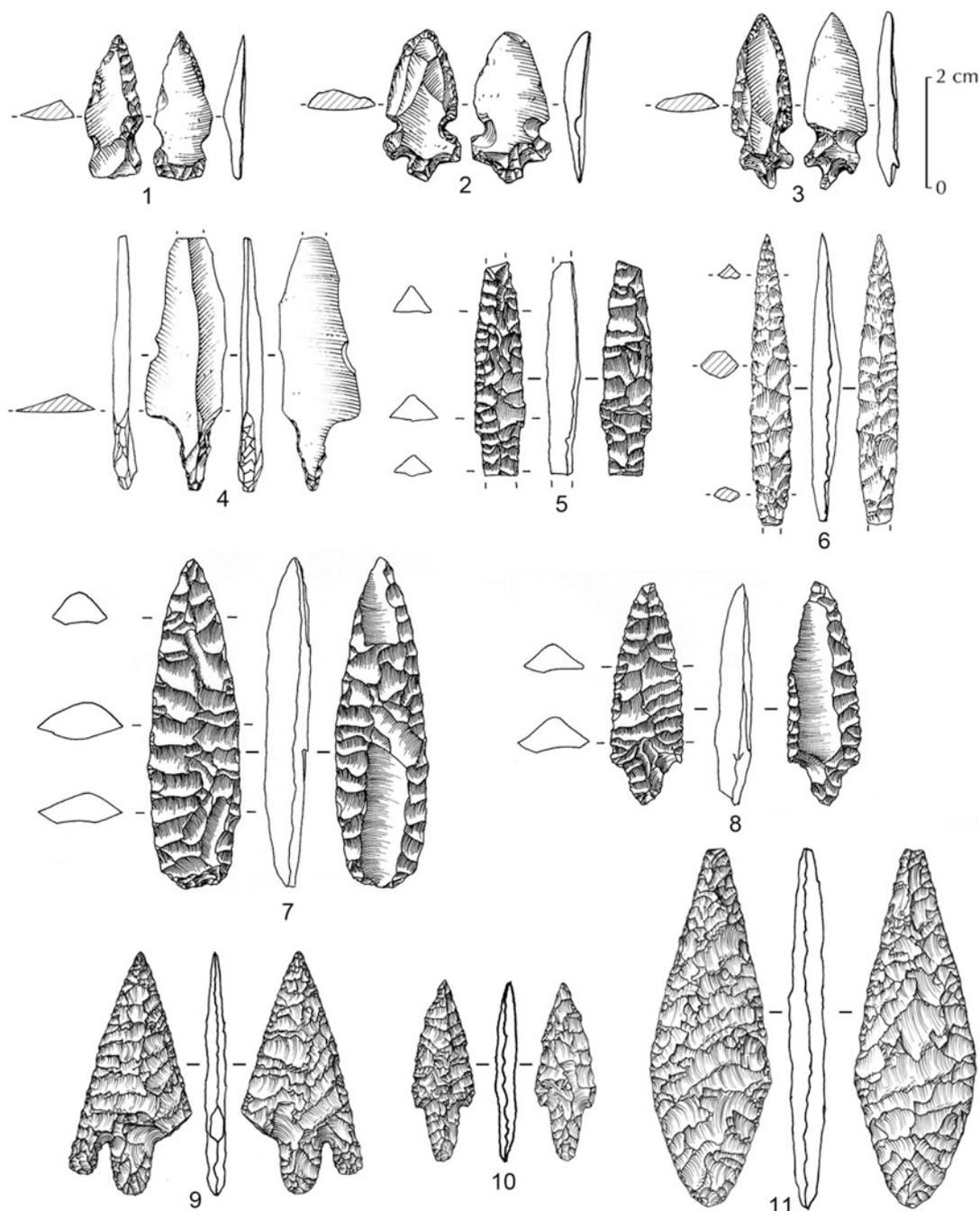
During the Early Holocene, after 10,000 years ago, stone tool assemblages begin to include projectile weaponry (Fig. 2). Stone tools include small tanged arrowheads made on a thin flake or blade-like blanks. Certain forms of arrowheads, named Fasad points, appear to be geographically restricted to the southern part of the Peninsula, especially in Oman and the Emirates (Charpentier &



**Fig. 1** Arabian Paleolithic stone technology: (1) Lower Paleolithic Acheulean handaxe (From Jubbah, JKF-8 site, northern Saudi Arabia); (2) Middle Paleolithic (MP) Levallois preferential core (From Jubbah, JSM-1 site); (3) MP Levallois preferential flake (From Jubbah, JKF-1 site); (4) MP retouched tool (From Mundafan, MDF-1 site, southern Saudi Arabia); (5) MP Levallois preferential core (From Al-Kharj, AK-22 site, central Saudi Arabia); (6) MP Nubian core (From Al-Kharj, AK-22 site)

Crassard, 2013). Later on, and in correspondence with the rise of the Neolithic (mainly characterized by pastoralism) from the mid-seventh millennium BC, a typical facies of trihedral arrowheads appears in Yemen and spreads across southern Arabia, from the Red Sea coast to the Gulf. These finely made trihedral arrowheads are bifacially, and sometimes trifacially, shaped, showing a triangular cross section. Some of these stone tool forms are fluted, the fluting method consisting of the extraction of a flake along the longitudinal axis of the point, on its ventral face. This highly characteristic fluting method of stone tool manufacture is so far only found in south Arabia. Neolithic developments include the production of sophisticated bifacial foliate industries and other types of bifacial and unifacial arrowheads, as well as small finely shaped semicircular end scrapers (Crassard & Drechsler 2013), quite clearly present in the whole of south Arabia. For the rest of the Peninsula, stratified and dated Early and Mid-Holocene sites are still infrequent. Surface finds (sometimes broadly attributed to a vague “Arabian Bifacial Tradition”) indicate a probable difference with the traditions observed in Yemen, Oman, and the Gulf.

Stone technology does not entirely disappear in the Bronze Age which begins at about the fourth millennium BC. Yet, there is a clear tendency for expediency: retouched tools are made on flakes, with no particular method to produce specific forms of particular sizes and shapes. The blade and bladelet component, sometimes abundant in Neolithic assemblages, begins to disappear in favor of metal products. During the Bronze Age and Iron Age in Yemen, geometric microlith traditions are



**Fig. 2** Arabian Late Prehistory stone technology: (1–3) El-Khiam and Helwan points (From Jubbah, JQ-101 site, northern Saudi Arabia); (4) Fasad point (from Qi Haid site, Oman); (5) Trihedral point (From Manayzah site, Yemen); (6) Trihedral point (From HDOR-419 site, Yemen); (7–8). Fluted points (From Manayzah site, Yemen); (9–11). Bifacial arrowheads and tool (From Mundafan, MDF-16 and MDF-20 sites, southern Saudi Arabia)

reinvented. These tool forms are typically made of a distinctive volcanic material called obsidian, found locally and imported from Africa. These microlithic tool forms represent the final phase of stone tool industries used in Arabia, coming to an end by the beginning of the Common Era (Crassard, 2008).

## Conclusions

Arabia is central in debates concerning human origins and the colonization of the Old World. Stone technology helps archaeologists to examine cultural traditions, human activities, and population relationships and movements. Today's explorations and excavations are helping to improve our understanding of Arabia's role in past history, and studies of stone technology are fundamental in tracing interactions, influences, and dispersals of early human groups out of, and into, Africa. Analysis of stone tool variations and patterns also help in evaluating the more recent peopling and re-peopling of the Arabian Peninsula, up to the rise of urbanized and complex civilizations.

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