Acheulian Large Flake Industries: Technology, Chronology and Significance

Gonen Sharon

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This book on Acheulean technology by Gonen Sharon represents his doctoral research and is divided into six main chapters, followed by Appendix A (site descriptions) and Appendix B (analytical attribute lists). This is a welcome study since such books elaborating on the comparative technological and behavioral attributes of the Acheulean are rare and currently an understudied subject in comparison to the Oldowan and post-Acheulean lithic industries. The study of bifaces (Acheulean and otherwise) has come a long way (e.g., Soressi and Dibble 2003) since Derek Roe's and Francois Bordes' classic work on quantitative shape studies done several decades ago. Probably for the first time, through this volume, many of the techniques are compared with each other using key sites (but certainly not the most important sites) from various parts of the world (e.g., Table 1.3 and p. 68). The chapters are also well illustrated with ample figures, tables, and graphs; most of the photographs are of high quality and images of the studied sites are a pleasure to see. Importantly, the book is a good source of global comparative information in relation to the Acheulean, and biface functions, typology, and technological interpretations by others. This study has demonstrated that there is significant geographic variance in Acheulean technology, typology, and ecological land-use patterns at a regional scale, although at varying frequencies.

Chapter One is an introduction which basically outlines the work, introduces the Acheulean, and defines *large cutting tools* (LCTs) and *large-flake based* (LFB or on flakes larger than 10 cm) Acheulean industries. Typology is an important focus of this chapter although Sharon himself (rightly) is not clear about some distinctions (e.g., specimens 'h' and 'f' on page 19). This is an opportunity to reconsider such terminology as it harks back to the problems with such terms as "chopping tool" instead of bifacial or bimarginal chopper, for example. Likewise, "pre-form" is not clearly techno-morphologically distinguished from "proto-biface" even though the latter is not a commonly used term today. From a general interpretative perspective, the use of the term 'LCT' is also too arbitrary and vague in scope because bifaces throughout the Pleistocene (principally handaxes) probably were used for many more functions than just *cutting* (especially thick pointed bifaces). Therefore, we should perhaps continue with the use of the more traditional term of *bifaces* instead of *large cutting tools*. Although he mentions general professional consensus that bifaces were probably manufactured primarily for cutting meat (p. 173), we should respect several key facts: a) our knowledge of the full range of biface functions is still far from complete; b) Acheulean sites with well-preserved faunal remains (especially with cut-marks) are rare; and, most importantly, c) Oldowan implements seem to have been perfectly suitable for butchery…so then why specifically invent symmetrical bifaces – especially when asymmetrical bifaces also were equally effective (see Machin et al. 2007)?

In Chapter Two, Sharon provides readers with a description of how the bifaces were measured and which attributes were utilized in the study. His principal method of analysis incorporates a myriad of attributes including typology, raw material variation, technological details, and associated statistical tests of significance. The methodology outlined here is a valuable source of reference for students analyzing Acheulean lithic assemblages for the first time. Some experimental knapping data (generated by Sharon and B. Madsen) also are incorporated to compare with the archaeological specimens. Flakes, flake tools and cores, and core tools are mentioned, but not given as in depth treatment as the finished bifaces are throughout the volume. More importantly, the thrust on the qualitative aspects of the study limit quantitative comparisons with assemblages studied by others. The categories of amounts of retouch and the preservation of cortex, for example, are arbitrarily organized—all giant cores in the sampled population come from Gesher Benot Yaa'qov (GBY) and are defined, simply, as being larger than 20 x 25 centimeters. In relation to overall size, it is not clear why Sharon finds "90% of all LCTs from all regions of the Acheulean distribution fall within a 100 mm length range" as being a striking feature.

Different techniques of flake (blank) removal from larger clasts are discussed and described. These include bifacial and sliced slab method from giant cores, *éclat entame* (cobble opening flake), Kombewa method, and so forth. Some chapters or sections have been given more attention than others (e.g., the Victoria West methods). It is a striking and humbling fact that we still do not know precisely *when* certain technological milestones and cognitive horizons were first reached (including at associated type-sites) within the Acheulean. For example, we have no (reliable) absolute dates for the earliest occurrence(s) of the Kombewa, Victoria West, and Tabelbala-Tachenghit techniques. Sharon also critically cautions against the use of Levallois core terminology for certain Acheulean techniques (p. 64): "To describe Victoria West or Tabelbala-Tachenghit cores as nothing more than Levallois cores would result in the loss of many significant details." The discussion on the Kombewa

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method is interesting, but the analyses and the associated experimental work do not clearly reveal why this method is more common at some sites (e.g., GBY) over others. I completely agree with Sharon that cleavers have not received their due compared to handaxes, and it is a pleasure to see various sections on cleavers in this volume. Describing and illustrating some of these techniques in detail and depicting archaeological examples from well-known sites (including key type-sites) is extremely useful and necessary to appreciate both similarities and differences between them.

In Chapter 3, striking platform and morphological variance (plain vs. prepared, and cortical) also are compared between techniques/methods (e.g. Victoria West, Tabelbala-Tachenghit), highlighting this volume as a good example of an increasing emphasis on technology rather than typology and descriptive analyses. Although there is no classic 'flint' in India, certain fine-grained raw materials from this region have been lumped into this category for the sake of convenience. Is the efficiency of Acheulean giant core technology similar to Levallois cores (proportionately and technologically)? From a volumetric or mass perspective, the experimental giant cores produced more blanks and debitage for a range of bifaces and other tools. It is illuminating that even within a small region yielding the same raw material (e.g., basalt), the quality varies significantly (e.g., GBY). An important observation is made that even when fine-grained raw material was easily available, LFB Acheulean tool-makers preferred coarse-grained raw materials for biface manufacture. This trend may be related to functional efficiency (as opposed to the flaking quality) where coarse-grained raw materials were more resilient for specific heavy-duty tasks, compared with fine-grained or siliceous materials. The shape or morphology of the initial raw material blanks also must have been a major factor in their selectivity for specific tool manufacture. Sharon's study also demonstrates there is no significant correlation between raw material type and striking platform type and Figures 64–65 (p. 81) further reinforce that cleavers were mostly made on flakes, while handaxes were mostly made on cores (chunks) or flake cores (though flakes were often used for handaxe production as well).

Chapter Four focuses on the shaping of bifaces or Acheulean LCTs and compares the different assemblages in the study. Sharon critically explains why Tabun Cave handaxes cannot be (and should not be) easily compared with other classic Acheulean assemblages. This site is the only exceptional case where small handaxes were produced despite the large size of the raw material available to those hominin groups. The presence of dimunitive handaxes (i.e., <10 cm) does not automatically preclude an earlier Acheulean designation, Sharon rightly stresses. Unfortunately, changing trends in technology and raw material preference/exploitation strategies are not discussed from a chronological perspective; the main reason being the lack of absolute dates for many of the studied assemblages.[1] Edge-to-perimeter ratio values is an important issue to address but the site-wise distribution of handaxe edge location does not reveal a clear or consistent geographic pattern of variation. On the other hand, an explanation for the comparative abundance of certain traits (e.g. 'rough, large, thick tools, low flake scar counts') at such sites as Isimila K19, STIC Quarry, and Doornlaagte is that they may represent workshop sites where finished tools were removed. Sharon posits that this explanation is supported by the almost exclusive presence of 'unused large flake blanks, rejects, pre-forms and technological failures, and large bifacial thinning flakes'. While Sharon is correct when observing the (known) fact that tools were sometimes brought in as pre-forms (from the quarry) and then thinned and shaped away from the raw material source, one of his broad observations of the Indian Acheulean requires corroboration through further research. Because of 'workshop characteristics' for handaxe manufacture (specimens found in various stages of manufacture, especially early stages), but where (finished) cleavers are of 'high quality', he states (p. 129): "We may be looking at a cultural phenomenon, in which the handaxes of the Indian Acheulian were less carefully made. Cleavers, on the other hand, seem to be very well evolved and their technology is developed." Before such broad observations can be accurately confirmed, however, the Indian Acheulean data requires a better chronological framework than is currently available, as well as better stratigraphic control of the known biface assemblages.

For comparative reference purposes, the most useful chapter (visually speaking) is probably Chapter Four, which has a large number of box-and-whisker plots, as well as numerous bar graphs for all the studied sites. Some figures, such as Figure 18, illustrate the processing sequences of certain biface specimens and include photos of archaeological specimens. Other illustrations may be somewhat superfluous such as Figure 17 which compares a cleaver (with slice morphology) with a wedge of cheese. Some of the flake detachment techniques discussed in this study (both archaeological and experimental) crucially reiterate or emphasize two important points: 1) that prepared core technologies were a complex phenomenon and varied collectively from technological, sociological, cognitive, communicative, cultural and possibly even functional perspectives; and, 2) that the Levallois method (*sensu stricto*) needs to be separated from *other* distinct prepared core technologies within the Acheulean, *in spite* of geographic and phylogenetic overlap. There appears to have been more 'compromise' in the blow direction for handaxes compared to cleavers, because the latter required intact working edges compared to the former, which could be more worked at a later stage.

Chapter Five deals with a long-known preoccupation of Paleolithic archaeologists—interpreting the shape of Acheulean bifaces or LCTs. For extracting patterns in plan-form shape of bifaces, Sharon resorts to visual typology and eyeball symmetry. Sharon starts the chapter with a brief review of the typological approaches used by others thus far and the definition and benefits of typology. The main tenets and methods established by F. Bordes (ratios of metrical measurements), M. Kleindienst (type shape diagrams), and D. Roe (metrics and measurements through scatter-

grams) are briefly mentioned and how recent archaeologists criticize some of these approaches (particularly that of Bordes). Sharon observes that: 1) almost all handaxes in the study sample are tear-drop shaped; 2) there are almost no pointed, square or straight butts (most are round); and, 3) despite the known range of handaxe types, the shape variability *within* assemblages seem to have been limited. Overall, four broad shape categories (with variations therein) are proposed (Figure 116, p. 138), but unique types such as the British 'twisted' handaxes are not discussed separately. Reasons for unconventional biface shapes include aesthetics, compromises, mistakes for function's sake, raw material type, blanks shape, and so forth. While there is a four-point summary for handaxe shape, none is provided for cleaver shape. It is also noteworthy that some handaxe types are absent from the samples (but not in other assemblages) such as triangles, ovals, and cleaver-edged shapes. In relation to the last type, Sharon is critical of P.R. Jones for not including cleavers and cleaver-edged handaxes and for restricting analyses to handaxes with 360° cutting-edges (p. 138). Sharon also recognizes *ficrons* from Isimila K6 as the only example of a handaxe 'type,' while most other handaxes are dominated by the tear-drop shape (p. 141). He also rejects knives as a formal tool type within LFB Acheulean assemblages.

Chapter Six represents the discussions and conclusions of the work and here, Sharon discusses such key topics as geographical and chronological definition of the LFB Acheulean, the relevance of cleavers, key technological aspects, and biface size and shape. He also visually describes the geographic distinctions (Figure 142 on p. 165) between LFB and non-LFB Acheulean industries, some of which may be indirectly related to the 'Roe Line'. He notes, interestingly, that there appears to have been a shift from non-LFB industries to LFB industries at ~800 ka and then back to non-LFB or cleaver-less at ~500 ka. In some regions, including the Levant at 500 ka, cleavers may have been largely substituted by broad-tipped ovate handaxes (see p. 153). However, this is a problematic interpretation because almost all cleavers have a convenient butt for grasping (like an axe-head), whereas ovate handaxes generally have a 360° working-edge, thus making it difficult to grasp for similar heavy-duty 'cleaving.' In addition, other regions, such as India, have cleavers that were produced along with broad-tipped handaxes at ~500 ka and later, and this needs to be explained. Such broad observations regarding the true regional substitution of cleavers (if any) require further support through systematic comparisons of more *comprehensive* datasets using published reports and other available databases. The same applies to the casual statement that biface size probably did not relatively change over time (p. 107). In concluding this chapter, Sharon acknowledges the broad regional developments in relation to the second Acheulean dispersal from Africa (distinguished from the earlier "Ubeidiya-like" Acheulean), but also respects current limitations in our knowledge (p. 174): "Our archaeological resolution, both in chronology and in excavated site density, does not even permit a guess as to whether these changes were the result of different waves of "Out of Africa" migrations or local regional developments."[2] He also highlights cultural conservatism and similar functional needs to explain the broad morphological similarity shared by global Acheulean assemblages and mentions their rather rapid global replacement by the subsequent Levallois Mousterian tradition.

The scope in this volume is limited primarily to handaxes and cleavers; other key Acheulean elements such as bifacial scrapers are not addressed. The research is generally restricted to large flake blanks, while core-based blanks are not adequately discussed. Therefore, it remains unclear whether there were specific cognitive and technological differences between the two types. Tryon and Potts (in press) have clearly demonstrated the relevance and value of also analyzing both cores *and* flakes to better understand Acheulean technology and, specifically, reduction sequences. My main criticism with this book, however, is that Sharon has relied heavily on pre-biased collections curated at select museums; although such an ambitious endeavor was probably limited by both time and available funding. The data from the Levant and GBY is more comprehensively utilized only because of Sharon's direct involvement in the excavations of that site and access to those collections. A large number of sites and biface assemblages remain to be included in such a study—surprisingly some of the most important East African assemblages are not used. The inadequate number of specimens from some of the studied localities (e.g., only five handaxes from Yediapur, India) and the lack of large flakes in over half of the sampled population may have affected some of the general interpretations and the author's perceptions of *those* specific data.

By formally including published data for key sites and regions (e.g., Olduvai, Boxgrove, Middle Awash, 'Ubeidiya; although key examples have been included in the text) instead of solely relying on select sites (GBY) and biased museum collections, the author's conclusions and broader perceptions could have been considerably strengthened. Indeed readers may wonder if some of Sharon's general observations and conclusions also can be surmised from comparing *only* published data from well-excavated and well-studied sites. Therefore, some of the interpretations and conclusions that Sharon makes should be viewed as provisional until a more comprehensive dataset is comparatively analyzed. Other minor criticisms include: 1) specific major problems and research questions could have been outlined or listed at the end of the last chapter; 2) the lack of an index makes it difficult for readers to find specific information or conclusions in the text; 3) perhaps more sophisticated quantitative applications could have been used in addition to the qualitative study, to provide more robust and novel perspectives; 4) metric data is given for some select assemblages but comprehensive metrical data for *all studied* specimens would have been useful and ideal to include so that other researchers could utilize or process that data using other analytical methods (e.g., Marshall et al.'s 2003 online database of Acheulean handaxes); and, 5) several key citations are missing in the text. It would have

been useful to include ages in Table A1 (p. 175) for sites that have been dated. There are the inevitable typographical errors but otherwise, the book is well edited. That being said, the fact that sites from *under-studied* regions, such as India, were included is important and scientifically more comprehensive when it comes to relevant global comparisons. Additionally, some interesting patterns emerge in the study, such as the preference for end-struck flake cleavers at Ternifine (Algeria) and a side-struck blow direction at Chirki (India).

Despite some of the aforementioned criticisms, it is hoped that this important work by Sharon will stimulate further large-scale comparative studies on the Acheulean and related technologies, a phenomenon still inadequately understood within our discipline. The greatest benefit this volume will have is as a first comparative reference volume for key technological attributes of various Acheulean sites. Still, very fundamental basics of Acheulean studies remain un-established, including globally-applicable typological classification, the spelling of the term itself (*Acheulean* vs. *Acheulian*: see J. Riel-Salvatore's online blog on this issue: http://averyremoteperiodindeed.blogspot.com/2007_11_01_archive.html), metrical measurement methods, properly understanding the functions and dispersals of Acheulean technology, and the patterns of biface distribution within and outside the Acheulean domain (e.g. the Movius Line). In fact, the very *first* question we need to ask ourselves today before we can even begin to compare Paleolithic biface assemblages at such a global scale is: *Which assemblages are clearly Acheulean and which are simply Acheulean-like*? For example, even within the geographic domain of the 'classic' Acheulean, there may have been multiple innovations of such technology during the Pleistocene (whether short-lived or not) instead of only a single tradition (see Lycett and Gowlett 2008) being continuously transmitted between contemporaneous hominin groups and over generations. Other important issues include a) the impact of raw material type/quality on biface morphology, size, symmetry, typology, and function; b) resolving the precise ages of key Acheulean sites; c) understanding precisely the various functions of bifaces and changes (if any) in prey choice compared with the Oldowan; d) clearly distinguishing between reduction intensity and initial shape preference at key sites; e) increased multidisciplinary excavations in under-represented regions; and, f) more focused work on the appearance of the Acheulean and its subsequent transitions. There is clearly more to the Acheulean world than that which meets the eyes.

ENDNOTES

1. Although Sharon correctly states that no absolute dates are currently available for Chirki, G. Corvinus assigned it to the Middle Pleistocene based on typo-technological grounds and the presence of *Bos*; and, Th-U ages place it older than 350 Ka (see Pappu, 2001).
2. The key paper by Bar-Yosef and Belfer-Cohen (2001) was not cited regarding multiple Acheulean dispersals from Africa and particularly the dispersal of cleaver technology (see also Lycett and von Cramon-Taubadel, 2008).

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