A MIDDLE PALEOLITHIC ASSEMBLAGE FROM NUBIA AND ITS CULTURAL RELATIONSHIPS

by

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A Middle Paleolithic Assemblage from Nubia and its Cultural Relationships

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ABSTRACT

This thesis consists of a technological and typological analysis of the lithics (flaked stone artifacts and detritus) recovered through archaeological excavation of the site of Magendohli (11-H-9), which rests atop an isolated inselberg on the west bank of the Nile in Sudanese Nubia, and a comparison of this assemblage with lithic industries previously defined. Of the nearly 30,000 lithic pieces, fewer than ten percent are finished tools. Of these, side scrapers, denticulates, and notched pieces are the most common types. Pedunculates occur in small numbers as do blades. In addition there is a high frequency of cortex and non-cortex flakes and of cores in various stages of preparation. The unrestricted Levallois index for the site is relatively high. These frequencies and indices indicate that Magendohli was a quarry site, and support the hypothesis that the assemblage found there belongs to the Nubian Middle Paleolithic which is in turn related to the Aterian, a lithic industry of North Africa.

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I. Introduction

This study consists of a technological and typological analysis of an assemblage of stone tools and debitage recovered from excavations at the site of Magendohli (11-H-9) in Sudanese Nubia in 1966. The main thrust of the study is directed toward determining the nature of the assemblage, and its similarities and differences with other assemblages from Nubia in particular, and North Africa in general. These goals are reached first by describing the site and the excavation from which the assemblage came. The assemblage is then analyzed and described. The methods and techniques employed in this analysis and description are also presented, so that the reader is aware of their limitations and capabilities. Finally, the Magendohli assemblage is compared with other assemblages and industries, and inferences concerning cultural relationships are generated. The assemblage from Magendohli will be tested against the previously developed analyses. A review of the relevant cultural taxonomy is also included in this concluding section.

Description of Magendohli

Magendohli (Figure 1) is an isolated outcrop of pre-Cambrian rock which rises approximately 60 m. above the west bank of the Nile River in the omdia of Saras. It was excavated in 1966 by the Colorado Expedition directed by Roy Carlson, as part of the Nubian salvage operations undertaken during the construction of the New Aswan High Dam and the subsequent filling of the reservoir. The top of this inselberg showed evidence of several cultural components ranging from Middle Paleolithic to Nubian C-Group or slightly younger. Linear rock alignments, reminiscent of the gazelle fences found in the Sahara, were located near either end of the jebel while oval rock alignments, which Carlson and Sigstad (1973:55) suggest may have been hunters' blinds, were located near the linear rock alignments.

The excavation of two 5 X 5 m. pits and one half that size were undertaken near the north end of the jebel to a depth of between .70 m. and 1.60 m. This area was chosen as the surface scatter suggested that there was a wealth of material below the surface (Carlson, pers.comm.). While there were no distinct stratigraphic units in the deposit, gradations were recognized ranging fom dark red in the lower portions to a lighter red in the upper reaches and from greater compaction in the lower portions to lesser compaction in the upper areas. The grades, from top to bottom, are as follows:

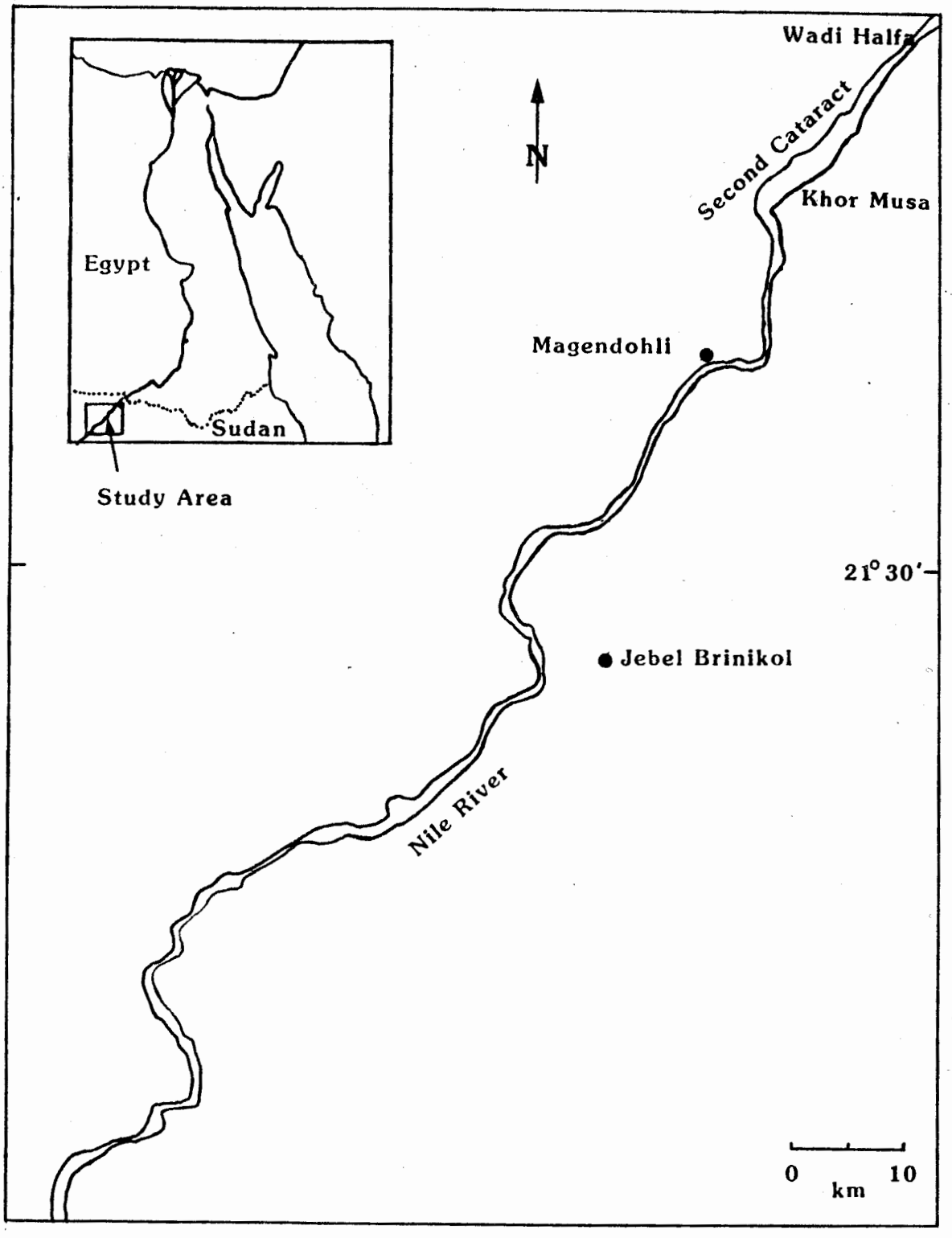


Figure 1.1. Map of Magendohli

I a. Orange aeolian sand which ranged from 0 - 5 cm. in depth

I b. A yellow gray fine silty sand about the colour of volcanic ash, which may have been an eluviated soil horizon. Artifacts in this deposit are the same yellow gray colour as the soil whereas those from the red soil below are red.

II. A yellow red rocky soil, mostly sand, which was apparently deposited at the same time as the human occupation.

III. A red rocky soil much the same as II but rockier and somewhat more consolidated.

IV. Bedrock which is deep red and crumbly (Carlson and Sigstad, 1973).

Nature of the Past Deposit

The nature of the deposit suggests that it was formed during a relatively wet period in the climatic history of the region during which vegetation growth occurred. The chemical processes which caused the formation of the red soil would have occurred during the following subpluvial. Red paleosols are a result of "deflation during hyperarid intervals without vegetation...preconditioned by total soil dessication and by structural deterioration (Butzer and Hansen, 1968:252)." This would seem to indicate that the site was in use sometime between

the end of the Lower Paleolithic and the Khormusan according to the environmental data collected by Wendorf and Schild (1980). The only potential environmental indicators recovered from Magendohli were four snail shells, tentatively identified as Zootecus insularis, and an insect nest, probably that of a wasp or termite. Both would tend to indicate greater moisture and plant growth than at present on the completely barren inselberg.

The faunal evidence from both the Mousterian and Aterian sites in the Western Desert seems to suggest that the climate was much more hospitable than at present. The animals represented in the archaeological sites of this region are representative of those which would be found in a savannah grassland (Wendorf and Schild, 1976:106). Rognon and Williams (1977:296), whose investigations in the Sahara have stretched from Mauritania to Afar, have noted that lake levels in these areas were high between about 40,000 and 20,000 B.P. and river terraces in Morocco and Algeria were formed by "...a highly competent fluvial regime." There is also evidence which suggests that temperatures were lower and precipitation was increased. Hobler and Hester (1968) have suggested that an increase of only 50 mm. would have considerably shrunk the size of the desert, replacing it with a savannah. Following the Aterian, there is strong evidence indicating an extensive period of hyperaridity and an increase in aeolian activity occurring through to the Holocene. Again, there is very little evidence available but the absence of human occupations and the absence of evidence of

increased spring activity seems to support this statement. In addition, increased aeolian activity is noted along the west bank of the Nile in the form of dune fields "...interfingering with silts...(Wendorf and Schild, 1980:235)." However, sometime after the onset of this hyperarid period, if the geological and archaeological interpretations are correct, the Nile Valley retained its savannah-like habitat as is evidenced by the presence of remains of large herbivores, hippopotamus, birds and rodents in Khormusan sites (Marks, 1968a).

Combining the preceding environmental information with the data on the lithics from Magendohli, it would appear that the site was occupied sometime during the Middle Paleolithic with the red paleosol developing during the period of hyperaridity following the Aterian.

II. The Lithics from Magendohli

The assemblage from Magendohli is comprised of a large number of flakes, especially cortex flakes, and cores in all stages of preparation. There are a number of finished tools but there is a noticeable lack of retouched flakes as well as the other residual evidence of the processes involved in the production of finished tools. Both the debitage and the finished tools from Magendohli were analyzed and classified using already established taxonomies, so as to enable easy comparison between this assemblage and assemblages from previously reported sites. In total, almost 30,000 pieces were examined. With a large collection such as this, one might prefer to analyze only a sample of the lithics, however in the case of the lithics from Magendohli, some level bags were pre-sorted in the field, catalogued and packed while others were simply catalogued and packed. This prevented sub-sampling by box (or packing crate) as there was no way of determining whether the lithics within a given box were pre-sorted. Once sorting of all the boxes was completed (a process which took approximately one man year), it did not require too much more work to count each class of artifact.

One of the major problems in separating retouched tools from the remainder of the pieces was in identifying those pieces which were 'retouched' by processes other than human-related

activities. This type of 'retouch' is often referred to as 'trampling'. Trampling on pieces can be a result of many factors including the weight of deposition building on top of sites, excavation and transportation. It need not always be caused by creatures (humans and animals) walking on the deposit. Modern trampling and edge damage resulting from excavation, transport and handling were usually easy to distinguish as these types of breaks have a fresh appearance. As has been previously mentioned, weathering is a dominant characteristic of the lithics at Magendohli. The weathered surfaces of the pieces have a very smooth, highly polished look to them which emphasizes the colour of the raw material. Fresh breaks are easily distinguished as the lustre resulting from weathering is absent, the breaks are dull and the colour(s) of the raw material are not as distinct. Trampling which occurred in the past and has since been weathered is a much greater problem. When sorting of the Magendohli lithics was being undertaken, pieces which were immediately identifiable as retouched tools were put together in trays. Debitage was placed in other trays for further analysis and those pieces which showed possible (or dubious) signs of retouch were kept together and were then analyzed as a group.

Familiarization with trampling and its effects was gained through experimental studies. Debitage was created by students in a lithics course on a bi-weekly basis. After each knapping session, the students were asked to walk over the debitage in the knapping area. At the end of the semester, several pieces of

debris of varying sizes, shapes and thicknesses were collected for study. Break patterns on the experimental collection were compared with those found on the Magendohli lithics.

Despite the care which was taken when sorting the pieces under question, it is still possible that some naturally retouched pieces may have been included in the 'retouched tools' category. However, it is hoped that the majority of these pieces have been eliminated. The pieces which were initially placed in the 'artifact' class were subjected to the same scrutiny while being put through the final sorting process. If errors were made in identifying true retouch, they should not greatly affect the tool frequencies.

Methodology used in the Analysis

Debitage is the residual lithic material resulting from the production of tools. It is usually the most frequently occurring form of artifact found in a site yet, until recently, it has not been extensively studied (Fish, 1980; Hassan, 1976). Debitage analysis should be a standard practice as it can provide information on the technological processes which occurred at a site however it has been neglected, unlike the study of finished tools such as points and scrapers which have, in the past, been considered as the 'true artifacts'. Debitage was classified according to a taxonomy established by Wendorf and Schild (1980), which attempts to identify all stages of lithic

manufacture present at a given site. Wendorf and Schild have developed an index for their taxonomy which is called the Index of General Structure (IGL) which measures the frequency of Levallois pieces in an assemblage. It can be seen in Table 2.1, as can the formula for the restricted index which is the same figures, less the undetermined pieces.

It was decided to sort the Magendohli debitage using the Wendorf and Schild scheme, even though the more recent develcpment of this taxonomy had precluded its use in classifying the material excavated in Nubia in the 1960s. In actuality, the debitage from Nubia has not been extensively analyzed. This analysis of the Magendohli material now provides both a complete record of all pieces retrieved from the site, and information on the technology of the site.

The finished tools were sorted according to a modified Bordes' (1961) typology. Although this typology was originally intended for use in western Europe, it has been broadly applied throughout eastern Europe, the Near East and North Africa , with varying degrees of success. Controversy concerning Bordes' typology centres on whether the identified taxonomic units are functional or stylistic groupings. The literature on this relatively familiar subject is voluminous and does not warrant a discussion here (see Binford,L., 1973; Binford and Binford, 1966; Binford, S., 1972; Bordes, 1973; Mellars, 1970). For the purposes of this paper, Bordes' typology has been used as a vehicle for classifying a Middle Paleolithic assemblage so that

Table 2.1.
General Structure Typology (per Wendorf and Schild, 1980)

Group I — Initial Group

1. Primary flakes
2. Primary blades
3. Early-stage core-preparation flakes

Group II — Levallois Group

4. Levallois core-preparation flakes
5. Levallois cores
6. Levallois flakes
7. Levallois blades
8. Levallois points

Group III — Flake Group

9. Single platform flake cores
10. Flakes from single platform cores
11. Opposed platform flake cores
12. Flakes from opposed platform flake cores
13. Discoidal cores
14. Flakes from discoidal cores
15. Change of orientation cores
16. Flakes from change of orientation cores
17. Undetermined flakes

Group IV — Blade Group

18. Single platform blade cores
19. Blades from single platform cores
20. Opposed platform blade cores
21. Flakes from opposed platform blade cores
22. Single platform bladelet cores
23. Bladelets from single platform cores
24. Opposed platform bladelet cores
25. Bladelets from opposed platform cores

Group V — Core rejuvenation and Early Removal from pre-cores Group

26. Core tablets
27. Core trimming 'blades'

Group VI Chip Group

28. Regular chips
29. Retouch chips

Group VII Tools and Tool-production waste Group

30. Retouched tools
31. Resharpening spalls
32. Biface trimming flakes and chips
33. Burin spalls
34. Notch spalls

Group VIII Hammerstone Group

35. Spheroidal hammerstones
36. Regular hammerstones

Group IX Undetermined Group

37. Crushed chips
38. Chunks
39. Undetermined cores

*Categories 28, 29, 37, 38, and 39 are excluded from the restricted percentages.

General Structure Index (IGL) =

$$\frac{\text{Categories 4 - 9 of General Structure Count} + \text{all retouched Levallois Pieces} \times 100}{\text{All categories of the restricted technological structure}}$$

it can be compared with other similar sites whose excavators have used the same typology.

Wendorf and Schild (1980:10) point out that many Middle Paleolithic industries cannot be classified unless Bordes' typology is modified. They (Wendorf and Schild) have modified Bordes' typology by including the following types for the Mousterian-Aterian complex. They are:

62a Undetermined sidescraper

62b Bifacial triangular point

62c Bifacial edge piece

62d Spheroidal piece

62e Regular hammerstone

62f Undetermined and fragments

With these modifications, it is possible to classify most (if not all) of the lithics found in the North African Middle Paleolithic, and it is this modified taxonomy which has been employed on the finished tools from Magendohli. The type listing is shown in Table 2.2.

Bordes (1950, 1953) also introduced typological and technological (fig. 2.1) indices which measure particular characteristics of a given assemblage. Technological indices measure the presence of Levallois technology (IL), in the assemblage and the ratio of blades to flakes (Ilame). The facetting indices (IF, IFs) were not employed on the Magendohli collection. The typological indices measure the occurrence of Levallois pieces not made into retouched tools (ILty), side

Table 2.2. Bordes' Typology (Bordes, 1961)

1. Levallois flakes, typical
2. Levallois flakes, atypical
3. Levallois points
4. Levallois points, retouched
5. Pseudo-Levallois points
6. Mousterian points,
7. Mousterian points, elongated
8. Limaces
9. Side scrapers, simple straight
10. Side scrapers, simple convex
11. Side scrapers, simple concave
12. Side scrapers, double straight
13. Side scrapers, double straight-convex
14. Side scrapers, double straight-concave
15. Side scrapers, double biconvex
16. Side scrapers, double biconcave
17. Side scrapers, double convex-concave
18. Side scrapers, convergent straight
19. Side scrapers, convergent convex
20. Side scrapers, convergent concave
21. Side scrapers, canted
22. Side scrapers, transverse straight
23. Side scrapers, transverse convex
24. Side scrapers, transverse concave
25. Side scrapers, inversely retouched
26. Side scrapers, abruptly retouched
27. Side scrapers, thinned
28. Side scrapers, bifacially retouched
29. Side scrapers, alternately retouched
30. End scrapers, typical
31. End scrapers, atypical
32. Burins, typical
33. Burins, atypical
34. Borers, typical
35. Borers, atypical
36. Backed knives, typical
37. Backed knives, atypical
38. Natural backed knives
39. Raclettes
40. Truncated pieces
41. Mousterian tranchets
42. Notched pieces
43. Denticulate pieces
44. Bec burins

Table 2.2 (continued)

45.	Inversely retouched pieces
46.	Thick, abruptly retouched pieces
47.	Thick, alternately retouched pieces
48.	Thin, abruptly retouched pieces
49.	Thin, alternately retouched pieces
50.	Bifacially retouched pieces
51.	Tayac points
52.	Notched triangles
53.	Pseudo-microburins
54.	Pieces notched at the distal end
55.	Hachoirs
56.	Rabots
57.	Pedunculate points
58.	Pedunculate tools
59.	Choppers
60.	Inverse choppers
61.	Chopping tools
62.	Varia
62a.	Undetermined sidescraper
62b.	Bifacial triangular points
62c.	Bifacial edge pieces
62d.	Spheroidal pieces
62e.	Regular hammerstones
62f.	Undetermined and fragments

Figure 2.1 Formulas for Calculation of Bordes' (1951) Technological and Typological Indices

Technological Indices:

IL (Levallois Index) = $\frac{\text{Total number of Levallois flakes, blades and points x 100}}{\text{Total number of flakes, blades and points}}$

Ilame (Blades Index) = $\frac{\text{Total number of blades x 100}}{\text{Total number of flakes, blades and points}}$

Typological Indices:

ILty (Typological Levallois Index) = $\frac{\text{Bordes' types 1 through 4 x 100}}{\text{Bordes' types 1 through 62}}$

IR (Side scraper Index) = $\frac{\text{Total number of side scrapers (Bordes' types 9 through 29) x 100}}{\text{Total number of tools (Bordes' types 1 through 62)}}$

IC (Charentian Index) = $\frac{\text{Total number of Bordes' types 8, 10, 22 through 24 x 100}}{\text{Total number of tools (Bordes' types 1 through 62)}}$

IAu (Backed Knife Index) = $\frac{\text{Total number of Typical and Atypical backed knives x 100}}{\text{Total number of tools (Bordes' types 1 through 62)}}$

scrapers (IR), and backed knives (IAu). The Charentian index (IC), which measures the frequency of limaces and convex and transverse side scrapers, was also employed. Restricted indices record only the frequencies of retouched tools, eliminating Bordes' types one through three, which are unretouched Levallois pieces and type forty-five, which is the class for inversely retouched pieces. Indices are calculated as for a full index but the totals recorded for Bordes' types one, two, three, and forty-five are removed.

Indices of characteristic groups of artifact types were also devised by Bordes (1953; Figure 2.2). Through experience he had noticed that certain artifact types regularly cluster together in particular lithic industries. These indices measure the typological significance of artifact clusters for the Levallois, Mousterian, Upper Paleolithic and the Denticulate groups. Wendorf and Schild (1980) have added an index to this which measures the Aterian group.

The following section contains a description of both the debitage and the artifacts recovered from Magendohli, beginning with the debitage. Debitage frequencies are given in Table 2.3, and debitage groups are described in the immediately following paragraphs.

Figure 2.2 Characteristic Group Indices (per Bordes, 1951).

Group I — Index of Levallois Group

$$\frac{\text{Bordes' categories 1 - 4 X 100}}{\text{Bordes' categories 1 - 63}}$$

Group II — Index of Mousterian Group

$$\frac{\text{Bordes' categories 5 - 29 X 100}}{\text{Bordes' categories 1 - 63}}$$

Group III — Index of Upper Paleolithic Group

$$\frac{\text{Bordes' categories 30 - 37 X 100}}{\text{Bordes' categories 1 - 63}}$$

Group IV — Index of Denticulate Group

$$\frac{\text{Bordes' category 43 X 100}}{\text{Bordes' categories 1 -63}}$$

VI — Index of Aterian Group (Wendorf & Schild, 1980)

$$\frac{\text{Aterian Pedunculates + bifacial foliate pieces X 100}}{\text{Bordes' categories 1 - 63}}$$

*Restricted indices for these groups are calculated as for other Bordes' Indices (see Figure 2.1)

Table 2.3 General Structure of Magendohli Site

Group No.	Class No..	Total	Freq.	Restr. Freq.	Class Total	Class Freq.
I	1.	9,096	30.4	39.6	10,191	89.3
	2.	797	2.7	3.5		7.8
	3.	298	1.0	1.3	(34.1)	2.9
II	4.	267	0.9	1.2		21.8
	5.	158	0.5	0.7	1,227	12.9
	6.	527	1.8	2.3		43.0
	7.	229	0.8	1.0	(4.1)	18.7
	8.	46	0.2	0.2		3.7
III	9.	194	0.6	0.8		2.9
	10.	3,062	10.3	13.3		46.7
	11.	343	1.1	1.5	6,553	5.2
	12.	161	0.5	0.7		2.5
	13.	37	0.1	0.2		0.6
	14.	145	0.5	0.6		2.2
	15.	248	0.8	1.1		3.8
	16.	536	1.8	2.3	(21.9)	8.2
	17.	1,827	6.1	7.9		27.9
IV	18.	120	0.4	0.5		7.7
	19.	1,350	4.5	5.9	1,560	86.5
	20.	54	0.2	0.2		3.5
	21.	36	0.1	0.2		2.3
	22.					
	23.					
	24.				(5.2)	
	25.					
V	26.					
	27.	292	1.0	1.3	292	100.0
VI	28.	2,498	8.4		2,498	100.0
	29.					
VII	30.	944	3.2	4.1	944	100.0
	31.					
	32.					
	33.				(3.2)	
	34.					

Table 2.3 General structure of Magendohli site

Group No.	Class No.	Total	Freq.	Restr. Freq.	Class Total	Class Freq.
VIII	35.					
	36.					
IX	37.				4,381	
	38.	4,278	14.5			97.6
	39.	103	0.3		(14.7)	2.4
unsorted		2,227	non-cortex flakes			
TOTAL		29,873	(22,994 restricted)			

Description of the Magendohli Lithics

Group I consists of primary flakes, primary blades and early core-preparation flakes and makes up 34.1% of the entire assemblage, the largest single group. As in all other groups, flakes are distinguished from blades by the traditional definition that blades are at least twice as long as they are wide (Close, 1977). Primary flakes or blades are those which retain more than 50% cortex on their dorsal surface. A total of 9,096 primary flakes and 797 primary blades were identified comprising 30.4% (39.6% restricted) and 2.7% (3.5% restricted) of the total assemblage respectively. Early stage core-preparation flakes are relatively thick flakes which, on their dorsal surface, display irregular patterns of flake scars and a high percentage (but < 50%) of cortex. These pieces make up 1.0% (1.3% restricted) of the total assemblage. 298 early stage core-preparation flakes were recognized.

Group II, the Levallois group, represents 4.1% of the total assemblage. Levallois cores, blades, flakes and points are identified according to Bordes' (1961) definitions, while Levallois core preparation flakes are defined as flakes which are usually as wide as they are long and which result from the preparation processes undertaken when shaping a Levallois core (Wendorf and Schild, 1978). There were 267 Levallois core preparation flakes identified; 158 Levallois cores including two

Nubian (Type II) cores (Guichard and Guichard, 1965); 527 Levallois flakes, 229 Levallois blades and 46 Levallois points.

Group III is made up of all the remaining varieties of flakes and cores. The flakes in this group display less than 50% cortex on their dorsal surfaces and are categorized according to the type of core from which they were removed. Flakes or blades from single platform cores have dorsal flake scars which indicate that they were removed from the same direction as the flake itself. Flakes or blades from opposed platform flake cores have dorsal flake scars indicating that they were removed from the opposite direction to the flake. Flakes from changed orientation cores have dorsal flake scars which were removed perpendicular (i.e. at right angles) to the flake. Undetermined flakes are those on which the direction of the dorsal flake scars cannot be identified. Due to difficulties which arose during sorting, 2227 non-cortex flakes were not sorted. There are a total of 5,731 flakes in this class (19.2% of the entire assemblage), of which the majority are flakes from single platform cores (3,062 in total for 10.3% of the entire assemblage, 13.3% restricted) and undetermined flakes (1,827 in total, for 6.1% of the assemblage, 7.9% restricted). There were 161 flakes from opposed platform cores, 145 flakes from discoidal cores and 536 flakes counted from change of orientation cores. Cores in this class make up 2.7% of the entire collection for a total 822 pieces, and are identified by the position of the striking platform(s). There were 194 single

platform flake cores (0.6%; 0.8% restricted), 343 opposed platform flake cores (1.1%; 1.5% restricted), 37 discoidal cores (0.1%; 0.2% restricted) and 248 change of orientation cores (0.8%; 1.1% restricted).

Group IV is comprised of blades and blade cores, which are identified according to the same criteria as established for flakes. While bladelets and bladelet cores were included in this group by Wendorf and Schild (1980), there were none recorded from the Magendohli excavation. Of the 1,386 blades recovered (4.6% of the total assemblage), 1,350 are from single platform cores, 956 of them being thin, flat blades probably produced using a billet flaking technique. The remaining 36 are from opposed platform cores. There were 120 (0.4%) single platform blade cores identified as were 54 (0.2%) opposed platform blade cores.

Group V is the "core rejuvenation and early removal from pre-cores" class. No core tablets were identified. The core trimming blades are defined as narrow, curvate blades with a central ridge running the length of the dorsal surface. These pieces appear to have been removed from cores for the express purpose of creating a striking platform (B. Hayden, pers. comm.). Two hundred ninety-two pieces were identified, comprising 1.0% of the entire assemblage.

Group VI is the chip group and chips are defined as broken pieces of flakes or blades which have a maximum dimension of less than 15 mm. Chips were not counted from Magendohli as most

pieces which could be identified as such are a result of trampling, making it virtually impossible at times to distinguish between the old chips and the new.

Group VII is made up of retouched tools and the residual matter resulting from the maintenance and resharpening of retouched tools. Due to the frequency of edge damage evident in the collection, it was not possible to distinguish between notch spalls, resharpening spalls, burin spalls and spalls resulting from trampling, so these debitage types were not included in the analysis.

Hammerstones (Group VIII) were not included in this analysis as the battering characteristic of hammerstone 'wear' may have resulted from trampling, therefore rendering these pieces as mere nodules.

The final group (Group IX) is the Undetermined group made up of pieces which do not fit any of the debitage types previously described. They included crushed chips, chunks and undetermined cores. Crushed chips were eliminated from the analysis as the bottoms of the containers carrying the artifacts contained crushed chips of a recent age which were indistinguishable from those which were of a much greater age. Chunks were considered by the author to be cultural pieces which did not fit any of the previous definitions but were larger than the 15 mm. maximum dimension that Wendorf and Schild (Close, 1978) employ for the chips classification. A total of 4,278 pieces or 14.5% were classified as chunks and, in general, did

not have a maximum dimension of greater than 55 mm. It appears that these pieces resulted from early lithic reduction processes as most display more than 50% cortex on the dorsal surface. The 103 undetermined cores are nodules which have had a small number of flakes (not usually more than 5) removed and were subsequently discarded due to flaws running through the material. These are identified as initially struck cores (Wendorf and Schild, 1977:17) in the Acheulean but this debitage class is not included in the taxonomic list for the Mousterian/Aterian.

The debitage described in the preceding paragraphs makes up about 97% of the entire assemblage. The remaining 3% consists of pieces classified as finished tools. These relative frequencies strongly indicate that Magendohli was primarily a quarry site. The finished tools are described in the paragraphs which follow according to the modified Bordes' typology previously described. Type frequencies of tool types are given in Table 2.4.

The Levallois flakes have already been discussed in the previous section. Bordes divided this, and many other tool classes into two types: Typical and Atypical Levallois flakes. Atypical and Typical types occur in about equal numbers (265 Typical; 262 Atypical). As with all other classes of tools, there is a great range in size and quality.

Four types of points have been identified. They are Levallois points, retouched Levallois points, pseudo-Levallois points and Mousterian points. There were forty-six Levallois

Table 2.4 Tool List for Magendohli (11-H-9)

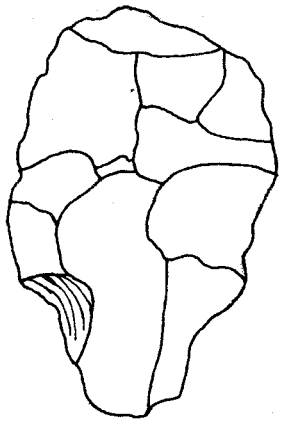
Tool Number	Total	%	Restr. %	Number	Total	%	Restr. %
1.	265	17.5		41.	3	0.2	0.3
2.	262	17.3		42.	130	8.6	13.8
3.	46	3.0		43.	104	6.9	11.0
4.	1	0.1		44.	3	0.2	0.3
5.	5	0.3	0.5	45.			
6.	2	0.1	0.2	46.	45	3.0	4.8
7.	4	0.3	0.4	47.			
8.				48.			
9.	26	1.7	2.8	49.			
10.	71	4.7	7.5	50.	1	0.1	0.1
11.	88	5.8	9.3	51.			
12.				52.			
13.	1	0.1	0.1	53.	2	0.1	0.2
14.				54.	11	0.7	1.2
15.	1	0.1	0.1	55.			
16.	6	0.4	0.6	56.	20	1.3	2.1
17.	9	0.6	1.0	57.	9	0.6	1.0
18.				58.	15	1.0	1.6
19.	2	0.1	0.2	59.	3	0.2	0.3
20.				60.			
21.	29	1.9	3.1	61.	2	0.1	0.2
22.	4	0.3	0.5	62.	46	3.0	4.9
23.	3	0.2	0.3	62.a	33	2.2	3.5
24.	5	0.3	0.5	62b.			
25.				62c.			
26.	12	0.8	1.3	62d.			
27.				62e.			
28.	2	0.1	0.2	62f.			
29.	30	2.0	3.2	63.	1	0.1	0.1
30.	2	0.1	0.2				
31.	7	0.5	0.7		1517 (944)		
32.	32	2.1	3.4				
33.	34	2.2	3.6				
34.	55	3.6	5.8				
35.	48	3.2	5.1				
36.	1	0.1	0.1				
37.	1	0.1	0.1				
38.	26	1.7	2.8				
39.							
40.	10	0.7	1.1				

points of high quality, one very weathered retouched Levallois point, five pseudo-Levallois points of varying quality, two Mousterian points and four elongated Mousterian points. One of the Mousterian points if made of quartz and is of very high quality (fig. 2.3).

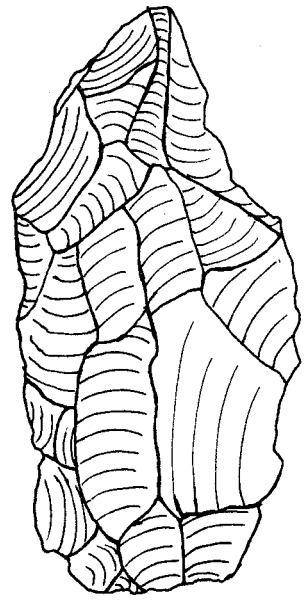
Side scrapers make up the largest group of tool types (30.6%), as a total of 289 were identified. Most of are of poor quality. Simple side scrapers were the most common forms representing approximately 66% of all side scrapers. Canted side scrapers make up another relatively well represented form, making up 10.0% (a total of 29) of the total number of side scrapers, as are side scrapers with alternate retouch which comprise 10.6% (a total of 30) of all side scrapers. pieces however are of extremely poor quality and heavily weathered. The remaining varieties of side scrapers make up about 13% of the side scraper collection (fig. 2.4).

A total of nine end scrapers were identified, including two Typical forms and 7 Atypical forms, all of which are of very poor quality. Of the two Typical pieces, one is on a blade, the other on a Levallois flake.

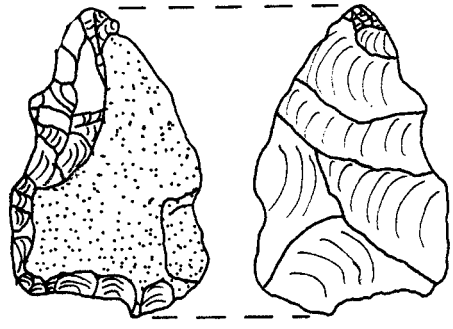
A total of sixty-six burins were recognized, comprising 4.3% of the total number of tools. These pieces appear in varying sizes and shapes. Most of the Atypical burins are highly weathered and may be a result of natural breaks. Atypical and Typical forms occur in roughly equal numbers (32 Typical; 34 Atypical).



a



b



c

Figure 2.3. Artifacts from Magendohli.
a - Levallois flake, b - Levallois flake
c - Mousterian point

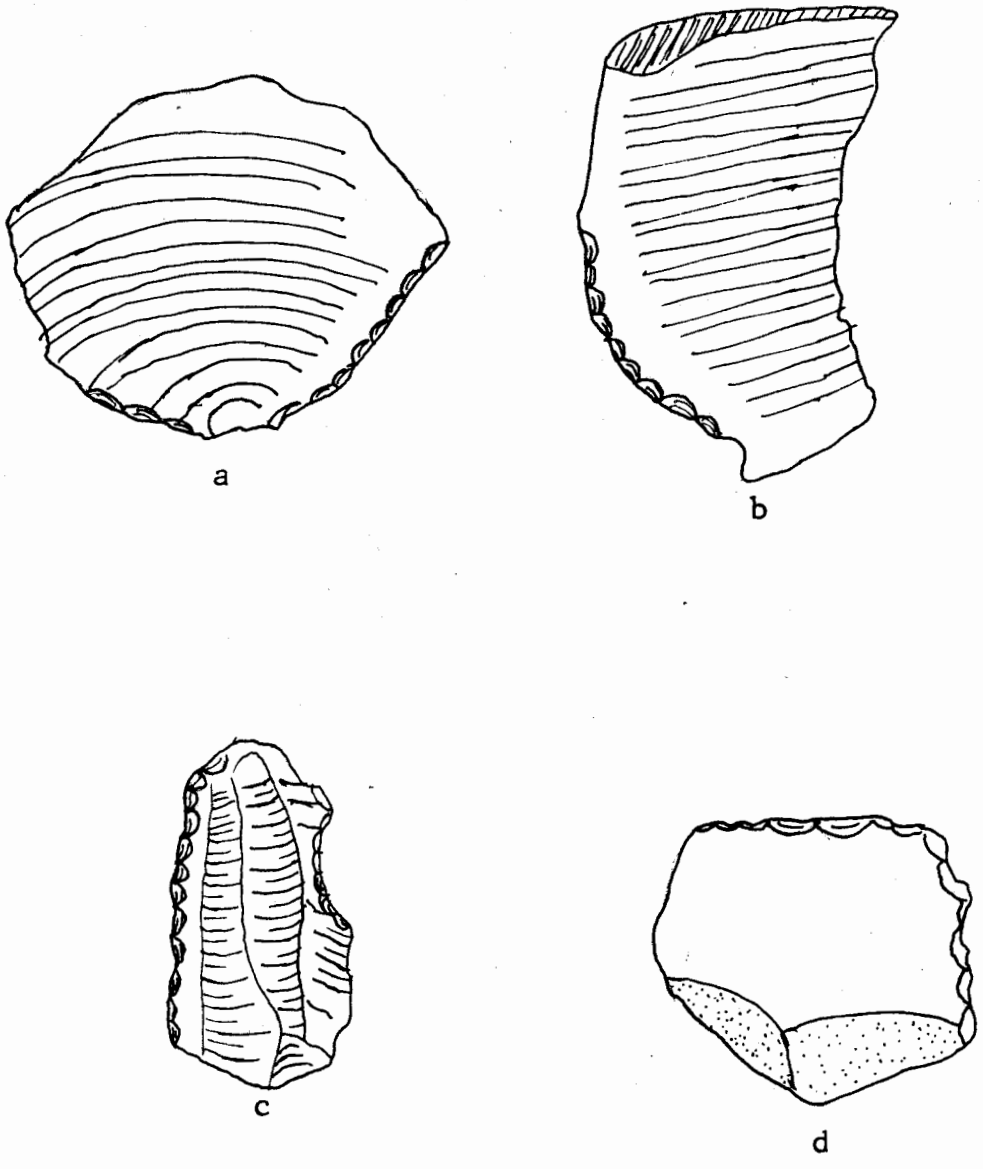


Figure 2.4 Artifacts from Magendohli - sidescrapers.
a - Inversely retouched; b - simple convex
c - double concavo-convex; d - transverse

As with other well represented artifact classes, the borer group includes a variety of sizes and flake types. A total of 103 pieces are included in this group, 55 of them being Typical borers. All of these pieces are heavily weathered. This class of tools makes up almost 7.0% of the entire collection of tools.

A total of 28 knives were identified however only two of these are backed knives, the remaining 26 being naturally backed knives. All of the knives display evidence of varying degrees of edge damage which is probably due to trampling. Of the two backed knives identified, one is Typical, the other Atypical. The naturally backed knives range in length from 34 mm. to 126 mm.

Ten truncated pieces were identified and they all display concave truncations. There appears to be no preference to the orientation of the truncation.

Mousterian tranchets make up only 0.2% of the entire collection of tools. The three pieces identified are small (<20 mm.) and are all highly questionable pieces. Again, however, the degree of weathering on the pieces makes it extremely difficult to assess the nature of these pieces.

Notches make up 8.6% of the tool assemblage, totalling 130 in number. The width of the individual notches ranges from 24 mm to 66 mm. Again, as with other classes of tools, there appears to be no selection being made for specific flake types. Denticulates are also found on a wide variety of flake types and they number 104 (6.9%). Some of these pieces can be seen in

Figure 2.5.

Three weathered pieces have been identified as bec burins while 45 pieces display retouch on the ventral surface. The Combined Prehistoric Expedition (Wendorf, 1968) chose not to include these pieces in their classification scheme due to the presence of trampling damage on most pieces however, due to the trampling study performed prior to the analysis of the materials from Magendohli, this class was included in this study.

The next four classes of tools are specimens which are all heavily weathered. One bifacially retouched piece was identified but is highly suspect. There are also 2 small pseudo-microburins, 11 distal end notch pieces, and 20 rabots, thirteen of which occur on slabs, the other seven on cores.

The two most important tool classes in the Magendohli collection are the pedunculate points and tools. Both the pedunculate points and the pedunculate tools display poorly defined 'stems'. A total of 24 pedunculate pieces were identified, 9 of which are points (Figure 2.5). Of the remaining 15 pieces, it appears that 13 may have served as scrapers. These classes make up only 1.6% of the total tool assemblage however their mere presence signals the presence of the Aterian.

Five very questionable choppers and chopping tools were recovered. Two of the three choppers identified occur on split nodules, the other is on a large, but exhausted, Levallois core which has had an 'overpassed' flake removed from the proximal end.

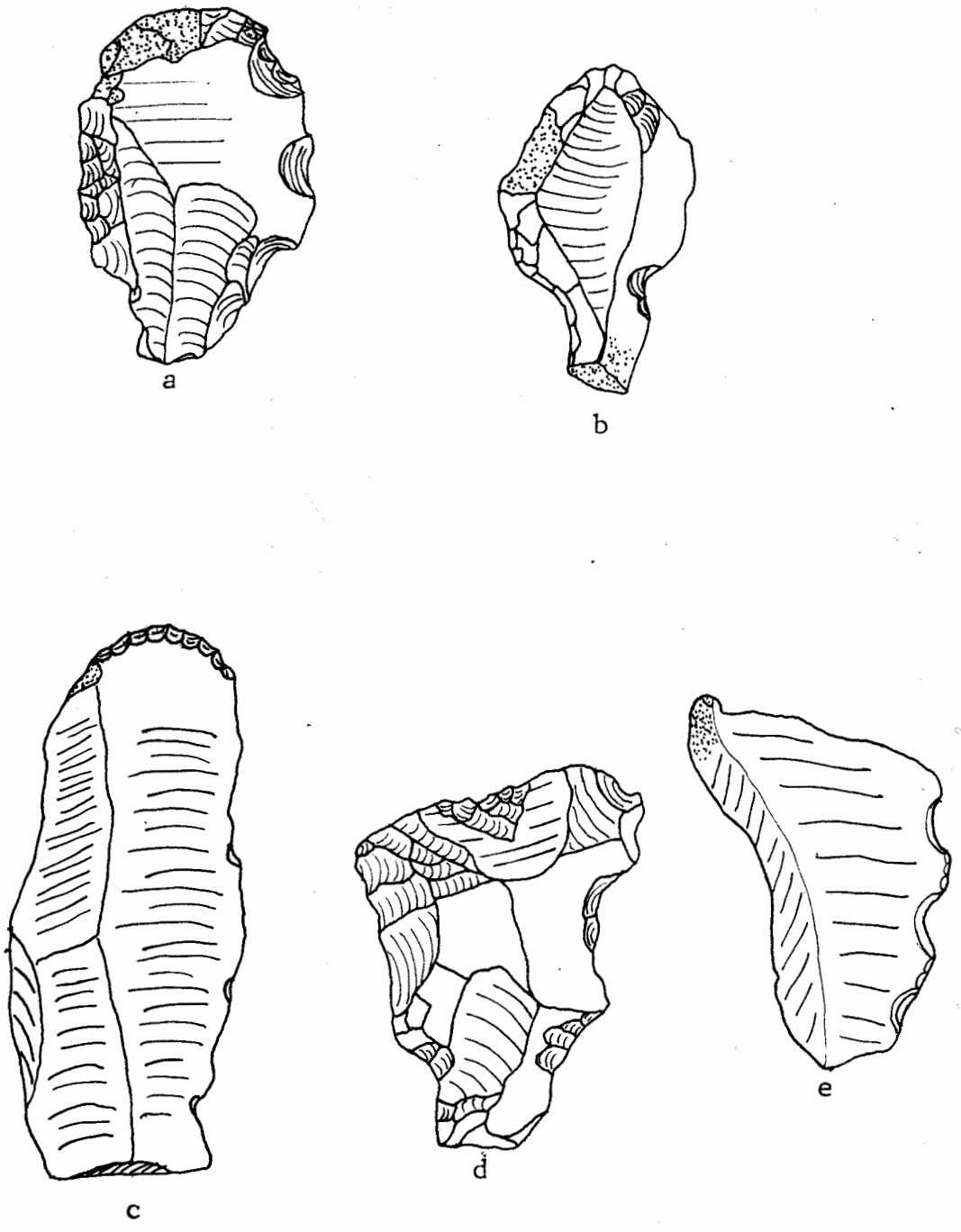


Figure 2.5. Artifacts from Magendohli.
Denticulates - d, e; pedunculates - a, b;
Endscraper/notched piece - c.

Thirty-three small (25 mm. - 48 mm.) retouched pieces are included in the Varia class. These pieces appear to be multi-purpose implements but are too fragmented to orient and/or too badly weathered to correctly identify.

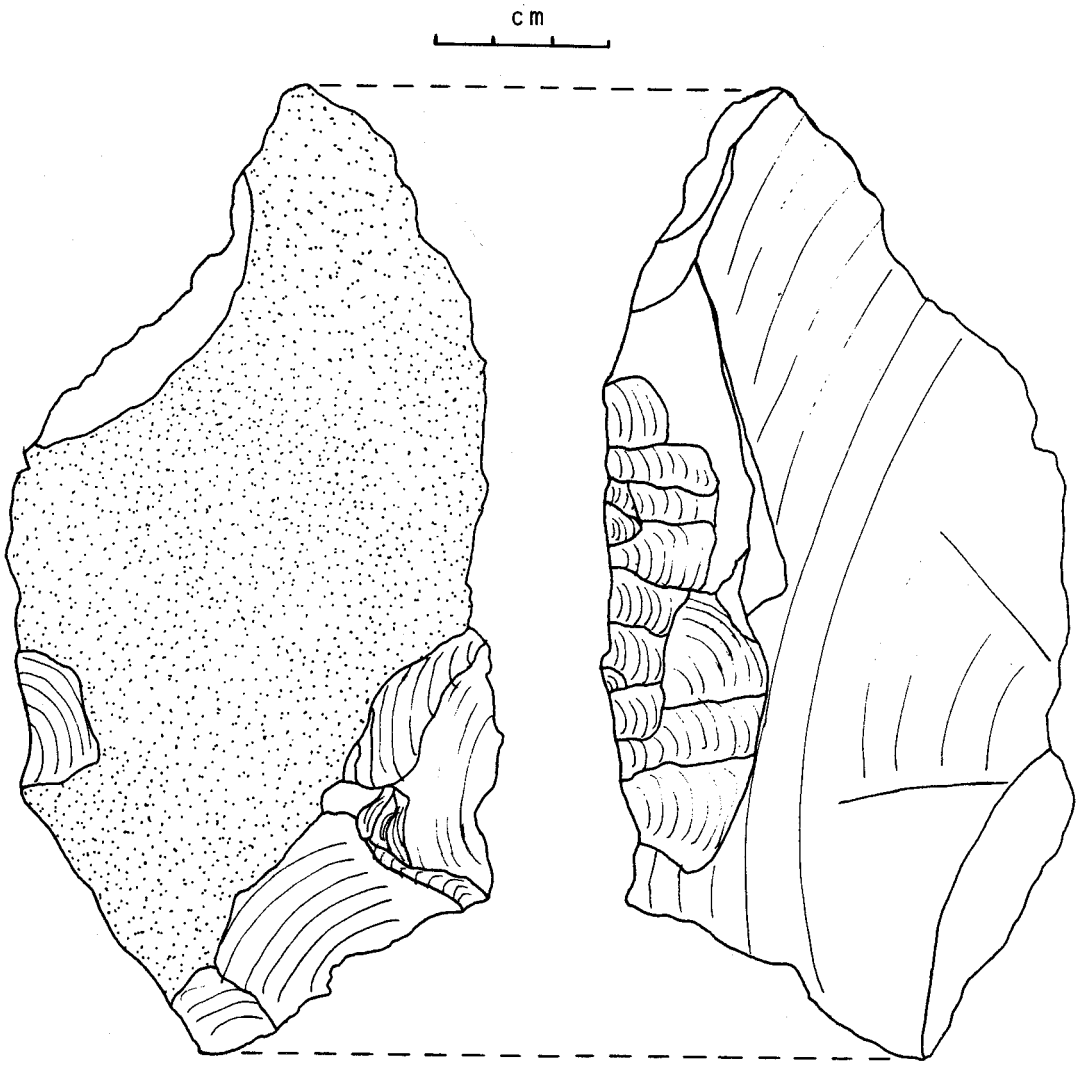
The last implement to be described is a highly weathered biface. It appears that this piece was discarded after several unsuccessful attempts were made to remove cortex from the centre of the piece. It is possible that this piece may be a core however, due to the general shape of the piece (which is dissimilar to the other cores from the site), it has been classified as a biface (Figure 2.6).

Summary of the Magendohli Industry

Magendohli was obviously exploited as a quarry, as is evidenced by the vast numbers of lithic waste products which were excavated. The extent of the quarry site is not known as only one trench was excavated, however it appears to be extensive. The lithics from the excavated area of the site appear to be homogeneous despite evidence of occupations on the jebel by peoples from later cultures (e.g. Nubian C-Group). The lithics collected from the surface at Area A seem to be different from those at Area B, although such a comparison is invalid due to the disparity in collection sizes.

The lithic assemblage from Magendohli shows a high proportion of waste flakes, comprising just over 63% of the

Figure 2.6 Biface from Magendohli



entire assemblage. Primary reduction of nodules appears to have been the primary manufacturing goal at the site. A large part of the debitage appears to have resulted from the knappers search for good quality raw material As has been previously mentioned, many of the pieces in the assemblage (103 undentified cores) suggest the knapper had removed a number of flakes from the nodule to judge the quality of the raw material, as most of these pieces have signs of internal flaws.

Levallois technology is reasonably prominent although not overwhelmingly present. While there is evidence of debitage resulting from shaping and finishing tools, cores and finished tools are not overwhelmingly apparent. The cores are either completely exhausted and relatively small or are extremely large and still usable. Many cores have flaws running through the material and it appears that the knappers would remove as many flakes from around the flaw as was possible if the nodule contained very fine-grained material. If the raw material was not the best available from the site, no exceptional effort was made to extract as many flakes or blades as possible from the core - it was simply discarded.

The presence of a fairly large number of finished tools must also be discussed. It is not common to find a large number of retouched pieces at a quarry site. The presence of these pieces suggests that they were either made prior to arrival at Magendohli and subsequently discarded or they were pieces found at the site, retouched and used only for the duration of the

stay at Magendohli. A number of scenarios are possible in explaining this. If the journey to Magendohli was made by only a small number of people from the group, they may have carried with them only the bare essentials, necessitating the manufacture of some rudimentary pieces during their stay at the site. This would be an even more reasonable hypothesis, if the quarry site were within a short travelling distance of the main group. The knappers could afford to travel to the site without any flake tools if it were only a relatively short distance between the camp and the quarry. Any flake tools which might have been needed during the visiting of Magendohli could be manufactured on the spot.

An alternative hypothesis would be that the whole group may have been at Magendohli during its exploitation and may not have used or discarded any of the retouched tools in their possession but instead used pieces which were readily available on the site and required very little alteration. This meant more time could be spent on quarrying or workshop activities.

The exploiters of the site might also have simply discarded any pieces which they had retained from the previous visit to the quarry - most of these pieces having not been frequently used prior to being discarded. These pieces would have been discarded in favour of better pieces. This would explain the absence of evidence of resharpening activities at the site.

The last possibility, but one which is very unlikely, is that most of the retouched pieces were 'practice' pieces. The

poor quality of retouch may be the result of an amateur learning the art of flintknapping. If one were to learn knapping techniques, a quarry would be the best place to learn as there would be much debitage on which to practice. Alternatively, if one were to learn the techniques of flintknapping, it would probably be best to start by knocking cortex off of prospective cores which would give the experienced knappers more time to spend on further shaping and/or reduction of pieces to be removed from the site.

Before any of the above hypotheses can be tested, related living sites must be discovered. Habitation sites may give the archaeologist some clue as to the tools which were employed in daily activities. Until this is known, there is little hope of trying to understand what people were doing at Magendohli other than in purely technological terms.

III. A Comparison with Other Contemporary Lithic Assemblages from the region

History of Nubian Archaeological Research

To understand the lithic industries in Nubia, it is necessary to be cognizant of the history of archaeological research in the region. The construction of dams across the Nile at Aswan has resulted in the compiling of most of the archaeological material in Nubia recovered to date. The first dam was built in 1902, enlarged in 1907, then raised in 1923. Reisner, Firth and Emery were all involved in surveying archaeological sites during these periods of construction but concentrated on Pharaonic and Christian period sites. Very little was known of the prehistoric sites. Information on a few prehistoric sites was gathered in the reservoir area by Sandford and Arkell (1933) who worked at Dibeira while Myers (1958, 1960) worked at Abka.

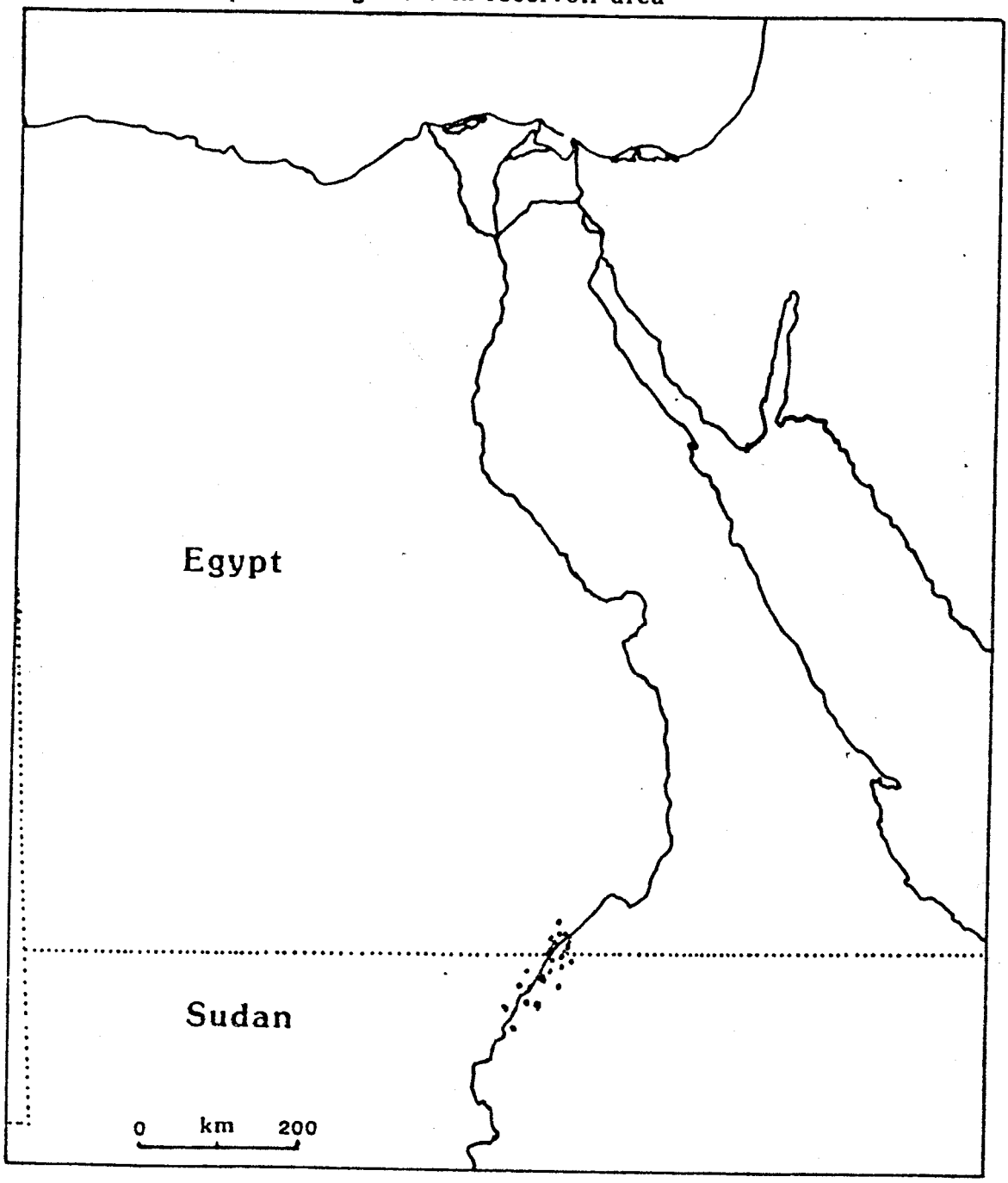
Archaeological research flourished in Egypt and Sudan between the First and Second World Wars with a number of people, such as Sterns (1917), Vignard (1934), and Caton-Thompson and Gardner (1932; 1934) discovering sites. Systematic surveys and some excavations occurred between 1920 and 1930. After World War II, this activity ceased due to an uneasy political climate and,

in part, due to the lack of interest in the prehistory of the region which resulted from the belief that northeastern Africa remained outside the mainstream of cultural development during most of the Paleolithic. Early archaeological research indicated that lithic traditions in this part of the world had remained relatively unchanged from the Middle Paleolithic until the beginning of the Neolithic. This view was supported by Huzayyin (1941), Caton-Thompson (1952), and Vignard (1934).

When the decision was made to salvage Nubias archaeological resources prior to the construction of the New Aswan High Dam, concession areas were commissioned to different groups. The west bank of Wadi Halfa was worked by the University of Colorado, Kom Ombo was contracted out to Yale University and the Canadian National Museum, and a group made up of members from various nations, known collectively as the Combined Prehistoric Expedition, worked in a number of localities within the reservoir (Fig.3.1). While other groups reported prehistoric sites, these were the groups mainly responsible for the prehistoric work in the region.

Although Sandford and Arkell (1933) did not formulate a true synthesis of cultural progression in Nubia, their finds should be noted. They reported finding pebble tools on the upper (100 foot) terrace as well as all forms of Chellean tools. Acheulean was also recorded on the lower (50 foot) terrace. In addition, all forms found on the upper terrace were located on the lower terrace but were considered derived. The non-Acheulean

Figure 3.1. Map showing sites in reservoir area



artifacts identified by Sandford and Arkell were considered to be post-Chellean and pre-Mousterian as no Mousterian forms were found (Sandford and Arkell, 1933:25). Bifaces were the most common tool type on the 100 foot terrace and in the 100 and 50 foot gravels. More highly finished tools of Chellean and well developed Acheulean traditions were recognized from the 50 foot terrace while the 30 foot terrace produced derived Acheulean artifacts as well as coarse flakes and cores resembling Mousterian types (Sandford and Arkell, 1933:76).

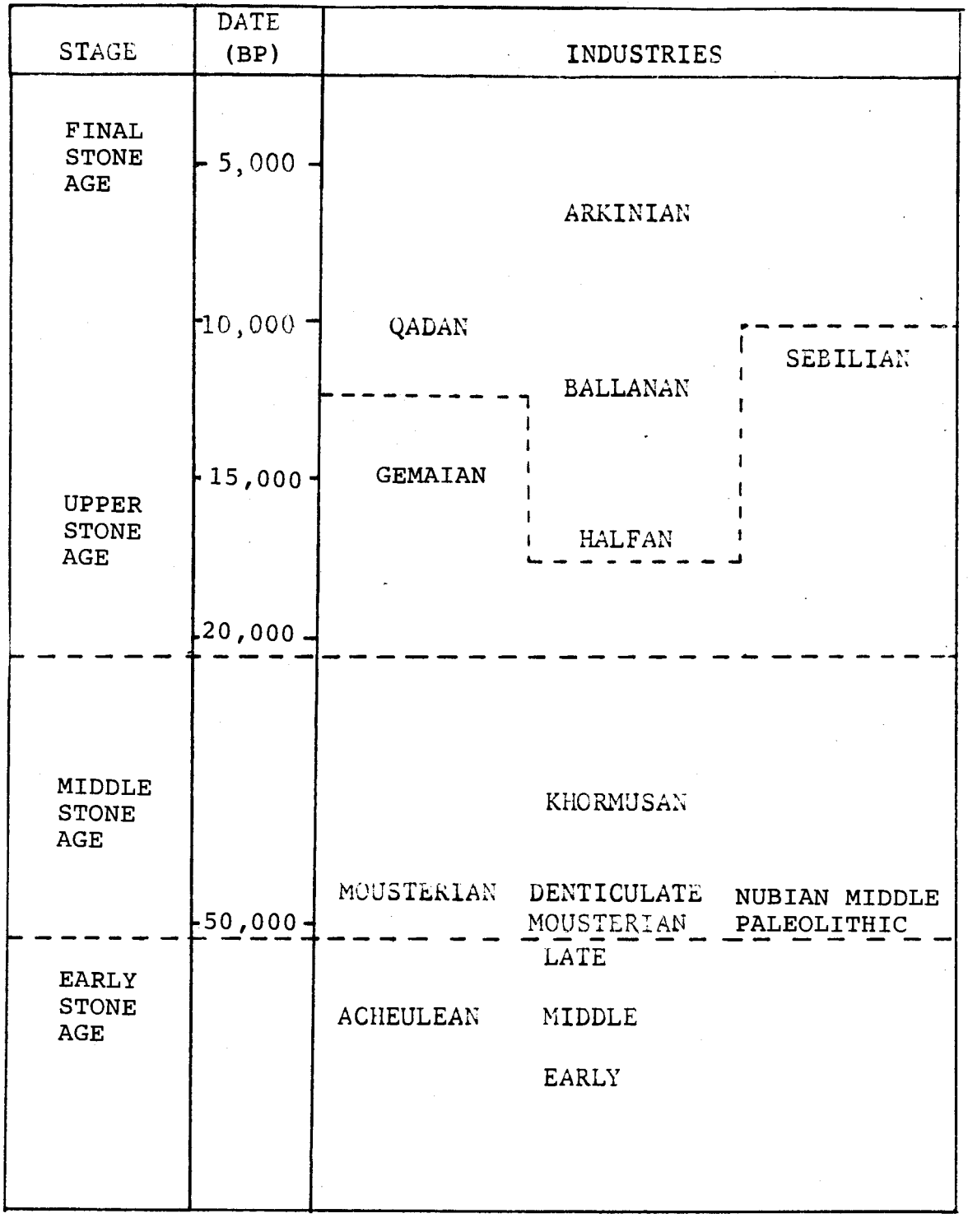
Unfortunately, it appears that these tools were isolated surface finds, and in addition, a high percentage were derived. Therefore, although these sites indicate the possibility of cultures earlier than the Acheulean, there are no _in situ_ sites recorded to date. This holds true for many of the finds recorded by A.J. Arkell. In his _Old Stone Age in Anglo-Egyptian Sudan_ (Arkell, 1949), Arkell lists many sites where pebble tools (pre-Chelles-Acheul) were located. The absence of living floors makes it difficult to form conclusions on the possible industry or industries. These isolated occurrences of possible pre-Acheulean artifacts indicates that, conceivably, there were earlier cultures than the Acheulean. Guichard and Guichard (1968:153) did not find solid evidence of pre-Acheulean stratigraphic levels although they did note concentrations of heavily weathered choppers and flakes. Without sufficient evidence it is necessary, at this point in time, to consider the Acheulean as the first recognized lithic industry in the region

(Figure 3.2).

In the Nile Valley, the Acheulean displays a gradual development of the Levallois technique which is absent in the Lower Acheulean (Wendorf, 1968:1043; Marks, 1970:18). Ferrocrete sandstone is the favoured raw material. There is an increase in flake tools in the Middle and Upper Acheulean which are typologically indistinguishable from those found in the Middle Paleolithic but appear in fewer numbers. As well, there is an increase and refinement in the production of handaxes (Wendorf, 1968; Marks, 1970; Chmielewski, 1968; Guichard and Guichard, 1968). Other Acheulean traits include a very high ratio of bifaces to flake tools. The bifaces are considerably polymorphic in form. There is an absence of para-Levallois technique and cleaver flakes, as well as a rarity of trihedral bifaces.

In the Eastern Sahara, bordering the west bank of the Nile, the Acheulean has two recognizable taxonomic units which are based on qualitative and quantitative differences found in the bifaces retrieved (Wendorf and Schild, 1980:243). Late Acheulean sites contain bifaces which are predominantly amygdaloidal, cordiform or backed, while those being attributed to the Final Acheulean are primarily subtriangular or asymmetrical cordiform types. These units, while significantly different from the Nubian Acheulean sites, do share some similarities such as exploitation of the local raw material for lithic tool production, regardless of quality. There is also an absence of cleavers, which are commonly found in Acheulean sites in

Figure 3.2. Chronology of Nubian Prehistoric lithic industries (based on Wendorf, 1968)



northwest Africa. The central Sahara and at Khor Abu Anga (the type site), near Khartoum (Wendorf and Schild, 1980:244). It is very evident that the Magendohli assemblage is very different from and does not belong with the Acheulean.

Following the Acheulean (Lower Paleolithic) are the Middle Paleolithic industries: the Mousterian, the Nubian Middle Stone Age, Aterian which is found in the neighbouring desert, and the Khormusan. The Khormusan, the only industry which is unique to the Nile Valley, was originally believed to be an Upper Paleolithic industry but this was revised when new radiocarbon dates indicated it was much older than previously thought (Wendorf et al, 1976). The absence of multi-component sites renders it impossible to make statements concerning the temporal relationship of these industries.

Classification of Middle Paleolithic Industries

The Mousterian was originally subdivided into Type A and Type B on the basis of absence or presence of handaxes. The two types have now been subsumed under the heading of Typical Mousterian of Levallois facies (Wendorf and Schild, 1976; Figures 3.3 - 3.5). Nubian Mousterian sites are generally found *in situ* in the Older Pediments or are surface sites located on the tops of jebels and are of two types: either compact living sites or workshops. A total of ten sites were reported by the Combined Prehistoric Expedition. The lithic assemblage is

Figure 3.3

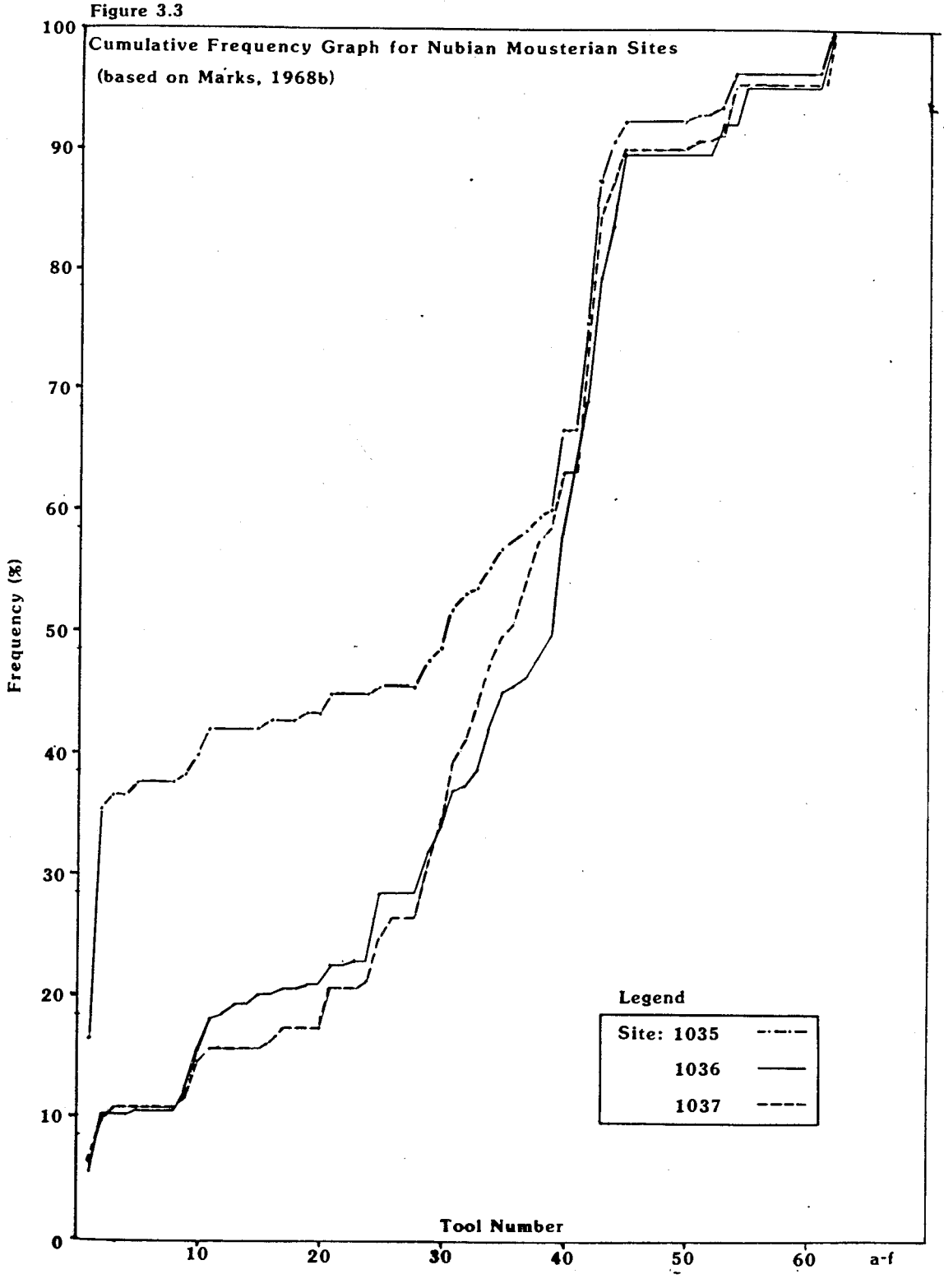

Cumulative Frequency Graph for Nubian Mousterian Sites
(based on Marks, 1968b)
Frequency (%)
100
90
80
70
60
50
40
30
20
10
0
Tool Number
10
20
30
40
50
60
a-f
Legend
Site: 1035
1036
1037

Figure 3.4

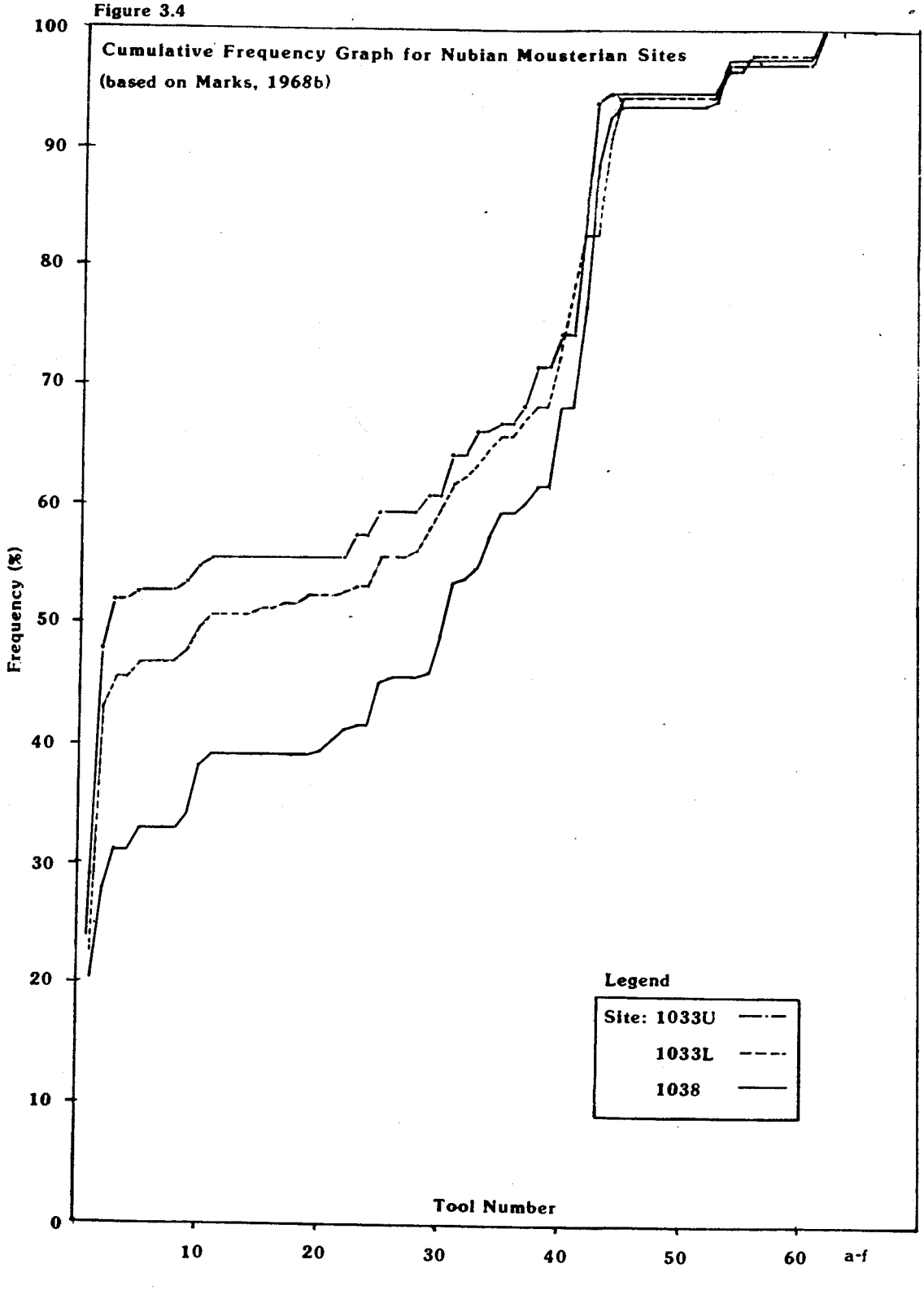
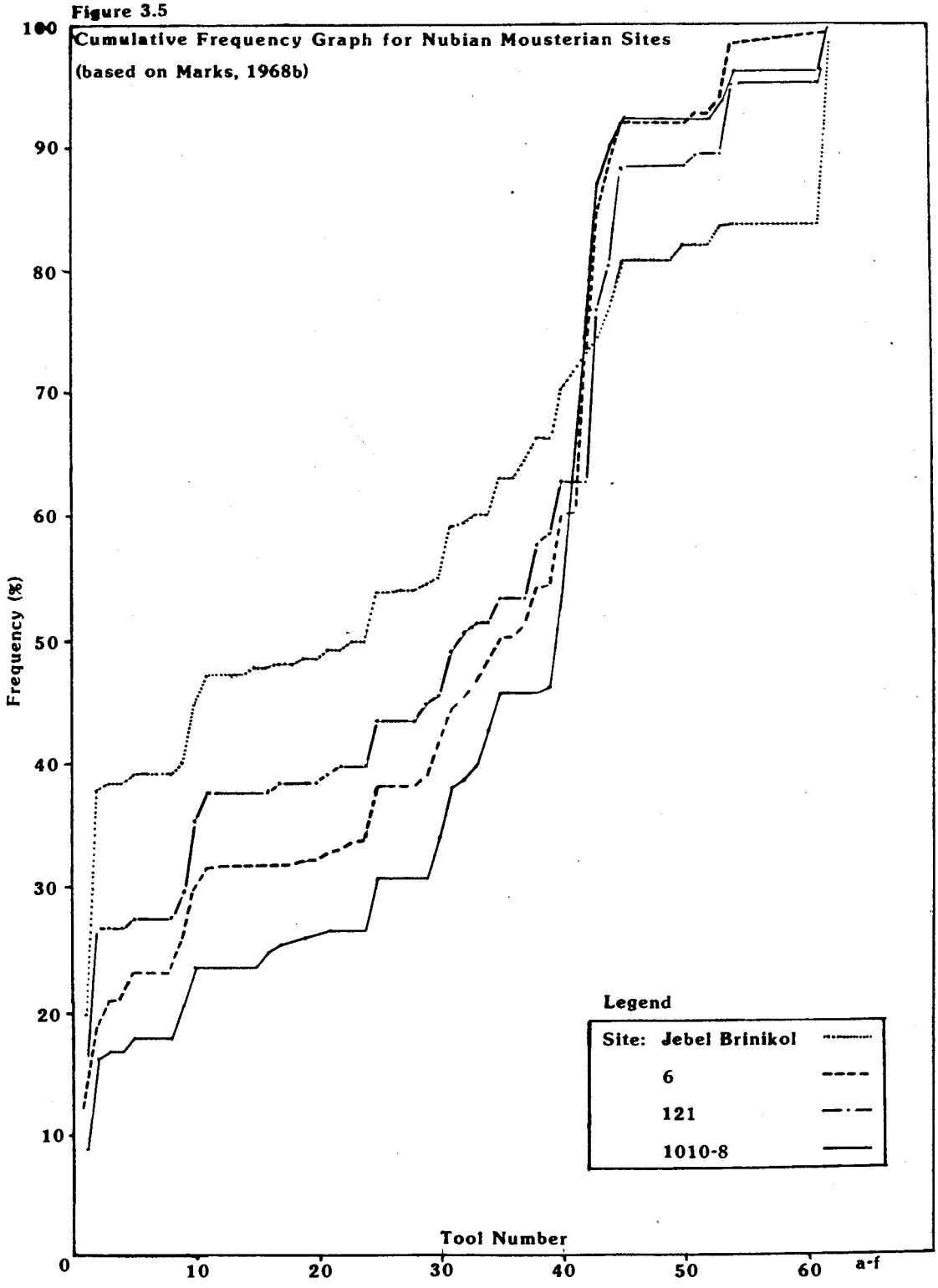

Cumulative Frequency Graph for Nubian Mousterian Sites
(based on Marks, 1968b)
Frequency (%)
100
90
80
70
60
50
40
30
20
10
0
Tool Number
10
20
30
40
50
60
a-f
Legend
Site: 1033U
1033L
1038

Figure 3.5

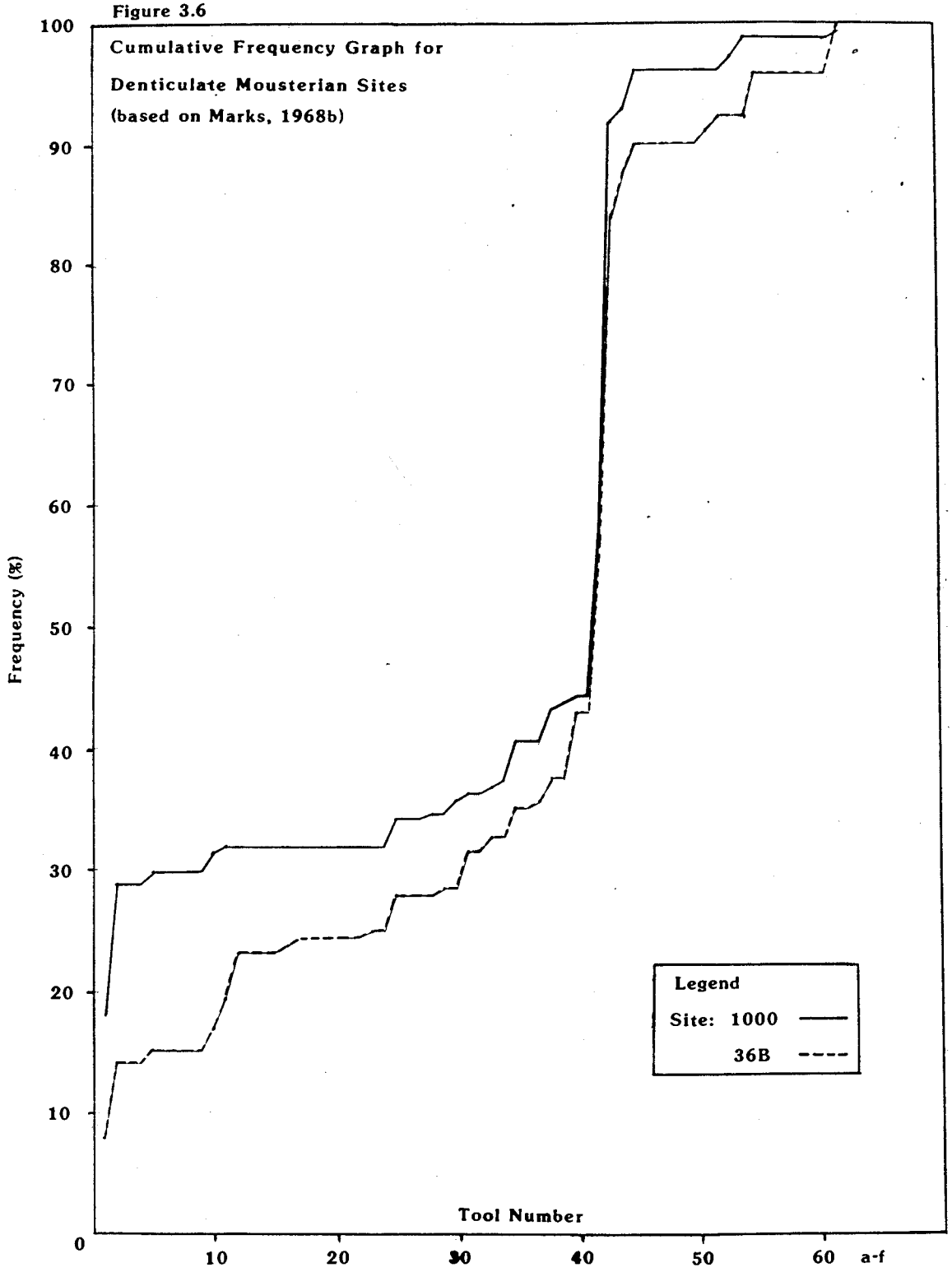

Cumulative Frequency Graph for Nubian Mousterian Sites
(based on Marks, 1968b)
Frequency (%)
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
a-f
Tool Number
Legend
Site: Jebel Brinikol
6
121
1010-8

characterized by poor quality retouch and a high number of atypical tools, made almost exclusively from ferrocrete sandstone. While Levallois flakes and points are not common they are well made as are the Levallois cores. Sidescrapers appear in equal numbers to the Upper Paleolithic tool types such as burins, backed knives and endscrapers. The Nubian Mousterian is typologically comparable to the Typical Mousterian found in Europe although significantly different due to the high frequency of Upper Paleolithic tool types (Marks, 1968). It is also similar to the Mousterian found by Wendorf and Schild (1980) in the Eastern Sahara, as is to be expected.

A second type of Mousterian called 'Denticulate Mousterian' is also known from Nubia, but only two Denticulate Mousterian sites have been found and both are located near Wadi Halfa. The assemblages of denticulates, a low frequency of blades, a low frequency of Middle and Upper Paleolithic tool types and a low Levallois index. The frequencies for this industry can be seen in Figure 3.6. The tools are all made of ferrocrete sandstone and the industry is fully comparable with the Denticulate Mousterian found in the Near East and Europe (Marks, 1968; 1970) and, like these industries, it is not known whether the Nubian Denticulate Mousterian represents a separate lithic tradition or a specialized economy.

The Nubian Middle Paleolithic is another Middle Stone Age (Middle Paleolithic) industry. A total of nine sites were located, all workshops and quarries. The absence of habitation

Figure 3.6


Cumulative Frequency Graph for
Denticulate Mousterian Sites
(based on Marks, 1968b)
Frequency (%)
100
90
80
70
60
50
40
30
20
10
0
Tool Number
10
20
30
40
50
60
a-f
Legend
Site: 1000
36B

sites again makes it difficult to fully assess the Nubian Middle Paleolithic. Marks (1968) feels that the definition for the industry, as given by Guichard and Guichard (1965; 1968), does not allow for the inclusion of the Jebel Brinikol material, as this assemblage contains only one of the three horizon markers identified by Guichard and Guichard. Marks suggests that the material from Jebel Brinikol be included in the Mousterian.

The Nubian Middle Paleolithic was defined by Guichard and Guichard (1965; 1968) and is the second complex in the Nubian Middle Stone Age. The sites, with the exception of Site 440, are all relatively small quarries or workshops and are found in situ in the Older Pediments, as well as on the surface of jebels. The Nubian Middle Paleolithic is characterized by Nubian cores and scrapers, as well as a prevalence of other scraper types. These assemblages display a high frequency of Levallois technology and typical tools include bifaces, notched pieces, denticulates, truncated flakes and bifacial foliates.

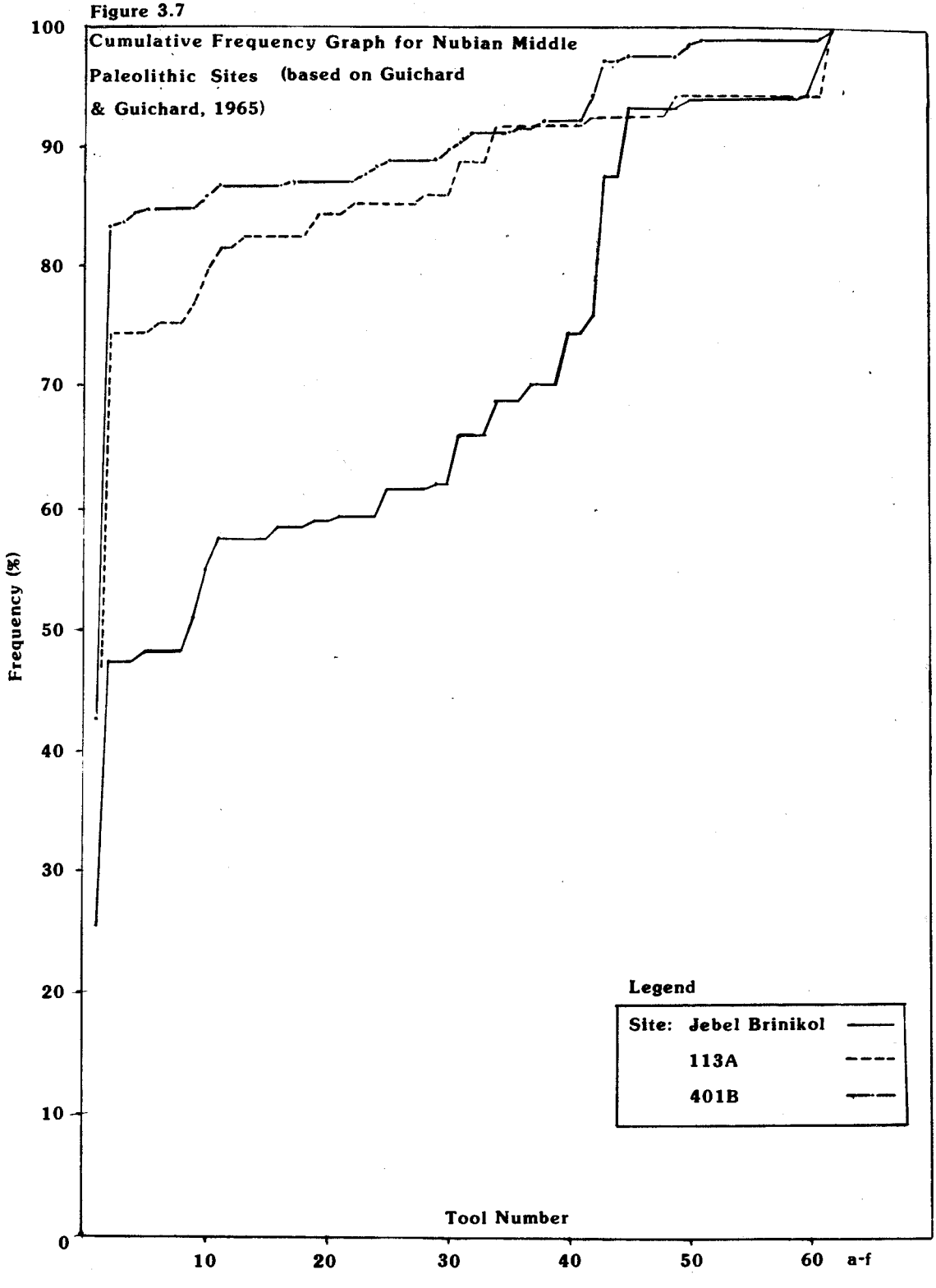
Guichard and Guichard (1965; 1968) suggested that some of the bifacial foliates discovered at Nubian Middle Paleolithic sites were similar to those found in the Sangoan, others resembled bifacial foliates from the Lupemban and even others were similar to those found in the Aterian. Unfortunately, missing from these sites were the other type fossils used to identify these industries. There were no Sangoan polyhedral stones or picks, no Lupemban core-axes and no pedunculate objects located at the Nubian Middle Paleolithic sites.

Marks (1968) felt that Jebel Brinikol should be removed from the Nubian Middle Paleolithic due to the presence of only one of the three defined horizon markers, bifacial foliates; however Wendorf and Schild (1980:252) view sites Arkin 14 and Jebel Brinikol as specialized activity sites where bifaces and bifacial foliates were manufactured. Figure 3.7 shows the tool frequencies for three Nubian Middle Paleolithic sites for which complete data was available.

The Aterian Industry

Aterian sites are known throughout North Africa (Figure 3.8) The industry was named after Bir-el-Ater, Algeria where Reygasse (1922) located a Levallois assemblage containing pedunculate tools. Aterian sites in Egypt have been discovered at Kharga Oasis (Caton-Thompson, 1946; 1952), Dungul (Hester and Hobler, 1969), Jebel Uweinat (de Heinzelin, Haesaerts and Van Noten, 1969) and Bir Tarfawi (Schild and Wendorf, 1976; Wendorf and Schild, 1980). Within the Aterian there is a great deal of variation (Table 3.1). The figures for bifacial foliates record eight of the seventeen sites as having indices of less than two and only three sites as having an index figure of more than 5.0. Ferring (1975) attributes the variability to possible differences in site function, however it is equally likely that the discrepancies are due to regional variation, differences in raw material flakeability or even temporal differences. The

Figure 3.7


Cumulative Frequency Graph for Nubian Middle Paleolithic Sites (based on Guichard & Guichard, 1965)
Frequency (%)
100
90
80
70
60
50
40
30
20
10
0
Tool Number
10
20
30
40
50
60
a-f
Legend
Site: Jebel Brinikol
113A
401B

Key to Figure 3.8 (based on Ferring, 1978)

1. Dar es Soltan
2. Mugháret el'Aliya
3. Ain Fritissa
4. Taforalt
5. Vignes Deloache
6. Pierre a Sacrifices
7. Cap Blanc
8. Zaouia el Kebira
9. Anchal
10. Kheneg el Tlaia
11. Adrar Bous
12. Mreyye
13. Meniet
14. Dungul Oasis
15. Bir Sahara and Bir Tarfawi
16. Magendohli
17. Kharga Oasis
18. Bulaq Pass

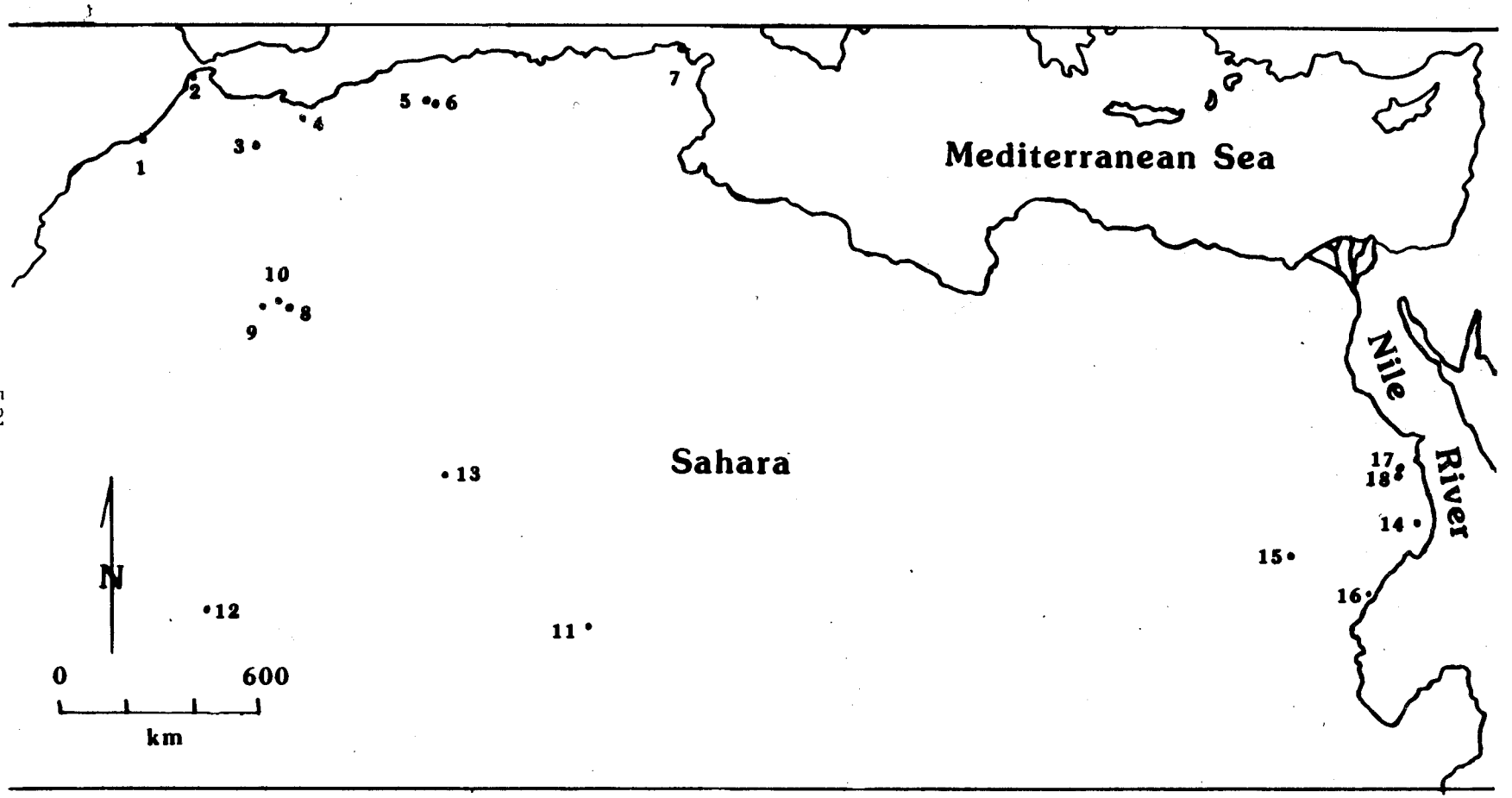


Figure 3.8. Map showing some Aterian sites in relation to Magendohli

Table 3.1 Selected Indices for Aterian sites (based on Ferring, 1978)

	Denticulates	Bifacial foliates	Pedunculates
Morocco:			
Ain Fritissa (1720)	8.3	2.7	1.1
Taforalt H (158)		1.3	0.0
Taforalt F (?)	9.5	0.8	1.3
Taforalt D (?)		12.5	4.5
Dar es Soltan 1 (96)	11.5	2.1	30.2
Dar es Soltan C2 (121)	9.9	3.3	24.8
Mugharet el Aliya 6 (503)		14.3	1.2
Mugharet el Aliya 5 (270)		2.6	2.2
Maghreb:			
Pierre a Sacrifices (143)		0.0	5.6
Vignes Deloache (220)		1.8	16.8
West and Northwest Sahara:			
Zaouria el Kebira (693)	24.8	0.1	11.8
Anchal (226)	14.2	6.6	19.5
Point 1, Mreyye (84)	25.0	1.2	14.3
Kheneg et Tlaia	8.1		28.1
Central Sahara:			
Meniet (223)	5.4	few	3.1
Egyptian Sahara:			
Dungul 8735 (73)	19.2	0.0	1.4
Dungul 8708 (60)	10.0	1.7	11.7

Table 3.1 continued

	Blade Index	Mousterian Points	Sidescrapers
Morocco:			
Ain Fritissa (1720)		5.7	63.3
Taforalt H (158)	36.3	3.1	61.0
Taforalt F (?)	32.0	2.1	41.3
Taforalt D (?)	42.2		27.2
Dar es Soltan 1 (96)	36.1	4.1	40.6
Dar es Soltan C2 (121)	29.1	4.1	36.4
Mugharet el Aliya 6 (503)		14.9	17.1
Mugharet el Aliya 5 (270)		24.4	17.4
Maghreb:			
Pierre a Sacrifices (143)		9.1	79.0
Vignes Deloache (220)		0.0	64.0
West and Northwest Sahara:			
Zaouia el Kebira (693)	20.2	4.0	28.3
Anchal (226)		13.7	12.4
Point 1, Mreyye (84)	11.0	1.2	10.7
Kheneg et Tlaia (135)		6.7	4.4
Central Sahara:			
Meniet (223)		1.3	17.0
Egyptian Sahara:			
Dungul 8735 (73)	26.1	0.0	6.9
Dungul 8708 (60)	25.0	3.3	16.7

Table 3.1 continued

	Endscrapers	Burins	Facetting Index
Morocco:			
Ain Fritissa	3.3	0.5	54.9
Taforalt H (158)	7.5		65.5
Taforalt F (?)	8.0		64.9
Taforalt D (?)	15.9		69.3
Dar es Soltan 1 (96)	5.2	0.0	51.7
Dar es Soltan C2 (121)	0.0	1.7	49.0
Mugharet el Aliya 6 (503)	0.4		
Mugharet el Aliya 5 (270)	0.4		
Maghreb:			
Pierre a Sacrifices (143)	5.6		
Vignes Deloache (220)	11.8		
West and Northwest Sahara:			
Zaouia el Kebira (693)	4.0	3.6	39.1
Anchal (226)	11.5	2.7	54.0
Point 1, Mreyye (84)	8.3	0.0	31.0
Kheneg et Tlaia (135)	20.7	2.2	
Central Sahara:			
Meniet (223)	28.3		81.3
Egyptian Sahara:			
Dungul 8735 (73)	6.9	5.5	75.0
Dungul 8708 (60)	11.7	0.0	76.1

Table 3.1 continued

	Restricted Facetting Index	Blade Index
Morocco:		
Ain Fritissa (1720)	43.4	
Taforalt H (158)	53.7	29.7
Taforalt F (?)	49.7	28.4
Taforalt D (?)	50.0	28.3
Dar es Soltan 1 (96)	41.4	20.0
Dar es Soltan C2 (121)	30.0	13.7
Mugharet el Aliya 6 (503)		
Mugharet el Aliya 5 (270)		
Maghreb:		
Pierre a Sacrifices (143)		
Vignes Deloache (220)		
West and Northwest Sahara:		
Zaouia el Kebira (693)	21.8	12.9
Anchal (226)	53.5	
Point 1, Mreyye (84)	13.0	24.0
Kheneg et Tlaia (135)		
Central Sahara:		
Meniet (223)	75.4	
Egyptian Sahara:		
Dungul 8735 (73)	55.9	16.3
Dungul 8708 (60)	41.3	19.6

latter is a likely possibility as there are very few good radiocarbon dates available for the Aterian.

The closest Aterian sites to Nubia are those found at Bir Tarfawi (Wendorf and Schild, 1975; 1980). The closest quarry/workshop is at Kharga Oasis. Unfortunately, Caton-Thompson (1946;52) worked at this site prior to the creation of Bordes' typology and extrapolation of her data is extremely difficult. It would appear that the most compatible data for comparison with the Magendohli assemblage is the material from Bir Tarfawi. Before this is done however, a brief description of the site and its assemblages may be helpful. Bir Tarfawi and Bir Sahara are located on a sandy plain in the approximate centre of the Nubian Desert, about 350 km. west northwest of Abu Simbel. The area is marked by three shallow basins, the eastern one is Bir Tarfawi, Bir Sahara is 14 km. west of Bir Tarfawi, however this is not the Bir Sahara excavated by Beadnell in 1927 (Wendorf and Schild, 1980:52).. The third unnamed basin lies 22 km. northwest of Bir Tarfawi. The entire region is archeologically rich in fauna and "...provides a basic sequence for the early Upper Pleistocene of the Western Desert ...consisting (sic) of a series of alternating lacustrine events associated with human occupations (Wendorf and Schild, 1980:20)." The human occupation includes the Acheulean, Mousterian and Aterian aged sites.

The stratigraphic sequences at the site indicate that the environment was quite rich during the Aterian occupation. Four

species of mollusks were recovered, in addition to the faunal remains which included two types of gazelle, two types of antelope, fox, wild ass, jackal, white rhinoceros, wild camel, a large bovid, turtle and birds. In general, the faunal remains are characterized by herbivores adapted to a savannah or steppe environment. The presence of camel and Gazella rufifrons suggests a dry steppe. Other than the camel and the bovid, both of which are extinct, all of the species in the faunal assemblage are found today in Sudan and Chad, a minimum distance of 1000 km. (Gautier, 1980:325). It is not known whether these animals were attracted to the Bir Sahara-Bir Tarfawi region on a seasonal basis or whether they were full time residents.

The site at Bir Tarfawi (BT-14) was a remnant of indurated lake deposit which had numerous animal bones in various stages of weathering eroding from the surface. Aterian artifacts were scattered amongst the bones (Wendorf and Schild, 1980:52). Other Aterian artifacts were clustered on the calcareous lake deposits or on the lowered dune deposits near the lacustrine sediments.

> Some of the clusters are of enormous size, representing a continuous litter of dropped artifacts, the largest of which covered an area of 180 m. in length by 50 m. in width. Presumably, almost all of them could represent many reoccupations of suitable places near lakes (Wendorf and Schild, 1980:53).

The site was divided into distinct areas and labelled 'A' through 'F' and 'N' Area A provided most of the faunal remains and few of the artifacts. Some of the lithics had been recently exposed while others were well-weathered however, both types display the same 'General Structure' characteristics. A total of

1,987 pieces were recovered from this area (Figure 3.9).

Area B produced 6,840 pieces in an area of 89 square meters. The entire extent of the concentration was not determined as much of the area is covered by a recently deposited sand sheet. It is possible that it extends a distance of 70 m. and consists of several distinct clusters. The lithics from this area are similar to those found in Area A with the exception of "...core-preparation and core exploitation elements, and (sic) differences that suggest varying approaches to the raw-material economy...(Wendorf and Schild, 1980:67)."

Area C was both surface collected and excavated. The surface collection appears to be mixed. The excavated material was recovered from a layer 15 cm. thick found just below the surface and covered an area of 118 square meters. The surface collection consisted of 630 pieces while the excavated area produced 3,587 pieces.

The artifacts from Area D did not form a distinct cluster but were separated from the rest of the area on the basis of stratigraphic evidence. A total of 501 pieces were recovered.

The assemblage characteristics of each of these areas is distinct but they are obviously related. Each area shows a high frequency of flakes, especially initial (Class I) and Levallois (Class II) forms. Blades are almost non-existent, while the hammerstone group (Class VIII) and the core rejuvenation group (Class V) are not represented. The tool kits are marked by a high frequency of Mousterian (Group II) tools and a low

Figure 3.9

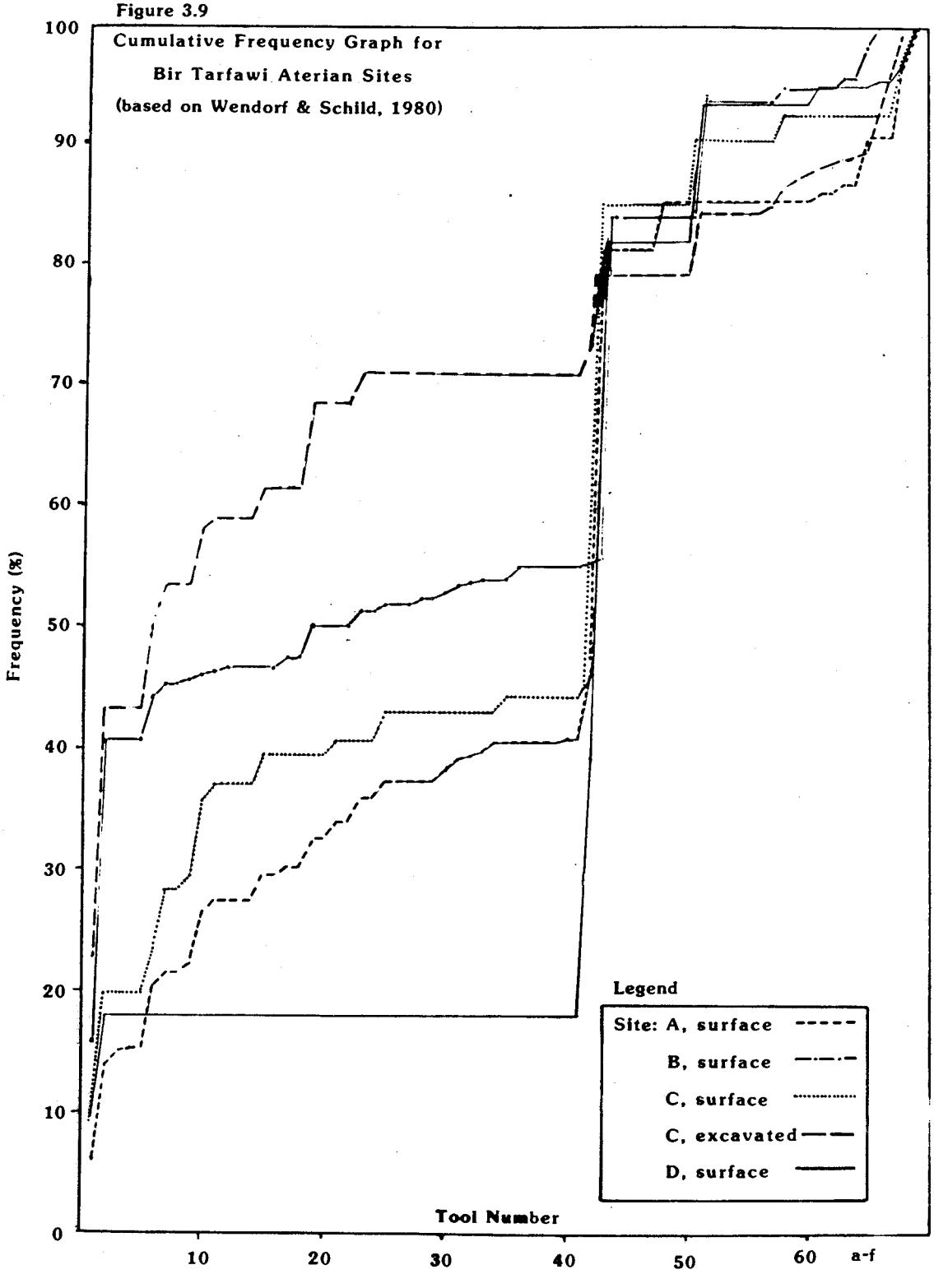

Cumulative Frequency Graph for
Bir Tarfawi Aterian Sites
(based on Wendorf & Schild, 1980)
Frequency (%)
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
a-f
Tool Number
Legend
Site: A, surface
B, surface
C, surface
C, excavated
D, surface

Figure 3.9 General Structure of Bir Tarfawi Aterian Sites.

Site:		A surface			C surface		
Class	Group	Total	%	Rest. %	Total	%	Rest. %
I	1.	96	4.8	7.4	28	4.4	15.8
	2.						
	3.	22	1.1	1.2	2	0.3	1.1
II	4.	50	2.5	3.9	40	6.3	22.6
	5.	17	0.9	2.6	8	1.3	4.5
	6.	52	2.6	8.1	15	2.4	8.5
	7.	3	0.2	0.5	1	0.2	0.6
	8.	4	0.2	0.5			
III	9.	3	0.2	0.5	2	0.3	1.1
	10.	25	1.3	3.9	8	1.3	4.5
	11.	1	0.1	0.2			
	12.				1	0.2	0.6
	13.	1	0.1	0.2			
	14.				1	0.2	0.6
	15.	14	0.7	2.2	4	0.6	2.3
	16.	9	0.5	1.4	2	0.3	1.1
	17	647	32.6		257	40.8	
IV	18.						
	19.	3	0.2	0.5			
	20.						
	21.						
	22.						
	23.						
	24.						
	25.						
V	26.						
	27.						
VI	28.	270	13.6		81	12.9	
	29.						

Figure 3.9 General Structure of Bir Artfawi Aterian Sites (continued)

Site:		A surface			C surface		
Class	Group	Total	%	Rest. %	Total	%	Rest. %
VII	30.	340	17.1	52.7	65	10.3	36.7
	31.						
	32.	2	0.1	0.3			
	33.	1	0.1	0.3			
	34.	2	0.1	0.3			
VIII	35.						
	36.						
IX	37.	413	20.8		113	17.9	
	38.						
	39.	12	0.6		2	0.3	
TOTAL		1987 (645)			630 (177)		

Figure 3.9 General Structure of Bir Tarfawi Aterian Sites

Site:		C excavated			B surface		
Class	Group	Total	%	%	Total	%	%
I	1.	58	1.6	9.2	267	3.9	17.1
	2.						
	3.	55	1.5	8.7	100	1.5	6.4
II	4.	365	10.2	57.7	675	9.9	43.1
	5.	14	0.4	2.2	36	0.5	2.3
	6.	47	1.3	7.4	149	2.2	9.5
	7.	8	0.2	1.3	15	0.2	1.0
	8.	1	0.0	0.2			
III	9.				8	0.1	0.5
	10.	6	0.2	0.9	25	0.4	1.6
	11.				1	0.0	0.1
	12.				2	0.0	0.1
	13.				4	0.1	0.3
	14.						
	15.				5	0.1	0.3
	16.				2	0.0	0.1
	17.	221	6.2		731	10.7	17.4
IV	18.						
	19.	4	0.1	0.9	23	0.3	1.5
	20.						
	21.	1	0.0	0.1			
	22.						
	23.						
	24.						
	25.						
V	26.						
	27.						
VI	28.	1454	40.5		1997	29.2	
	29.	106	3.0		29	0.4	

Figure 3.9continued

Site:		C excavated			B surface		
Class	Group	Total	%	%	Total	%	%
VII	30.	71	2.0	11.2	237	3.5	15.1
	31.						
	32.	4	0.1	0.6	4	0.1	0.3
	33.						
	34.				11	0.2	0.7
VIII	35.						
	36.						
IX	37.	1172	32.7		2495	36.5	
	38.						
	39.	1	0.0		23	0.3	
TOTAL		3587 (633)			6840 (1565)		

Figure 3.9 General Structure of Bir Tarfawi Aterian Sites

D surface

Class	Group	Total	%	% (restr.)
I	1.	5	1.0	5.2
	2.			
	3.	1	0.2	1.0
II	4.	12	2.4	12.5
	5.	2	0.4	2.1
	6.	8	1.6	8.3
	7.	3	0.6	3.1
	8.			
III	9.	2	0.4	2.1
	10.	4	0.8	4.2
	11.			
	12.			
	13.			
	14.	1	0.2	1.0
	15.	2	0.4	2.1
	16.	2	0.4	2.1
	17.	87	17.4	
IV	18.			
	19.	1	0.2	1.0
	20.			
	21.			
	22.			
	23.			
	24.			
	25.			
V	26.			
	27.			
VI	28.	149	29.7	
	29.	6	1.2	

Figure 3.9 continued

D surface

Class	Group	Total	%	% (restr.)
VII	30.	50	10.1	52.1
	31.			
	32.	2	0.4	2.1
	33.			
	34.	1	0.1	1.0
VIII	35.			
	36.			
IX	37.	153	30.5	
	38.			
	39.	10	2.0	
TOTAL		501 (96)		

frequency of Upper Paleolithic (Group III) tools, which are non-existent in Area C (excavated) and Area D. Denticulates and side scrapers are the most commonly found retouched tools. It is interesting that the Aterian type tools, pedunculates and bifacial foliates, are rare. However, it is the presence of these pieces, no matter how rare, that signals the identity of the Aterian.

The assemblage from Magendohli, although containing many more artifact types, follows much the same general pattern found in the Bir Tarfawi collections. Classes I through III of the Restricted General Structure are well represented as is Type number thirty. The artifacts in the assemblage again show the same general patterning as those from Bir Tarfawi with side scrapers, denticulates and notches occurring regularly. Tayac points are not present in the Magendohli collection, however neither are bifacial foliates, which occur infrequently at BT-14.

The Khormusan Industry

The Khormusan is the last industry in the Middle Paleolithic . It is known only from the Nile Valley and the sites are usually large and oriented on the sand along the banks of the Nile. It is characterized by unretouched Levallois flakes, burins and denticulates. In the early stages, as with the previously discussed industries, ferrocrete sandstone is the

predominant raw material although some "...pre-Cambrian rocks...(Marks, 1970:19)" are used. There is a shift to Nile chert in the later stages.

The Khormusan was originally considered to be part of the Upper Paleolithic on the basis of the high percentage of Upper Paleolithic tool types and the radiocarbon dates (Marks, 1968a). Wendorf (1968:1045) estimated the time range to be between 25,000 and 16,000 B.P., throwing out a date of >36,000 B.P. as too old. However, some of the radiocarbon samples were rerun and now the time range is estimated to be between 37,000 and 18,000 B.P. (Wendorf and Schild, 1976).

The Khormusan is known from a total of four sites all located in the Nile Valley and are all presumably small camp sites. It is now assumed that the Khormusan developed out of the Mousterian, although it was originally not considered a Mousterian-derived industry and, based on the presence of a high frequency of Upper Paleolithic tool types, was placed in the Upper Paleolithic (Table 3.10). The Khormusan is the only Middle Paleolithic industry in Nubia to have radiocarbon dates. (For a comparison of these assemblages with that of Nagendohli, see Figure 3.11).

Since the salvage work of the Sixties, little research has been done in Nubia. The reservoir area is filled by Lake Nasser, covering innumerable sites, and research now extends beyond Nubia into the Sahara Desert in Egypt. Since this time, there has been no work reported from northern Sudan except site survey

Figure 3.10

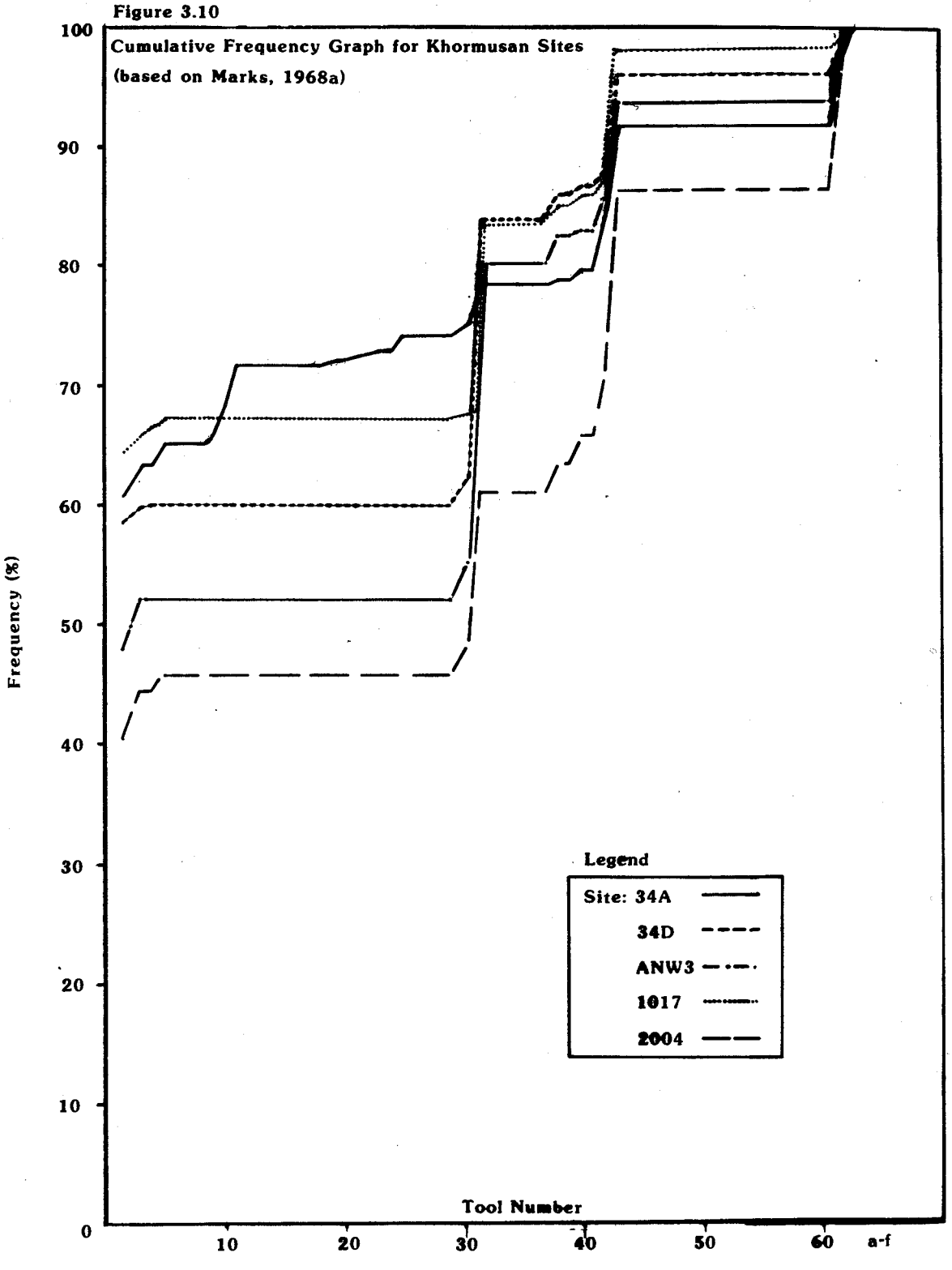
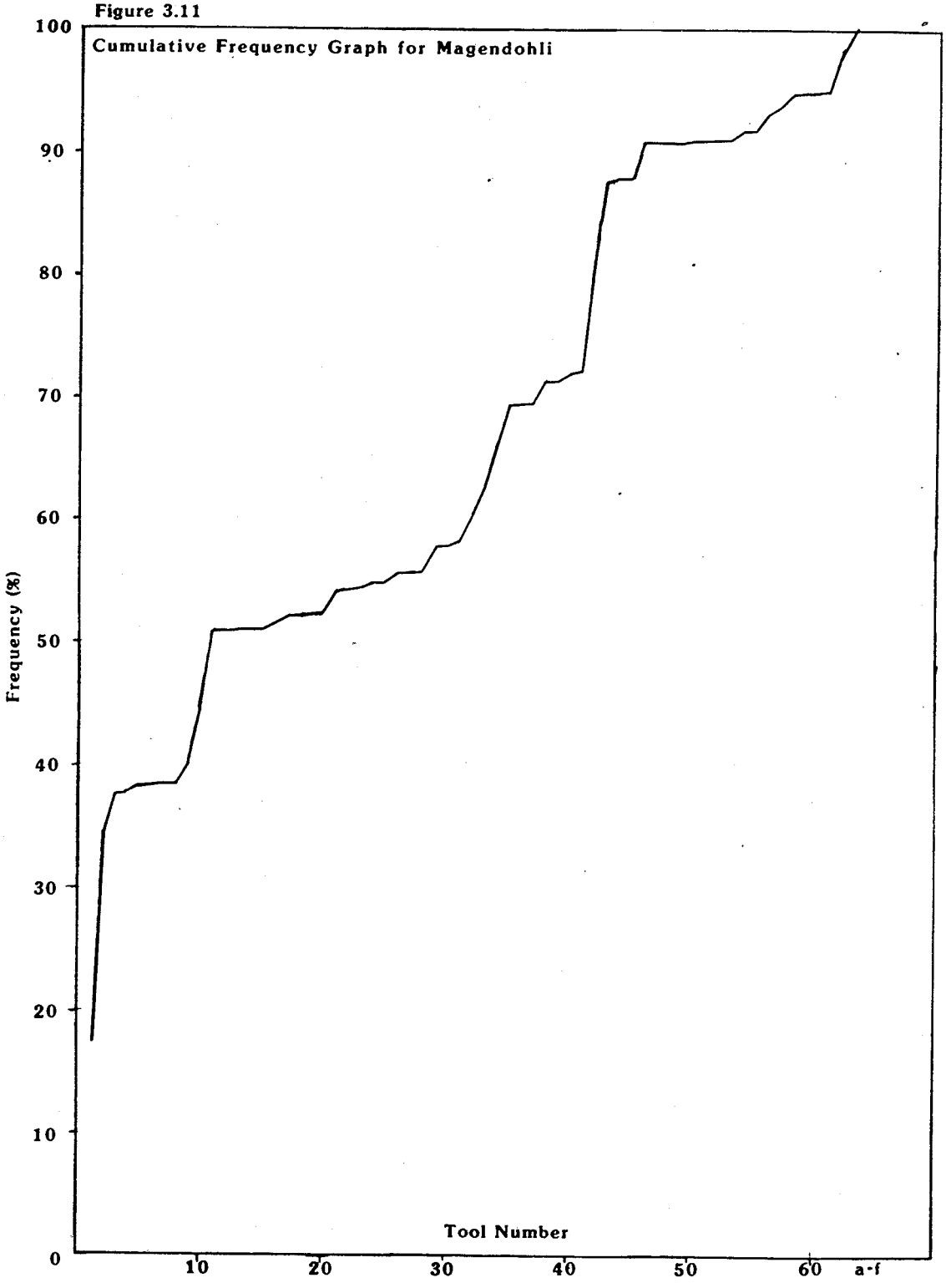

Cumulative Frequency Graph for Khormusan Sites
(based on Marks, 1968a)
Frequency (%)
100
90
80
70
60
50
40
30
20
10
0
Tool Number
10
20
30
40
50
60
a-f
Legend
Site: 34A
34D
ANW3
1017
2004

Figure 3.11


Cumulative Frequency Graph for Magendohli
Frequency (%)
100
90
80
70
60
50
40
30
20
10
0
Tool Number
10
20
30
40
50
60
a-f

reports from the Dal Cataract region where research was continued until 1974 (Vila, 1978). Much of the material which was excavated has yet to be analyzed beyond the preliminary report stage.

Discussion and Comparison of Middle Paleolithic Industries

A general survey of tool type tendencies for Middle Paleolithic aged sites in Nubia suggests that the lithics from Magendohli could belong to any of these lithic cultures. It resembles the Mousterian with its denticulates, sidescrapers and Upper Paleolithic tool types, although it lacks handaxes. However, as has been mentioned earlier, not all Mousterian sites have handaxes. Magendohli is also similar to the Khormusan with its large numbers of unretouched Levallois flakes and its denticulates. Magendohli resembles the Denticulate Mousterian with its denticulates but is dissimilar in that the assemblage from Magendohli has a high frequency of sidescrapers. However, due to the fact that all the sites recorded for the Nubian Middle Paleolithic are workshop/quarry sites as is Magendohli, the best comparison is made between these assemblages, even though Magendohli lacks bifacial foliates. Magendohli is also similar to the Aterian in that they both have relatively high frequencies of denticulates and notched pieces, not to mention pedunculates. These similarities can be further examined using Bordes' Indices. See Tables 3.2 through 3.5 for index

Table 3.2. Unrestricted Typological and Technological Indices for Nubian Middle Stone Age sites*

	IL	Ilam	ILty	IR	IC	IAu
MOUSTERIAN:						
1000	14.3	13.9	28.7	6.0	1.6	0.0
36B	11.6	11.6	14.0	13.3	3.0	0.6
1010-8	25.4	3.5	16.8	12.7	3.5	0.0
1035	21.7	7.8	36.7	10.1	2.2	1.6
1036	4.9	3.2	10.2	21.6	3.8	1.2
1037	11.6	6.0	10.8	19.8	3.4	4.5
1038	18.7	11.0	31.0	13.2	5.3	0.9
1033U	7.0	9.5	45.4	11.2	3.4	1.4
6	6.3	10.5	20.6	16.3	4.8	1.3
Jebel Brinikol	24.7	22.2	38.4	15.2	4.4	1.4
KHORMUSAN:						
1017	36.6	14.1	65.9	0.6	0.7	0.0
34D	23.2	9.0	59.7	1.5	0.6	0.0
ANW-3	30.1	14.1	51.4	1.9	1.3	0.0
2004	18.8	11.7	44.3	2.9	2.5	0.0
MIDDLE PALEOLITHIC:						
401B	15.5	4.7	84.4	4.2	2.6	0.5
Jebel Brinikol	24.3	12.9	47.5	13.7	4.0	1.4
113-A	42.3	19.7	73.0	10.8	3.6	0.0
ATERIAN:						
A, surface	8.0	2.7	15.0	15.8	6.3	
C, surface	6.7	0.8	19.8	14.8	8.6	
C, excavated	8.9	1.7	44.1	21.3	7.1	
B, surface	10.9	1.8	40.9	10.7	4.7	
D, surface	7.9	5.1	18.0			
MAGENDOHLI:	2.9	8.5	35.1	19.0	5.5	0.1

*based on data acquired from Wendorf, 1965, 1968; Wendorf and Schild, 1980.

Table 3.3 Restricted Typological and Technological Indices for Nubian Middle Stone Age sites*

	ILty	IR	IC	IAu
MOUSTERIAN:				
1000	0.0	7.2	2.4	0.0
36B	0.0	15.8	3.6	0.7
1010-8	0.0	16.7	4.5	0.0
1035	0.0	15.8	3.6	2.7
1036	0.0	23.6	4.5	1.5
1037	0.0	23.7	4.0	5.2
1038	0.0	19.3	7.8	1.3
1033U	0.0	21.0	6.4	2.8
6	0.0	21.3	6.6	1.7
121	0.0	25.2	9.4	0.0
Jebel Brinikol	0.0	27.0	7.7	2.4
KHORMUSAN:				
1017	0.0	0.6	0.6	0.0
34D	0.0	3.6	1.4	0.0
ANW-3	0.0	3.9	2.4	0.0
2004	0.0	5.3	4.4	0.0
MIDDLE PALEOLITHIC:				
401B	4.8	25.4	15.9	3.2
Jebel Brinikol	0.0	26.0	7.5	2.7
113-A	0.0	40.0	13.3	0.0
ATERIAN:				
A, surface	0.3	18.5	7.4	
C, surface	0.0	18.5	10.8	
C, excavated	0.0	38.0	38.0	
B, surface	0.0	18.1	8.0	
D, surface	0.0			
MAGENDOHLI:	0.1	30.6	8.8	0.2

*based on data acquired from Wendorf, 1965, 1968; and Wendorf and Schild, 1980.

Table 3.4 Unrestricted Characteristic Group Indices for Nubian Middle Stone Age sites*

	I	II	III	IV	VI
MOUSTERIAN:					
Site 1000	28.7	7.2	5.9	32.4	
Site 36B	14.0	14.8	7.2	26.2	
1010-8	16.8	13.8	15.1	13.9	
1035	36.9	11.2	10.9	12.5	
1036	10.2	22.0	14.4	10.2	
1037	10.8	19.8	23.6	10.8	
1038	31.0	15.0	14.2	12.0	
1033U/1	45.4	12.6	9.1	5.9	
6	20.6	19.1	13.2	11.3	
Jebel Brinikol	38.4	16.1	10.0	11.6	
KHORMUSAN:					
1017	65.9	0.6	19.2	10.8	
34D	59.7	0.6	26.4	8.8	
ANW-3	51.4	2.9	30.5	8.6	
2004	44.3	16.6	16.1	16.2	
MIDDLE PALEOLITHIC:					
401B	84.4	3.9	2.9	2.9	
Jebel Brinikol	47.5	27.4	8.3	11.5	
113-A	73.0	10.8	5.4	0.0	
ATERIAN:					
A, surface	15.0	22.1	3.0	37.8	3.8
C, surface	19.8	23.5	1.2	43.2	3.7
C, excavated	44.1	31.5		7.9	1.6
B, surface	40.9	12.2	2.7	37.2	3.5
D, surface	18.0			54.1	
MAGENDOHLI:	35.1	19.8	11.4	6.9	1.6

*based on data acquired from Wendorf, 1965, 1968; Wendorf and Schild, 1980.

Table 3.5 Restricted Characteristic Group Indices calculated for Nubian Middle Stone Age sites*

	I	II	III	IV	VI
MOUSTERIAN:					
1000	0.0	9.6	8.0	48.0	
36B	0.0	17.4	8.7	31.3	
1010-8	0.0	18.2	19.7	18.2	
1035	0.0	17.6	18.0	19.8	
1036	0.0	24.1	17.0	12.2	
1037	0.0	23.7	26.8	12.5	
1038	0.0	21.9	20.8	17.9	
1033U/L	0.0	23.8	17.5	11.1	
6	0.0	24.4	16.0	14.7	
121	0.0	26.2	12.5	16.8	
Jebel Brinikol	0.0	28.6	17.5	20.5	
KHORMUSAN:					
1017	0.0	0.6	19.2	31.5	
34D	0.0	1.4	26.4	21.4	
ANW-3	0.0	5.5	56.9	17.8	
2004	0.0	28.9	28.1	29.0	
MIDDLE PALEOLITHIC:					
401B	4.8	23.8	17.5	17.5	
Jebel Brinikol	0.0	27.4	15.8	21.9	
113-A	0.0	40.0	20.0	0.0	
ATERIAN:					
A, surface	0.3	25.9	3.5	44.4	4.4
C, surface	0.0	29.2	1.5	53.9	4.6
C, excavated	0.0	56.3		14.1	2.8
B, surface	0.0	20.7	4.6	62.9	5.9
D, surface	0.0			66.0	
MAGENDOHLI:	0.1	31.8	19.1	11.0	2.5

*based on data acquired from Wendorf, 1965, 1968; Wendorf and Schild, 1980.

calculations.

The Levallois Index (IL) for Magendohli is 2.9 which is the lowest index figure recorded for all sites under examination. The range of figures calculated for the remaining industries are: Aterian 6.6 - 10.9, Denticulate Mousterian 11.6 - 14.3, the Mousterian 4.9 - 25.4, the Khormusan 18.8 - 36.6 and the Nubian Middle Paleolithic 15.5 - 42.3.

The Blade Index (Ilame) for Magendohli is 8.5 and falls into the ranges calculated for the Mousterian (3.2 - 12.9), the Nubian Middle Paleolithic (4.7 - 19.7) and the Khormusan (8.1 - 14.1). It is higher than the range calculated for the Aterian (0.8 - 5.1) and lower than the range for the Denticulate Mousterian (11.6 - 13.9).

The Typological Index of Levallois (ILty) for Magendohli 35.1 and is a measure of the frequency of unretouched Levallois pieces within the assemblage. This number falls within the range of the Nubian Mousterian which is between 10.2 and 45.4 and the range calculated for the Bir Tarfawi Aterian (15.0 - 44.1). It is higher than the index calculations for the Denticulate Mousterian, where the two sites recorded index figures of 14.0 and 28.7. However, it is marginally lower than the range calculated for the Nubian Middle Paleolithic (38.2 - 52.6) and considerably lower than the range calculated for the Khormusan (44.3 - 65.9). The restricted Typological Index of Levallois is interesting in that all the Middle Paleolithic sites in the region record an index of 0.0 except Magendohli, which is 0.1,

and a Nubian Middle Paleolithic site (401-B), which recorded a figure of 4.8.

The IR or Sidescraper Index for Magendohli is 19.0. It is within the range of figures recorded for the Mousterian, which are from 10.1 - 21.6 and the Bir Tarfawi Aterian (10.7 - 21.3), but is higher than the remaining industries, whose index figures are as follows: Denticulate Mousterian 6.0 and 21.6, Khormusan 0.6 - 8.9, and Nubian Middle Paleolithic 4.2 - 13.7. The restricted IR index figure for Magendohli is 30.6. This is within the range of only two industries, the Nubian Middle Paleolithic, whose figures range from 25.4 - 40.0 and the Bir Tarfawi Aterian (18.1 - 38.0). The figure is far too high for the Denticulate Mousterian (7.2 and 15.8) and the Khormusan whose figures range from 0.6 - 24.1. Four of the five Khormusan sites record index figures of less than 5.4. The index figure from Magendohli is only slightly higher than those recorded for Mousterian sites which range from 15.8 - 27.0.

The Charentian Index (IC) for Magendohli is 5.5. Once again it falls within the range of the index figures for the Mousterian which records figures from 2.2 - 5.3 and for the Bir Tarfawi Aterian (4.7 - 8.6). It is marginally higher than the index figures for the Nubian Middle Paleolithic (2.6 - 4.0) and considerably higher than the Denticulate Mousterian (1.6 - 3.0) and the Khormusan (0.6 - 3.0). The restricted Charentian index figure for Magendohli is 8.8. While this is considerably higher than those figures calculated for the Denticulate Mousterian

(2.4 and 3.6) and the Khormusan (0.6 - 4.4), it does fit within the range calculated for the Mousterian (3.6 9.4) and for the Nubian Middle Paleolithic (7.5 - 15.9) as well as the Bir Tarfawi Aterian (7.4 - 38.0).

The Backed Knife Index figure calculated for Magendohli is 0.1. This is the only index in which the figure for Magendohli is within the range of all the Middle Paleolithic industries. The range of figures calculated for these industries is as follows: Denticulate Mousterian 0.0 and 0.6, Mousterian 0.0 - 4.5, Khormusan 0.0 - 0.3 and the Nubian Middle Paleolithic 0.0 - 1.4. The restricted Backed Knife Index figure for Magendohli falls within the index figure range calculated for all Middle Paleolithic industries with the exception of the Khormusan which records its index figure as 0.0. The range for the Nubian Middle Paleolithic is 0.0 - 3.2 while the Denticulate Mousterian range is 0.0 - 5.2 and the figures recorded for the Denticulate Mousterian are in the range of 0.0 - 0.7. There are no figures provided for the Aterian at Bir Tarfawi (Wendorf and Schild, 1980).

The Levallois Group Index figure for Magendohli is calculated as 35.1, identical to the ILty. This holds true for the remainder of the indices calculated for Middle Paleolithic industries. The restricted Levallois Group Index figures are identical to those for the restricted ILty.

The Mousterian Group (Group II) index for Magendohli is 19.8 and falls within the index figure ranges for the Mousterian

(11.2 - 22.0) the Nubian Middle Paleolithic (4.6 - 30.5) and the Aterian of Bir Tarfawi (12.2 - 31.5). It is slightly above the index figure range calculated for the Khormusan and well above that calculated for the Denticulate Mousterian (7.2 - 14.8). The restricted Group II Index figure for Magendohli is calculated as 31.8 which places it only within the index figure range of the Nubian Middle Paleolithic (23.8 40.0) and the Bir Tarfawi Aterian (20.7 - 56.3). It is only slightly higher than the ranges calculated for the Mousterian (17.4 - 28.6) and the Khormusan (0.6 - 28.9), but well above the range calculated for the Denticulate Mousterian (9.6 - 17.4).

The Upper Paleolithic Group (Group III) figure for Magendohli is 11.4, which falls within the range of the Mousterian (9.1 - 23.6) and the Khormusan (4.6 - 30.5). It is only slightly higher than those calculated for the Denticulate Mousterian (5.9 - 7.2) and the Nubian Middle Paleolithic (2.9 - 8.3) and well above the range for the Aterian at Bir Tarfawi (1.2 - 3.0). The restricted index for this group has been calculated for Magendohli as 19.1. This figure falls within the index range calculated for the Nubian Middle Paleolithic (15.8 - 20.0) and the Mousterian (12.5 - 26.8). It is very near the range calculated for the Khormusan (19.2 - 56.9), but well above the range for the Bir Tarfawi Aterian (1.5 - 4.6).

The Group IV Index is a measure of the Denticulate Group and has been recorded as 6.9 for Magendohli. This falls within the range of figures calculated for the Nubian Middle

Paleolithic (0.0 - 11.5) and the Mousterian (5.9 - 13.9). It should be noted, with the exception of one site (Site 1033), all of the Mousterian sites record index figures of more than 10.0. It is slightly lower than the figures calculated for the Khormusan (7.1 - 16.2) and the Aterian (7.9 - 54.1) but considerably less than those calculated for the Denticulate Mousterian (26.2 - 32.4). The restricted index figures calculated for this group for Magendohli is 11.0 which is below the ranges calculated for all the Middle Paleolithic industries, with the exception of the Nubian Middle Paleolithic whose range is 0.0 - 21.9. The figure is just slightly below the figures calculated for the Mousterian site 1033. The index figure ranges are as follows: Denticulate Mousterian 31.3 - 48.0, Mousterian 31.3 - 48.0, Khormusan 17.8 - 31.5 and Aterian (14.1 - 66.0).

Magendohli has a Group VI Index figure calculated at 1.6 (2.5 restricted), while the range for the Bir Tarfawi Aterian is 1.6 - 3.8 (14.1 - 66.0, restricted).

The restricted indices used in the above comparisons are probably the most indicative as a large number of the Middle Paleolithic sites found in Nubia are quarry or workshop sites which contain an inordinately high percentage of unretouched Levallois pieces. The presence of a large number of unretouched Levallois pieces often skews the distribution of artifact types, camouflaging significant index figures.

Summary of the Comparison

From the comparison of index figures it appears that Magendohli is most closely related to the Nubian Middle Paleolithic, as its restricted indice figures fall within the ranges calculated for this industry, while only falling within the range of five of the eight index ranges calculated for the Mousterian. The Magendohli assemblage also falls within five of eight index ranges for the Aterian at Bir Tarfawi. This relationship is highly significant in that all the Nubian Middle Paleolithic sites are quarry/workshops like Magendohli.

As previously noted Marks has suggested that the assemblage from Jebel Brinikol be removed from the Nubian Middle Paleolithic as "...most of the differences between the Nubian Mousterian and the Nubian Middle Paleolithic are not strongly reflected at Jebel Brinikol (Marks, 1968:297)." In addition, of the three type fossils found in the Nubian Middle Paleolithic (i.e. Nubian side scraper, Nubian core and bifacial foliates), the Jebel Brinikol assemblage contains only the latter. If the data from Jebel Brinikol is removed from the Nubian Middle Paleolithic, and a comparison of the resulting material is made with that from Magendohli, the collection from Magendohli still falls within the range of seven of the eight restricted indices (one unrestricted), as compared to eight of eight restricted (four unrestricted) with the inclusion of Jebel Brinikol. It would appear from this information that the inclusion (or

exclusion) of the Jebel Brinikol material has relatively little effect on the interpretation of the Magendohli collection, if dealing only with restricted indices.

Marks' statement on the validity of including Jebel Brinikol in the Nubian Middle Paleolithic suggests that the Magendohli collection also not be included in the Nubian Middle Paleolithic as, even though the assemblage is technologically and typologically similar, it lacks the necessary horizon markers: Nubian side scrapers and bifacial foliates. The data suggest that, while Magendohli may not belong to the Nubian Middle Paleolithic due to the absence of horizon markers, it is related in terms of technology and typology. It is possible that the Jebel Brinikol and Magendohli assemblages are either transitional or regional variants however more data is needed to prove or disprove these hypotheses.

Indices for Magendohli and BT-14 show that the figures for Magendohli fall well within the range calculated for the assemblages from Bir Tarfawi, with the exception of the Group III figure where Magendohli has a much higher Upper Paleolithic tool index than those from Bir Tarfawi. Despite the differences in site function, the tool kits remain remarkably similar. As has been previously mentioned, it has been suggested that the Aterian and the Nubian Middle Paleolithic are related however there has been no further research undertaken to test this hypothesis.

A comparison of tools shows that the major difference between the Nubian Middle Paleolithic assemblages and the Aterian assemblages from Bir Tarfawi are the absence of Mousterian points and the relatively small number of Tayac points, not to mention the absence of pedunculates. However, general trends are still distinguishable. There is a relatively high frequency of side scrapers, especially the simple forms; a relatively low frequency of Upper Paleolithic tool types and a low frequency of chopper/chopping tools. These general trends suggest that there may indeed be a relationship between the Aterian and the Nubian Middle Paleolithic, but the extent of this relationship and the connection between them and the Magendohli assemblage cannot be determined.

IV. Conclusions

In the previous sections the lithic assemblage collected from the excavations at Magendohli has been described and discussed not only as a separate entity but in comparison with Nubian assemblages of similar ages. The industries discussed must be better defined and hypotheses concerning the relationships between these industries should be developed so as to test them. The problem at hand was to discover how the lithics from Magendohli fit into the present chronological scheme and to derive information from the site which may aid in developing the archaeologist's understanding of the prehistory of the region. Magendohli is similar to all of the local industries of the Middle Paleolithic period. Further refinement of its relationships must await the development of better cultural-historical models against which to test hypotheses than those which presently exist for the Nubian region.

Nubia's cultural chronology is based on pre-existing models taken from other regions. While lithic industries from Nubia may resemble those from other regions, they are also different. However, it has been a practice in the past to lump all similar assemblages together regardless of their differences. The Aterian is a good example. Aterian sites have been found from the Atlantic coast to the Nile Valley but the range of variability of assemblages is tremendous. This is the result of

a number of factors, the major one being that the presence of pedunculates is the horizon marker for the industry and little attention has been paid to the other associated lithics. It is necessary for the archaeologists working in these regions to re-examine their data outside the confines of existing cultural chronologies in the hopes of redefining their industries and/or clarifying their criteria for membership in a specific lithic tradition. African lithic cultures are not the same as those found in Europe and while European chronologies and typologies were a good starting point for examining lithic industries from Africa, it is now necessary to develop chronologies and definitions for industries which are more suited to what is found in Africa.

Future research in Nubia should strive to correct many of the problems which presently exist. Wendorf and Schild's research in the Western Desert in Egypt is an attempt to correlate the data from the Nile with what is found in the bordering regions. Work such as this should be extensively continued south of the Second Cataract, as well as reaching out into the desert. Raising of the river level south of Aswan may have resulted in the covering of some archeological sites however many more should still be found on the higher terraces and banks. Extending surveys out from both banks of the river should result in the location of numerous sites. Research strategies should be focussed on, not only 'filling in' the gaps in the archaeological record but also to develop hypotheses on

the relationships between the industries. The questions raised by Marks concerning the inclusion of Jebel Brinikol in the Nubian Middle Paleolithic, suggests that the Nubian Middle Paleolithic, as defined by Guichard and Guichard, should be re-examined in the hopes of clarifying the specific characteristics of a Nubian Middle Paleolithic site.

The preceding chapters have attempted to present the data in as complete a manner as possible. The geological data, in conjunction with the environmental information, suggests that Magendohli was occupied during a relatively wet period which was then followed by an extensive period of aridity. In the Western Desert, this appears to correspond to the Mousterian-Aterian period and in the Nile Valley, it probably corresponds to the Nubian Middle Paleolithic. The lithics from Magendohli suggest that there is a relationship not only between the Nubian Middle Paleolithic of the Nile Valley but also with the Aterian of the Sahara Desert. Due to the differences in site types available for study (the desert sites are habitation sites as opposed to quarry/workshops in the Nile Valley), it is difficult to assess the relationship between the two industries and Magendohli, however it appears that a relationship does exist.

It is hoped that the information presented here not only adds to the scant data base but provides comprehensive information which may be reworked, if necessary, in the future. The hypothesis which suggests that the Nubian Middle Paleolithic and the Aterian may be related has been further strengthened by

the data presented here and it is also hoped that future research will test this hypothesis as well as to develop the complete prehistory of Nubia into something more substantial than a chronological framework. The development of this cultural chronology has been fraught with problems and has raised as many questions as it has answered, but it provides a base on which to centre future investigations.

Future research should take of the form of more refined definitions for lithic industries as well as to develop a cultural-historical model on which to structure continuing research.

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