Survey of Prehistoric Sites in Mahra, Eastern Yemen

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Abstract. *A recent survey in the governorate of Mahra, Yemen produced surface collections of lithic artifacts rich in bifacial tools and blades. Technological analysis of the Mahra collection suggests a simple blade industry unrelated to the Upper Palaeolithic blade traditions found in the deserts of the northern Arabian Peninsula. A large percentage of the Mahra assemblage consists of specialized bifacial tools characterized as plano-keeled naviforms. Correlates to these tool types have been discovered throughout Oman. It is suggested the artifacts are associated with an Early/Middle Holocene wet-phase lasting from 10,000 to 5,000 BP.*

Introduction:

In the summer of 2000, an archaeological reconnaissance was conducted in the governorate of Mahra, eastern Yemen. The survey was carried out by a small group made up of both Americans and Yemeni from the General Organization for Ancient Monuments and Manuscripts (GOAMM). The primary goal of this project was to find evidence of prehistoric habitation and to locate contexts that may contain stratified Pleistocene deposits. The brief ten-day survey was focused in the Wadis Thabut and Faydami on the sandy plain surrounding Al-Ghaydah, and the narrow strip of coastline extending eastward toward Hawf on the Omani border (fig. 1). A total of 14 sites, all appearing to date to the Holocene, were identified and are briefly described in the following report.

Geography and Climate:

The governorate of Mahra is situated in the easternmost province of Yemen. With only 110,000 inhabitants (half of whom are Bedouin and the other half fishers), occupying approximately 57,000 square kilometers, Mahra is one of the least populated and least developed provinces in all of Yemen. As of the time our survey was carried out, there were no paved roads connecting the Mahra Governorate with the rest of the country. Because of the logistical difficulties inhibiting travel to this distant governorate, Mahra has received very little prior archaeological attention. The only previous survey was conducted by Amirkhanov (1994) in the mid-1980s. Presently, the Mahra Archaeological Project (MAP), led by Dr. Juris Zarins, is actively engaged in archaeological research in this region. While investigating Iron Age trade routes for frankincense and myrrh in 1997, Zarins' team discovered potential Palaeolithic artifacts ranging from Lower Palaeolithic handaxes to Upper Palaeolithic blade industries (Zarins et al., n.d.). The Mahra Prehistoric Survey was implemented in 2000 to further investigate these finds.

The interior of Mahra consists of low mountains, typically less than 1000 meters in elevation. The basement rock is composed of Paleocene and Eocene limestones, marls, shales, and sandstones (Birse et al. 1997). Obtaining raw material would not have been a problem for human groups occupying this region--flint sources are ubiquitous and of excellent quality for knapping. Tabular blocks were observed eroding from exposed limestone terraces, and an abundance of rounded nodules are available within the wadi channels and scattered throughout the

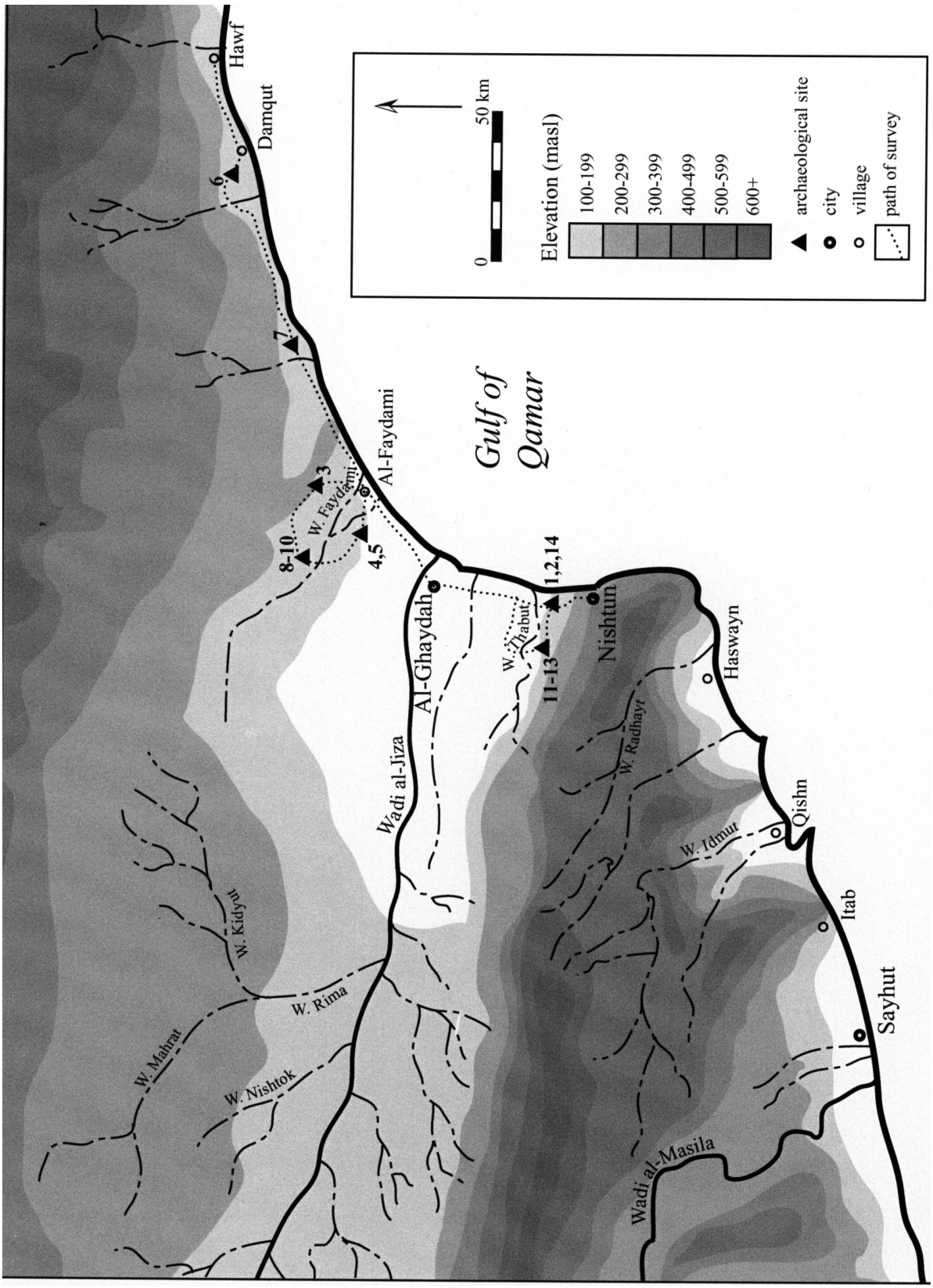

Fig. 1-Map of Mahra, eastern Yemen

peneplain.

Seasonal drainage channels incise the rocky landscape. Along the coast a narrow plain serves as a buffer between the low mountains and the Arabian Sea. Jutting across the Omani border into eastern Mahra is the westernmost extent of the Dhofar mountain range. Upon the flanks of this low mountain chain there is a 20,000-hectare forest made up of Tamarindus, Commiphora, and Anogeissus. The forest is sustained by the Southwest Monsoon System that cycles seasonally through the Indian Ocean and is responsible for depositing approximately 200mm of rainfall over eastern Mahra per annum (Schyfsma 1978).

During certain periods of the Pleistocene (IOS 5e, 5a, 3) and early Holocene, the Southwest Monsoon System appears to have increased in intensity (Sanlaville 1992; Cleuziou et al.1992). These periodic fluctuations are attributed to 1) a rise in continental albedo in the northern hemisphere, 2) retreating ice sheets in Europe and Asia, and 3) an increase in water surface temperature throughout the western Indian Ocean (Clemens et al. 1991; Zonneveld et al. 1997). As a result of the strengthened monsoons, seasonal storms were driven further north into the hinterlands of the Arabian Peninsula and deposited significantly greater amounts of rainfall over the land (Sarntheim 1972; Kutzbach 1981).

Sub-tropical environments, now limited to a handful of forests located at high elevations, characterized much of southern Arabia during the Pleistocene and Holocene mesic phases. The vast seas of sand currently blanketing South Arabia's lowland basins and plains were once covered in grasslands, open savanna, and stabilized dunes. Increased rainfall produced playa lakes and seasonal drainages throughout these landscapes, providing enough freshwater to facilitate hominid habitation (McClure 1974; McClure 1978; Garrard and Harvey 1981; Schulz and Whitney 1986; Schulz and Whitney 1987; Lezine et al. 1998).

Survey Methods:

The goal of this survey was to identify settings with a potential for *in situ* Pleistocene deposits. Much of the work was conducted by traveling via automobile to a variety of geomorphic regions, in order to assess the presence/absence of Pleistocene accumulations. The survey covered approximately 100 km along the coastal plain (fig. 1), 10% of which was intensively examined. Among the areas specifically targeted were relic terraces near ancient watercourses, caves, and rockshelters. Upon identification of these loci, survey was carried out on foot to collect archaeological materials.

If artifacts were found, a more extensive reconnaissance strategy was employed to determine the horizontal extent of the site and to collect a sample of material for analysis. Tools, cores, and debitage encompassing all size ranges were collected. Each site was numbered consecutively, in the order of its discovery, beginning with the prefix MPS (Mahra Prehistoric Survey). It must be emphasized that collection techniques focused on obtaining diagnostic tools and debitage. The assemblages are not unbiased, representative samples. For this reason a detailed technological analysis of the lithics was not carried out, as it would not adequately describe the reduction sequence. Only a small sample of the collection could be exported from Yemen, further hindering classification of the artifacts.

Sites and Artifacts:

Fourteen sites were discovered, of which ten are located on relic alluvial terraces overlooking the low plain around Al-Ghaydah (fig. 1). This flattened lowland extends from the town

ARTIFACT TYPE	*MPS 1*		*MPS 3*		*MPS 8*		*MPS 9*		*MPS 10*		*MPS 11*		*MPS 12*		*MPS 13*		*MPS 14*	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
CORES																		
amorphous cores	6	10.5	4	7.7	3	3.9			5	9.4	4	13.3	1	10	7	10.2	1	1.1
tabular blade cores					2	2.6			1	1.9								
parametal cores					3	3.9					2	6.7	1	10	1	1.5		
DEBITAGE																		
flakes	43	75.4	34	65.4	38	49.3	42	77.8	37	69.8	18	60	5	50	48	69.6	64	70.3
blades			4	7.7	13	16.9	4	7.4	1	1.9	2	6.7	1	10	4	5.8	23	25.3
TOOLS																		
plano-keeled naviforms	4	7	9	17.3	12	15.6	8	14.9	5	9.4	3	10	2	20	8	11.6	2	2.2
scrapers	1	1.8	1	1.9	2	2.6												
bifacial knives					1	1.3												
misc. bifacial element					2	2.6												
UNIDENTIFIED	3	5.3			1	1.3			4	7.5	1	3.3			1	1.5	1	1.1
TOTAL	**57**		**52**		**77**		**54**		**53**		**30**		**10**		**69**		**91**	

Table 1-Frequencies of artifact types at the nine prehistoric sites

of Al-Faydami in the north to Nishtun in the south, and gradually ascends westward approximately 100 kilometers from the coast toward the Hadramaut Plateau. The plain is bounded by low mountains to the north and south. Ancient fluvial systems draining from these mountains carved a network of relic terraces into the landscape.

The sites of MPS 1, 2, 3, 8, 9, 10, 11, 12, 13, and 14 (fig. 1) yielded identical chipped stone industries. Table 1 presents the frequencies of various lithic types present at these terrace sites. MPS 2 is omitted due to the extremely low piece count. Because of the biased nature of the MPS assemblages, the lithic categories used for this analysis are loosely defined, and are intended only to give a general sense of the technology and typology. The "flake" category encompasses flakes, retouched flakes, and primary flakes. The few bladelets discovered by the survey are lumped together with the blades. The type classified as "plano-keeled naviforms" include all pieces belonging to that technological continuum, from crude roughouts to completed tools.

The MPS prehistoric terrace sites are lithic scatters of indeterminate expanse sprawling across the relic alluvial terraces. Within these terraces are interstratified outcrops of high quality, fine-grained flint. Tabular blocks of raw material are found eroding from the inselbergs, and rounded nodules blanket the surface of the deflated terraces. The ubiquitous flint debitage, cores, and tools found throughout the surface of the landscape suggest the sites may have functioned as primary reduction workshops. Nearly every one of the terraces surveyed contained some degree of reworked lithic material lying on the surface. In some cases refits could be made, indicating the artifacts were still in their primary context.

The surveyed terraces range in elevation from 42 to 153 masl; their surfaces are characterized as deflated alluvium. In general, the artifacts bear little evidence of water wear, while patination ranges from medium (orange) to heavy (burgundy). The artifacts encompass a wide range of sizes, from small chips (>2 cm) to large tools and cores (<15 cm). This pattern demonstrates minimal post-depositional aeolian and/or alluvial sorting.

The richest concentrations of material were found on terraces along the Wadis Faydami and Thabut (fig. 1). Large, thick blades with unfaceted striking platforms make up a high percentage of debitage from these localities (fig. 2). Three types of cores are recognized: the first are single and multiple-platform amorphous flake cores derived from rounded nodules, the second type consists of unidirectional blade cores manufactured from tabular flint (fig. 3), and the third type is characterized as parametal, recurrent exploitation of the flint nodule. The latter two cores types tend to be pyramidal in shape with unmodified and unabraded platforms. Platform angles on the blade cores are typically quite steep, averaging around 90-degrees. Based on the deep bulbar scars, it appears that blanks were produced using hard hammer percussion.

A number of tools were found that do not fit into any current typological category. They are naviform in plan view with a plano-keeled cross-section (fig. 4). These artifacts are bifacially and unifacially worked. Typically, there is little to no retouch on the ventral face, and on the dorsal face steep flakes are removed to produce the diagnostic keeled cross-section. A large percentage of artifacts of this type were found, representing various stages of reduction. Other tool forms discovered on the relic terraces include: backed bifacial chopping tools (fig. 5), ad hoc retouched pieces, and various scraping tools. Analysis of tool frequencies is purposely omitted from this report, as it

Fig. 2-Large, crude blade blanks with unfaceted platforms

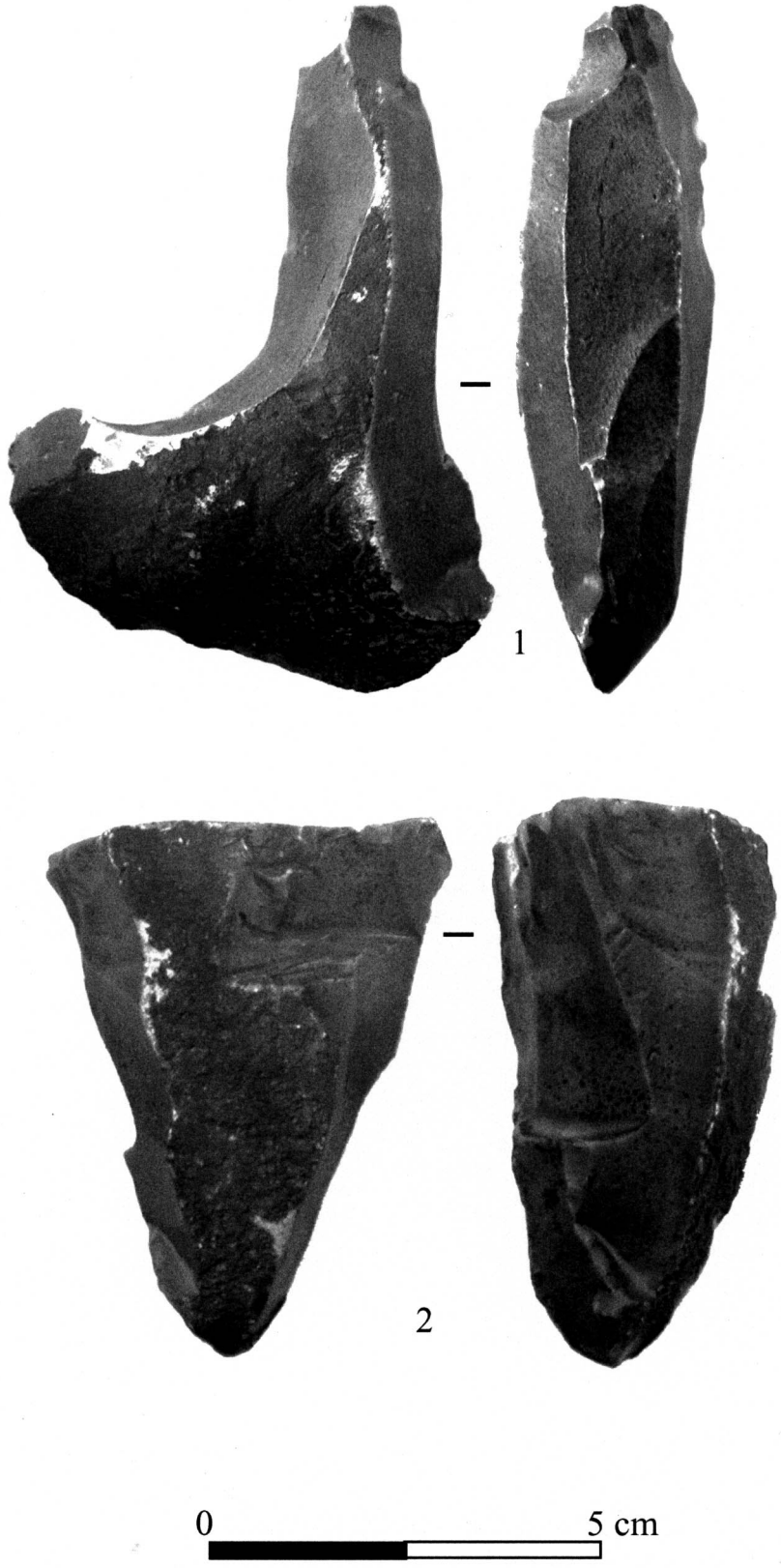

Fig. 3-Blade cores exhibiting unmodified, unabraded, low-angle platforms

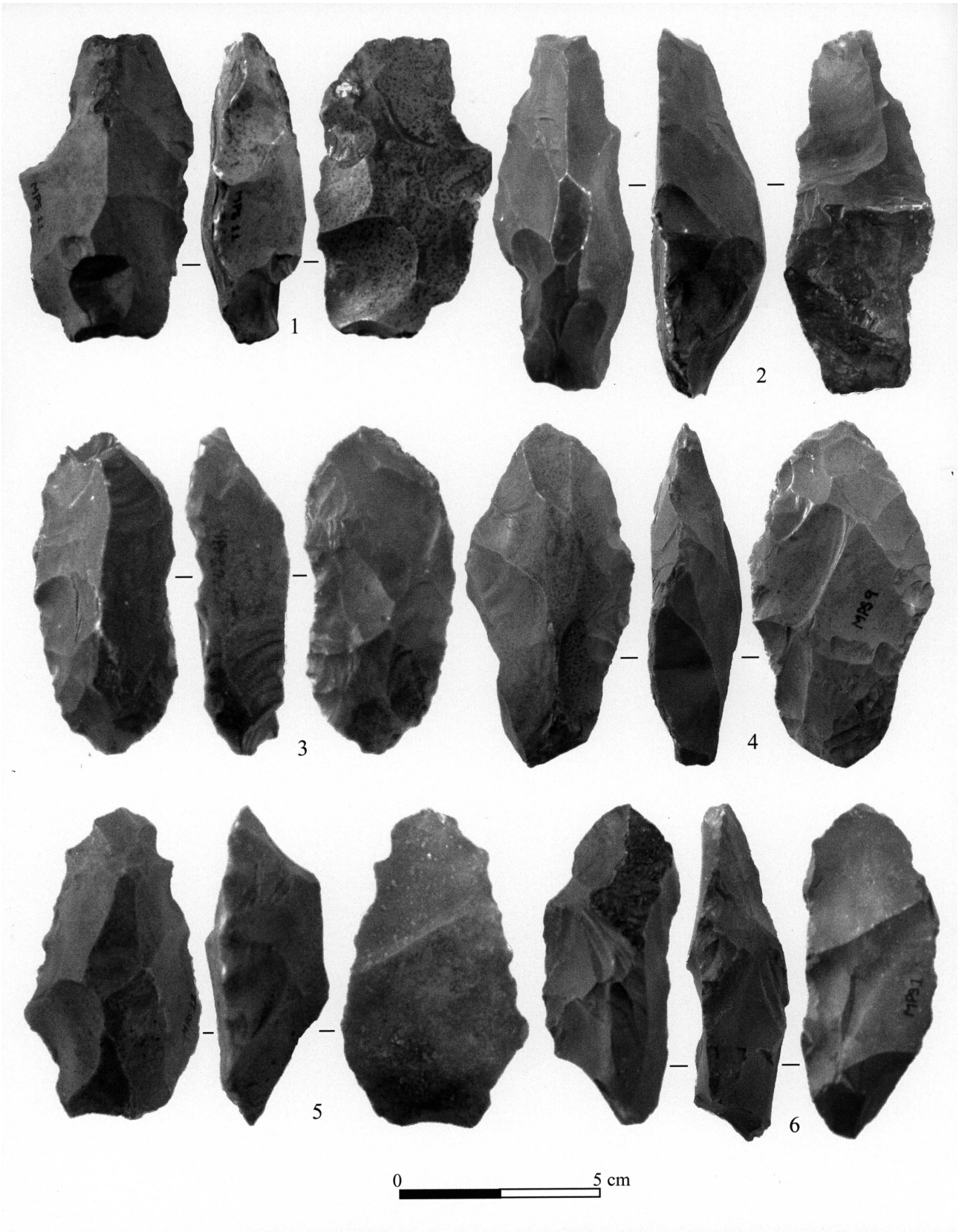

Fig. 4-Plano-keeled, naviform tools

would only be representative of our sampling biases.

Among the ten relic terrace sites, two yielded evidence of architectural remains. Two stone features were discovered at MPS 1 and MPS 10. In the case of MPS 1, the installation consists of a circle of rocks preserved up to 1/2 meter high. The outer wall of the structure is approximately .64 m thick; the total diameter of the feature ranges between 4.2 and 4.9 m. The circle of rocks was constructed on the eastern edge of a terrace overlooking the coast. No artifacts were inside the feature, while a handful of chipped stone pieces, including one plano-keeled naviform, were discovered immediately adjacent to the circle. The site itself is situated atop an inselberg in proximity to the present coastline. The inselberg is bounded on its northern side by an active wadi channel that drains into the Gulf of Qamar (fig. 1).

The second stone circle was discovered at MPS 10. This feature is considerably more prominent than that recognized at MPS 1, the piled rocks reach nearly 1 1/4 meters in height (fig. 6). This installation is described as a solid cairn of stone piled in a circle. The cairn averages approximately 4.3 meters in diameter. In the center there is a circular depression about .8 m in diameter and .6 m deep, giving the entire structure a volcano-like appearance. In addition, two parallel rows of stones extend about three meters outward from the feature. The installation was constructed on one of the highest hilltops in the immediate region, 153 masl. Similar to the feature at MPS 1, several artifacts were found immediately adjacent to the stone circle, including two plano-keeled naviforms.

The purpose of these stone features is unknown, though similar structures were identified in the province of Hadramaut and are thought to have served as post-Palaeolithic burials. An alternate interpretation posits these features were used in some capacity for hunting. The location of MPS 1, overlooking the confluence of a wadi channel and the coastline, would have provided favorable conditions for hunting game attracted to the freshwater. Until one of the circles is excavated, however, these ideas are purely conjectural.

The four other sites discovered during the Mahra Palaeolithic Survey were historic in age, and thus not examined in any great detail. In two cases (MPS 4 and MPS 5) the age of the site was determined based on the presence of artifacts associated with triliths--small piles of stones specially placed in a line. These features, dating to the Iron Age, are commonly found throughout southern Arabia and are thought to mark the ancient frankincense route to and from the Dhofar region in Oman (Zarins 1998).

The final two historic sites, MPS 6 and 7, yielded only light concentrations of lithic artifacts. While both sites were found on scree slopes below caves, it is likely that the artifacts originated from sediments within these caves. Flint material was found in conjunction with non-diagnostic ceramics. The chipped stone recovered from these sites was significantly less patinated than the material discovered on the alluvial terraces around the Al-Ghaydah plain.

Discussion:

Archaeologists working in Oman have reported assemblages similar in nature to the material collected from the terraces around Wadis Faydami and Thabut. Villiers-Petocz (1989) published a collection of lithic material held by the Omani Department of Antiquities. He describes bifacially worked pieces, discovered in multiple localities throughout

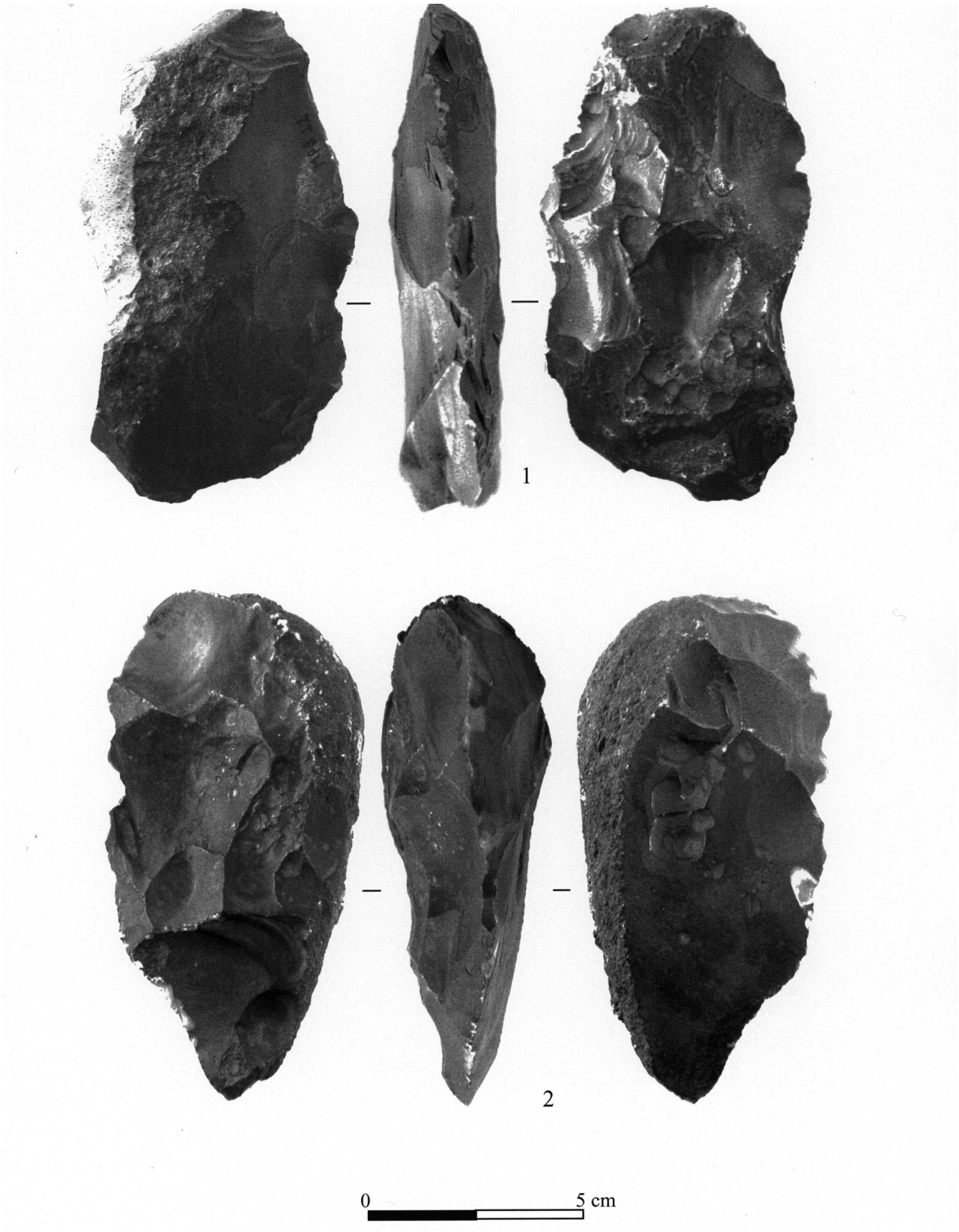

Fig. 5-Backed (1) and naturally backed (2) bifacial tools

Fig. 6-View of stone installation from MPS 10, looking west

Oman, which are similar in shape and technology to the plano-keeled naviforms found in Mahra. These pieces were found in conjunction with a blade industry, similar to the Mahra findings. Smith (1977) reports bifacially worked plano-keeled pieces from southeast Oman. Whalen (personal communication) describes artifacts fitting this description found in a survey along the Wadi Ghadun in southwestern Oman. It should be noted that this tool type has not yet been found west of Mahra. It may be that the distribution of this industry is limited to Oman and eastern Yemen.

Based on the consistent presence of plano-keeled naviform tools, it is clear the ten relic terrace sites discovered on this survey are homogenous. It is yet to be determined, however, to which phase of time these collections can be attributed. An analysis of the blade technology excludes certain periods. The blades were produced by hard hammer percussion, forming 90-degree platform angles on unabraded and unmodified striking platforms. In addition, there were no core tablets associated with these surface collections. This pattern suggests that the Mahra technology does not have affinities with the Upper Palaeolithic blade technology of northern Arabia (Coinman 1997), ruling out a later Pleistocene age for these artifacts.

The aforementioned Omani assemblages are posited to fall somewhere between the late Palaeolithic and post-Palaeolithic periods. In considering current palaeoenvironmental data, it is unlikely early human populations would have inhabited marginal environments in southern Arabia between 30,000 and 17,000 B.P. This phase was one of the driest the Arabian Peninsula has ever been subjected to, more arid than the present day. The bracket for the Mahra lithic industry, thus, can be narrowed to sometime after 17,000 B.P. It is suggested these occurrences roughly coincide with a pronounced wet-phase during the early and middle Holocene, lasting from ca. 10,000 to 5,000 B.P. (Wilkinson 1997).

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ملخص: أفضى مسح حديث لمنطقة "مهرة" في اليمن، إلى جمع مشغولات حجرية غنية بالأدوات والأنصال ثنائية الوجة. ويشير التحليل التكنولوجي لمجموعة "مهرة" إلى صناعة أنصال بسيطة، لا ترتبط بتقاليد النّصل العائد إلى العصر الحجري القديم الأعلى، الذي وجد في صحاري شمال شبه الجزيرة العربية. فضمن المجموعة توجد نسبة كبيرة منها تتألف من أدوات، اختصت بثنائية الوجه، واتسمت بأشكال زورقية مستوية العارضة. وقد أكتُشف مثل هذا النوع من الأدوات، في كافة أرجاء عُمان. ويعتقد أن هذه الأدوات، ترتبط بالحقبة الرطبة الحديثة الأولى، أو الوسيطة، التي دامت من ١٠بم٠٠٠ إلى ٥بم٠٠٠ سنة، قبل الوقت الحاضر (المتعارف عليه لدى الباحثين بسنة ١٩٥٠م).

Notes:

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