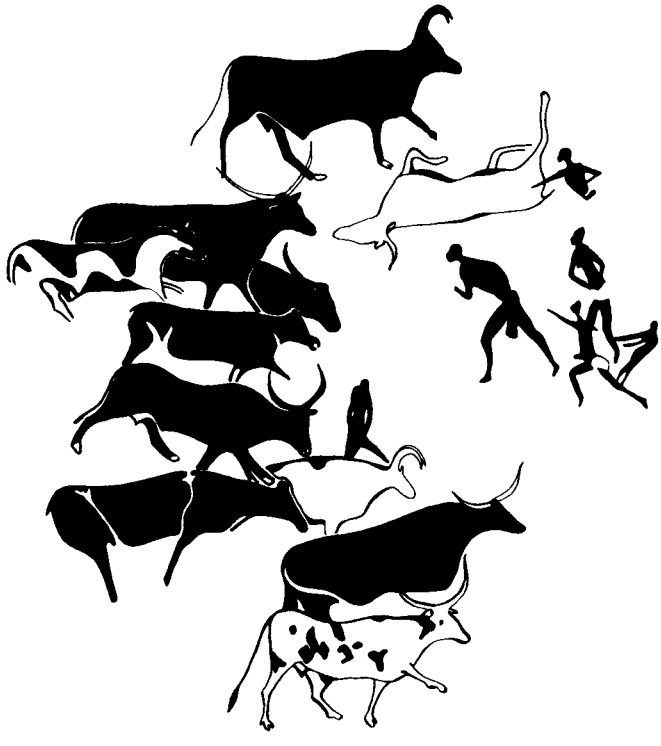
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Earth, Man and Climate in the Egyptian Nile Valley During the Pleistocene

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INTRODUCTION

Perhaps no valley in the world has received so much attention in the scientific literature as the lower part of the Nile Valley in Sudan and Egypt. Most reviews are based on a few original contributions containing an astonishing quantity of geological and archaeological observations, which were the outcome of research projects lasting several years. The work of Sandford (1934) and of Sandford and Arkell (1929, 1933, 1939) is now classic, but the publications resulting from the Nubian Salvage Campaigns (Butzer and Hansen 1968; Wendorf 1965, 1968a) are invaluable. There have also been smaller-scale studies of Nilotic prehistory, such as those of Bovier-Lapierre (1926) in Abbassia, of Vignard (1923) and of Smith (1966, 1967) in the Kom Ombo area, of Caton-Thompson (1946), of Debono (1973) near Luxor and of Vermeersch (1978) in Elkab (Figure 3.1).

The early 1980s were exceptionally rich in scholarly publications concerning the Nile Valley. These included reports on Wadi Kubbaniya (Wendorf *et al.* 1980, 1986), Williams and Faure's (1980) compendium of Quaternary environments and prehistoric occupations in the valley and in the Sahara, Said's magisterial work on the geological evolution of the Egyptian Nile (1981; see also Said 1975) and the alluvial history of the Blue and White Niles in central Sudan (Williams and Adamson 1982). These comprehensive accounts of the geological and geomorphological evolution of the Nile Valley might give the impression that the Nilotic sequences are well established for most periods in the past. Even the well-documented Late Pleistocene, however, has been the focus of considerable revision of general concepts both by the Combined Prehistoric Expedition (Wendorf and Schild 1976a; Wendorf *et al.* 1980) and also in the critical comments of other scholars (Butzer 1982; Hassan 1982).

The series of publications on Nilotic prehistory, which began with the Nubian Campaign, has radically altered our perception of the subject. Earlier researchers had believed that this was an isolated part of North Africa and remained outside the general current of evolution of lithic industries as known in Europe and southwestern Asia. Wendorf was able to conclude in 1968 that this whole concept of stagnation in the lithic

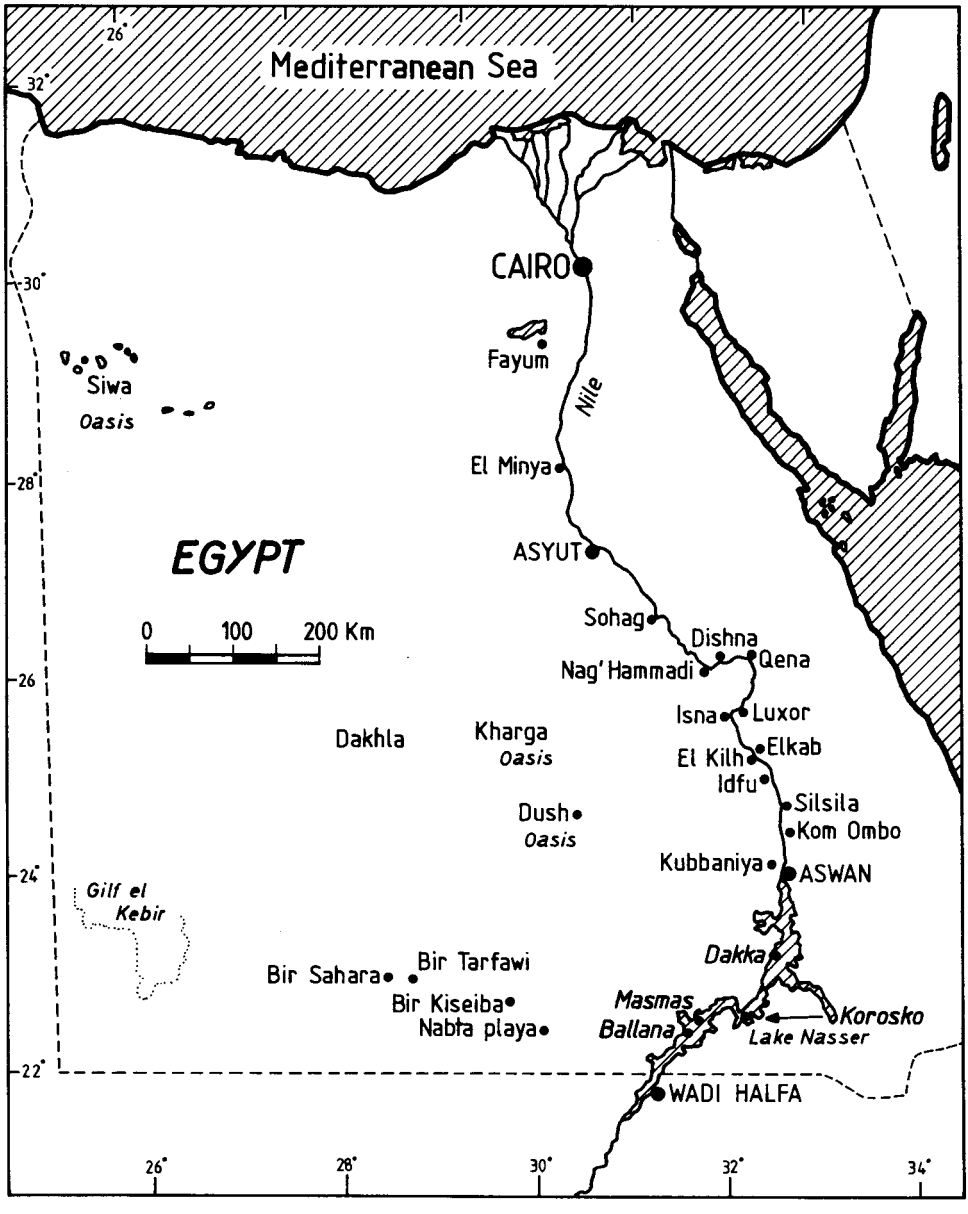


Figure 3.1 Map of Egypt.

sequence, which had supposedly evolved from a local Acheulean to Middle Paleolithic Levalloisian into Epi-Levalloisian and Sebilian flake industries, bore no relation to reality (1968b:1054). The Combined Prehistoric Expedition's subsequent work on the Late Paleolithic in particular has revealed a very dynamic complexity with enormous variability in technology and typology.

The Belgian Middle Egypt Prehistoric Project (B.M.E.P.P.) was begun in 1976 and still continues. Our research objective is a general study of prehistoric sites that are geologically *in situ* (that is, buried within or under other layers, but not necessarily in primary archaeological context), and our study area is between Qena and Asyut

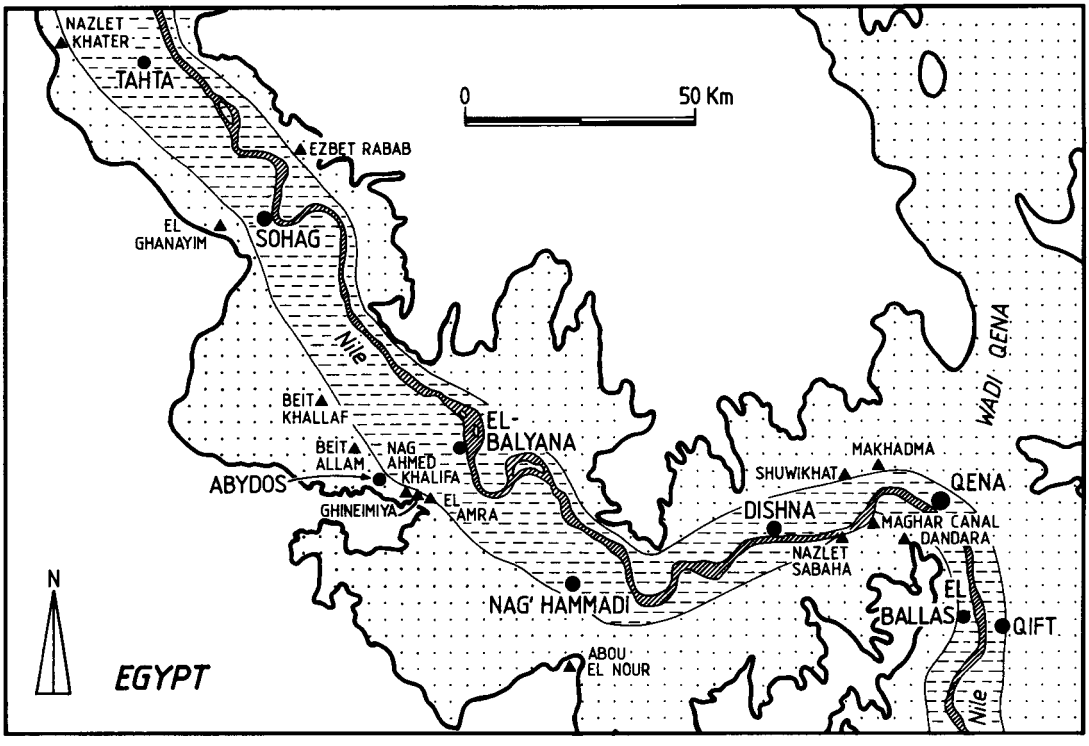


Figure 3.2 Locations of sites in the areas of Qena, Abydos and Sohag-Tahta.

(Figure 3.2), which was a direct extension of those parts of the valley most recently studied when we began. Considerable time has been invested in surveys to obtain a general impression of the area of study and to select the most appropriate sites for detailed excavation, so that as many artifacts as possible can be recovered in stratigraphic context. Thus far, we have excavated one Acheulean, five Middle Paleolithic and four Upper and Late Paleolithic sites. Detailed geomorphological and geological studies of the surrounding areas have revealed a very complex stratigraphy, which we have not been able to relate to the known Nile sequence. Nevertheless, the stratigraphic framework of these sites sheds new light on environmental and paleoclimatological models for the Nile Valley, and the results of the radiometric dating of the Upper Paleolithic sites were most unexpected (Paulissen *et al.* 1985; Vermeersch *et al.* 1982a, 1982b, 1984a, 1984c, in press b).

In this chapter, we will evaluate the detailed observations upon which more general concepts have been developed by several authors, and will add our own observations. Finally, we will develop conclusions and working hypotheses for further research in the Nile Valley.

STRATIGRAPHIC POSITION OF LOWER PALEOLITHIC ARTIFACTS

The human origin of the supposedly Pebble Culture artifacts recovered by Debono (1973) in local terraces near Luxor is questionable. Other stratigraphically very old artifacts are culturally non-specific.

Most of the Acheulean artifacts reported in the Nile Valley are derived surface finds (Chmielewski 1968; Guichard and Guichard 1965, 1968; Sandford 1934; Sandford and Arkell 1929, 1933, 1939), although the surface concentrations sampled in Sudanese Nubia did provide some information on the typological evolution of handaxes. Since the classic studies of Sandford and Arkell, we have known that the bottom of the Nile Valley was already quite close to its modern position in Acheulean times. They reported "Chellean" and Acheulean artifacts within gravel deposits they described as Nile or wadi terraces at elevations of 30 m and 15 m (respectively) above the modern floodplain throughout the Nile Valley, with an additional discontinuous terrace at 22 m in Egyptian Nubia.

The basic observations of Sandford and Arkell have been elaborated in Nubia by Butzer and Hansen (1968) and Butzer (1980). They introduced the following informal names for the alluvial gravel units with Acheulean artifacts: the Dakka stage (older) at 30–35 m, with a valley margin pedimentation, and the Wadi Korosko stages (younger) at 23–25 m and 12–15 m.

All these gravel deposits containing Late Acheulean are called the Abbassia gravels by Said (1981), and were deposited during his Prenile/Neonile interval (Q_2/Q_3). It is worth noting that the archaeological content of the deposits has not been restudied, so that their relation with the Acheulean is still based purely on the finds of Bovier-Lapierre (1926) at Abbassia, near Cairo, and on those of Sandford and Arkell.

Butzer (1980:260) places the "Late Acheulean artifacts contained in a matrix of red gravels" (Kleindienst 1967:111) in the Adindan stage at 40–42 m, which predates the major paleosol in Nilotic Quaternary deposits (Butzer 1980:258).

The Qena Formation, as defined by Said (1981:51–58), represents deposits of the Middle Pleistocene Prenile (Q_2); the only datable elements included in this formation were some late Acheulean implements in its top part (Said 1981:58).

It is unfortunate that we have no further details about the finds in these two older deposits, since artifacts of such stratigraphic importance should be carefully documented. Experience has taught us that clear profiles are essential to distinguish between an *in situ* formation and overlying slope deposits reworked from the original material. In our own surveys, we have not found any artifacts *in situ* either in gravel deposits overlain by the major paleosol or in the Qena Formation. We believe that the Qena Formation is much older. In the Qena area, the inverted gravel deposits overlying the formation show heavily weathered soil profiles such as we have observed only in very old terrace deposits. The limestone cobbles within these gravels show clear solution phenomena with subsequent drop formation and *in situ* limestone redeposition.

Most Acheulean bifaces were found at the surface, but only a very few clusters of Acheulean artifacts were recovered *in situ*. These observations support the hypothesis, to which we subscribe, that the Late Acheulean sites occur within sediments associated with a wadi of relatively modern morphology (Wendorf and Schild 1980b:227).

The site of Arkin 8 (Chmielewski 1968:111) is indeed situated near the edge of the lower wadi terrace and is covered by 20–30 cm of wadi deposits. At Nag Ahmed Khalifa near Abydos, a cluster of locally derived Middle to Late Acheulean artifacts is situated within a weathered wadi fan (Figure 3.3) composed of gravels and cobbles, a few meters above the wadi bed and very close to, but 11 m above, the Nile floodplain (Vermeersch *et al.* 1977, 1979, 1980a). This site is covered by the red paleosol already noted at the top of the Late Acheulean levels by Said (1981) and classified by Butzer (1980) as a Haplargid.

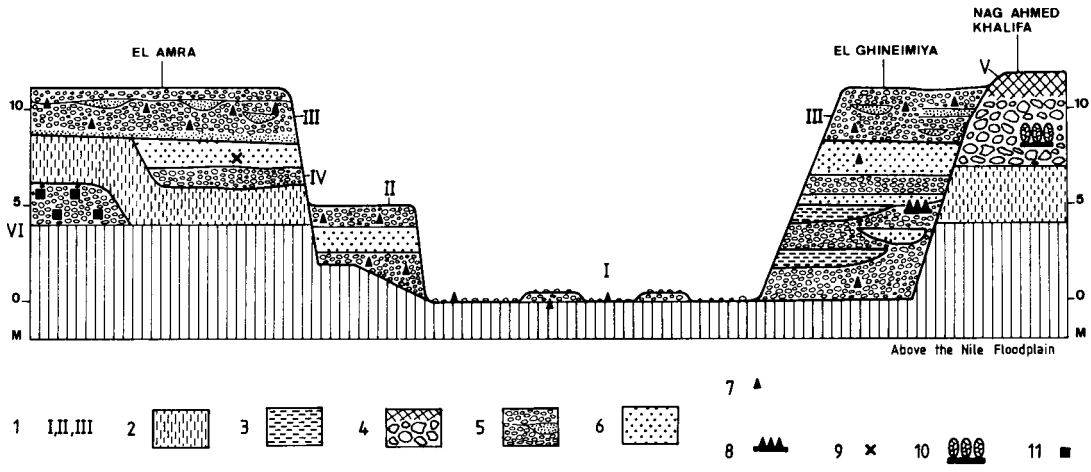


Figure 3.3 Wadi deposits in the Abydos area, as exemplified in Wadi Himeil. Key: 1, important wadi stages ordered from younger to older; 2, heavily weathered Nile silts occurring locally up to +23 m, attributed to the Dandara Formation; 3, Nile silts intercalated in a Middle Paleolithic wadi fan deposit; 4, very coarse wadi deposits with red soil on top, containing Nag Ahmed Khalifa Acheulean site; 5, wadi deposits, very gravely in a sandy matrix; 6, sandy wadi deposits; 7, derived Middle Paleolithic artifacts; 8, Middle Paleolithic site of El Ghineimiya; 9, Levallois point; 10, Acheulean site of Nag Ahmed Khalifa; 11, derived flakes in wadi deposits underlying Dandara silts.

The Dandara Formation is made up of a lower bed of grey, calcareous silt and an upper unit of brown weathered silt with thin limestone interbeds (Said 1981:112). Hassan (1976) has shown that this formation is the oldest known Nile deposit of Ethiopian origin. In the type-area, the Dandara silts can still be seen at 25 m above the modern floodplain (their top is estimated to be at +27 m). Their base is at +12 to +14 m and the silts overlie a unit of Nile cobble deposits with a thickness of at least 9 m. Near Ballas, we have observed a Nile gravel terrace with its top at 26–27 m and its base at 21–22 m above the modern floodplain, eroded into the Dandara Formation. There is a second, well-preserved terrace postdating the Dandara Formation in an old meander bend on the eastern bank, about 15 km downstream from Qena. The flat surface of the terrace is close to +20 m, but the base of the gravel is very irregular, consisting of a succession of different channels with uneven bases. No artifacts were recovered *in situ*, but derived slope deposits yielded one biface.

This observation is of the utmost importance, since it shows the intercalation of Ethiopian flood-silts of the Dandara Formation between older cobble terraces, many of the cobbles being of local origin, and younger gravel terraces, the gravels originating from the Red Sea Hills, Nubia and Sudan.

In the type-section at Dandara (Site E61O1), the truncated top of the Dandara silts is at +15 m (our measurements) and is covered by a wadi wash about 1 m thick with a red paleosol on top. The artifacts recovered from the red wadi deposits and overlying the Dandara Formation are interpreted as Late Acheulean with Levallois technology (Wendorf and Schild 1976a:95 and 1980b:227); a single core was found *in situ* within the silts. We also have studied the type-section and have found numerous Late Acheulean handaxes *in situ* within the wadi gravels, as well as flakes in the very top of the silts. During our 1984 survey, we found numerous handaxes throughout the Dandara area, but always in the slope deposits overlying the truncated Dandara Formation, or on top of older gravel terraces.

On the western bank of the Nile between Nag Hammadi and Tahta, we mapped several exposures of transgressive and heavily weathered Nile silts reaching elevations of +23 m. At El Amra, south of Abydos, these silts cover a wadi deposit with rolled artifacts, which precludes a Pliocene age; no *in situ* artifacts have been recovered from the silts. There is, however, clear morphological evidence that both the Dandara silts in the type area and these old Nile silts near Abydos are younger than the gravel terraces mentioned above and than the Qena Sands. We therefore tentatively correlate the old silts in the Nag Hammadi-Tahta stretch with the Dandara Formation.

At Nag Ahmed Khalifa, near Abydos, the gravel fan with a red paleosol, containing *in situ* Middle to Late Acheulean, is deposited in a wadi mouth eroded in the Dandara Formation. We conclude from this that the Nag Ahmed Khalifa Acheulean site postdates the Dandara silts.

In light of what is known about the high age of human presence in Africa and Europe, it is likely that human occupation of the Nile Valley is very old and could well be of Early Pleistocene age. Apart from some culturally non-specific flakes and cores from wadi deposits below the Dandara Formation, the earliest clear evidence for human presence in the Nile Valley postdates the Dandara Formation and can be attributed to a Middle or Late Acheulean industry.

MIDDLE PALEOLITHIC AND RELATED DEPOSITS

Hassan (1980) gives a good review of the Middle Paleolithic sites which have been studied along the Nubian Nile. Several groups have been defined on technological and typological grounds: the Nubian Mousterian, the Denticulate Mousterian (Marks 1968a) and the Nubian Middle Stone Age (Guichard and Guichard 1965, 1968). The sites give no evidence for clear stratigraphic superposition of the various industries, nor was there any other evidence which would permit a chronological seriation (Hassan 1980:428).

Wendorf and Schild (1976a, 1976b) have made important revisions to the chronology developed in Nubia, and these revisions have been supported by new radiocarbon dates (Wendorf *et al.* 1979). First, the Khormusan is considered to be a Middle Paleolithic industry on technological grounds, a point of view we fully share. In their evaluation of the Middle Paleolithic of Nubia, Wendorf and Schild (1976b) proposed a sequence, from older to younger, of Mousterian (Nubian Mousterian and Denticulate Mousterian), Aterian and Aterian-related industries, such as the Nubian Middle Paleolithic, and Khormusan. Second, the radiocarbon chronology for some prehistoric sites in Nubia has been revised drastically, especially in relation to the Khormusan, and a new absolute chronology has been proposed (Wendorf and Schild 1976a:238; Wendorf *et al.* 1979). It is now believed that the Khormusan is much older than was originally thought and lies beyond the range of conventional radiocarbon dating.

As far as we know, not a single Middle Paleolithic site was known *in situ* in the Egyptian Nile Valley downstream from Aswan before the work of the B.M.E.P.P. Derived artifacts, however, are quite common. Most are related to local deposits, and only a few occur in Nilotic deposits. The B.M.E.P.P. has located several *in situ* Middle Paleolithic sites and has thus far excavated five of them. Before discussing their general

characteristics, we will first consider the geographical position of the surface sites and then the stratigraphic position of the main Middle Paleolithic sites and of the most important derived Middle Paleolithic artifacts.

Surface Sites

Our survey of the lower desert, mainly on the western bank, has shown that Middle Paleolithic artifacts can be found throughout the area, both scattered over wide surfaces and in many local terrace deposits. Unfortunately, sites with material in underived stratigraphic position are extremely rare. From this, we may conclude that Middle Paleolithic occupation was very extensive and important, but that most of the sites have been destroyed by erosion since their occupation. This erosion prevents any detailed study of site locations, but we have been able to collect some information about site distribution in the valley.

Accumulations of Middle Paleolithic material over large areas (>1000 m^2) could be observed on higher terraces and pediments, and on the edge of the limestone plateau bordering the valley. Some of them, like that at Abou el Nour (Vignard 1921), were already known, and others were discovered by us, such as El Ghanayim (ME76/16 and ME76/17) and Beit Khallaf (ME76/25). All of these sites are related to the exploitation of local chert; few real retouched tools were produced.

Comparable geographical situations, but not directly related to chert occurrences, have yielded smaller artifact concentrations, such as Site ME76/26 near Beit Khallaf. The number of artifacts is sometimes very low (<100 artifacts), but refitting is still possible. Other sites are larger and contain several thousand artifacts. These surface sites always lack small chips. The huge concentration of artifacts could imply that the original artifact scatter, as created by prehistoric man, has been largely preserved and that probably only the very small pieces have been removed by deflation. These sites are always in geomorphological situations that suggest they were located on good observation points. This may mean that they were related to hunting, and the scarcity of tools may indicate some specialized, short-term activity.

Stratigraphic Position of *In Situ* Middle Paleolithic Sites

Nubian Sites

The geological and archaeological results obtained by the Combined Prehistoric Expedition in Egyptian and Sudanese Nubia have been fully published by Wendorf (1965, 1968a), but it is mainly the geological work of the joint Yale University-Canadian National Museum group, in Egyptian Nubia and the Kom Ombo Plain, which has been published (Butzer and Hansen 1968). The geologists of both groups introduced their own lithostratigraphic sequences with different terminologies. However, the general frameworks of both systems were identical, and were based upon aggradations of Ethiopian flood-silts at different levels, separated by periods of Nile dissection. Even in the earliest publications of their results, nearly identical lithostratigraphic correlations (Figure 3.4) were proposed for most of the Late Pleistocene formations deduced (de Heinzelin 1967:324; Butzer and Hansen 1968:323–324).

Since all the Nubian Middle Paleolithic sites were excavated by the Combined Prehistoric Expedition, we will relate them to the lithostratigraphic column originally

proposed by de Heinzelin. Apart from the Khormusan sites, only one site is in relation to Nilotic deposits.

Ikhtiariya Formation. Two prehistoric occurrences, Site 440 (Shiner 1968:636) and Site 34A (Marks 1968b:318), are reported to be related to the Ikhtiariya Formation in Sudanese Nubia. Site 440, in the Khor Musa, consists of a lower and an upper archaeological level (de Heinzelin 1968: Atlas Figure 15, Industries 6 and 7) in a sand unit, which is interpreted as aeolian in origin. The sand unit is part of the Ikhtiariya Formation and is covered by Nile silts (de Heinzelin 1968:46). According to Shiner (1968:636), the industry of Site 440 has some resemblances to the early Khormusan assemblages and affinities with the Denticulate Mousterian. Wendorf and Schild (1976a:237) classify the site as Denticulate Mousterian with an Aterian affiliation. The Khormusan Site 34A lies within the top of a large dune 30 m above the floodplain and is covered by fluviatile sands and silts. These dune sands are the type-section of the Ikhtiariya Formation.

Dibeira-Jer Formation with Khormusan. The Khormusan industry, of which several sites are *in situ*, seems to be limited to the Nubian Nile Valley. Marks states (1968b:321) that there is no Khormusan site beyond the limits of the Dibeira-Jer Formation, and that no Mousterian artifact was ever found within or directly under it. The Dibeira-Jer Formation was originally defined (de Heinzelin 1968:46) as a Nile aggradation with regular and rapidly accumulating silt layers and sand-bars up to about 156–157 m asl, or 34–35 m above the floodplain in the type area. It lies over the Ikhtiariya Formation and under the Ballana Formation; an important vertisol developed on its top.

Site 1017, the type-locality of the Khormusan (Marks 1968b:343–352), is considered to be a living-floor included within the Dibeira-Jer aggradational phase. A charcoal sample from this site was originally dated at 20,900 B.P. ± 280 years (WSU.203), but redated as >36,750 B.P. (SMU.245, after incomplete pretreatment; Wendorf *et al.* 1979). Another Khormusan site, 34D, is *in situ* near the top of the Dibeira-Jer at +28 m, and yielded a date of >41,490 B.P. (SMU.107; Wendorf *et al.* 1979).

Ballana Formation with Khormusan. A Khormusan site, ANW-3, has also been reported from the overlying Ballana Formation. At ANW-3 (Marks 1968b:320), Khormusan artifacts are reported on and in the formation, which is banked against a remnant of Dibeira-Jer silts. The site has a date on charcoal of 17,800 B.P. ± 500 years (WSU.215), which must be considered suspect; unfortunately, the sample was too small to be redated (Wendorf *et al.* 1979). The Khormusan Site 2004 is situated at +8 m, but it is not certain whether it belongs to the base of the Sahaba Formation or to the final phase of the Ballana Formation (Marks 1968b:321).

Comments on the Nubian Sites. The reassessments of the Nubian Middle Paleolithic have had major consequences on the presumed ages of some lithostratigraphic units established by de Heinzelin. The Dibeira-Jer aggradation, the underlying Ikhtiariya Formation and even part of the overlying Ballana Formation, which contains *in situ* Khormusan, should all date from before 40,000 B.P.

Both de Heinzelin and Butzer and Hansen correlated the Dibeira-Jer with the Masmas Formation (Figure 3.4), on the basis of their identical morphological position,

de Heinzelin	Butzer and Hansen	
QADRUS Formation	GEBEL SILSILA FORMATION	(?) KIBDI Member
ARKIN Formation		(?) ARMINNA Member
BIRBET Recession		(Downcutting)
SAHABA Formation		DARAU Member
BALLANA Formation (Aeolian)	(Downcutting)	
DIBEIRA-JER Formation (ex-Khor Musa F)	MASMAS Formation	
IKHTIARIYA F. (Aeolian)	(Downcutting)	
	KOROSKO Formation	

Figure 3.4 Lithostratigraphical correlations for Late Pleistocene Nile deposits proposed by de Heinzelin (1967) and Butzer and Hansen (1967, 1968).

lithological field characteristics and the superposition of an important vertisol. No archaeological remains are known from the Masmas Formation. Two marl samples from Kom Ombo have radiocarbon dates of 18,300 B.P. ± 310 years (I.2060) and 17,100 B.P. ± 400 years (I.2178). (For discussion of these dates, see Butzer and Hansen 1968:496; it is important to note that only Sample I.2060 was taken *within* the Masmas Formation.) Because of the type of material dated, we consider these readings to be highly questionable, and the chronostratigraphic position of the Masmas Formation not to be established. This is something which has not been reconsidered in the literature since the real minimum age of the Khormusan became apparent.

Sites Studied by the B.M.E.P.P.

All the sites we will discuss here are in the lower desert on the western bank of the Nile, except for Makhadma-6 which is on the edge of Wadi Makhadma on the eastern bank. All wadi and slope evolution at these sites is the result of very local rains, so that the wadi evolution is complementary to that of the wadis on the eastern bank upstream from Qena (Butzer and Hansen 1968; Vermeersch 1978), where wadi discharge originates from rains falling in the Red Sea Hills. The lithic industry of these sites, which is being studied by P. Van Peer, can be generally described as having a predominantly Levallois technology. Tools are rare and are essentially restricted to a few denticulates.

Qena Area. Site Makhadma-6 is a rather well-preserved Middle Paleolithic site, 11 m above the Nile floodplain on the lower slope of Wadi Makhadma, some 12 km downstream from Qena. The Qena Sands are covered with 0.5-m thick slope-wash of

coarse sands and gravels mixed with rolled Middle Paleolithic artifacts. At one spot, a small concentration of about 200 fresh artifacts was found within the top of the slope-wash. Many of these artifacts could be refitted, but there were no chips. Stratigraphically, the site predates the deposition of the Shuwikhat silts (Paulissen *et al.* 1985).

A Middle Paleolithic, but otherwise undated, chert-exploitation site has recently been discovered at Nazlet Sahaba, downstream from Dandara (Vermeersch *et al.* in press a). No dated Middle Paleolithic Nile deposits are known in this area.

Abydos Area. The Abydos area yielded some *in situ* Middle Paleolithic material. The most important site is Beit Allam, 8 km north of Abydos (Vermeersch *et al.* 1978a). It is on a small, isolated surface, 1 m above the wadi floor and 8 m above the Nile floodplain. Layers of wadi material, with a total thickness of 0.5 m, disconformably overlie a core of very coarse sands and gravel of Nilotic origin. The rich archaeological material is embedded within the wadi deposits. There has been considerable erosional wadi activity since and probably during the occupation of the site. Chert cobbles were available in the nearby wadi bed at the time of occupation.

Numerous Middle Paleolithic artifacts have been recovered from all levels of a huge wadi-fan deposit at El Ghineimiya, 7 km south of Abydos (Vermeersch *et al.* 1980a). This deposit is separated from the modern floodplain by an 11-m scarp, which provides a large profile (Figure 3.3). Two silt layers of Nilotic origin, at 3 m and 5 m above the floodplain, interfinger with the wadi deposits. The matrix is predominantly of sand in the upper part, while the lower part of the fan deposit contains a larger amount of gravel. A cluster of very fresh artifacts was recovered from within the lower unit. Many of the artifacts could be refitted, indicating that they were nearly archaeologically *in situ*. The Middle Paleolithic occupation of the site is believed to have been contemporaneous with an important episode of wadi activity.

Sohag-Tahta Area. Nazlet Khater, some 12 km west of Tahta and close to the valley scarp, is very rich in Middle Paleolithic sites (Vermeersch *et al.* 1978a, 1978b, 1980b, 1982a). This is probably due to the presence of derived chert cobbles of good quality and to the protection of the sites from subsequent Nile erosion by a magnificent, protruding, limestone valley-cliff.

The Middle Paleolithic site of Nazlet Khater-1 lies on a small elevation adjacent to the edge of the cultivated zone. Nile sediments (gravels, silts and clays) form the core of this rise. The uppermost, Nilotic, gravel deposit, which is 5 m above the floodplain and partially covered by Nile silts, contains numerous (>100 per m^2) Middle Paleolithic artifacts. The upper part of the rise, consisting of local wadi-slope deposits, is also very rich in Middle Paleolithic artifacts (>600 per m^2), and both occurrences could be derived from the same site.

Nazlet Khater-2 has a stratigraphy similar to that of Nazlet Khater-1. The top of the Nilotic deposits, gravels and coarse sands is at about 10 m above the floodplain and some 10 m lower than the truncated top of the weathered Dandara silts. Limited areas of the locally derived gravels contained large quantities (>500 per m^2) of Middle Paleolithic artifacts. This attests to an important erosional activity with rapidly moving channels. Charcoal collected from one of these channels gave a date of >35,700 B.P. (GrN.10578).

Nazlet Khater-3 consists of an isolated rise at +4 m. The very dense concentration of material (up to 1200 pieces per m^2) results from an accumulation of lithic material in a wadi channel and slope deposits. Part of the site was washed away by later wadi gullying.

The sites of Ezbet Rabab, some 12 km north of Sohag on the eastern bank, and of Rifa, 5 km south of Asyut, are in similar stratigraphic positions: in slope deposits covering a core of Nilotic deposits at elevations of +6 m and +4 m, respectively. At Ezbet Rabab, artifacts are probably also included in the upper part of the Nilotic gravel deposits, which are more than 8 m thick. These sites are rich in Middle Paleolithic artifacts but have not yet been excavated.

Wadi Kubbaniya Sites

Middle Paleolithic has been recorded at Sites E-78-11 (Singleton and Close 1980), E-82-4, E-82-5 and E-82-6a (Wendorf *et al.* 1986).

Site E-82-5 is the most important from a stratigraphic point of view. It was still slightly *in situ* in the surface of a Stabilization Zone, developed in the truncated top of the Upper Dune Sands (see below) and in the very base of the overlying aeolian Sandsheet. This Sandsheet, of which the lower part has been dated by thermoluminescence to 89,000 B.P. ± 18,000 years (Gd.TL33), completes the preserved portion of the first cycle of aggradation in the basin, which is termed the Middle Paleolithic Valley Filling Episode (Schild and Wendorf 1986). Schild (this volume) gives seven new thermoluminescence dates from below the Sandsheet. During this sequence, Nile silts, sands and intercalating aeolian deposits aggraded from at least 98 m to 110.5 m asl, or from 8 m to 20.5 m above the modern floodplain. No artifacts were found beneath the Sandsheet.

The lithostratigraphic sequence of this episode consists of an alternation of three (Lower, Middle and Upper) Silts with three Dune Sands (Lower, Middle and Upper) in the mouth of a tributary wadi, while areas close to the Nile received fine sands and silts. Typical floodplain silts and clays are the only sediments of this episode found farther inside the mouth of Wadi Kubbaniya.

A thin, but extensive, scatter of Khormusan-related artifacts (Site E-82-4) was found at about 105 m asl in lag position on the surface of the Middle Paleolithic floodplain silts. Elsewhere, dune deposits seem to postdate the highest Middle Paleolithic siltation. The base of these dune sands has been dated by thermoluminescence to 31,000 B.P. ± 8000 years (Gd.TL32) (Schild and Wendorf 1986). Schild and Wendorf believe that the Middle Paleolithic sequence at Wadi Kubbaniya postdates the last Late Pleistocene episode of local rainfall and resultant wadi activity.

Deposits with Derived Middle Paleolithic Artifacts

Derived Middle Paleolithic artifacts occur within pediment and wadi deposits of various ages. The geomorphological evolution shows that they cannot all be incorporated into a single event, so that the artifacts give only a *terminus postquem*. For completeness, we refer the reader to the Nilotic sequence and position of the Middle Paleolithic artifacts as described in the surveys of Sandford and Arkell and summarized by Caton-Thompson (1946:68).

Korosko Formation

The Korosko Formation (Butzer and Hansen 1968:87–96, 266–272) is described as a marly, sandy sediment, which is essentially fluvial in origin; mollusca are fairly common. According to de Heinzelin (1967:324), this formation is very patchy in the Wadi Halfa area, and we have not yet been able to recognize similar deposits downstream from Qena. There are no true archaeological sites within this formation, but Butzer and Hansen mention the presence of unpatinated, water-worn flakes of Middle Paleolithic type in the upper part of the formation at two localities at Wadi Or, Nubia. A sample taken from a marl within the lower half of the Korosko Formation in this wadi has a radiocarbon date of 27,200 B.P. ± 950 years (I.2061). The significance of this date is questionable, since the history of the marl is unknown.

Nag el Amra Section

In the profile of Nag El Amra mentioned above (Figure 3.3), one typical Levallois (Nubian) point has been collected from a unit of wadi deposits composed entirely of rubified sands (7.5YR 6/4). This deposit includes numerous shells of *Zootecus insularis*, lies over the presumed Dandara silts and is covered by a unit of coarser wadi bed with rolled Middle Paleolithic artifacts, similar to the nearby wadi deposits at El Ghineimiya. All of the younger wadi levels contain rolled Middle Paleolithic implements.

Makhadma Formation

The Makhadma site E61O4 (Wendorf and Schild 1976a:113–119) is designated by Said (1981:67) as the type-section of the Makhadma Formation. The Makhadma Formation is defined here as the lower slope-wash under the dark silts. This relatively thin slope-wash includes derived archaeological material of Middle Paleolithic tradition and is attributed to the wet Mousterian-Aterian interval (Said 1981:126). Subsequent research at the site, which was kindly assigned to us by F. Wendorf, has revealed, however, that the lower slope-wash also contains derived Middle and Upper Paleolithic artifacts and, in fact, represents a Late Paleolithic slope evolution (Paulissen *et al.* 1985; Vermeersch *et al.* in press b).

Some Considerations on Middle Paleolithic Site Function

Activities at the Middle Paleolithic sites that have been studied seem to have been related mainly to the exploitation of chert. The chert occurs in the form of cobbles in coarse-grained Nile terraces, which, as in the Abydos region, are preserved banked up against the valley wall. The cobbles are often reworked as bedload in wadi deposits and as Nile deposits in the lower desert, like the cobble deposits near the modern Nile, along the Maghar Canal downstream from Dandara. At the time of occupation, almost all of

the Middle Paleolithic sites were beyond the Nile floodplain (this assumes that the Nile was a silt-Nile) in what was then the lower desert and was eventually transformed into a dry savannah; sites were rarely very close to or in the floodplain itself (Nazlet Khater-1).

The Levallois or Nubian techniques, or both, are always present at these sites, and retouched tools are always rare; only denticulates are ever frequent. Furthermore, it is quite possible that many of the "tools" are the result of non-human activity, such as trampling, or the shrinking and expansion of clay. Even the isolated artifacts scattered throughout the lower desert are rarely retouched. Instead, what is always found is simple debitage (flakes and chips) and cores. In terms of the models currently favored in Southwest Asia and Europe, the Egyptian sites would be considered to be quarry and workshop sites, where domestic activities were only occasionally carried out. This implies that the lower desert was not very attractive for Middle Paleolithic man, and that hunting, gathering and domestic activities were done in what was then the floodplain, which is now destroyed by erosion or buried under more recent deposits. It also implies that most human activities were related to the Nile Valley and that the potential food-resources of the lower desert were probably not very rich, despite a somewhat wetter climate.

This situation appears to contrast with that of the Middle Paleolithic sites in Nubia, where the Nubian Mousterian and the Nubian Middle Paleolithic in particular are characterized by rather high numbers of sidescrapers. These high frequencies could, however, result from the bias of the "enriched collections" (Guichard and Guichard 1965:66). Moreover, even in Nubia most of the sites were quarries and workshops (Wendorf 1968b:1043–1044).

For Wendorf and Schild (1976b), the association of the Khormusan with riverine deposits is an indication that these occupations are of a different period from the Middle Paleolithic sites in the adjacent desert. However, these differences might also have been influenced by site function. The Khormusan sites could be domestic sites with an economy based primarily on hunting large animals of both savannah and Nilotic forms, plus some fishing (Gautier 1968). Unfortunately, such an economic orientation is not apparent in the lithic materials, especially the tools. Even though specific tools, such as burins, occur in the Khormusan, there are no sidescrapers, which are characteristic of Middle Paleolithic sites in Southwest Asia and Europe. The burins and the somewhat more typical denticulates may have had domestic functions, but this remains speculative.

As a whole, the lithic industry of the Egyptian Middle Paleolithic sites is characterized by the use of Levallois technology, with a predilection for the Nubian style of debitage. It appears, however, that some sites are characterized by Nubia Type I debitage (Guichard and Guichard 1965), whereas this technique is lacking at other sites and is replaced by a traditional Levallois technique. Some sites, such as Beit Allam, have both the Levallois technique and blade production (Vermeersch *et al.* 1978a). Van Peer (1986) has observed that the Nubian technique occurs in many Aterian assemblages beyond the Nile Valley, but only additional research will demonstrate if there is a relationship between this technique and the Aterian. Aterian artifacts are completely absent from our region, nor can Khormusan be recognized. Bifacial foliates occur in surface scatters of artifacts, mostly with handaxes, but we have never found them in our sites.

At present, therefore, we are unable to confirm the existence within the Middle Paleolithic of our region of the three major entities (Mousterian, Aterian and Khormusan) recognized by Wendorf and Schild (1976b).

LATE PLEISTOCENE DEPOSITS AND RELATED LATE PALEOLITHIC SITES

Even the simple enumeration and definition of the Late Pleistocene deposits of the Nile Valley is not easy. This is primarily due to the complexity of Nilotic evolution and to the sporadic evidence available for paleogeographical reconstruction. Consequently, several changes in interpretation and correlations of lithological units have been proposed in the literature. The complexity of the known Nile system continues to be regularly increased by new field observations (and by the revision of the Nubian radiocarbon chronology). We will therefore critically review the main results of earlier publications and then add the most important of our own observations.

Nubian Views

This review is based on the general lithostratigraphic correlations established by de Heinzelin and Butzer and Hansen (Figure 3.4).

Dibeira-Jer and Masmas Formations

The Dibeira-Jer and the homologous Masmas Formations are defined as a Nile aggradation of regularly accumulating silt layers and sand-bars. Their total thickness exceeds 31 m in Nubia and 20 m (possibly 43 m) in the Kom Ombo Plain. Butzer and Hansen (1968:103) mention the occurrence of only three minor lenses of wadi wash in a 13-m vertical profile located in front of a wadi; both they and de Heinzelin mention an important vertisol at the top. No artifacts were found in the Masmas Formation but the Dibeira-Jer Formation contains Khormusan sites.

Ballana Formation

The Ballana Formation comprises local deposits of dune sands and wadi fans from a period of Nile recession (de Heinzelin 1967:323). Butzer does not mention any similar deposit. The prehistoric Site 8899 (Wendorf 1968c:807–822) is of the utmost importance; this site had two Sebilian levels within the Ballana Formation, although, unfortunately, no absolute dates are available. All of the Halfan sites, except Site 1020 which is on top of a Nile silt, are on top of a sand deposit, interpreted as a dune sand and classified into the Ballana Formation (Marks 1968c; Wendorf 1968c). From this, it is clear that the Ballana Formation is earlier than the occupation of the Halfan sites. Even for Site 8859 (at Ballana in Egypt), Wendorf (1968c:797) concluded that "the occupation of the site occurred at the time when the Ballana dune was being reworked. The deposition of the Ballana sand occurred well before 19,000 B.P." The stratigraphic positions of the three Ballanan sites (8956, 8957, 8863; Wendorf 1968c:831–832) are all quite similar: all are on the contact between the Ballana aeolian sand at the base and the overlying remnant of Sahaba silts.

Sahaba Formation and Darau Member

The Sahaba Formation and the Darau Member, with a thickness of >18 m, are widely distributed in Nubia. The Darau Member is the only part of the Gebel Silsila Formation occurring in the Kom Ombo Plain. The facies of this deposit is heterogeneous and consists of floodplain and bedload deposits, rich in fluviatile mollusca. The original publications give more than 20 radiocarbon dates, on charcoal and shells, related to the Sahaba Formation and the Darau Member (Butzer and Hansen 1968:114; Wendorf 1968c:941, Table 25). A reasonable estimate for the time-range of the aggradation is between 16,500 B.P. (Site 8905; WSU.315) and 12,000 B.P.

Arkin Formation

The Birbet Recession (Formation) of de Heinzelin was a short recession, with renewed encroachment of windblown sands, preceding the Arkin Formation. The Arkin Formation and the Arminna and Kibdi Members (Butzer 1980:268) represent an aggradation characterized by mainly overbank deposits: Nile silts and fine micaceous sands. De Heinzelin estimated that the Nile in Nubia fell to less than 8–9 m above the modern floodplain at about 11,000 B.P. The Arkin Formation attained its highest level, +13 m, at about 9500–9000 B.P. and receded in stages during the next five millennia.

Comments on the Nubian Views

All of the Nubian sequences are now drowned beneath Lake Nasser and the sequences and cultures mentioned above are the only evidence we will ever have of Late Pleistocene human occupation and geomorphological evolution along the Nubian Nile. No sites can be rechecked and no new information can be gathered.

Two of the most important results of the work in Nubia have been a complete revision of the geological history of the River Nile and the establishment of a framework for all later contributions. An important aspect of this geological framework is that two independent teams recognized comparable geological sequences in the Nile silts (Figure 3.4), consisting essentially of periods of silt aggradation separated by periods of Nile down-cutting. The sequences are based primarily on geomorphological and secondarily on lithostratigraphic criteria. From our own field evidence, however, we believe that uneroded Nile terraces are extremely rare and that most Nile deposits have lost their original morphology; most of the terrace deposits have been transformed by various processes into gentle sloping surfaces dipping towards the Nile. Although the basic Nilotic sequence is sound, several correlations of low-lying silt spurs and Nile gravel ridges are speculative. Archaeological sites and radiometric dates have contributed significantly to establishing correlations between terrace remnants.

The Nile sequence as established in Nubia must be seen as a simplification of the real evolution of the Nile. It is highly likely that every period of aggradation or down-cutting was composed of different phases, like those which can be seen in the evolution of the Nubian Nile during the last 12,000 years, since the aggradation of the Sahaba silts.

Butzer concentrated on wadi behavior and de Heinzelin on aeolian deposits. De Heinzelin's association of Nile down-cutting with the extension of aeolian deposits does not mean that there was no aeolian activity during periods of Nile aggradation. On the contrary, it is very likely that Nile aggradations were contemporaneous with the

build-up of aeolian sands within the floodplain. This can be observed today at several places on the western edge of the floodplain, such as north of Asyut, and the invasion of such dune sands is, of course, determined by environmental conditions beyond and independent of the floodplain. Dune deposits within the floodplain are lithologically distinct, but it is doubtful that their extension during phases of Nile down-cutting was as important as de Heinzelin suggested. We believe that the lithostratigraphic characteristics of these aeolian formations and the number of associated radiometric dates are too scanty for them to be considered as real chronostratigraphic markers. The aeolian deposits are independent of the Nile and were laid down during Nile aggradations and recessions.

Post-Nubian Views

After the Nubian Campaign, part of the Combined Prehistoric Expedition continued work in the Nile Valley downstream from Aswan towards Sohag in 1967 and 1968, and then in the Fayum in 1969. According to Wendorf and Schild (1975:127), this work must be regarded essentially as a preliminary reconnaissance to determine the potential of the Paleolithic materials; the project was terminated in late 1969 due to political events. We will discuss here only the most recent publications of this research (Wendorf and Schild 1975, 1976a), and especially those concerning the Late Pleistocene silt deposits, which Said (1975, 1981) attributes to the Neonile.

Wendorf and Schild's new interpretations of the silt deposits are based on two major areas: El Kilh, near Idfu, and a location just north of Isna. Local sequences established for each of these areas were compared on the basis of radiometric and archaeological data, and an informal terminology was drawn from those of both de Heinzelin and Butzer and Hansen (changing the original significance of the formational names). Wendorf and Schild (1975, 1976a) introduced two important events of silt aggradation for the Nile Valley: the Ballana-Masmas aggradation and the Sahaba-Darau aggradation, separated by the El Fakhuri Recession.

The Ballana-Masmas event is characterized by a silt aggradation accompanied by extensive migration of aeolian sands, and is dated between 19,000 and 17,000 B.P. (There are eight radiocarbon dates within this time-range on *Unio* shells from sites in the Idfu-Isna area.) There are problems in correlating the Idfu-Isna sequence with parts of the Dibeira-Jer in Nubia and with the Masmas Formation in the Kom Ombo Plain. This revision of stratigraphy is based only on reinterpretations of the Nubian observations (Sites 8859 and 2014). New correlations have been proposed without any firm lithostratigraphic evidence and with only the one radiometric date from Site 8859 (18,600 B.P. ± 550 years; WSU.318), itself a questionable date in light of the new Nubian chronology. The dates for the Dibeira-Jer are minimal and substantially older. There are no dates from within the Ballana Formation and only one questionable date on marl from within the Masmas Formation. According to Wendorf and Schild, the lower part of the Nubian Sahaba Formation and the Darau Member should also belong to the Ballana-Masmas aggradation.

The Sahaba-Darau event (Wendorf and Schild 1976a:273–303) is characterized by a silt aggradation and should correspond to the upper part of the Sahaba Formation in Nubia. It is dated from slightly before 14,000 B.P. to slightly after 12,000 B.P. Two new dates pertaining to the Sahaba-Darau aggradation are 12,500 B.P. ± 230 years (I.3424) on carbonaceous sand near the so-called burned layer within the dark silts at Kimbelat,

near Qena, and 12,690 B.P. ± 240 years (I.3421) from a pond-sediment in the Isna area. The Sahaba-Darau aggradation was followed by a major recession of the Nile. The beginning of the recession is dated at Site E71P5 (El Kilh) to 11,560 B.P. ± 80 years (I.3760) and to 11,200 B.P. ± 285 years (I.531) at the base of the Arkin aggradation in Nubia (both on *Unio* shells). It is called the Birbet recession in Nubia and the Dishna-Ineiba Formation (Said 1981:73) in Upper Egypt.

Schild and Wendorf later suggested (1980:39–41) that all of the Late Paleolithic Nile sediments in the mouth of Wadi Kubbaniya (about 15 km north of Aswan) were deposited during a single Nile aggradation, in which numerous interfingerings of Nile silts, dunes and lacustrine sands could be observed. The radiocarbon dates indicate that the aggradation began shortly before 18,300 B.P. and lasted until about 12,000 B.P., which includes the entire time-span attributed to both the Ballana-Masmas and Sahaba-Darau aggradations as defined earlier (Wendorf and Schild 1976a). There are now 52 radiocarbon dates available from the numerous archaeological sites in the mouth of Wadi Kubbaniya (Wendorf *et al.* 1986; see also Close 1984), confirming a Late Paleolithic Alluviation (or "Valley Filling Episode" of Wendorf *et al.* 1986). The earliest recorded sediments of this episode, dating from about 20,500 B.P. (Site E-81-4) are at +12 m and the latest, dating from about 12,500 B.P. (Site E-81-5), are at *ca.* 27–28 m above the modern floodplain.

In his geological history of the Nile, Said (1981:61–80) groups all the silts of Ethiopian origin into the Neonile (Q_3). The Neonile deposits, structured silts with interfingering dune sands, were laid down during four aggradational episodes: the Dandara Formation (see above), the Masmas-Ballana Formation, the Sahaba-Darau Formation and the Arkin Formation. All Said's conclusions concerning these deposits are based on the studies mentioned above. He uses Masmas-Ballana and Sahaba-Darau Formations in the same sense as did Wendorf and Schild (1976a), and thus with the Deir el Fakhuri Formation related to the recessional interval between them. The dating of these events is also identical, except that the beginning of the Masmas-Ballana aggradation is estimated at about 30,000 B.P., while radiocarbon dates for its middle layers cluster between 21,000 and 17,000 B.P. (Said 1981:69).

Butzer's account of the Pleistocene geology of Egypt and Lower Nubia (1980) is based on his earlier work (Butzer and Hansen 1968) and no new observations are added. The terminology for the Nilotic events is the same as that in Figure 3.4. The correlations with the lithostratigraphic units of de Heinzelin are confirmed. The age of the Korosko Formation is estimated to be >32,000–27,000 B.P. for the upper member and >40,000 B.P. for the lower. The subsequent Masmas Formation falls between about 25,000 B.P. and 18,000 B.P. (based on radiocarbon dates on marl). Butzer reasserts the identity of the Masmas and Dibeira-Jer in Sudanese Nubia, without considering the new chronology for the Khormusan industry.

Comments on the Post-Nubian Views

From the evidence from Wadi Kubbaniya and the reassessment of the Masmas-Ballana and Sahaba-Darau aggradations by Schild and Wendorf (1980:39–41), it becomes clear that both units refer to a single aggradational event. We could wish that Wendorf and Schild (1976a) had introduced only informal local names for the events in the Isna-Idfu area. The new definitions of old names will be a source of confusion, especially since Said (1981) has used the names as formal lithostratigraphic units.

In fact, following the original Nubian concepts, both the Sahaba-Darau and the Masmas-Ballana aggradations can be classified with the Sahaba Formation of de Heinzelin or within the Darau Member of Butzer and Hansen. In spite of redefinition, we feel that the term "Sahaba-Darau aggradation" can still be used for the Nile silts deposited during one episode between about 20,000 and 12,000 B.P. The best solution in the long run, however, is to introduce a new name for this event and its related deposits, and to choose the name in relation to the most complete and best-dated section at Wadi Kubbaniya.

The last episode within this Sahaba-Darau event is extremely important. It is characterized by a thin suite of dark silts, found during the post-Nubian campaigns, which we have named the Sheikh Houssein silt at Makhadma (Paulissen *et al.* 1985; Vermeersch *et al.* in press b). It contains the "burned layer" as a key horizon and lies well above and outside the normal floodplain of the Sahaba-Darau aggradation. The Deir el Fakhuri Formation of Said can also be considered as a local deposit, which was not necessarily associated with a (minor) Nile recession. The important Nile recession after the Sahaba-Darau aggradation dates from about 12,000 to 11,000 B.P. and is followed by the various stages of the Arkin aggradation.

The use of the term Sahaba-Darau aggradation in its original Nubian sense means that the term Masmas-Ballana has no significance. Two deposits of different origin and from widely separated areas were put together without any firm lithostratigraphic or chronostratigraphic support for such a correlation. For the moment, we propose to retain the original local terms for the older silt deposits, namely the Dibeira-Jer Formation with Khormusan industry for Nubia and the Masmas Formation for the Kom Ombo Plain; correlations between them remain unproven. Elsewhere, it would be preferable to introduce other local names for Nile deposits which are older than 20,000 years or which are not dated.

Upper Paleolithic Sites of the B.M.E.P.P.

Sohag-Tahta Area

Our most important site is the early Upper Paleolithic site of Nazlet Khater-4, which has been dated to about 33,000 B.P. by nine radiocarbon dates on charcoal (Vermeersch *et al.* 1982b, 1984b, 1984c). The position of the site, at about 10 m above the modern floodplain, places it beyond the reach of all Nile influence both during its occupation and since then. The site is a typical chert-exploitation site, using simple mining-techniques (Figure 3.5). The tool-inventory is restricted and no Ouchtata blades were found. Some similarities exist between this material and the Dabban of Cyrenaica (McBurney 1967). We also discovered there a burial of a human skeleton, which we named the Nazlet Khater Man (Thoma 1984; Vermeersch *et al.* 1984a, 1984b, 1984c). Although he has not been dated directly, we believe for several reasons that he was a member of the cultural group who exploited the mines.

The trenches dug by the Upper Paleolithic groups were filled with rubble at the base and with aeolian sands in the upper part. The occurrence within this sand unit of an *in situ* hearth (32,100 B.P. ± 700 years; GrN.11,297) indicates that the site was still occupied during this stage. The later morphological evolution of the site consisted of the formation of a salt crust with desiccation wedges and the establishment of the overall gentle slope, dipping toward the Nile.

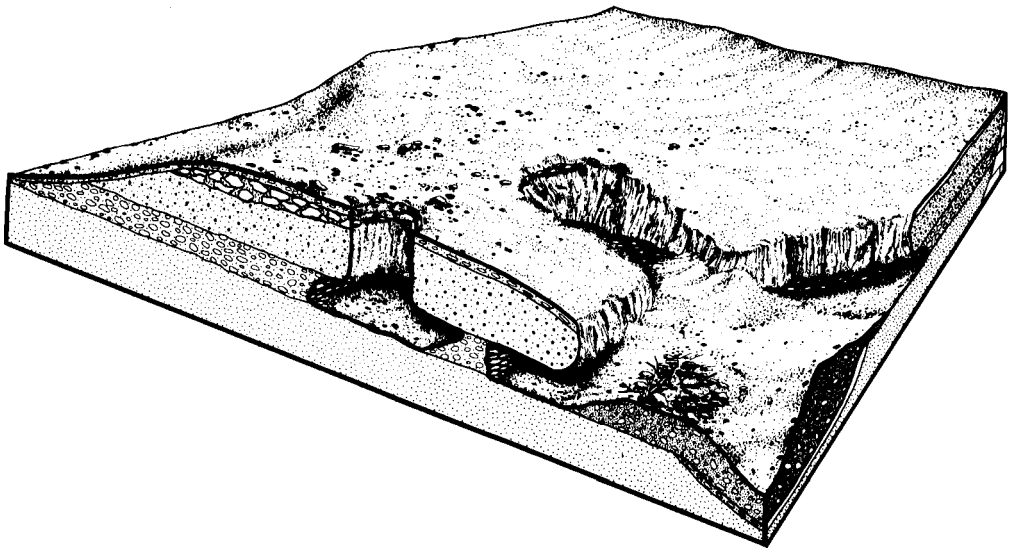


Figure 3.5 Reconstruction of chert-mining site of Nazlet Khater-4 (drawn by M. Van Meenen).

Qena Area

The *Shuwikhat Silts*, the top of which is about 4 m above the modern floodplain (Paulissen *et al.* 1985), form a continuous terrace in the Makhadma area, and are identical to the "dark-grayish-brown, sandy silt" underlying the Makhadma site of Wendorf and Schild (1976a:115). Even when situated in a wadi mouth, no wadi deposits were recognized within a thickness of about 6 m of these silts. On stratigraphic grounds, the Shuwikhat silts are older than the dark silts of Upper Egypt, which include various archaeological industries dating from about 21,000–20,000 B.P. onward (Wendorf and Schild 1976a, 1980a; Wendorf *et al.* 1986).

Shuwikhat-1, on the east bank some 14 km downstream from Qena, is an early Upper Paleolithic site within the Shuwikhat silts, which represent the former floodplain (Figure 3.6). Faunal remains are abundant; aurochs, hartebeest, gazelle and one fragment of catfish have been recognized. A thermoluminescence date of 24,700 B.P. ± 2500 years (OxTL.253) has been obtained on burned clay fragments buried in the silts. Technologically, the artifacts from this living-site are undoubtedly of Upper Paleolithic technique, but differ from the Upper Paleolithic materials recovered by the Combined Prehistoric Expedition, except, perhaps, for the non-Levallois Idfuan site of E71K9 (Wendorf and Schild 1976a). For the latter site, a thermoluminescence date of 21,590 B.P. ± 1520 years (Oxford Laboratory for Archaeology, 161-C-1) has been obtained, also on burned clays (Wendorf and Schild 1975:138). This date is consistent with a younger radiocarbon date on a calcareous root-cast from the base of pond sediments overlying the brown silts near Site E71K9 (Wendorf and Schild 1976a:84). This date of 16,830 B.P. ± 250 years (I.3420) must be regarded as minimal because of the material dated.

At Makhadma, four Upper Paleolithic sites occur in a similar position on the lower part of the eroding slope of the Qena Sands and overlying the Shuwikhat silts. Makhadma-2 and 4 have been excavated (Vermeersch 1983; Vermeersch *et al.* in press b) and are middens, comparable to the *escargotières* of the Maghreb but composed of

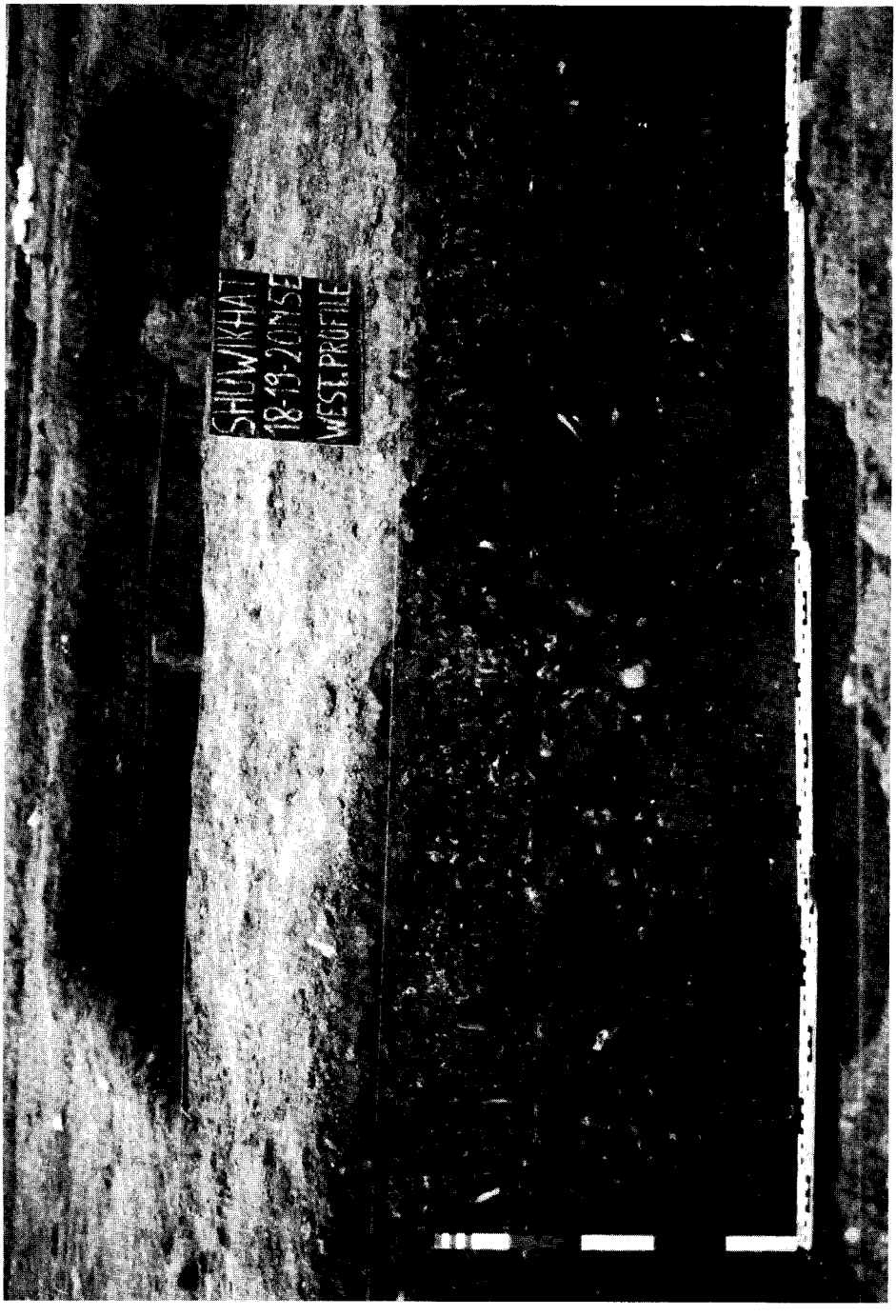


Figure 3.6 Early Upper Paleolithic site of Shuwikhat-1, just under a truncated fossil soil within Shuwikhat Silts.

fish-bone rather than snail-shells. Makhadma-2 and 4 are rare examples of sites where the occupation and the corresponding Nile deposits have been dated independently. The lithic material shows similarities to the Silsilian (Vermeersch *et al.* in press b), and we now have eight radiocarbon dates on charcoal, ranging from 13,400 to 12,100 B.P. The sites are related to the thin layer of dark Nile silts which we have locally named the Sheikh Houssein silts (see above). They were deposited during the "Wild Nile" stage (Adamson *et al.* 1980; Butzer 1980:272) when floods at Makhadma reached 6 m above the modern floodplain, the highest level recorded in this area apart from the Dandara silts. All the evidence from the Egyptian Nile Valley suggests that this catastrophic period was between about 13,000 and 12,000 B.P. It was noted above that the "burned layer" of Wendorf and Schild (1975:136; 1976a), an important marker horizon at about 12,500 years ago, is intercalated within the Sheikh Houssein silts. There are no wadi deposits within them. Landscape evolution was very limited during the interval between the Shuwikhat and Sheikh Houssein silts; subsequent wadi and slope evolution has been more important. A charcoal sample from a hearth *in situ* near the top of the sandy wadi deposits has a radiocarbon date of 6320 B.P. ± 75 years (Lv.1379). This date is very close to the end of this later, wetter episode.

Lithic Traditions of the Upper Paleolithic

Concerning the Origin of the Upper Paleolithic

In this section, we will not attempt to review the extreme richness of the Upper Paleolithic which has emerged from the work of the Combined Prehistoric Expedition. Such a review has been made by Roubet and el Hadidi (1981–82), who cite more than 20 prehistoric "cultures" for the last 20,000 years. We agree with them that it is not yet possible to place the complex Upper Paleolithic record of the Nile Valley in an orderly cultural and chronological perspective.

The surveys of the Combined Prehistoric Expedition did not locate any sites attributable to the early Upper Paleolithic period, before 20,000 years ago; such sites are extremely rare throughout northern Africa (Wendorf 1968b; Wendorf and Schild 1976b). This was unexpected, since it left apparent technological continuity between the Middle Paleolithic and the Levallois industries of the Late Paleolithic but a temporal hiatus of probably more than 20,000 years. This raises the question of what happened in Egypt during this long period, which in other regions, such as the Negev and Cyrenaica, coincides with the Middle to Upper Paleolithic transition.

At the site of Boker Tachtit, in the Negev, it is possible to follow a gradual transition from the essentially Levallois-oriented core-reduction in Level 1, dated to about 47,000 B.P., to the dominant single-platform blade technology in Level 4, dated to about 42,000 B.P. (Marks 1981), from which the Levallois method has disappeared (Hietala and Marks 1981). Both in Level 4 of Boker Tachtit and in the two earliest occupations at the site of Boker (Boker D, Levels 1 and 2), the core-reduction methods were Upper Paleolithic even though some of the secondary reduction techniques led to the production of points which are morphologically identical to Levallois points. Boker A, which can be dated to about 38,000 B.P. may be seen as the earliest classic Upper Paleolithic known in the Negev, and the earliest representative of the Ahmarian tradition (Gilead 1981), which also includes the Lagaman of northern Sinai (Bar Yosef and Phillips 1977).

The latest use of Levallois technology at the Haua Fteah is in Level XXV, which dates to about 42,000 B.P. (McBurney 1967:131).

There is no known lithic sequence in the Egyptian Nile Valley, which shows a transition from the Levallois technology of the Middle Paleolithic into an Upper Paleolithic blade technology. Only the sites of Nazlet Khater-4 (Vermeersch *et al.* 1982b, 1984a, 1984b, 1984c) and Shuwikhat-1 (Paulissen *et al.* 1985) fall within the 40,000–20,000 B.P. gap in the Egyptian prehistoric record. Even with these sites, the record remains poor, but neither has any use of the Levallois technique.

It seems anomalous that the Upper Paleolithic of the Egyptian Nile Valley on the one hand appears progressive and evolved (Roubet and el Hadidi 1981–82), but, on the other, the occurrence of the Levallois technique within it is archaic when compared with the circum-Mediterranean world. This anomaly is even more marked since the discovery of early Upper Paleolithic sites (Nazlet Khater-4 and Shuwikhat-1) with non-Levallois technologies.

Upper Paleolithic Sites with Levallois Technology?

Since the Levallois technique did not exist in the Upper Paleolithic of other parts of the circum-Mediterranean world, we will examine the sites where this technique was extensively utilized (ILty > 10). These sites are assigned to the Sebilian, the Idfuan and the Halfan, and we must consider if they really belong to the Upper Paleolithic, and how their ages are affected by the revision of the Nubian chronology (Wendorf *et al.* 1979).

Older Sebilian. The Sebilian, as defined by Vignard (1923), was divided into three chronological phases, of which the oldest is clearly of Levallois tradition. None of Vignard's sites has been well dated. Butzer and Hansen (1968:181 *et seq.*) emphasize that information on the stratigraphy of the sites is scanty and inconclusive. All well-documented sites in Sudan and Egypt discovered since Vignard most closely resemble his Lower Sebilian (Hassan and Wendorf 1974).

According to Marks (1968d), the Sudanese sites, with an ILty between 16.4 and 31.8, occurred in stratigraphic positions which exclude the possibility of an early Upper Paleolithic age. However, Marks was writing at a time when it was generally agreed that all younger silt deposits were contemporaneous with Late Paleolithic sites. Subsequent rethinking of the Khormusan and related deposits and the evidence that several Nile silt deposits were contemporaneous with Middle Paleolithic sites have led to important changes in these views. Most of the Sudanese sites were surface concentrations. According to Marks (1968d:483), Site 1042 rested on the deflated fluviatile sands of the Sahaba Formation, 12 m above the modern floodplain. However, no evidence has been presented to support the assumption that the sands belong to the Sahaba Formation; their height above the floodplain is not conclusive.

Only three sites, 1024A, 1024C and 2013, showed a minimum of deflation. Site 1024 was too far from the Nile to link it directly with Nile silts. Charcoal from two hearths gave dates of 10,925 B.P. ± 140 years (WSU.188) and 11,000 B.P. ± 120 years (WSU.144); even in 1968, Wendorf (1968c: 831) believed these dates to be too recent. Site 2013 rested on a sandstone outcrop just above the highest level of the Sahaba silts.

Farther north in Egyptian Nubia, Site 8899 (Wendorf 1968c:807) is of the utmost importance for determining the age of the Sebilian. The two Sebilian occupation horizons are stratified in sands that are correlated with the Ballana event, but,

unfortunately, no absolute dates could be obtained from this site. At Site ANW-3 (Marks 1968b:318), Khormusan artifacts have been found in sands of the Ballana Formation. Charcoal from ANW-3 gave a date of 17,800 B.P. ± 500 years (WSU.215), but a revised age of more than 42,000 years for the Khormusan industry (Wendorf *et al.* 1979) would suggest that the sands at Site ANW-3 and Site 8899, as well as the Sebilian at the latter site, might be placed in an earlier time-range.

The sites on the Dishna Plain (Hassan 1972, 1974), such as E61M1, Area B, were almost completely destroyed by local salt-quarrying, and the artifacts were found in the back-dirt of the quarry-pits (Wendorf and Schild 1976a:133). The sites are related to artifacts found in a small trench, from just below the top of a silt to a depth of 25 cm; the silt is undated but is considered to be coeval with the final silts of the Sahaba Formation (Wendorf and Schild 1976a:148). Our own survey in the Dishna Plain was equally unsuccessful in dating the various silt deposits of this bend; we have, however, serious doubts about their presumed age of 15,000–12,000 B.P. (Connor and Marks 1986).

Neither Vignard's sites, nor the Nubian sites, nor those of the Dishna plain have been well dated.

Levallois Idfuan. According to Wendorf and Schild (1976a:243), the technological characteristics of the Idfuan industry suggest a clustering of the assemblages into two main groups, one containing a high frequency of the Levallois technique and the other entirely lacking in Levallois. Three sites, E71P1, E71K8 and E71K10, are representative of the Levallois group, of which only one, E71P1 with an ILty of about 15, has been studied in some detail. Most of the collected material came from the surface, but trenches revealed artifacts *in situ* within a very loose, friable, sandy silt unit and the underlying, soft, slightly consolidated silt.

Five radiocarbon dates of about 17,500 B.P. have been obtained from *Unio* shells from Site E71P1, although the association of the shells with the industry is not well established. Moreover, according to Mook and Waterbolk (1985:25), the dating of freshwater shells is rather unreliable. We would therefore prefer to await the results of new research at these sites before accepting an age of 17,500 B.P. for an industry with such a high ILty.

Halfan Stage II. The age and the homogeneity of some Halfan sites are questionable. In the original publication of the Halfan (Marks 1968c:365), five evolutionary stages were defined, the first of which was hypothetical. Levallois debitage is never important and is confined to Marks' second stage. The manufacture of Levallois-related Halfa flakes was also important in the second stage but became less common in the later stages. In general, Levallois technology was much less important in the Halfan than in the Older Sebilian and the Levallois Idfuan. According to Marks, the Late Khormusan and Stage II of the Halfan were broadly contemporaneous; however, this opinion was based upon the then-available radiocarbon dates from the Washington State University laboratory and these appear to have been unreliable for the Nubian sites (Wendorf *et al.* 1979).

DISCUSSION

From this review, we conclude that the data presented in the site-reports do not conclusively demonstrate that the sites are of the ages originally suggested for them. We must also stress, however, that neither is there absolute proof of an older age for any one

of the sites reviewed here. It is our opinion that extensive use of Levallois technology by Upper Paleolithic groups in the Egyptian Nile Valley has yet to be demonstrated; in this, we differ from the scholars who actually investigated the sites discussed. All recent work has tended to show that sites are older than had been thought and, supported by this general trend, we suspect that all of the Levallois-rich sites—the Older Sebilian, the Levallois Idfuan and Stage II of the Halfan—are, indeed, much older than was thought.

The scattered data now available from the Nile Valley downstream from Aswan show that there was a fully developed blade technology current at about 33,000 (Nazlet Khater-4), at 25,000 (Shuwikhat-1) and at 20,000 years ago (Early Kubbaniyan, or Fakhurian-related). None of these sites has any evidence of Levallois technology.

The Levallois technique is occasionally, but clearly, attested in the Kubbaniyan from about 18,000 B.P. on (A. E. Close *in litt.* 1986), and this may also be true of other Upper Paleolithic groups. The impact of the technique was very modest, but it poses the question of how this reappearance is to be interpreted. A first hypothesis would be that Kubbaniyan groups reinvented the Levallois technique for some special purpose; such a hypothesized reinvention is, properly, not fashionable in archaeological models. Alternatively, the reappearance could be viewed as intrusive. Since there is no Levallois technology known in the Upper Paleolithic of regions to the north, east and west of the Nile Valley, the south would seem to be the only possible source. In fact, the Levallois technique appears to have continued well into the Upper Paleolithic in parts of East Africa, as, for example, at the site of Kalambo Falls (Clark 1974). This hypothesis would imply that such southern groups had some influence on the Upper Paleolithic of the Nile Valley after 18,000 B.P.

A similar hypothesis might also be proposed for the Sebilian. If additional dates were to show that the Older Sebilian was indeed late, then the problem would arise that its technology simply does not fit into the local development of Upper Paleolithic industries in the Egyptian Nile Valley. In that case, it might well be regarded as an intrusive phenomenon (Marks 1975) that could have come only from the south. In the present state of knowledge, however, and in the absence of any real indications to the contrary, we would prefer to align the Older Sebilian with the late Middle Paleolithic of Egypt, in accordance with its technology, thus reintroducing Caton-Thompson's (1946:117) suggested age for Sebilian I.

The chronological positions of the Levallois Idfuan and of Halfan Stage II in the Egyptian Nile Valley are difficult to ascertain. Technologically and typologically, these industries might best be placed in the Middle-Upper Paleolithic border-zone, and we would suggest an age of about 40,000–30,000 years for them. Later stages of the Halfan tradition appear to have lingered on in the Nile Valley in Nubia, from where they might have influenced the Kubbaniyan; these stages appear to be absent, however, from the Egyptian Nile Valley.

If, on the basis of their technology, some sites of the Older Sebilian, the Levallois Idfuan and the Halfan Stage II are to be viewed as Middle Paleolithic, then we must consider their relationship to the traditional Middle Paleolithic. According to Wendorf (1968b:1048), the Khormusan, Sebilian and Halfan were primarily based on the hunting of large savannah mammals; Khormusan and Halfan sites also have indications of the hunting of Nilotic mammals and of some fishing. The economy of the Idfuan sites is less well known since the fauna was poorly preserved (Gautier 1976). Geomorphologically, these sites are more closely related to the Nile floodplain than are the traditional Middle Paleolithic sites. As was argued above for the Khormusan, some of them could be regarded as more domestically oriented sites, since, in addition to the

normal products of Levallois debitage, tools also are well represented: burins in the Khormusan, truncations in the Sebilian and retouched pieces in the Levallois Idfuan.

We believe that the Middle Paleolithic of the lower Nile Valley was very complex. It covered a long period of time, and included different technological traditions and different facies, developing in response to environmental factors. It comprises sites which have been attributed to the following industries: Nubian Mousterian, Denticulate Mousterian, Nubian Middle Paleolithic, Khormusan, Aterian, Older Sebilian, Levallois Idfuan and probably some sites attributed to the Halfan. We do not yet understand the chronological or cultural position of these different traditions in the Egyptian Nile Valley.

PALEOCLIMATIC RECONSTRUCTION IN UPPER EGYPT: AN ESSAY

The available data on which to base a paleoclimatic reconstruction are of uneven quality and usually poorly calibrated. There are no palynological records, and most interpretations rest on the study of alluvial and colluvial deposits, many of them dated only by the archaeological remains they include. Paleoclimatic reconstruction is not equal for all periods; the later ones appear to be much more complex than the earlier, although the actual complexity of the earlier periods was probably at least as great.

Our reconstruction will be limited to a climatological evaluation of water as a geomorphic agent, but there are still important difficulties. First, in any paleoenvironmental reconstruction, non-climatic factors must be considered before drawing conclusions about the paleoclimate. As Rognon (1980) has shown for arid regions, the water available at a site is not only a function of rainfall, but is determined by a number of non-climatic factors. Second, high run-off peaks in response to high, but short-term, precipitation are very characteristic of arid conditions. It is very difficult to decide whether a deposit is related to a few events of high magnitude or to a longer period of steady development. Third, the Nile has a very large catchment, and Nile aggradation and down-cutting are not necessarily related to climatic events in Upper Egypt. Local climatic events are better reflected in wadi behavior, slope evolution and soil-types. The fluviatile deposits we have chosen for this paleoclimatic reconstruction are all of very local origin, so that the processes they represent originated from local rains. All generalizations put forward in this section should therefore be viewed only as working hypotheses.

The paleoclimate of the Nile Valley has been reviewed by Butzer (1980), who states that deposits associated with Early and Middle Paleolithic artifacts indicate an essentially semi-arid climate, while the climate was usually hyperarid during the Late Paleolithic. Said (1981:95) introduced new names for the five pluvials he recognized in the Quaternary of southern Egypt, which remained, nevertheless, mostly arid.

Lower Paleolithic Climatic Fluctuations

Since none of the Acheulean sites is archaeologically *in situ*, we must emphasize that all paleoenvironmental and paleoclimatological hypotheses concerning the Acheulean are based on the assumption that there was only a limited period of time between the occupation of a site and its subsequent erosion.

Said (1981:95) has introduced the term "Abbassia Pluvial" for a Middle Pleistocene pluvial which led to the deposition of polygenetic gravels. Butzer (1980) characterized the same period as semi-arid. Nearly all deposits and paleosols in the Nile Valley indicate wetter climatic conditions, although evidence from the Eastern Sahara (Wendorf and Schild 1980b:227) suggests that the Late Acheulean climate was very complex and included more than one period of moister climate and intervening semi-arid and arid phases. The Early and Middle Paleolithic sequence at Bir Sahara-Bir Tarfawi (Wendorf *et al.* 1977; Wendorf and Schild 1980b), about 300 km west-northwest of Abu Simbel, can be usefully considered in relation to the Nile Valley.

Two different lacustrine sediments and subsequent spring-mounds, underneath Middle Paleolithic levels, are considered as clear evidence for wetter phases in the Eastern Sahara; they are dated to the Acheulean by the association of the sediments with Late Acheulean artifacts. On the basis of the Bir Sahara-Bir Tarfawi sequence, Wendorf and Schild (1980b:225–226) concluded that there were three moister episodes during the Acheulean, separated by two minor episodes of aridity. It is not possible to correlate the Bir Sahara-Bir Tarfawi data with those of the Nile Valley.

Beneath the Dandara silts south of Qena are Nile cobble deposits at least 6 m thick and with their top at +12 to +14 m. They are very rich in chert cobbles derived from the limestone cliffs, and probably represent one of the most recent bedload deposits of the very competent Nile which we know from the older cobble terraces. This first stage, of a very competent, bedload Nile depositing cobbles, is succeeded, as we saw above, by a suspended-load Nile aggrading the Dandara Formation (Stage 2) and then by a bedload Nile (Stage 3) depositing gravels—a finer bedload material than in Stage 1. The only possible explanation for these enormous changes in the behavior of the Nile is that they were related to climatic changes. We are tempted to correlate the changes in the bedload competence of the Nile with the long-term, mid-Brunhes changes in global climate, which were superimposed on the glacial and interglacial cycles at about 0.4–0.3 mya (Jansen *et al.* 1986). All the available, well-documented marine and continental records from a wide range of latitudes at this period indicate a more northerly position for the early Brunhes oceanic fronts, coincident with intensified atmospheric and ocean-surface circulation in the southern hemisphere. This is a climatic pattern that has never been repeated.

Our interpretation of the global, lithological units of the River Nile is, then, as follows:

1. A highly competent, bedload Nile deposited mainly cobbles during early Brunhes and probably during earlier (>0.4 mya) periods as well. The climate was very humid throughout the entire Nile basin, including Egypt; this type of climate subsequently disappeared.

2. A competent, bedload Nile deposited mainly gravels during late Brunhes (see below), when conditions were humid over most of the Nile basin but drier in Egypt.

3. The Dandara Formation, the first influx of Ethiopian silts, lies at the mid-Brunhes climatic change from (1) to (2), and should be related to a glaciation at about 0.4–0.3 mya. At this time, the bedload Nile disappeared and was replaced by a suspended-load river, which implies arid conditions over the Nile basin as a whole and hyperarid conditions over Egypt. We propose to name this stage the *Dandara Crisis*.

From the Nag el Khalifa evidence, we infer that the Dandara silt aggradation was a major arid episode before the Abbassia pluvial, not later than it as Said stated (1981:62). The Acheulean wadi fan deposits on the western edge of the valley are related to a later wet phase, since they erode the Dandara Formation. Most of the wadi

fans are coarse-grained, predominantly of cobbles, and reflect competent channels. The characteristics of the River Nile during the deposition of the Khalifa wadi fan are unknown. We know only (from metrical characteristics of the fan) that the river in the Abydos area was <8 m above the modern floodplain, so it was probably still a gravel-bedload river.

Middle Paleolithic Climatic Fluctuations

The wadi fans which contain *in situ* Middle and Late Paleolithic artifacts are much finer grained than the earlier ones, which may indicate that there has been no humid period like that of the Acheulean in more recent times. This is also suggested by the red paleosols. As was observed in Nubia and Kom Ombo by Butzer (1980:258), the red soil on top of the Late Acheulean slope and fan deposits represents the last weathering of that type, and lies stratigraphically at the transition from a semi-arid to a sub-arid climate.

In post-Acheulean times, the Nile became a typical suspended-load river with a dominance of floodplain deposits, and its behavior was governed by climatic changes in the headwaters. It is not known when this transition occurred, but we are able to relate the event to deposits including Middle Paleolithic material. The Nile deposits with *in situ* Middle Paleolithic artifacts were in a small Nile channel of bedload and channel-fill deposits at Nazlet Khater-1 (Tahta), at 5 m above the modern floodplain. These deposits indicate a braided Nile system, but now with an influx of Ethiopian silts. The interfingering of Nile silts and typical overbank deposits within wadi deposits with an almost *in situ* Middle Paleolithic site (El Ghineimiya) indicates that the suspended-load river was fully established at that time. The Nubian Dibeira-Jer deposits, with *in situ* Khormusan, and the Middle Paleolithic Alluvation in Wadi Kubbaniya reflect a similar river-system, while the Ikhtiariya dune sands are clear evidence of an arid climate in Nubia and Upper Egypt.

Local climate may be deduced from wadi and slope evolution. The coarseness of the wadi deposits with almost *in situ* Middle Paleolithic at Ghineimiya implies wet climatic conditions, but less so than in pre-Dandara times and during the deposition of the Acheulean fans. We assume that the Middle Paleolithic sites of Nazlet Khater-1, 2 and 3 and of Beit Allam were partially destroyed during this period.

The position of the Middle Paleolithic site of Makhadma-6 (Qena) supports this hypothesis. The site, which is almost archaeologically *in situ*, is situated on a slope of more than 10% and on top of slope deposits containing rolled Middle Paleolithic implements. This implies that Makhadma-6 was occupied after the destruction of the Middle Paleolithic sites mentioned above, and also after the wet phase(s) that aggraded the wadi fan at Ghineimiya. The Acheulean humid phase at Nag el Khalifa is separated from the wet Middle Paleolithic episode by a sandy wadi deposit, containing *Zootecus insularis* and a Levallois point of Nubian technique, sandwiched between the two coarser deposits under consideration. Said (1981:95) named the Middle Paleolithic humid phase in the Nile Valley the Korosko-Makhadma Pluvial (but see below).

From all available evidence and in agreement with Schild and Wendorf (1986:30), we may conclude with some confidence that the final shift towards aridity in the

Egyptian Nile Valley dates from the Middle Paleolithic. The Middle Paleolithic Nilotic sequence in Wadi Kubbaniya postdates the last Late Pleistocene episode of local rainfall and resultant wadi activity (Schild and Wendorf 1986:30) and is thus later than El Ghineimiya wadi deposits. The stratigraphic positions of the Wadi Floor Conglomerate and of the Korosko Formation with derived Middle Paleolithic artifacts (Butzer and Hansen 1968) are still not fixed in our scheme. The Korosko Formation might be older than or coeval with the Middle Paleolithic Valley Filling Episode at Wadi Kubbaniya. The second possibility has been suggested by Schild and Wendorf (1986:30), while the first is suggested by the intercalation of Nile silts with wadi deposits in the Korosko Formation. It is of interest here to note that, north of Luxor, we have mapped pale brown, indurated, marly silts, which are younger than the Dandara Formation and are covered by important wadi deposits. Unfortunately, these silts have not been dated and did not yield any *in situ* artifacts.

The Bir Sahara-Bir Tarfawi area provides a unique sequence for the reconstruction of paleoenvironments associated with Middle Paleolilthic (Wendorf and Schild 1980b). The evidence from Bir Sahara indicates a succession of two humid and two arid phases after the Final Acheulean occupation. The age and duration of these phases are, however, uncertain and the age of the lacustrine sediments involved is believed to be beyond the range of conventional radiocarbon dating techniques (Wendorf and Schild 1980b:234). The Older Dune and the Older Lacustrine Deposits have been dated by the Mousterian artifacts and sites they contain. The occurrence of similar Mousterian archaeology within clayey deposits at the Dyke site, some 100 km north-northeast of Bir Tarfawi (Wendorf and Schild 1980b), indicates true pluvial conditions in the area during Mousterian times. The Upper Lacustrine Series is dated by the presence of Aterian artifacts, and the two wet phases are separated by an arid episode.

The numerous vertebrate remains studied by Gautier (1980:371) give considerable information about the paleoenvironment. The fauna hunted in the Eastern Sahara during the Mousterian-Aterian wet phase(s) is characterized mainly by herbivorous species which live in herds or small groups in open biotopes of savannah or steppe type. The vertebrate species recorded in the two basins are identical except for the absence of warthog from Bir Tarfawi. The presence of camel and red-fronted gazelle indicates generalized dry steppic conditions. Gautier (1980:325) argues that the white rhinoceros (*Ceratotherium simum*) is a good indicator of a landscape dominated by rich grassland, where trees, bushes and shrubs played only a minor role.

The hyperarid period which began during the Middle Paleolithic occupation of the valley continued for most of the Late Pleistocene and throughout the Upper Paleolithic occupation. During this period, the Eastern Sahara appears to have been devoid of water, fauna and any evidence of human activity (Wendorf *et al.* 1977). This lasted until the Epipaleolithic-Neolithic transition and is well documented in Nabta playa (Wendorf and Schild 1980b) and El Adam playa, near Bir Kiseiba (Wendorf *et al.* 1979).

The climatic deterioration towards hyperaridity more than 60,000 years ago must have had a tremendous impact on all human groups living in the Sahara. We believe that this was a period of migration for the various Middle Paleolithic groups, and the Nile Valley must have been a refuge area for many of them. We suspect that the movement of these various groups into the Nile Valley may have led to the cultural changes that later become apparent in the various evolved cultures with Levallois technology, such as the Khormusan, the Levallois Idfuan, the Halfan and the Sebilian.

Upper Paleolithic Hyperaridity

The early Upper Paleolithic site of Nazlet Khater-4 at 33,000 years old is at present the oldest site with precise radiometric dates. Arid conditions are deduced from the filling of the mine-trench and -pits by aeolian sands. The undated Nile silts of Masmas and the Upper Paleolithic silts of Shuwikhat and Wadi Kubbaniya only very rarely contain intercalations of wadi deposits, thus indicating a hyperarid climate. We have no evidence of a wet interval before the end of the Shuwikhat aggradation, of which the top part has a thermoluminescence date of 24,700 B.P. ± 2500 years (OxTL.253). After this aggradation, the Nile receded and cut a smaller valley.

Thus far, we have not found any evidence for the Sahaba-Darau aggradation north of Qena, except for the Sheikh Houssein silts, which are related to the "Wild Nile" stage and date between 13,000 and 12,000 B.P. At Makhadma, these silts separate two units of slope deposits. The lower slope deposit, less than 1 m thick, is the type-section of the Makhadma Formation, which was erroneously attributed to the Mousterian-Aterian interval by Said (1981:126). In fact, this deposit, being intercalated between the Shuwikhat and the Sheikh Houssein silts, represents all the slope evolution between about 25,000 and 12,000 B.P. This period must, therefore, be considered as generally hyperarid with short wetter spells, or, eventually, with events of higher amplitude caused by local rainfall. Further research is needed to detail the slope evolution. It is possible that this slope deposit was formed during a much shorter span of time, reflecting an episode of wetter climate during the hyperarid Upper Paleolithic. If this should prove to be correct, then this wetter interval would date from *ca.* 23,000 to 21,000 B.P. and would lie between the end of the Shuwikhat silt aggradation and the beginning of the Kubbaniya silt aggradation, both of which were coeval with hyperarid periods.

The detailed characteristics of the Nile regimen have yet to be worked out (see also Schild and Wendorf 1980:43). According to Butzer and Hansen (1968) and to Butzer (1980), there were vigorous, braided Nile channels during the Darau substage, which they date to 17,000–12,000 B.P. These bedload deposits included exotic pebbles, which implies significant fluvial transport from Ethiopia and Sudan. According to Adamson and others (1980), this channel-type was typical for the Nile during the intertropical dry phase from 20,000 to 12,500 B.P. It is, however, not certain that such a braided river-system would be compatible with the important overbank aggradation of silts occurring in Wadi Kubbaniya at the same time. It might be that the braided Nile system preceded the Kubbaniya silts and was related to the wetter interval postulated for the 23,000–21,000 B.P. interval.

A better understanding of the slope evolution at Makhadma might also help us to understand the significance of the Nile down-cutting which occurred at some time between 25,000 and 20,000 B.P. This slope deposit might correlate with the Malki Member of the Ineiba Formation of Butzer and Hansen (1968:117–119), which is described as broadly coeval with the Darau Substage of the Nile. Cold and dry conditions prevailed in the Nile headwaters (Adamson *et al.* 1980).

The "Wild Nile" stage also seems to represent a turning-point in paleoclimatological history, since a new humid episode began afterwards with conspicuous wadi activity resulting in the deposition of very sandy fans. These fans can be clearly seen on LANDSAT images of areas where the older silts are under cultivation. The wadi deposits related to this episode are called the Sinqari Member (Ineiba Formation) by Butzer and Hansen (1968:119–122). In Upper Egypt, the episode ended some time

after 6320 B.P. ± 75 years (Lv.1379), based on a date on charcoal from a hearth *in situ* in the top part of a sandy fan.

CONCLUSIONS AND PERSPECTIVES

In this chapter, we have critically reviewed the relevant literature concerning earth, man and climate in the Egyptian Nile Valley during the Pleistocene and have added to this the principal results of the Belgian Middle Egypt Prehistoric Project, although only the sections including archaeological elements or radiometric dates have been discussed. The final chronostratigraphy for the Late Pleistocene is based on radiocarbon dates on charcoal and on a few thermoluminescence dates; the stratigraphy for the older periods is still only relative. The current state of the art is presented in Figures 3.7 and 3.8, which summarize the deposits, industries and climate for the older periods and for the Upper Paleolithic.

Early Paleolithic deposits with *in situ* artifacts are very rare. This long period was principally characterized by a bedload Nile depositing cobble and gravel terraces, except for the interval of the Dandara Formation, when a suspended-load Nile aggraded floodplain silts originating in Ethiopia. Dandara silts are very common downstream from Luxor but have not yet been reported upstream from that city. A single, man-made core is reported from the Dandara Formation and a few rolled artifacts have been found in older wadi deposits.

A very important observation for this time-period is the chronological succession of three stages, attested by different Nilotic deposits, which are believed to relate to global climatic evolution in the Nile basin. The first stage is primarily characterized by the deposition of cobbles by a bedload Nile. Various step-like terraces were formed and, by the end of this stage, the valley was incised to <20 m above the floodplain north of Luxor. The exact position of the Qena Sands is not well established: they lie above Pliocene silts and below several cobble terraces. Overall, the Nile of this stage was the most competent of all the Niles ever to have flowed through Egypt.

The second stage is characterized by the first massive influx of Ethiopian silts into Egypt, deposited by a suspended-load river, which implies more arid conditions in the Nile basin as a whole and hyperarid conditions in Egypt. We believe that the Dandara Formation was aggraded during a period of pronounced climatic change and propose to refer to it as the *Dandara Crisis*.

During the third stage, the Nile once more became a bedload river, although less competent than during the first stage. The main deposits were gravels at several terrace levels varying from +23 m near Qena to +5 m in the Sohag area.

These three stages have not been dated in Egypt, but we would suggest that they correlate with the long-term climatological changes described by Jansen and others (1986). Thus, the Dandara Crisis would be the East African response to the mid-Brunhes climatic event, which is dated to 0.4–0.3 mya.

The most important Acheulean materials are found in local deposits of the gravels and cobbles of competent wadis, overlying the truncated Dandara Formation. These gravel deposits have a red soil and represent the wettest climate since the Dandara Crisis. The situation in which they occur north of Luxor indicates that the base-level of the wadis was not more than 15 m above the modern floodplain.

Our knowledge of the Middle Paleolithic and its related deposits is still poor. Since the revision of the Nubian chronostratigraphy and the discovery of early Upper

Paleolithic sites, it is apparent that the Middle Paleolithic industries of the Egyptian Nile Valley are more than 40,000 years old. The numbers of known sections and archaeological sites are growing, but there are still many significant hiatuses and no Middle Paleolithic sites or related Nile deposits are known downstream from Asyut. In Figure 3.7, we have correlated the known information from several areas, using the probably rather simplistic assumption that there was only one principal climatic change during the period in question—from wetter to drier.

In the early part of the Middle Paleolithic period, the Nile was still a bedload river. The bedload deposits downstream from Qena consist of fine gravels of which the top is no more than about 10 m above the modern floodplain. However, in the Sohag area later in the Middle Paleolithic, a suspended-load river aggraded to a height of about +6 m. This old floodplain interfingered with prograding wadi fans and slope deposits indicative of a much higher competence than in any subsequent stage and related to more humid climatic conditions than presently obtain in Upper Egypt. Nevertheless, this event was not of sufficiently great amplitude to restore the Nile to full bedload conditions.

One of the most important paleoclimatological conclusions is that the shift to hyperaridity in the Egyptian Nile Valley dates from well before 40,000 B.P. and clearly occurred during the Middle Paleolithic. The last episode of humidity co-occurring with a phase of significant wadi activity is represented in the Ghineimiya fan, which includes a Middle Paleolithic site that is almost archaeologically *in situ*. The first evidence for the deterioration of the climate towards hyperaridity falls within a period that includes the occupation of the Middle Paleolithic site of Makhadma-6, which was almost archaeologically *in situ* in the lower part of a rather steep slope, and the beginning of the Middle Paleolithic aggradation of the Nile silts (Figure 3.7). The age of this dramatic change of climate can be estimated only on the basis of the thermoluminescence dates for the Middle Paleolithic Nilotic sequence at Wadi Kubbaniya, which suggest that the shift toward aridity may have taken place before 60,000 B.P. (A. E. Close *in litt.* 1986; Schild, this volume; Schild and Wendorf 1986).

Once arid conditions had become well established, new Middle Paleolithic silt aggradations began: the Dibeira-Jer, which includes the Khormusan industry, in Nubia and the Middle Paleolithic Valley Filling Episode in Wadi Kubbaniya. It is not yet clear whether the Masmas Formation in the Kom Ombo Plain dates from the Upper Paleolithic or from the Middle Paleolithic. These youngest, Middle Paleolithic aggradations are very similar to later aggradations, and also interfinger with aeolian sands on the western bank of the Nile. No trace of them has been found north of Luxor.

All of the Middle Paleolithic sites north of Aswan, except for the Aterian site at Wadi Kubbaniya, are functionally oriented toward the exploitation of chert. Retouched tools are rare, so that the existence of different complexes can be deduced only on the basis of the debitage technology, suggesting variants with a traditional Levallois technology, with a predominance of Nubian Type 1 cores, and with a blade technology based on single-platform cores combined with the Levallois technique. The typological characterization of the sites is not good enough to permit recognition of the various Middle Paleolithic cultural traditions which could be identified in Nubia.

Except at Makhadma-6, the environmental indicators at these sites are always of a wetter climate than that of today. Their stratigraphic positions suggest a considerable age, which we estimate to be 60,000 years or more.

There is no known lithic sequence from the Egyptian Nile Valley which covers the transition from a Levallois Middle Paleolithic to a blade-producing Upper Paleolithic.

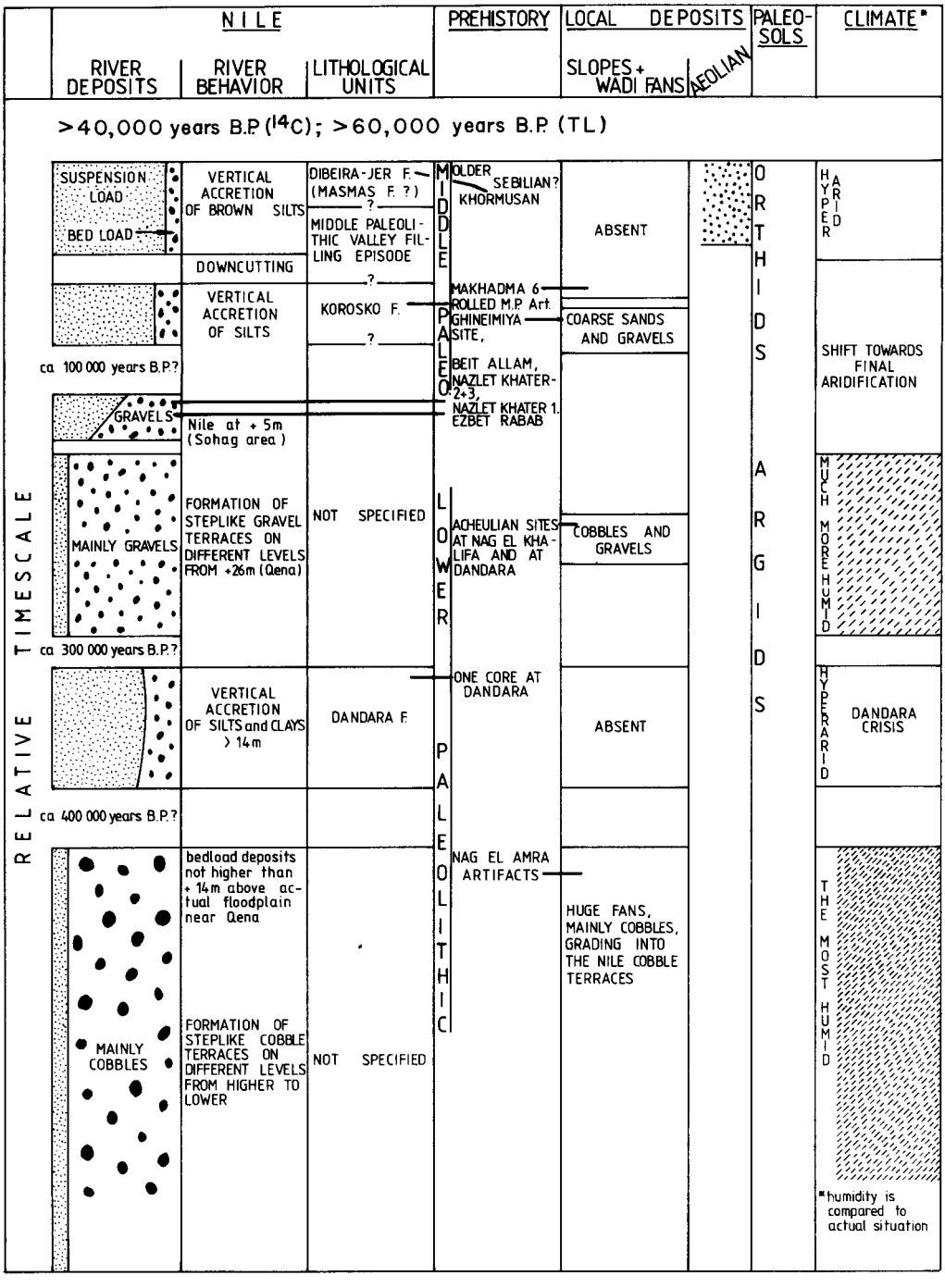


Figure 3.7 Summary of Nile and wadi behavior, lithostratigraphy, paleoclimates and prehistoric sites in Upper Egypt during the Early and Middle Paleolithic.

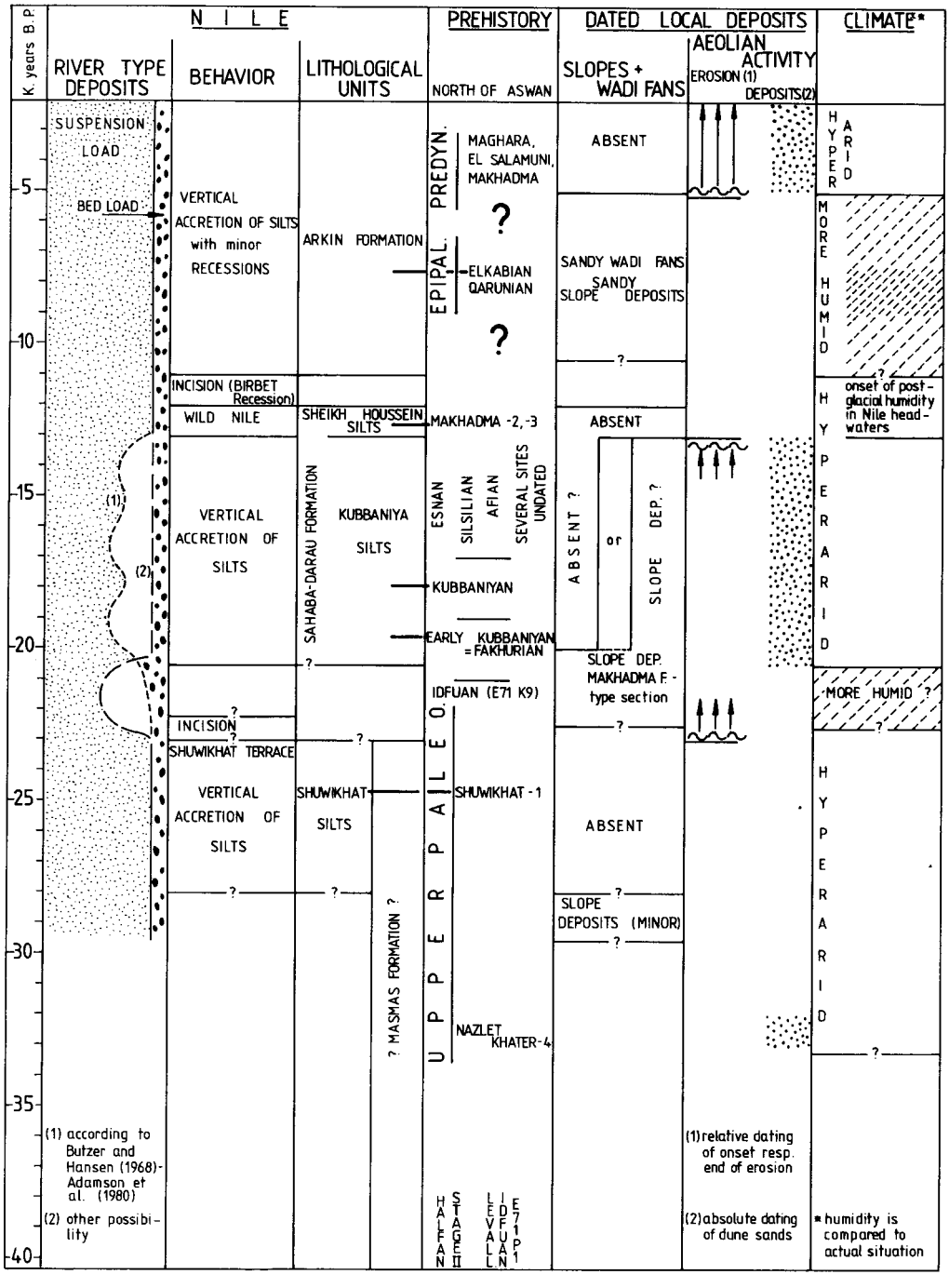


Figure 3.8 Summary of Nile and wadi behavior, lithostratigraphy, paleoclimates and Upper Paleolithic industries in Upper Egypt during the last 40,000 years.

Our knowledge of the Upper Paleolithic period is the most detailed and covers almost the entire Nile Valley in Upper Egypt and Nubia (Figure 3.8). We know nothing of the Nilotic sediments of the period north of Nag Hammadi, since they are now buried beneath more recent silts or are under cultivation.

The climate was hyperarid during this period, except for a possible, short, wetter interval at about 23,000–21,000 B.P. The Nile was a suspended-load river and was aggrading silts over wide floodplains, although, according to Butzer and Hansen (1968:115), bedload deposits are as important as suspended-load deposits in the Sahaba-Darau aggradation of the Kom Ombo Plain. The chronostratigraphic position of these bedload deposits merits further investigation.

The Shuwikhat silts, with their top dated to about 25,000 B.P., are the oldest dated Upper Paleolithic silts. They are separated from the silts of the subsequent Sahaba-Darau or Kubbaniya aggradation (about 20,000–12,000 B.P.) by a period of Nile down-cutting. Slope and wadi deposits are extremely limited throughout this period. The Wild Nile floods at 13,000–12,000 B.P. were the most important catastrophic event in the Late Pleistocene history of the Nile.

In our own work in the Nile Valley, we have excavated two sites attributable to the early Upper Paleolithic (>20,000 B.P.): Nazlet Khater-4, dated to about 33,000 B.P., and Shuwikhat-1, at about 25,000 B.P. The assemblages from these sites, as well as the Fakhurian-related assemblages from Wadi Kubbaniya which are firmly dated to 21,000–19,000 B.P., are characterized by a fully developed blade technology and are completely lacking in the Levallois technique. According to Marks:

> The post-Mousterian industries may be grouped into two basic technological traditions: those where the Levallois method or some modification of it persists, and those where a leptolithic technology either develops rapidly or seems to appear full-blown at the end of the Mousterian. The former situation is clearly present in the Maghreb and the Sahara, while the latter describes what apparently took place in the Levant and Cyrenaica (1975:446).

We have noted above that those sites in the Egyptian Nile Valley which are attributed to the Upper Paleolithic industries of the Levallois Idfuan, Stage II of the Halfan and the Older Sebilian are poorly dated. We suggest that these sites are much older and might fall within a late phase of the Middle Paleolithic (Sebilian) or in the Middle-Upper Paleolithic border-zone (Levallois Idfuan and Halfan Stage II). The principal argument for this hypothesis is that the Levallois technique does not occur in the early Upper Paleolithic sites in the Egyptian Nile Valley. The absence of Levallois technology from the lower Nile Valley by perhaps 35,000 years ago would make technological development in this region consistent with that known from Cyrenaica and the Levant and would place the lower Nile Valley within the circum-Mediterranean world. The Levallois technique seems to have persisted in more southerly parts of the Nile Valley, indicating a different evolution of technology. It is not clear whether this is also true of the Sahara and the Maghreb, as Marks (1975) suggested. We suspect that the border between these two Nilotic regions was somewhere near the First Cataract. It is possible to see some influx from the industries of the southern Nile Valley in some of the industries of the late Upper Paleolithic, such as the Kubbaniyan.

The only wetter period after the Middle Paleolithic for which there is good evidence is that of the Early Holocene. The beginning of this period is not directly dated in Upper Egypt but is estimated to have been at about 11,000 B.P.; the end of the wetter period is estimated to have fallen at about 6,000 radiocarbon years ago.

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