Angela E. Close

Early Holocene raw material economies in the Western Desert of Egypt

This paper deals with the use and treatment of lithic raw material in 22 assemblages, from 16 sites in the Western Desert of Egypt. Geographically, the sites fall into two major areas: six in the region of Gebel Nabta, some 100 km. west of Abu

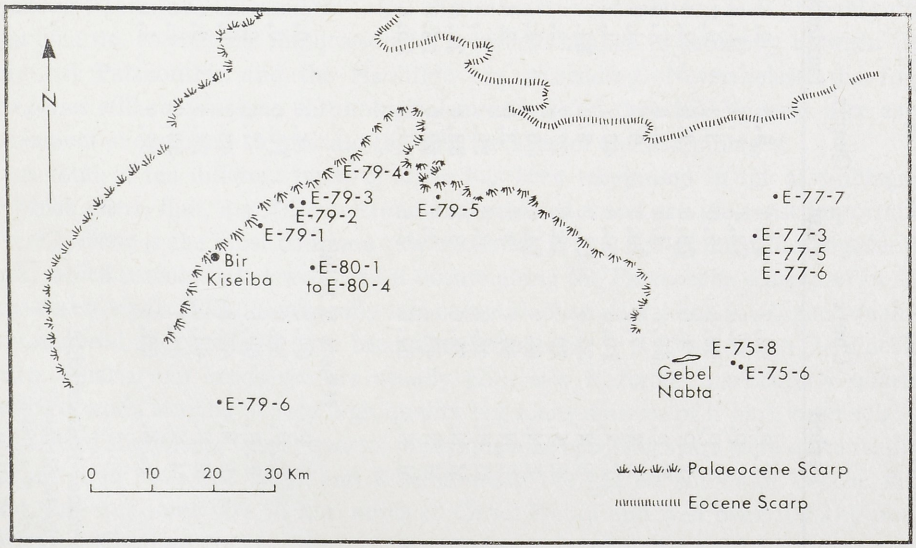

Fig. 1. Location of sites discussed and of Eocene and Palaeocene scarps

Simbel (Wendorf and Schild, 1980), and ten in the region of Bir Kiseiba, about 180 km. west-north-west of Abu Simbel (Fig. 1).

In the Nabta area, the Terminal Palaeolithic sites of E-77-3 and E-77-7 have radiocarbon dates of 8,840 B.P. ±90 (SMU 416) and 8,960 B.P. ±110 (SMU 440), respectively. The Early Neolithic of E-75-6 has 12 radiocarbon dates, ranging from

Table 1

Percentage frequencies of raw meterials in Early Holocene assemblages in the Western Desert

	Period	Chert	Flint	Quartz	Sandstone	Petrified Wood	Granite	Basalt	Jasper Chalcedony	Agate	Sample Size
Kiseiba Sites											
E-79-1, Surface	T.P.	53.7	21.1	5.3	2.5	17.1	0	0	0	0.4	0	2110
E-79-1, Excavated	T.P.	73.5	12.4	1.4	1.3	11.1	0	0	0	0.3	0	1200
E-79-3	T.P.	33.3	5.0	3.3	0.3	57.2	+	0	0.3	0.6	0	2361
E-79-4, Lower	T.P.	4.6	76.9	2.3	2.0	14.3	0	0	0	0	0	2437
E-80-4	T.P.	55.3	1.5	2.6	7.2	24.8	0	0	8.6	0	0	6949
E-79-4, Upper	E.N.	7.8	70.3	9.2	1.0	11.6	0	0	0	0	+	2890
E-79-5	E.N.	10.5	36.6	46.7	1.1	4.5	0.4	0	+	0.1	+	5466
E-80-1, Area A	E.N.	35.8	11.2	3.0	21.9	25.7	0	0	0	2.6	0	3320
E-80-1, Area C	E.N.	29.1	28.0	27.2	2.7	12.9	0.1	0	0	0	0	5974
E-80-2	E.N.	60.7	24.6	0	4.4	10.3	0	0	0	0	0	252
E-80-3	E.N.	64.7	9.5	3.6	3.0	16.7	0	0	0	2.5	0	3350
E-79-2	M.N.	45.9	8.6	26.1	1.6	17.1	+	0.2	0.4	0.1	+	27846
E-79-6, Surface	M.N.	28.6	3.5	38.4	21.6	6.1	0.7	0	0.1	0.9	0	6871
E-79-6, 0-20 cm.	M.N.	43.5	2.7	32.7	16.9	3.7	0.4	0	0	0.1	0	4489
E-79-6, Below 20 cm.	M.N.	55.6	2.6	21.5	15.8	4.5	0.2	0	0	0	0	1323
Nabta Sites		(Chert & Flint)										
E-77-3	T.P.	94.8		1.3	0.5	1.7	0.1	0.5	0.2	0.8	0.1	3977
E-77-6	T.P.	83.5		10.0	0.5	4.4	0.4	0	0.7	0.3	0.2	5236
E-77-7	T.P.	69.5		7.6	2.7	19.8	0.3	0	0	0	0.1	1733
E-75-6	E.N.	45.8		43.0	1.5	7.4	1.9	0	0.3	0.1	0.1	3208
E-75-8	M.N.	61.5		24.5	3.0	0.7	3.2	+	1.0	6.0	0.1	9459
E-77-5	M.N.	31.7		53.7	1.8	2.7	4.8	0	4.2	0.9	0.2	3898
E-75-8	L.N.	55.3		33.9	4.8	0.7	0.9	0.3	1.3	2.4	0.4	2261

Legend: T.P.: Terminal Palaeolithic
E.N.: Early Neolithic
M.N.: Middle Neolithic
L.N.: Late Neolithic
\+ : present but less than 0.1%

7,680 B.P. ±70 (SMU 191) to 8,130 B.P. ±60 (SMU 255). There is one date for the Middle Neolithic site of E-77-5 (7,530 B.P. ±100; SMU 462), and 13 dates for the same period at E-75-8, ranging from 6,240 B.P. ±70 (SMU 361) to 7,120 B.P. ±150 (SMU 242). The Late Neolithic at E-75-8 has a single date of 5,810 B.P. ±80 (SMU 473) (Close, 1980; Haas and Haynes, 1980). Near Bir Kiseiba, radiocarbon dates for the Terminal Palaeolithic are 8,250 B.P. ±70 (SMU 739) at E-79-1, 7,950 B.P. ±130 (SMU 744) at E-79-3, and 8,250 B.P. ±140 and 8,190 B.P. ±120 (both are SMU 750) at E-79-4. The Early Neolithic is dated to 7,890 B.P. ±90 (SMU 756) in the Upper Cultural Layer at E-79-4, and 8,070 B.P. ±190 (SMU 761) at E-79-5. The Middle Neolithic has dates of 8,130 B.P. ±110 (SMU 760) and 7,610 B.P. ±70 (SMU 764) at E-79-2, and 7,170 B.P. ±80 (SMU 749) at E-79-6 (below 20 cm.).

The assemblages have classified into four been groups: Terminal Palaeolithic (eight), Early Neolithic (seven), Middle Neolithic (six) and Late Neolithic (one) (Table 1). It was originally believed that this classification had some "cultural" significance, particularly in the distinction between the Terminal Palaeolithic, thought to represent essentially hunting-and-gathering groups, and the Neolithic, associated with pottery and domesticated plants and animals. It now appears, however, that the so-called "Terminal Palaeolithic" sites may also contain pottery and probably domestic cattle, so that the implications of a radical change in economy between the Terminal Palaeolithic and the Neolithic are misleading. Nevertheless, the four categories still retain some chronological meaning and they will be used here as a convenient short-hand to indicate the relative ages of the assemblages.

A total of ten different types of stone has been recognised in the assemblages, of which chert, flint, quartz, sandstone and petrified wood are the most important. Overall, chert is the most common raw material. It is a fine-grained, homogeneous rock, which usually flakes well, and it occurs along the Palaeocene scarp and in the rare desert wadis. Flint is generally less common than chert, but is a higher quality raw material and seems to have been a preferred one. It is found along the Eocene scarp. Quartz and sandstone are usually poor raw materials, particularly quartz; petrified wood may be of very high quality but many sources of it have been subject to thermal shattering. Chert, quartz, sandstone and petrified wood were quite readily accessible in both the Nabta and Kiseiba areas; the nearest source of Eocene flint however, was some 60 - 70 km. north of Gebel Nabta and well over 100 km. northeast of Kiseiba.

Of the minor raw materials, granite and basalt are found in occasional outcrops and are difficult to work. Chalcedony occurs as nodules on the "chalcedony playas" (Haynes, 1980) and may be a high quality raw material if the nodules are of sufficient size and not to have been weathered throughout. Jasper and agate both flake well but were little used. Jasper was available from local basement outcrops and agate may have been brought from the Nile Valley.

Given the differences in flaking-properties between the various raw materials, it is hardly surprising that they were treated differently within assemblages. Chert

is the most common raw material and, overall in the Kiseiba area, it is divided between the three major artefact classes as follows: 93.1% debitage; 5.5% cores; 1.4% tools. Taking chert as a standard with which other raw materials can be compared, we find that sandstone, jasper, chalcedony, granite and basalt produced relatively fewer cores and tools than chert; these are generally not high quality raw materials. Petrified wood was used to manufacture approximately the same relative frequencies of cores and tools as was chert; this is a good quality raw material when not thermally fractured and such pieces could, presumably, be recognised and discarded "in the field". Quartz yielded fewer tools than chert, which accords with its poor flaking-properties, but more cores. The latter phenomenon is assumed to result from the initial small size of the quartz pebbles, from which fewer useful flakes could be struck before exhaustion. Eocene flint, on the other hand, produced a relatively much higher frequency of tools than did chert, and fewer cores. Of the major raw materials, flint was the most difficult to obtain, but the cores do not seem to have been more fully exploited than were those of other raw materials; they are not, for example, noticeably smaller. The lower frequency of flint cores may, therefore, reflect the practice of curation – that flint was so highly valued that groups would take the cores with them when they moved. Flint was the finest of the available raw materials and was, therefore, much preferred for the manufacture of retouched tools (The frequencies of agate are so low that comparisons would be meaningless).

There are some exceptions to these general rules, but they concern only specific artefact-types in one or two assemblages. Thus, quartz was used for an unusually high frequency of the retouched tools at E-79-2, but this assemblage included many scaled pieces, which tend to be made on quartz. Similarly, sandstone tools are quite frequent in the assemblages from E-75-6 and E-75-8, but almost all of these are scrapers made on large sandstone flakes. On the whole, the differential treatment of the various raw materials within assemblages, which has been outlined above, is applicable to all of the sites under discussion.

Above this sub-stratum of similarity, there are, however, differences between sites in different areas and between assemblages of different periods. The percentage frequencies of the raw materials in each assemblage are given in Table 1. Unfortunately, chert and flint were not distinguished during the analyses of the Nabta material and only combined figures are available for the two. However, since the chert--flint group at Nabta includes significantly more tools and fewer cores than does the chert-flint group at Kiseiba, it seems likely that flint was used relatively more frequently in the Nabta sites than it was in the Kiseiba sites. The Kiseiba and Nabta assemblages differ most clearly in two of the minor raw materials, agate and granite, both of which are more common at Nabta. The consistent presence of agate may reflect the smaller distance from Nabta to the Nile Valley than from Kiseiba; the occasional presence of *Unio* shells in the desert sites shows there was some contact with the Valley. The higher frequency of granite is surely because of the large granite outcrop a few kilometres north of Gebel Nabta. Quartz crystals also could be ob-

tained from this outcrop, and quartz is more common in the Nabta sites. Of the other major raw materials, chert and flint are more frequent in the Nabta area and, as noted above, it is believed that flint, specifically, was used more frequently than at Kiseiba; this would accord with the greater distance from Kiseiba to the Eocene scarp. In contrast, petrified wood is of much greater importance in the Kiseiba area than in Nabta, possibly because flint was more difficult to obtain.

Variations in raw material frequencies between assemblages of different periods are a little less obvious from Table 1, but, in fact, are quite marked and concern principally the major raw material types. The greatest contrast is between the Terminal Palaeolithic and the Middle Neolithic assemblages – essentially, the beginning and the end of the sequence, there being only one Late Neolithic assemblage. The Terminal Palaeolithic groups made significantly more use of chert and flint (72.3%) and of petrified wood (17.5%) than did the Middle Neolithic groups (50.6% and 10.4%, respectively). Sandstone was rather less common (2.7% in the Terminal Palaeolithic and 6.0% in the Middle Neolithic) and quartz was much less common in the Terminal Palaeolithic (4.4%, as opposed to 29.8% in the Middle Neolithic). Other raw materials account, in total, for a little over 3% in each group and show only minor variations: chalcedony is rather more frequent in the Terminal Palaeolithic (probably only because of its high frequency at E-80-4) and granite and, to a lesser extent, jasper are slightly more common in the Middle Neolithic. The assemblages called Early Neolithic are a more heterogeneous group, but, as a whole, they fall quite firmly between the Terminal Palaeolithic and the Middle Neolithic, with 57.1% chert and flint, 12.4% petrified wood, 4.6% sandstone and 24.7% quartz.

Discriminant analyses were carried out on these data in an attempt to derive functions which could classify assemblages into periods, on the basis of their raw material frequencies. The attempt was only partially successful. The derived functions were able to classify the Terminal Palaeolithic and Middle Neolithic groups correctly and consistently, but not the Early Neolithic. In fact, using the major raw materials only, three of the seven Early Neolithic assemblages would be classified as Terminal Palaeolithic and two as Middle Neolithic. Additionally, in two-dimensional space the centroids of the three groups fall almost into a straight line. This, when considered together with the percentage frequencies given above, suggests that the Early Neolithic may be regarded as transitional between the Terminal Palaeolithic and the Middle Neolithic, or, to put it another, and probably better, way, that the Terminal Palaeolithic, Early Neolithic and Middle Neolithic are parts of a diachronic continuum, and that there are no real breaks between these three so-called "stages". This would accord with the underlying continuity, discussed above, in the patterns of exploitation of individual raw materials, and with evidence, from other sources, of correspondences in broader economic traits, such as the presence of domestic animals throughout the sequence and the extensive use of ground plant-foods, as witnessed by the numerous grinding-stones in all sites

and the recovery of domestic cereals from some of the Neolithic sites (Wendorf and Schild, 1980).

It remains to consider the lithic raw material economy within the overall economy of these Western Desert occupations, and how either might shed light upon the other. It is believed that the initial occupation was by groups of rather mobile cattle-herders and that their subsistence-strategies may not have been too different from those of modern cattle-herders in the Sahelian belt. Faunal studies indicate that, while cattle were present, wild rabbits and gazelle were the major sources of meat. Wild plantfoods were used extensively and, at least from the Early Neolithic onwards, barley was cultivated. Emmer wheat and sheep or goat appear in the Middle Neolithic. The (wild) fauna and flora indicate that the environment was not lush — indeed, that it was not really suitable for cattle — and it is therefore likely that the cattle had to be herded over rather long distances in order to find sufficient grazing. Sites of the initial period of occupation are small; large, organised settlements appear in the Early Neolithic and continue to be used, in conjunction with small sites, throughout the sequence.

It seems that the major factor in the selection of raw materials was opportunism. The occupants of a site tended to make use of the closest sources of suitable raw materials, hence the overall differences between the Nabta and Kiseiba areas and the differences between sites within each area. The high frequency of petrified wood at E-79-3, for example, presumably indicates the existence of a good and very close source of this raw material. It is also worthy of note that, in the large, stratified sites, the several assemblages from each site tend to be more like each other than they are like assemblages from other sites. This suggests not only a predominant use of local sources of raw materials, but also occupation of the sites by groups who already knew the local sources; that is, re-occupation by the "same" group. This, in turn, implies an established pattern of exploitative strategies with return visits to one locality, possibly on a seasonal or annual basis. This would be expected if the rains were predominantly seasonal in nature, and therefore predictable.

As well as opportunism, however, there was also a strong appreciation of, and preference for, good quality raw materials, particularly in the Terminal Palaeolithic and Early Neolithic. This is especially seen in the use of two raw materials, agate and Eocene flint. Agate is very rare and probably came from the Nile Valley. Traces of the Western Desert groups have not been found in the Valley, and it seems likely that the agate was obtained by trade. Flint, also, might have been got by trade, but the volume of it used suggests otherwise. After the rains, the plateau above the Eocene scarp would have been covered by grassland, with water being trapped in the numerous small basins. It seems improbable that the cattle would not have been taken up there to graze, in season, and flint could have been collected at the same time. The Eocene plateau remains an archaeological *terra incognita* but the hypothesis seems reasonable, particularly since many small and short-lived encampments of this general period are known from above the Palaeocene scarp near Ki-

seiba. As the plateau dried, the cattle would be brought back to the much larger basins below the scarp, and the flint was brought with them and treated as a prized raw material. Here, the assemblages from E-79-4 must be mentioned as being anomalous. Although the site is so far from the Eocene scarp, over 70% of all artefacts were made on flint, even during the Early Neolithic when the site appears to have been a large and well organised settlement of some permanence. The reason for this very high frequency is not known. The site may have been some kind of trading centre, but there is no sign of the goods for which the flint was traded. Alternatively, it may simply have been the first major stop after the return from the scarp, when the herders were still carrying a full complement of flint. In any case, it would seem to suggest that there was heavy and possibly quite rapid contact between E-79-4 and the Eocene scarp area.

This is essentially the pattern throughout the Terminal Palaeolithic and Early Neolithic, but it seems to have changed a little during the Middle Neolithic. There is no change in the settlement pattern, as we know it, but emmer wheat and sheep or goat were introduced into the economy at about this time. The changes in raw material usage are, perhaps, best shown in the Middle Neolithic sequence from E-79-6, where flint is always rare, chert decreases markedly through time and sandstone and quartz become much more common. This is accompanied at all sites by a change in typology, from the well made, specialised and essentially "Palaeolithic" tools of the Terminal Palaeolithic and the Early Neolithic, to a more generalised and, on the whole, less well made tool-kit, composed principally of notches, denticulates and retouched pieces. These two, the changes in raw material and in typology, correlate very closely but the relationship between them need not have been one of cause--and-effect. I would suggest that they are both symptoms of a general loss of interest in stone-working.

The reduction in the use of flint, which is known for the Kiseiba area and may also have occurred at Nabta, might indicate that the Eocene scarp was less accessible in the Middle Neolithic. Perhaps the greater emphasis upon food-production led to an increased territorial sense, so that it was more difficult to herd animals over long distances, or perhaps there was greater sedentism. In either case, it would be more difficult to obtain flint. On the other hand, the fine-grained Palaeocene chert was readily available from the Kiseiba scarp, but even this nearby source was much less heavily exploited during the Middle Neolithic. In this light, it seems possible that the Eocene plateau may have continued to be used for grazing as before, but that there simply was no longer so much interest in bringing back large quantities of fine flint.

Why this decline and loss of interest in stone working occurred is a mystery, but it has been observed in other Neolithic contexts. It does not seem to be associated with the onset of food-production *per se*, but it may be that it occurs at the stage when food-production finally becomes the most important part of the subsistence--strategy; when the "hunter" becomes a "peasant". It is interesting, in view of the

recent finds from Wadi Kubbaniya (Wendorf *et al.*, 1980), that even in the harsh Western Desert, where "environmental stress" might be expected to have been rather significant, some form of food-production was known and practised for several millennia before this change took place.

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