Recent Research Into the Stone Age of Northeastern Africa
Studies in African Archaeology 7
Poznań Archaeological Museum 2000

Laurel Phillipson

A functional consideration of Gudit scrapers from Aksum

Introduction

Gudit scrapers are highly standardized stone tools found in Aksumite contexts at sites in Aksum, Ethiopia and its near vicinity. Their uniformity and asymmetry provoke a question which might well be asked of all stone tools: for what were they used? Evidence presented here, including their circumscribed spatial and perhaps temporal distribution, indicates their use only in limited contexts which, to judge from their abundance, must have been of considerable economic importance.

The scrapers are found at a major site, Mai Ayne, in the plain west of Aksum, which it is hoped will be the subject of future investigation, in small quantities in excavated Aksumite residential areas within and near the modern town of Aksum, in the top levels of Gobedra Rockshelter, and at a site or sites investigated under the direction of Rudolfo Fattovich and Kathryn Bard at Beta Giyorgis Hill, overlooking Aksum. Their most abundant occurrence is on the surface of a small portion of the Gudit Stelae Field, west of Aksum town (Fig. 1).

In 1996 in an attempt to protect the stelae field, Ethiopian authorities enclosed it within a permanent fence, with a main entrance to the road opposite the site of Dungur, a much visited Aksumite building complex. This has had the unfortunate effect of ensuring that visitors to the stelae walk across the locus of the scrapers' densest distribution, which lies within and very near the entrance to the stelae field. As it was apparent that under these conditions their main occurrence could not long endure, collections of the scrapers and their few associated lithic artefacts were made in November and December 1966 and are here reported.

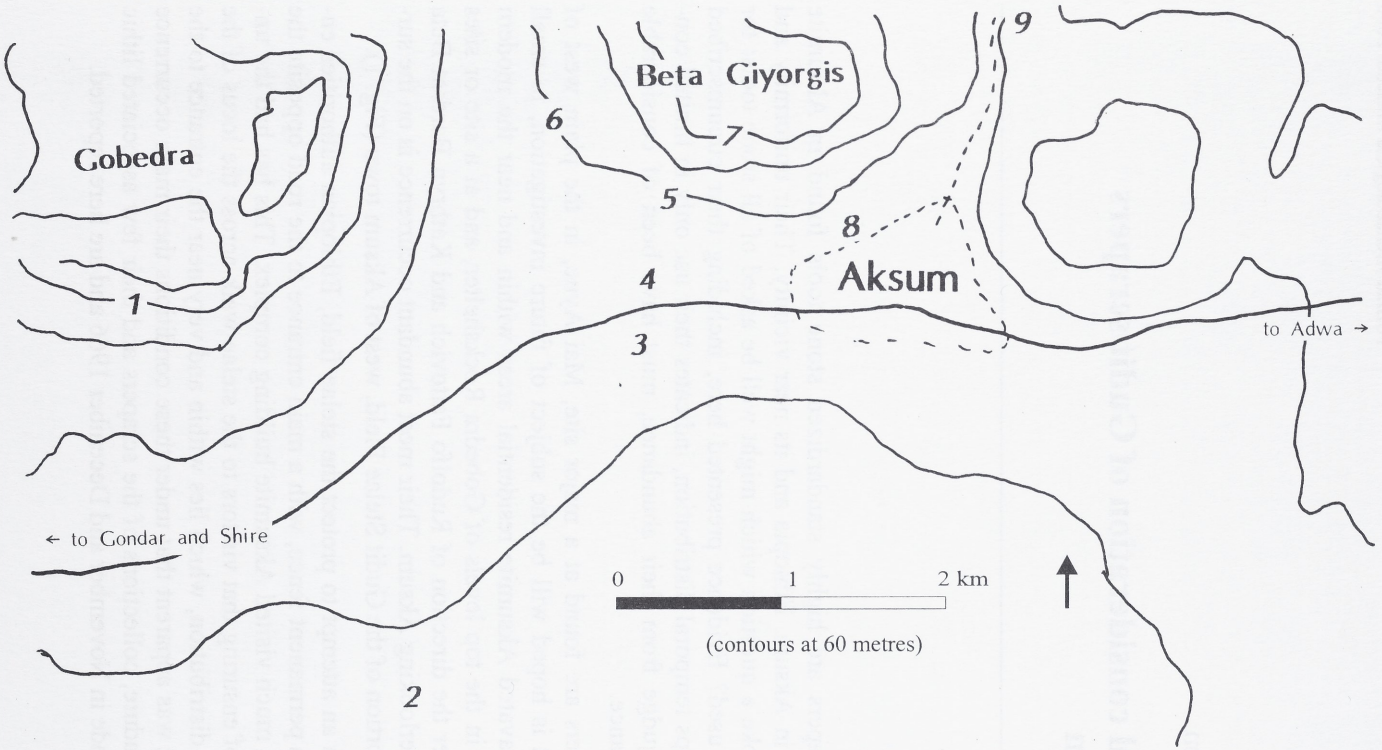


Fig. 1.
Location of sites mentioned in the text: 1, Gobedra Rockshelter; 2, Mai Ayne; 3, Gudit Stelae Field, surface collections A and E; 4, Dungur; 5, site of surface collection B; 6, findspot of chert block; 7, site(s) on Beta Giyorgis; 8, Kiros excavation site; 9, Domestic excavation site.

Fig. 2.
Surface collection A: scrapers. Dotted lines indicate extent of retouch/utilization scars.

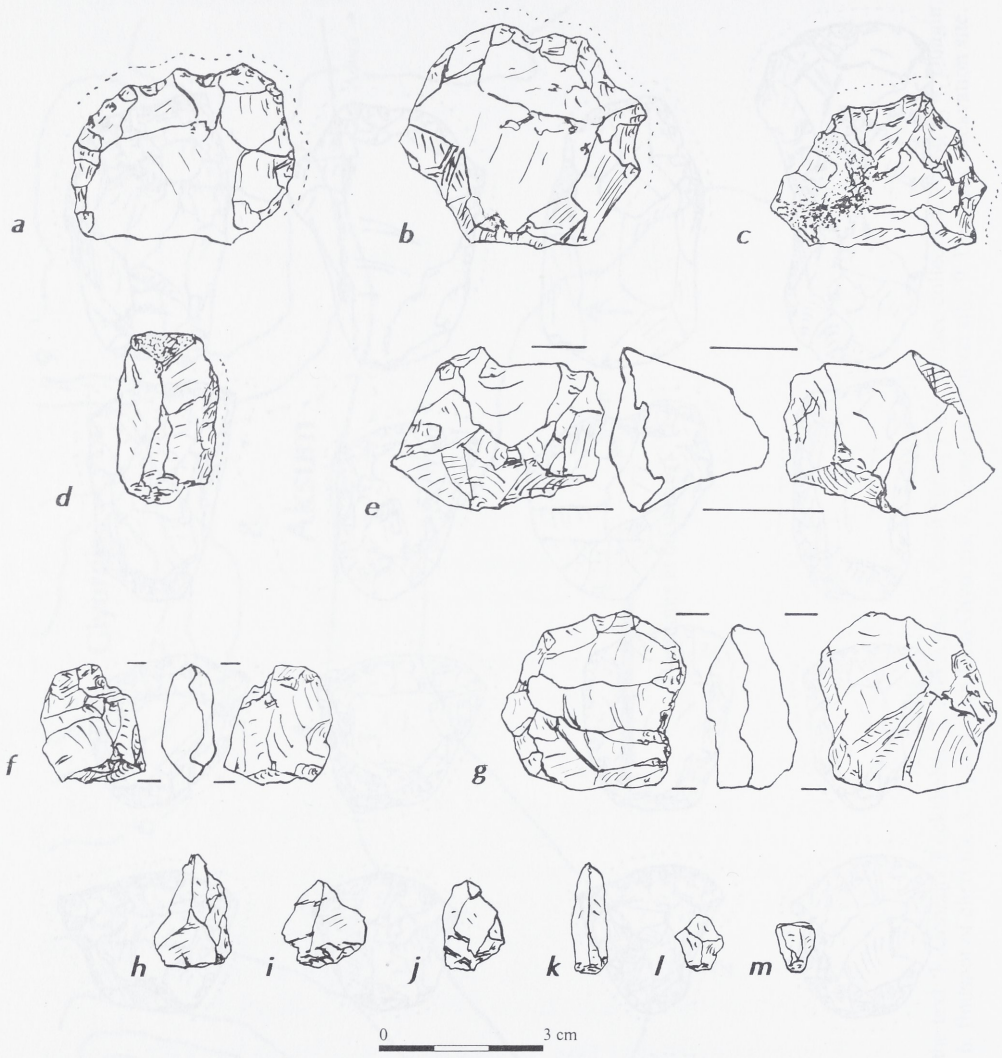


Fig. 3.
Surface collection A: a - c, denticulate scrapers; d, sidescraper; e - g, cores; h - m, resharpening/trimming flakes.

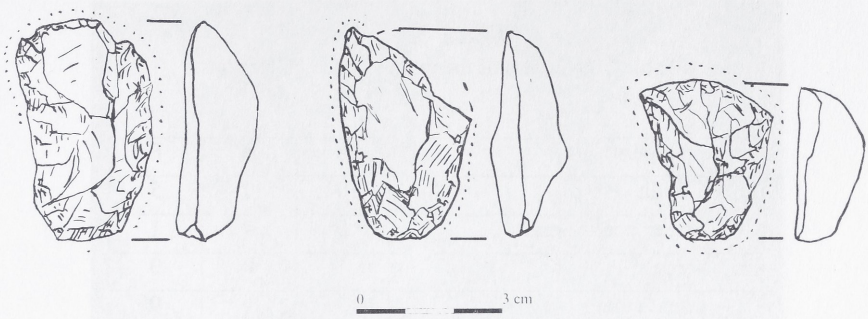


Fig. 4. Gudit Stelae Field surface finds: scrapers with narrowed butts.

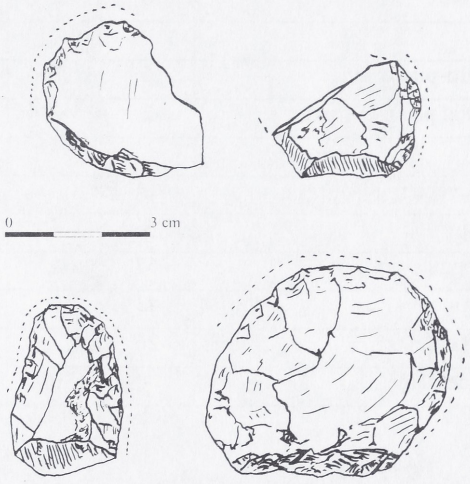


Fig. 5. Surface collection B: scrapers.

Fig. 6. Chert block, presumed import for scraper production.

Table 1. Synopsis of the main surface collections.

Flake scrapers	A	B	E
Gudit	104	0	5
steep convex end	0	1	1
side	1	0	0
denticulate	3	1	0
notched	0	1	0
convex	0	1	0
Cores			
multi-platform	6	9	0
radial plano-convex	2	3	0
Flakes			
rejuvenating	14	-	-
endstruck	9	-	-
irregular	67	-	-
Flake fragments	43	-	-
Chips and chunks	26	-	-
unsorted debitage	-	19	69

Table 2. Sample dimensions af Gudit scrapers from surface collection A.

length mm	breadth mm	thickness mm
58	41	24
57	29	19
39	25	16
33	38	16
27	21	11
22	27	07
21	22	11

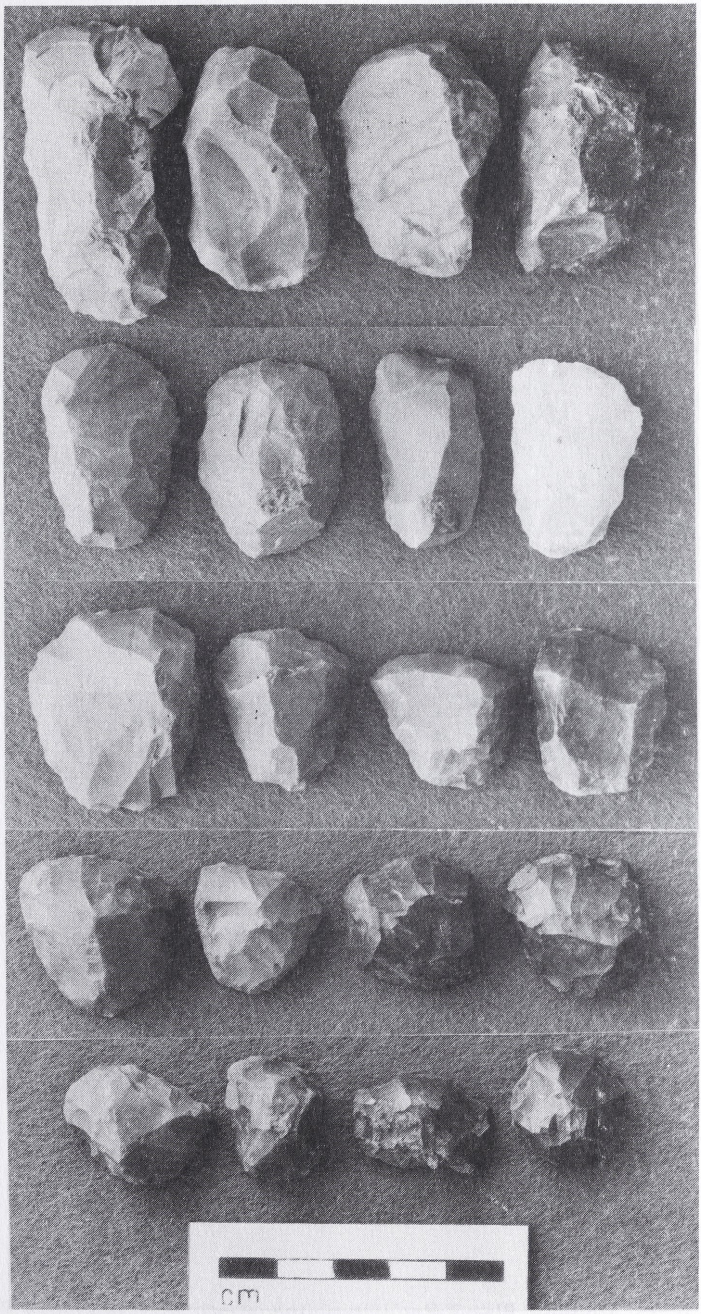
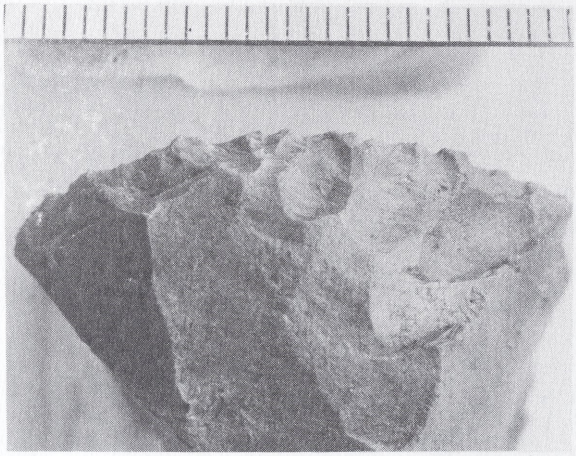
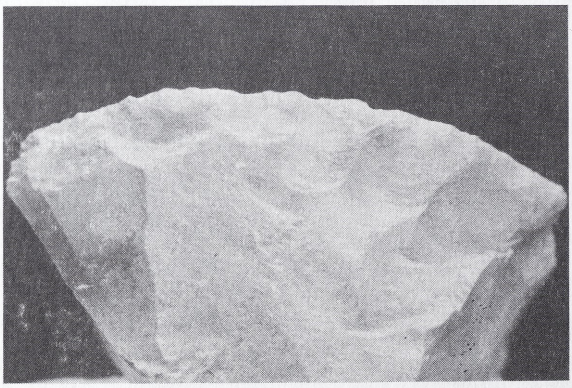


Plate 1. Gudit scrapers from surface collection A.



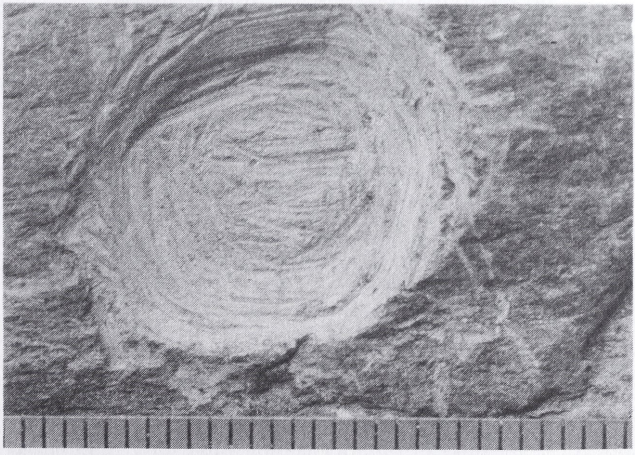
A



B

Plate 2. Replication experiments:
a, Gudit scraper after second resharpening; b, Gudit scraper after working soapstone.

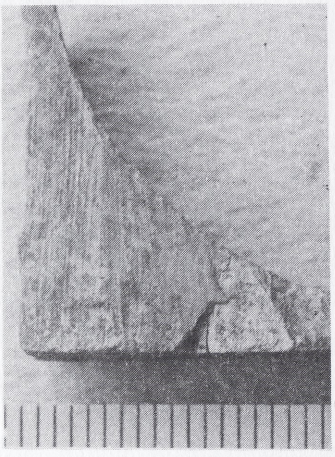
A



B

Plate 3. Replication experiments: a, tool marks on Aksumite soapstone seal; b, soapstone carved by scraper shown in plate 2.

A



B

C

Plate 4. Replication experiments: a, tool marks on reverse of an Aksumite ivory plaque; b, tool marks on Aksumite ivory turning waste; c, tools marks on eucalyptus wood shaped by scraper shown in plate 2.

Plate 5. Detail of Aksumite ivory furniture panel; V-shaped cuts retaining narrow ridges in their depths indicate the use of metal carving tools.

The collections

Two separate surface collections were made in the Gudit Stelae Field. The first of these, collection A, was over an area of 18.0 metres by 8.5 metres (153 square metres), 15 metres west of trench G3 excavated by Ayele Tarakegn in 1995 and 1996. All lithic artefacts within the designated area were collected; Aksumite pottery of several periods was noted but not collected; no other artefacts were encountered. This collection comprised 108 scrapers, 104 of which were of Gudit type, 8 cores, and 159 flakes and fragments (Plate l; Figs. 2,3).

Collection E was made over an area of 0.25 square metre adjacent to the area of collection A. This encompassed a dense distribution of minute flakes and fragments which had become exposed by several days of unseasonal rain. It comprised 68 flakes and fragments with maximum dimensions of 28 mm to just 4 mm. In addition, six scrapers were noted but not collected and not all the very smallest flake fragments were collected owing to the shortage of time available for the purpose. No other artefacts were encountered.

Elsewhere in the Gudit Stelae Field, a systematic search revealed a slight scatter of lithic material in its northern portion and rather more abundant Aksumite pottery in some parts of the site. There were no other lithic concentrations. Few cores and no implements other than steep scrapers on thick flakes were found. The only slight variant of the scrapers in collection A were three specimens of Gudit scrapers, 34 mm to 46 mm long, with slightly constricted butts, which could perhaps have been hafted for use as composite tools (Fig. 4). This surmise is only based on the fact that a slight narrowing at the butt end could have facilitated hafting.

A third collection, collection B, was made over an area of 100 square metres at the foot of Beta Giyorgis, north of the Dungur building complex site. This comprised 34 lithic artefacts, 12 of which were cores. In its greater range of scraper types as compared with the material from Gudit Stelae Field and in the presence of many cores, collection B material seems to resemble that from Mai Ayne, which will not be discussed here (Fig. 5).

Yellow chert flakes and occasional Gudit scrapers were also noted in the much disturbed spoil heaps among the Dungur ruins. These were not collected.

The artefacts

The composition of the three main surface collections is summarized in Table l. Sample dimensions of Gudit scrapers from surface collection A are given in Table 2. From these figures it may be noted that diminution in breadth and thickness of the scrapers is not proportionate to their diminution in length. Although some of the smaller scrapers have breadths equal to or slightly greater

than their lengths, sufficient dorsal scars remain to indicate that they are none-the-less endscrapers made on thick flakes of approximately triangular cross section, most of which have scars originating from a longitudinal dorsal ridge. Such flakes are often termed "core rejuvenating"; in this instance they appear to have been deliberately produced as blanks for scraper manufacture. The multi-platform and occasional radial cores in collections A and B could easily have produced such flakes.

Maximum dimensions of the cores in both collections were from 50 mm to 23 mm. They appear to have been worked by a bi-polar percussion technique to the point where they could no longer produce usable flakes. Maximum flake dimensions in collections A and E, those made within the Gudit Stelae Field, were 28 mm to 4 mm. In collection B, from the foot of Beta Giyorgis, maximum flake dimensions were much larger at 42 mm to 17 mm. Two facts may be deduced from these dimensions. First, cores tended to be fully worked and only discarded when no more usable flakes could be derived from them.

Second, the Gudit scrapers were frequently resharpened. No activity other than resharpening, most probably by pressure flaking with a narrow metal point or edge, is likely to have produced the numerous very small, shallow flakes and flake fragments found associated with the scrapers in collections A and E. The highly circumscribed distribution of the minute flakes which constitute collection E may well have resulted from a single incident of tool resharpening. The larger flakes in collection B, however, would have been by-products of the several stages of core reduction and scraper manufacture.

As defined by D. W. Phillipson in 1977, Gudit scrapers are characterized as steep, convex endscrapers with a slightly asymmetric plan shape and a rounded angle or point at one corner, usually the left when the scraper is viewed from the dorsal face with the scraper edge uppermost. That this plan shape is most characteristic of the smaller specimens, and most especially those recovered from Gudit Stelae Field, suggests that the shape is a deliberate result of the resharpening process applied to scrapers which, like the larger specimens in collections A and B, were originally produced with less distinctive convex edges.

When collection A scrapers were seriated according to their overall length, the progression from convex to typically Gudit to irregularly convex scraper edge plans was readily apparent (Fig. 2). This deliberately produced asymmetry and variable curvature of the working edge indicates that they must have been used without a haft or mounting as only direct manipulation by the thumb and fingers permits the minor adjustments of holding position which are necessary to take full advantage of the tool's subtle shape. A preponderance of acute angles on the

left corner of the scrapers probably correlates with the incidence of righthandedness among their users.

Raw material

All of the scrapers and their associated flakes and cores were made of homogeneous siliceous rocks with micro- or cryptocrystalline structure, among which chert, chalcedony and a translucent white stone were common. A distinctive, homogeneous ochre-yellow tabular chert was particularly abundant. Among the smallest flakes and fragments in collection E, 5 were of a red chert/chalcedony with yellow mottling which apparently derived from a single piece of stone, as did another 5 of brown-grey chert, 2 of olive-grey chert and 2 of dark grey chert. Thirty-nine fragments of ochre-yellow chert likewise appeared to have derived from a single source.

Tabular chert outcrops at the base of Beta Giyorgis and homogenous ochre -yellow chert is abundant to the north of this hill, about an hour's walk from Aksum. Other silicates were most likely obtained in the form of geodes eroded out from the underlying basalts and found in superficial deposits and river gravels. It was noted that a surface site with apparently Late Stone Age and/or more recent lithic material located a little more than 10 km east of Aksum had no artefacts of ochre-yellow chert, but did have some of an equally distinctive red tabular chert. Neither is yellow chert listed among the artefact materials recovered from Gobedra Rockshelter (D. W. Phillipson, personal communication).

A significant find of yellow chert as a raw material was made at a small Aksumite knoll site on the edge of the valley between the hills of Beta Giyorgis and Gobedra, about 3 km from Gudit Stelae Field. This is a triangular, wedge-shaped block of very homogeneous, fine, ochre-yellow tabular chert measuring 122 mm by 103 mm by 71 mm, with several flakes removed from a battered edge of the block (Fig. 5). The site where it was found lies along what was apparently a major communication route between a number of important Aksumite sites and settlements.

The block itself looks like something imported for the purpose of stone tool production. So far as could be ascertained visually, it was the same material as that of many of the Gudit scrapers and flakes.

Generally, the smaller Gudit scrapers tended to be made of the finer materials. This would have resulted from the less satisfactory specimens - those made of coarser or less homogeneous stone - having been resharpened less frequently and discarded sooner than the finer pieces, which were more likely to have been retained and resharpened until they became too small to use.

Replication experiments

Some information about the probable use of Gudit scrapers can be deduced from their morphology. The frequency with which they were resharpened suggests use on a tough, homogeneous, perhaps fibrous material that would tend to blunt rather than flake or chip the scraper edge. The steepness of the edge indicates a task involving a considerable degree of force applied to a resistant material, while the need for a constantly resharpened edge and the subtle, variable edge plan imply a task sometimes requiring fine or delicate work. The nearest analogue among modern tools is a set of wood-carver's gouges, which differ chiefly in that they are used with a pushing rather than a drawing motion and in that a variety or curvatures are not incorporated in a single tool. There is now abundant evidence that wood, ivory and soapstone were finely worked in Aksumite times, and it seems most probable that Gudit scrapers were used in some stages of shaping these materials.

As a partial check on this inference, a series of simple replication experiments was undertaken. A characteristically shaped, moderately fresh Gudit scraper was used first to carve soapstone for 15 minutes, then to scrape a goat long bone for 10 minutes. Working the soapstone put some wear on the scraper while making a considerable effect on the soapstone (Plate 2b). Scraping the bone was stopped when the scraper became so worn as to have no "bite" and to merely slide along the surface of the bone. Effect on the dry bone, which was harder than fresh ivory would have been, was minimal.

The scraper was then resharpened by applying heavy pressure with a narrow steel edge before being used to work a piece of dry eucalyptus timber along and across the grain. After 15 minutes the wood was well shaped and the tool noticeably blunted, but still usable. Where it had been used along the grain, the wood developed a pattern of semi-parallel striations corresponding to the minute denticulations and notches of the scraper edge (Plate 4c).

After a second resharpening (Plate 2a), the scraper was used to remove adhering bits of flesh from the still-wet hide of a recently slaughtered sheep. For this purpose the scraper was effective but not at all efficient as fibrous bits of flesh caught in and clogged the teeth of the scraper edge. These had to be removed by wiping the scraper edge clean after every 20 to 25 strokes. Furthermore, once it had become damp and slippery with use, the scraper proved to be inconveniently small to hold. This problem did not arise when dry materials were worked.

Fifteen minutes work cleaned an area of wet hide of about 400 square centimetres while producing little visible change to the scraper edge. Use of a Gudit scraper on dry hide tended to cut and scratch the skin.

At the start of these replication experiments the scraper measured 37.8 mm long, 27.1 mm broad, and 16.6 mm thick. Two resharpenings and a combined total of 45 minutes use on stone, bone, wood and hide reduced the scraper by 0.3 mm in length and 0.1 mm in breadth. The median edge angle was marginally increased to 80 degrees. These experiments demonstrated that a Gudit scraper can be used to rough-out or plane down shapes in soapstone, wood and, by inference, fresh ivory. It was ineffective on hard, dried bone and notably messy and inefficient when used on fresh hide. The pointed corner of the scraper successfully carved an approximate circle in soapstone and drilled a small dimple in wood, but a more acute edge would have been required to carve any finer detail in either material.

Examples of carved soapstone and ivory from excavated Aksumite contexts were examined for traces indicative of the tools by which they had been worked. It was found that some soapstone seals had working marks very similar indeed to these produced in the replication experiments (Plate 3a, b). Also, the reverse of a rectangular ivory plaque or gaming piece and waste scrap from a turned ivory object, both dated to the mid 6th century, have parallel striations similar to those produced by the Gudit scraper on wood and on soapstone (Plate 4a, b, c). However, the finest ivory carvings recovered from Aksum, such as the elaborate third century furniture panel, could only have been fashioned with metal blades (Plate 5).

Dating evidence

At present it is only possible to say that the manufacture and use of Gudit scrapers was contemporaneous with at least some phases of the Aksumite civilization. Presumably their presence at the Gudit Stelae Field postdates the use of that area as a place of burial, suggesting a date range relatively late in the Aksumite chronology. Sufficient specimens of these tools have been recovered from excavated deposits, particularly from the Domestic and Kiros sites, to locate them firmly within an Aksumite context.

Discussions with local informants including two carpenters and a carver of soapstone curios elicited a little recent knowledge of the use of stone tools for woodworking. Sharp unretouched syenite spalls are used to smooth plough shafts. Until recently they were also used for the rough shaping of furniture legs and broken bottle glass was used for woodworking and also for haircutting. It was mentioned that the "yellow stones" which could be collected from Gudit Stelae Field were better than glass for some purposes. Continued discussion and direct questioning elicited no knowledge of any techniques for shaping or resharpening stone tools. It was said that they were so plentiful at the Gudit site that when the ones being used became dull they were thrown away and more were

fetched. This information suggests that the incidence of flakes and scrapers was once greater than the 1.8 artefacts per square metre recovered in the area of surface collection A. The several informants had no knowledge of the use of sharp stones and broken glass except in connection with woodworking, haircutting and shaving.

Conclusions

It is now possible to construct a processual account of the manufacture and use of Gudit scrapers. At dispersed sites within a few kilometres of the *locus* of collection A, chunks of tabular chert and other siliceous stone were worked by a bipolar technique to produce stout flakes of approximately triangular cross section. Cores were worked until they had maximum dimensions of not more than 50 mm or until nothing remained but a few shattered fragments. Core remains and flakes too small or fragile to fashion into scrapers were discarded where they fell. Usable flakes were trimmed to produce steeply retouched convex end scrapers about 30 mm to 60 mm long. No evidence was found for the production of chert/chalcedony tools other than scrapers. (A few very delicate obsidian flakes and tools made from them have, however, been excavated from the Domestic Site. As their production and use seems to have been quite separate from that of the Gudit scrapers, they will be reported separately.)

As the Aksumite economy was apparently trade and market based, it is probable that the procurement of raw materials and the production of scrapers were done by separate individuals. These scrapers were used, probably by crafts specialists other than the scraper manufacturers, working at sites other than those where the scrapers were produced, for the planing and shaping but not the more detailed carving of wood, soapstone and ivory. While some of this scraper use occurred at dispersed residential locations, it was markedly concentrated in the area of surface collection A.

During the course of their use, the scrapers were repeatedly modified and refined in edge plan and profile by resharpening with a narrow metal tool, the more skilfully retouched specimens being made to assume a characteristic convex edge of variable curvature with a pointed corner. After about 100 resharpenings, representing perhaps 50 hours' use, a scraper would have been reduced in length by about 30 mm and then discarded as no longer useful.

Not only was the greatest concentration of discarded scrapers and retouching debris found in the vicinity of surface collection A, this was also the area with the greatest proportion of well shaped specimens. Sites elsewhere had more irregular Gudit and simple convex scrapers. Thus, while use of the scrapers was not confined to a single site or to a very limited sector of the population, it seems to have been particularly developed by specialist craft workers whose main

workshop area was located in the Gudit Stelae Field immediately south of the Dungur building complex.

Acknowledgements

A preliminary study of Aksumite lithic material, including the work presented here, was conducted as part of and partly funded by the fourth season's Aksum Archaeological Research Project. Grateful acknowledgement is made to the sponsors and financial supporters of the project: the British Institute in Eastern Africa, the McDonald Institute for Archaeological Research, the British Academy, the Society of Antiquaries of London, and the British Museum.

References

ANFRAY, F. 1968. Aspects de l'archeologie ethiopienne. *Journal of African History* 9:345-366.

GRACE, R. 1996. Use Wear Analysis: the State of the Art. *Archaeometry* 38 (2):209-229.

MUNRO-HAY, S. C. 1989. Flaked Stone Artefacts. In: *Excavations at Aksum*: 186-187. London : The British Institute in Eastern Africa.

PHILLIPSON, D. W. 1977. The Excavation of Gobedra Rockshelter, Axum. *Azania* 12:53-83.

..... 1998. *Ancient Ethiopia*. London: British Museum Press.

PHILLIPSON, L. and D. W. PHILLIPSON. 1970. Patterns of Edge Damage on the Late Stone Age Industry from Chiwemupula, Zambia. *Zambia Museums Journal* 1:40-75.