L.A. Quintero
P.J. Wilke
University of California
Riverside, CA 92521 - USA

G.O. Rollefson
Whitman College
Walla Walla, WA 99362 - USA
And University of California
Riverside, CA 92521 - USA

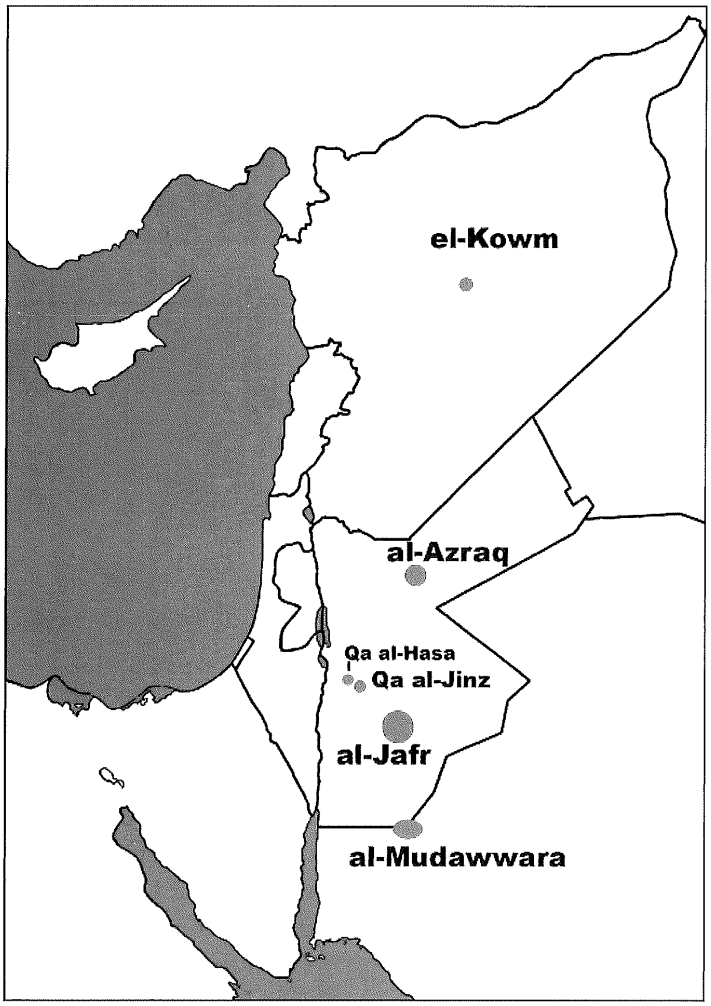
Leslie A. Quintero, Philip J. Wilke, and Gary O. Rollefson

An Eastern Jordan Perspective on The Lower Paleolithic of The "Levantine Corridor"

Introduction

For nearly two decades the concept of the "Levantine Corridor" has been employed as a guiding framework in discussions of Lower Paleolithic archaeological sites in the Levant and the eastern Mediterranean Basin (Bar-Yosef 1987). The concept has figured prominently in Lower Paleolithic studies more broadly across much of Eurasia. Discussions of both the Lower Paleolithic archaeology and of the Corridor itself have emphasized the movement of hominids (generally considered *Homo erectus*), technologies, and ideas between Africa and Eurasia. Because of the number of ancient sites found and studied in the Mediterranean Coastal zone, the Rift Valley system of the Levant, and the adjacent uplands, this westerly Levantine strip has emerged as a critically important avenue in studies of human geography during the Middle Pleistocene for much of the Old World. Major sites in this zone, including Tabun Cave on the coast near Haifa, Ubeidiya and Gesher Benot Ya'aqov along the Jordan River, and Latamne on the Orontes River in Syria, have yielded abundant information on the technology and life ways of Middle Pleistocene hominids. Many other important sites help to round out the known record of the Middle Pleistocene of the Levantine Corridor (for a detailed treatment of relevant sites and issues, current to a decade ago, see Bar-Yosef 1994).

Other work conducted during the same two decades in the basins of eastern Jordan and Syria (FIG. 1) has significantly broadened the zone of geographic distribution of Middle Pleistocene sites in the Levant. Study of the assemblages from these sites enables a better understanding of the technological development, mental capacity (Roche and Texier 1996), and ecological adaptation of *Homo erectus* within the Levantine Corridor and more



1. Map of lake basins in the eastern Levantine corridor.

widely throughout the Near East and much of Eurasia. This paper provides a brief progress summary of ongoing work on the archaeology of Middle Pleistocene lake basins of eastern Jordan with comparisons to surrounding areas. What follows is a working model of the known Pleistocene archaeology that currently guides our fieldwork and laboratory analyses. As suggested herein, our work in these basins requires a broadening of the concept of the Levantine Corridor to include eastern Jordan

nd Syria, and, probably, parts of northern Saudi Arabia as well (see also Copeland 1998).

Al-Azraq Basin

Al-Azraq Basin centers on the region where the panhandle of Jordan begins to extend northeastwards towards 'Iraq (FIG. 1). Its wider connections each nearly 400 kilometers to the southeast, deep nto Saudi Arabia along the length of the Wādī s-Sarḥān Depression. A major oasis occurs at al-Azraq on the northwestern margin of a substantial ephemeral lake of the same name. During much of he Pleistocene this lake undoubtedly was permanent. Even down to modern times major freshwater prings charged the al-Azraq Oasis for several kiometers stretching between the two modern towns of Azraq ash-Shīshān and Azraq ad-Drūz. The Azaq Oasis was a significant wetland of great biodiversity, seasonally visited by millions of waterfowl nd other bird species migrating between Africa nd Eurasia (Nelson 1973). These migrations coninued into the mid-to-late twentieth century. The ongstanding existence of the oasis is attested by a elict population of a small endemic fish, the Azraq killifish (*Aphanius sirhani*). Rock drawings in the rea portray the maned African lion, ostrich, leopard or cheetah, hyena, and other animals whose closest taxonomic affinities lie with the African aunal realm. These and other African-derived taxa survived until the widespread introduction of firearms in the last century. Of these, only the hyena is occasionally seen today.

Initial discoveries of rich Lower Paleolithic deposits in the area of the Azraq Oasis in the 1950s occurred at Lion Spring ('Ayn al-Asad), where hundreds of handaxes (hereafter 'bifaces') were unearthed in the course of an irrigation-development project. The site subsequently was excavated nd yielded a large sample of Acheulian artifacts (Rollefson 1983; Copeland 1998). At nearby C-Spring, abundant bifaces were first exposed in connection with the same irrigation-development project, and later were found in context in limited stratigraphic excavations (see reports summarized nd referenced by Copeland and Hours 1988, 1989). The artifacts occurred as "an extraordinary packed mass of Late Acheulean bifaces, bifacial cleavers, cores, flake-tools and thousands of flakes, mainly delicate biface-preparation flakes" (Copeland 1998: 17), all with a very fresh appearance. A study of the fauna recovered after the earthmoving operations (Clutton-Brock 1970, 1989) identified hartebeest, onager, rhinoceros, bison, and wild camel; faunal affinities were to both Eurasia and Africa. The fact that most of the animals were not fully grown led Clutton-Brock (1989) to conclude that the faunal remains were the food waste of ancient hunters.

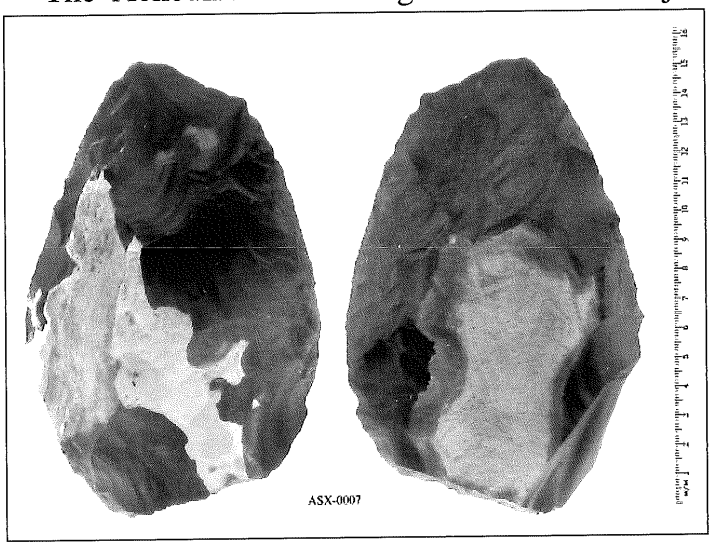
The deposits at both Lion Spring and C-Spring were tentatively dated to the Late Acheulian. Most remarkable was the fact that in these spring assemblages the lithic artifacts included many formed tools, and the tools in turn were mostly bifaces. A large percentage of the bifaces displayed flake scars from resharpening by the tranchet technique, in effect, making these artifacts tranchet cleavers. These findings compelled Copeland and Hours (1988) to propose the 'Late Acheulian of Azraq facies' as a distinctive spring-context entity, both geographically and technologically, in the eastern Levant. Based on typological comparisons with assemblages from Nadaouiyeh I Ain Askar in the al-Kowm Basin of Syria (Le Tensorer *et al.* 1993; Le Tensorer 1996), and with Tabun Cave, it is now thought that the Late Acheulian of Azraq facies must date from about 250 to 400 thousand years ago, or even older.

Jordan is a very dry country, and with the sole exception of its shared boundary waters, it is without a single significant river. It also has a burgeoning human population. A deepening water crisis became acute during the 1980s, and led to extensive pumping of Pleistocene groundwater in the al-Azraq Oasis to supply metropolitan needs. Predictably, the water table of the oasis declined drastically, and the wetland all but disappeared within a few short years. In an effort to restore a small portion of the former oasis and its aquatic habitat for waterfowl and endemic fish, the pond at ash-Shīshān Spring (now 'Ayn as-Sawda) was deepened and enlarged by dredging in the early 1990s. The restoration effort was doomed, however, by the continued pumping of groundwater. Nonetheless, the earthmoving operations had exposed rich Acheulian deposits, which were recognized finally in 1996. Our assessment of the salvaged material revealed that, as at Lion Spring and C-Spring, the tool assemblage was dominated by bifaces, and these included a majority of tranchet cleavers (Rollefson *et al.* 1997a).

We undertook exploratory excavations at the 'Ayn as-Sawda pool in 1997 (Rollefson *et al.* 1997b). Lower Paleolithic occupation surfaces with abundant bifaces were exposed in two areas.

The dominance of tranchet cleavers in the biface assemblage was again evident (FIGS. 2, 3). Cores and debitage[1] and a few other tools, including Levallois elements, complete the Acheulian artifact inventory (TABLE 1). Importantly, these deposits also contained remains of megafauna, identified as Pleistocene elephant, rhinoceros, equid, and camel (Dirks *et al.* 1998). Other excavations disclosed rich Middle Paleolithic deposits in context, with abundant Levallois cores, blades, and points associated with equid and bovid remains. Nearby, deposits spanning the Middle-to-Upper Paleolithic transition, and others dating on into the Epipaleolithic, were revealed.

The Acheulian assemblages disclose a major emphasis on hunting and butchering of large game animals in this lakeside/spring-fed marsh environment during the Middle Pleistocene. A lack of production debitage indicates that the bifaces were for the most part not made at the places where they were excavated at 'Ayn as-Sawda. They were resharpened and maintained there, as indicated by the recovery of several distinctive tranchet sharpening flakes. And abundant exhausted cleavers were discarded in anticipation of retooling elsewhere. The presence of Levallois technology supports the interpretation that these assemblages date to the Late Acheulian.



2. Late Acheulian bifacial cleaver from 'Ayn as-Sawda showing distinctive resharpening by detachment of tranchet flakes. Scale here and elsewhere in centimeters.

3. Edge view of a series of Late Acheulian cleavers from 'Ayn as-Sawda. The specimen shown in Figure 3 is third from the left.

While the 1997 excavations at 'Ayn as-Sawda were limited in scope, they reaffirmed the enormous potential of the al-Azraq Oasis for studies of the Acheulian industrial complex and the life ways of Middle Pleistocene hominids of eastern Jordan. Further archaeological and geological work is planned at this important locality, and it is hoped that the temporal span of the archaeological remains can be extended backward to include earlier phases of the Acheulian.

TABLE 1. Levallois elements and tools from excavated *in situ* deposits at 'Ayn as-Sawda.

	n	%
Levallois points	64	
Levallois blades	32	
Levallois flakes	41	
Subtotal	137	17.25
Sidescrapers	80	
Endscrapers	5	
Burins	7	
Borers	2	
Backed knives	2	
Naturally backed knives	5	
Notches	11	
Denticulates	9	
Diverse	20	
Subtotal	141	17.76
Bifaces	516	64.99
Total	794	100.00

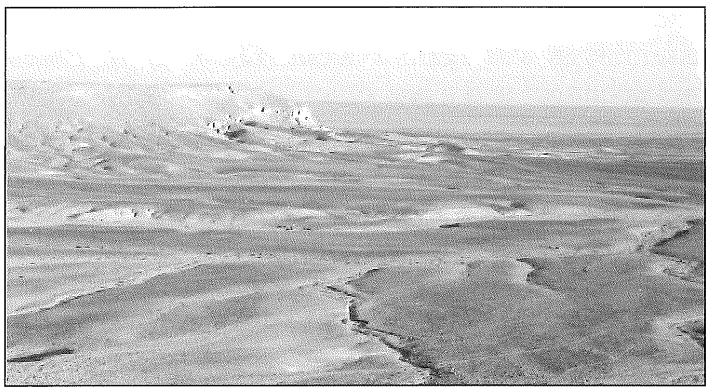
[1] Cores and non-Levallois debitage are currently being analyzed and figures are forthcoming.

Al-Jafr Basin

Al-Jafr Basin occupies a large area of the Ma'ān Plateau of southeastern Jordan. Roughly oval in configuration, it measures about 150 by 100 kilometers, and is entirely a closed drainage system. The floor of the basin is marked by Qā' al-Jafr, a mudflat of 240 square kilometers. The Qā' is the most recent small remnant of the immense Pleistocene Lake al-Jafr, which at times was one of the largest pluvial lakes in Southwest Asia (Huckriede and Wiesemann 1968). Escarpments 50 to 70 meters high delineate the northern and eastern margins of the basin. The geologic section exposed in these escarpments consists of Paleocene marls overlain by Eocene limestones containing abundant deposits of nodular flint (Kherfan 1987). This flint was used for tool production throughout all known periods of the prehistory of the region (Wilke *et al.* n.d.). The entire area is now hyperarid, receiving less than 50 millimeters of precipitation annually. Except on the floors of wadis, the basin is almost devoid of vegetation (Al-Eisawi 1996). This appearance, however, belies the fact that during much of the Pleistocene the region was well watered, and its immense lake was surrounded by a savannah with a fauna whose affinities would have been to the African realm.

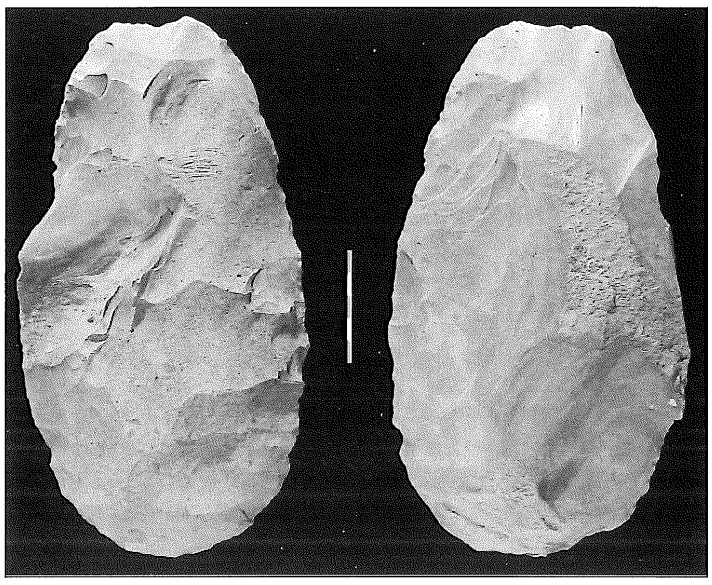
Prior to our work, which began in earnest in 1997, the basin had received only cursory attention by archaeologists. Our research has emphasized survey and reconnaissance, and has attempted to establish the broad outlines of the prehistory of the region and the relationships between ancient landforms and archaeological remains (Quintero and Wilke 1998; Quintero *et al.* 2002). A major effort has been made to locate and study sites relating to the Pleistocene human occupation of the basin, and to search for ancient sites with buried deposits.

A cluster of Acheulian sites was found along the northern edge of the basin at a locality we named Ayūn al-Qadīm (Ancient Springs; Quintero *et al.* 2004). The main topographical feature is a steep-sided box canyon cut by spring discharge into the bordering escarpment. This geomorphic structure is about a kilometer long and somewhat less wide at its mouth, tapering as it enters the headland (FIG. 4). On the floor of this box canyon is site J-83, which consisted of a large scatter of Late Acheulian bifaces and a few other artifacts. The scatter extended over a linear distance of some 800 meters on the Pleistocene terraces flanking the main drainage. Several localized clusters of bifaces appear to represent ancient activity areas. In 1999 and 2004 this site was carefully mapped, the surface assemblage was collected, and test excavations were carried out. These tests revealed no intact subsurface deposits. Preliminary analysis of the extensive surface assemblage supports its attribution to the Late Acheulian. Thus the assemblage at J-83 is roughly comparable in age to 'Ayn as-Sawda.



4. Entrance to the box canyon at 'Ayūn al-Qadīm. The Late Acheulian site J-83 extends along the terrace of the main wadi draining the canyon, from left to right across the middle of the picture.

Just outside the mouth of 'Ayūn al-Qadīm, and within a distance of only 2 kilometers along the escarpment, five more Acheulian sites were found. They occur on ancient terraces and low hills that stand off a few hundred meters from the escarpment. Two sites (J-25 and J-92) appear to include older components, as many of the bifaces are much larger and less refined in form than those at J-83 or at 'Ayn as-Sawda (FIG. 5). These sites were mapped and surface collected also. Test excavations at two of them suggest that all of these assem-



5. Large tranchet cleaver from site J-92.

blages are confined to the deflated desert pavement, which rests on Paleocene marls. Preliminary field identifications of artifacts collected at these sites are shown in TABLE 2.

The Acheulian assemblages recovered at 'Ayūn al-Qadīm, as at al-Azraq, are overwhelmingly dominated by formed tools. The tools, in turn, largely are bifaces, and the bifaces mostly are tranchet cleavers[2]. Tranchet resharpening flakes are well represented. At the sites just outside the box canyon of 'Ayūn al-Qadīm there also are many biface-production flakes. Critical to our study is the distribution, among all of the 'Ayūn al-Qadīm sites, of all categories of artifacts, including biface-production debitage, which will assist in the location of discrete knapping areas. When the analyses are complete, we anticipate being able to distinguish sites and/or discrete loci used primarily for living and tool-kit maintenance from those used primarily for hunting and butchering. As at al-Azraq, most of the 'Ayūn al-Qadīm assemblages also contain Levallois elements, again supporting a Late Acheulian attribution, at least for portions of these assemblages.

No subsurface deposits have yet been found at 'Ayūn al-Qadīm, and therefore there are no faunal remains to help guide interpretation of the significance of the sites discovered there. Nevertheless, data from 'Ayn as-Sawda and from C-Spring attest to the existence of an African-derived megafauna in eastern Jordan during the Late Acheulian. The cul-de-sac configuration of 'Ayūn al-Qadīm and the occurrence of substantial cleaver assemblages along its main drainage suggest to us that the landform served as a natural trap for ambushing large animals that came there for water. The walls of the canyon are quite precipitous. If animals such as elephants were cornered and attacked there, they would have been unable to gain the headland to

TABLE 2. Lower Paleolithic debitage and tools, including Levallois material, in al-Jafr sites.

Site	J-25		J-83		J-92		J-136		J-138		J-140		Total	
Cores	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Non-Levallois	61	46.92	2	22.22	6	46.15	5	71.43	3	27.27	57	47.90	134	46.37
Levallois point	11	8.46	1	11.11	2	15.38	0	0.00	1	9.09	5	4.20	20	6.92
Levallois blade	24	18.46	3	33.33	0	0.00	1	14.29	4	36.36	27	22.69	59	20.42
Levallois flake	34	26.15	3	33.33	5	38.46	1	14.29	3	27.27	30	25.21	76	26.30
Subtotal	130	100.00	9	100.00	13	100.00	7	100.00	11	100.00	119	100.00	289	100.01
Levallois cores		53.08		77.78		53.85		28.57		72.73		52.10		53.63
Debitage														
Unclass. flakes	48	13.87	1	25.00	3	30.00	4	28.57	3	25.00	31	32.63	90	18.71
Biface prod. flakes	271	78.32	3	75.00	5	50.00	8	57.14	7	58.33	45	47.37	339	70.48
Tranchet flakes	4	1.16	0	0.00	0	0.00	1	7.14	2	16.67	8	8.42	15	3.12
Levallois points	6	1.73	0	0.00	0	0.00	0	0.00	0	0.00	4	4.21	10	2.08
Levallois blades	7	2.02	0	0.00	0	0.00	1	7.14	0	0.00	2	2.11	10	2.08
Levallois flakes	10	2.89	0	0.00	2	20.00	0	0.00	0	0.00	5	5.26	17	3.53
Subtotal	346	100.00	4	100.00	10	100.00	14	100.00	12	100.00	95	100.00	481	100.00
Levallois debitage		6.65		0.00		20.00		7.14		0.00		11.58		7.69
Tools														
Scrapers	2	0.23	0	0.00	0	0.00	0	0.00	0	0.00	3	0.32	5	0.25
Bifaces & bif. blanks	408	46.15	287	95.67	77	77.00	25	54.35	39	62.90	732	77.05	1568	67.07
	884		300		100		46		62		950		2338	
Levallois material		10.41		2.3		9.00		6.52		12.90		7.68		8.21

Note: figures given here include fragmentary specimens. artifact counts for site j-140 reflect fieldwork in progress; total may exceed 1,000.

[2] No 'African flake cleavers' of the kind found at Gesher Benot Ya'aqov (Goren-Inbar and Saragusti 1996) have been found.

escape. While the means of killing such animals are not identified in the assemblages at 'Ayūn al-Qadīm, the cleavers used for butchering are abundantly represented.

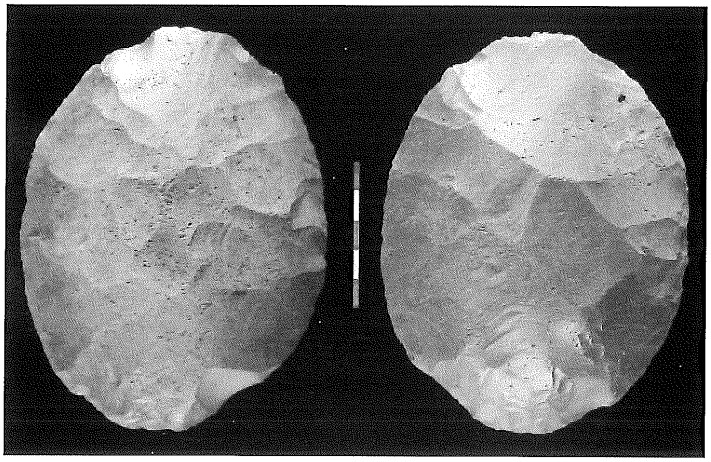
The Acheulian Assemblages

The most striking and distinctive feature of all the assemblages from both the al-Azraq and al-Jafr basins is the abundance and dominance among the formed artifacts of bifacial, tranchet cleavers, which have long been accepted as butchering tools (Jones 1980; Keeley 1980; Ashton and McNabb 1993; Schick and Toth 1993: 260). This situation contrasts sharply with that of most other known Acheulian sites in the western Levant, as at Tabun Cave, for example (Jelinek *et al.* 1973). There, a greater diversity of formed tools points to a broader range of industrial activities, perhaps in a living space where a variety of tasks were carried out, as opposed to a more specialized activity area dominated by hunting and butchering.

The distinctive presence of tranchet cleavers in Acheulian assemblages at al-Azraq Oasis was clearly recognized in Copeland and Hours' *The Hammer on the Rock* (1989). But the *overwhelming presence* of cleavers in Late Acheulian assemblages in eastern Jordan was not realized until analysis of the bifaces from the 1997 excavations and surface collections at 'Ayn as-Sawda was completed. Our detailed study of over 1,000 classifiable bifaces revealed a diagnostic set of technological attributes that together define the use-life history of the Acheulian bifacial cleaver (Quintero and Wilke 1997; Quintero *et al.* 2000, 2001, 2004). These attributes permit classification of Late Acheulian bifaces as tranchet cleavers even after many resharpenings, much consequent reworking of the tool margins, and gross alteration of the form of the original tool. The work has enabled classification of cleavers into approximate use-life stages, from selection of the tool blank, to initial tool production, through various stages of resharpening, to exhaustion and ultimate discard, all with attendant changes in tool form.

Briefly, our analysis revealed the following patterns. Late Acheulian bifaces encompass two major classes of butchering tools, those used for cutting (cleavers), and those used for piercing. The latter (i.e., ficrons, micoqians) constitute a very small percentage in the eastern Jordan assemblages and are not considered here. It is our firm conviction that the other class of bifaces, whether recognizable as cleavers or not, was used primarily for butchering large game animals. When initially made, Late Acheulian bifacial cleavers were formed with a basal grip area, an expendable midsection, and a distal cutting edge. The grip was intentionally configured for ease of holding, with mass retained to facilitate heavy-duty butchering tasks. Gripping the cleaver was facilitated by retention when possible of cortex, presence of *meplats*, steep unifacial flaking, and intentional dulling of edges. The cutting edge was conceived initially to accommodate multiple resharpenings. In most cases this edge, or bit, was created wide with ample length and width for repeated rejuvenations. These attributes are clearly shown in FIGS. 2 and 5. With use and resharpening, the bit usually became both narrower and shorter; finally it was resharpened down to the grip and its use-life ended (FIG. 6). The tranchet technique generally was used whenever possible to create and restore a sharp cutting edge, but bifacial thinning was also used.

Our analysis recognizes stages of production, and rejuvenation processes that vary depending on the configuration of the raw material and reduction events. In essence, the traditionally recognized handaxe forms or "types" (e.g., ovate, cordiform, amygdaloid, etc.) reflect stages in the use-life history of individual cleavers[3]. Ours is a pragmatic analysis of tools, technologically and behaviorally



6. Small cleaver from site J-140. The tool is completely exhausted.

[3] This analysis was initially presented at the 1997 annual meetings of the American Schools of Oriental Research in Napa, California (Quintero and Wilke 1997). A detailed presentation of the data is expected in 2005.

conceived. We perceive the form of an Acheulian biface recovered from an archaeological deposit to be more the result of its use-life history than of its original design. But more importantly, we see its conception, design, and creation as irrefutable proof of the extraordinary mental acuity of *Homo erectus*. The conceptualization of the tool and its longevity and use-life transformations were in the mind of the maker from the beginning of the process, when the raw material was selected.

Thus analyzed, among classifiable specimens, the frequency of cleavers in the biface assemblage from both excavated and surface contexts at 'Ayn as-Sawda is over 90 percent[4]. Our analysis of the various site assemblages from 'Ayūn al-Qadīm in the al-Jafr Basin (in progress at this writing) suggests that the results will be comparable.

The main clear difference we already note between the two study areas is that the bifaces in the al-Jafr assemblages are on average somewhat larger than those from 'Ayn as-Sawda. And many of the bifaces from sites J-25 and J-92 are much larger. We recognize that early-stage biface production could present an appearance of both irregularity of form and of larger size than would be evident in completed bifaces that were heavily used and resharpened. At the same time, such differences are also seen as chronological markers. We anticipate resolution of this issue as our analysis progresses. If the relationship between size and age of Acheulian bifaces, as suggested by Gilead (1970), has merit, some of the known sites at 'Ayūn al-Qadīm are older than the assemblages unearthed at 'Ayn as-Sawda. For the present, we can only estimate their ages at somewhere between 300 and 500 thousand years. Efforts are being made to date these surface assemblages more firmly, but this task is formidable. Whatever the outcome, the very large bifaces recovered at sites J-25 and J-92 are, with just several exceptions, completed tools; they are considerably less refined and regularized in form; and they may well date to older periods of the Acheulian, perhaps deriving from the Middle Acheulian of a half-million years ago.

And there are a few isolated bifaces from the 'Ayūn al-Qadīm locality that are very large indeed, reflective of the largest specimens from the Middle Acheulian site of Latamne in Syria. They possibly point to an even older Acheulian presence in the region. But so far we have been unable to locate any substantive sites with such ancient assemblages, or with even older ones.

Middle Pleistocene Hominid Adaptations in Eastern Jordan

Taken together, the information currently available on the Late Acheulian of the al-Azraq and al-Jafr Basins of eastern Jordan points to a focus by Middle Pleistocene hominids on exploitation of megafauna. In eastern Jordan the focus clearly was on megafauna attracted to aquatic settings – especially lakeshores and associated springs and marshes. This focus gave rise to the development of a specific tool assemblage dominated by tranchet cleavers. We believe that cleavers are integral to understanding critical aspects of the lifeways of these early hominids.

The obvious fact is that tranchet cleavers are simply, and only, heavy-duty butchering tools used for cutting and chopping. They have the sharpest and most efficient cutting edge obtainable in stone. Our replicative research has shown that this working edge is quickly and readily restorable, perhaps up to ten times on a given biface. The primary context in which such a tool would seem to have been used in these spring, stream, and lakeside settings would be in the butchering of large game animals. While much remains to be learned and understood about the exact nature of this behavioral niche, at this point we believe that megafaunal hunting and butchering was a major ecological pose of Middle Pleistocene hominids in the lacustrine basins of eastern Jordan. The presence of megafaunal remains associated with lithic assemblages in which nearly all of the tools are bifaces, and nearly all of the bifaces are tranchet cleavers is strong evidence. And certainly the discovery of self-tipped wooden spears at Shöningen, Germany, dating to nearly 400 thousand years ago (Thieme 1997), puts the hunting of large herbivores fully within the hominid technological grasp at the right time to shed light on the lifeway indicated by the Late Acheulian of eastern Jordan.

The patterns interpreted here are not limited to the lake basins of eastern Jordan. Already alluded to is Nadaouiyeh I Aïn Askar in the al-Kowm Basin

[4] A traditional analysis of the same material from 'Ayn as-Sawda, employing biface types defined by Bordes (1981), still revealed the presence of over 60 percent cleavers.

of Syria where preliminary reports of its Acheulian ecord depict a bifacial tranchet cleaver assemblage imilar to that at 'Ayn as-Sawda. We suggest that in aggressive search should be made for Acheulian sites in other lake basins and ancient oasis settings of the eastern Levant. To date, only Middle Paleolithic remains have been found in the al-Mulawwara Basin on the Saudi Arabian border southvest of the al-Jafr Basin (Abed *et al.* 2000) and in he al-Ḥasā lake basin to the east of Wādī al-Ḥasā Clark *et al.* 1988). However, numerous unstudied Pleistocene lake basins exist in eastern Jordan. And the above-mentioned Wādī as-Sarḥān Depression extending southeastward from al-Azraq deep nto Saudi Arabia hosted the immense pluvial Lake Hazawza. While largely unstudied, a few Acheulian localities were recently discovered on the edge of this depression (Whalen and Kolly 2001). And here are many lesser basins farther north across ordan (especially in the panhandle) into Syria, nd south into Saudi Arabia that in the Pleistocene osted lacustrine environments that may contain ecords of relevance. In all of these diverse regions, here are bound to be sites with buried deposits and aunal remains, as at 'Ayn as-Sawda, that can enich our reconstruction of hominid lifeways during he Middle Pleistocene of the eastern Levant.

mplications For The Acheulian Elsewhere

Our emerging interpretation of the known Acheulian of eastern Jordan lake basins has emphasized a ominid subsistence niche focused on the hunting nd butchering of large herbivores. This interpreation is suggested by the dominance of tranchet leavers in the bifacial tool assemblages at 'Ayn as-Sawda and 'Ayūn al-Qadīm sites. These tranchet leavers are essentially identical to those at Boxgrove in England (Roberts and Parfitt 1999) and at umerous sites elsewhere, and the very widespread attern of their adaptive utility across continents or hundreds of thousands of years is now clearly vident.

It is now apparent that scholars of the Acheulian n general have failed to appreciate the overwhelmng dominance and the behavioral significance of ranchet cleavers in Acheulian biface assemblages. We think the tendency has been to focus too much ttention on bifaces as morphological, but largely tatic, entities as described by Bordes (1981) and thers, so that tranchet cleavers generally have not been recognized when they are heavily resharpened, reworked, and exhausted. It is in this exhausted and analytically challenging condition that these artifacts usually would have entered the archaeological record. As a consequence, Acheulian bifaces have more often than not been classified simply as one or another form of 'handaxe' of undetermined (and, we believe, often unappreciated) function and significance. Instead, most of them should be viewed as cleavers, butchering tools whose forms changed constantly from use and resharpening.

A fresh look at the known Acheulian assemblages in the Levant and the regions flanking it clearly is in order. Such studies should be made with an eye to identifying the initial production forms of the generally heavily reworked and altered bifacial tools these assemblages contain. Emphasis should be given to raw materials from which Acheulian bifaces were made, and to the consequent formal tool trajectories these materials were likely to predetermine. Surely, the distinctive configuration of 'African' or 'African-related' handaxe assemblages with cleavers made on large flakes of extrusive volcanic rock, as at Gesher Benot Ya'aqov (Goren-Inbar and Saragusti 1996), is constrained and predetermined by the raw material character and configuration, as well as by its availability. Likewise, flints (especially the conveniently shaped, flat nodular ones) and related microcrystalline rocks would have enabled the production of efficient, repeatedly resharpenable, tranchet cleavers, as seen both in the eastern Levant and at far-away localities such as Boxgrove. Both of these general cleaver forms may have typified Acheulian assemblages in different regions, but the option to produce one form, or the other, is likely to have depended largely on the raw material available. More importantly, the utility of the cleaver in day-to-day situations must have been critical to hominid survival, and may have had profound evolutionary consequences for *Homo erectus* in its ongoing successful colonization of the lands beyond Africa.

Broadening The Concept of The Levantine Corridor

We suggest that there is a need to broaden perceptions of the Levantine Corridor and the important hominid adaptations and developments that occurred there during the Middle Pleistocene. This broadening should be a geographic one to include new interpretations of Pleistocene hominid adaptations in what are now the steppe/desert zones of the

eastern Levant, especially in ancient lacustrine environments. It should be a strongly behavioral and evolutionary one that incorporates heretofore unrealized interpretations of hominid ecological niches that lie hidden in the lithic clutter of Acheulian industries. It should view these industries as similar or different only after all raw material constraints and likely behavioral contexts have been thoroughly considered and accommodated. It should include very careful analyses to determine if the assemblage character seen in the eastern Jordan lake basins typifies assemblages elsewhere in the Levantine Corridor. It should focus afresh on the basic subsistence actions that our hominid ancestors are likely to have carried out on a daily basis in the ecological niche they had come to ever-more-efficiently occupy. Finally, it should seek new ways to extract information on how these early people must have cooperated to organize, provision, and defend themselves in this critical corridor between continents.

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