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## **Investigations of the Mid-Holocene settlement of Djara (Abu Muhariq Plateau, Western Desert of Egypt)**

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### **Introduction**

The Abu Muhariq Plateau (also called Libyan or Egyptian Plateau) stretches from the Nile Valley in the east to the curve of the Egyptian Oases in the west (Fig.1). Characteristic for this high plain is its often fairly homogenous appearance which could be described as a rocky desert (Simons 1973: 483-485; Said 1990: 14). The ground is covered to a large extent by Hamada, a lightly coloured hummocky landscape with wind polished and weathered rocky material (Kröpelin 1993: 37). The plateau is divided into two parts by over 600 km long Abu Muhariq dune-train. Fifteen km west of the dune lies the area of Djara (Fig. 2), situated in a landscape dominated by smaller limestone hills, depressions and wadis.

Djara was first mentioned by the German explorer Gerhard Rohlfs, who travelled in 1873 with his interdisciplinary expedition from Assiut in the Nile Valley to the Farafra Oasis. Rohlfs followed an old caravan route which led through this area. On Christmas Eve the expedition reached a dripstone cave - known as Djara (Rohlfs 1875: 59-60). A detailed map was added to his travelogue, the exact route noted, and an annotation made that the ground in this region was strewn with flint splinters. This can be rated as the first report on prehistoric stone artefacts in this region. Subsequently, the knowledge of the cave's existence sank into oblivion for more than 100 years. It was not until 1989 that the dripstone cave was rediscovered by the modern camel nomad, Carlo Bergmann. He reported retouched stone artefacts scattered around the cavern entrance, and he also described rock engravings made in the cave.

In 1990 and 1993 this archaeological site, now named Djara 90/1 (Fig. 2), was visited by members of the Heinrich-Barth-Institut (University of Cologne)

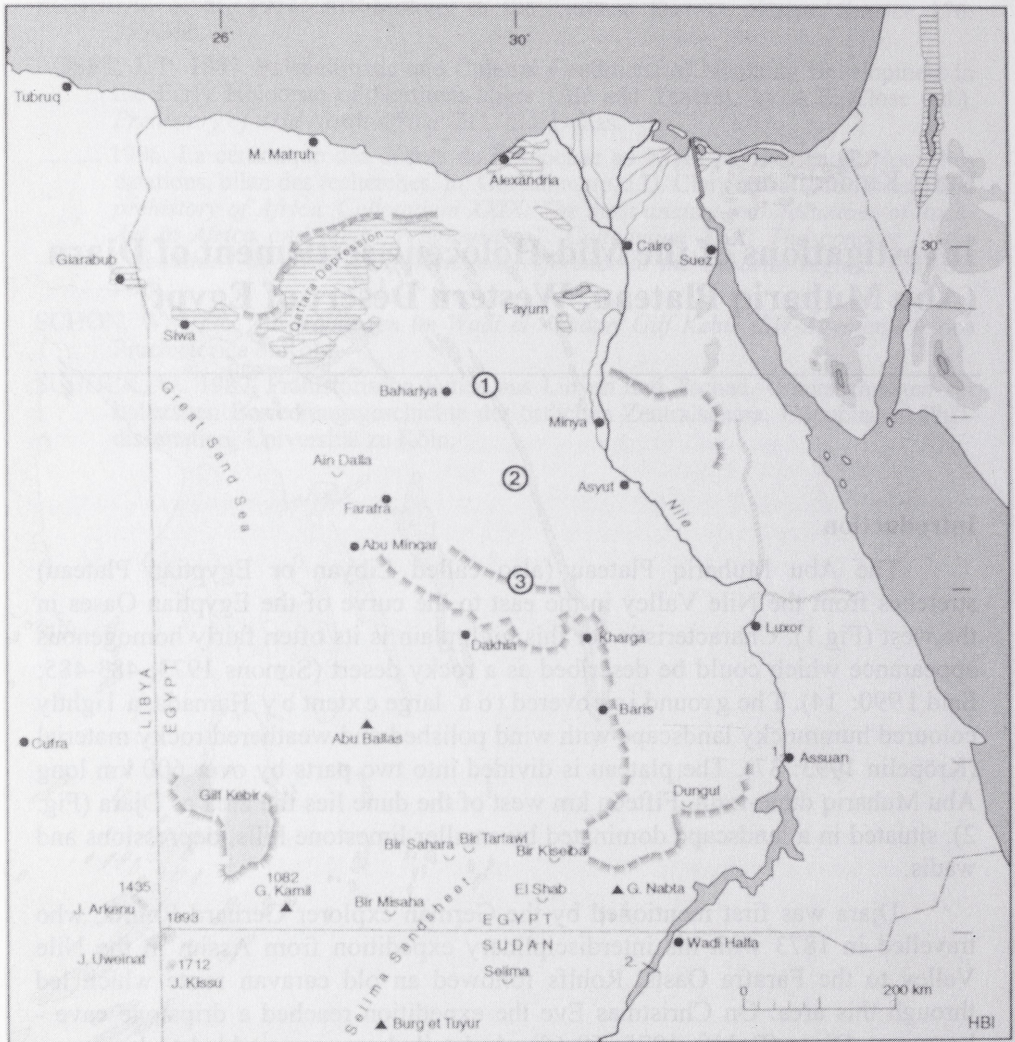


Fig. 1. Map showing the field work mentioned in the text: 1-Seton Hill, 2-Djara, 3- Abu Gerara.

(Kuper 1996: 82-83). Since 1998 the archaeological surveys and excavations were carried on the Abu Muhariq Plateau by the Collaborative Research Centre 389 - ACACIA (Arid Climate, Adaptation and Cultural Innovation in Africa) of the University of Cologne. ACACIA's subproject A1 focussing on "Climatic





Fig. 2. Djara 90/1 (seen from the north).



change and Human Settlement between the Nile Valley and the Central Sahara”, put emphasis on the mid-Holocene cluster of sites in the area of Djara (Classen et. al. 2001; Kindermann in press).

This paper refers to the results of this fieldwork, with special attention being paid to “Cultural Markers” understood here also as “Chronological Markers”. Therefore, characteristic artefact forms of the Djara inventory should be emphasised. The cave site, Djara 90/1, and the surrounding settlement will be described in a more detail.

### Site Djara 90/1

Djara 90/1 is situated in a shallow depression of nearly 400 m in diameter surrounded by small limestone hills (Fig. 2 and 3). Sparse vegetation - predominantly shrubs such as *Salsola imbricata* ssp. *getula*, *Anabasis articulata* and *Fagonia* cf. *arabica* - grows in the north-west, the lowest measured part of this site. Here, thin playa-sediments were noticed. During a phase with richer precipitation a periodic or episodic surface water was to be found here: this led to the accumulation of a clay material in this endorheic basin.

The dripstone cave itself is, generally speaking, a geomorphological peculiarity for desert regions (Fig. 4). This leaching cave with its impressive stalagmites and stalactites was formed as superficial water drained off (pers. comm. H.W. Franke). The entrance to this cave lays about 150 m south-east of the playa depression, where the limestone ceiling collapsed and gave access to the cave. A long sand slope leads down to the floor, 10 m below the surface. The level ground in the large cavern hall consists of 2 to 6 m thick sand deposit over the solid rock, as verified by ground penetrating radar profiles (Deutsches Montan-technologisches Institut für angewandte Geophysik Bochum, DMT). Granulometric examination of drilling samples clearly shows that the sediment in the cave, which consist of sterile sand only, was probably washed in after strong precipitation events (Steinmayr 1995). The lower part shows signs of an aeolian sorting which was presumably deposited during periods with more arid conditions. The upper zone, where the sand deposit is up to 2.5 m thick, was formed during more humid conditions. Whether this is an indication of a fundamental climatic change, and if so – when exactly it took place, is still uncertain. This final deposit possibly belongs to the last wet phase of the Holocene, as no considerable sand deposit has been registered since then. An absolute dating of the deposits by OSL analysis is currently being undertaken.

Directly behind the entrance, in the upper cavern hall (“hall of the gazelles”), the rock art was found not only on a large stalagmite (Fig. 3, panel A) but also on other parts of the rock face (Classen et. al. 2001). As all of the pictures were engraved on carbonate rock they must have originally appeared in a



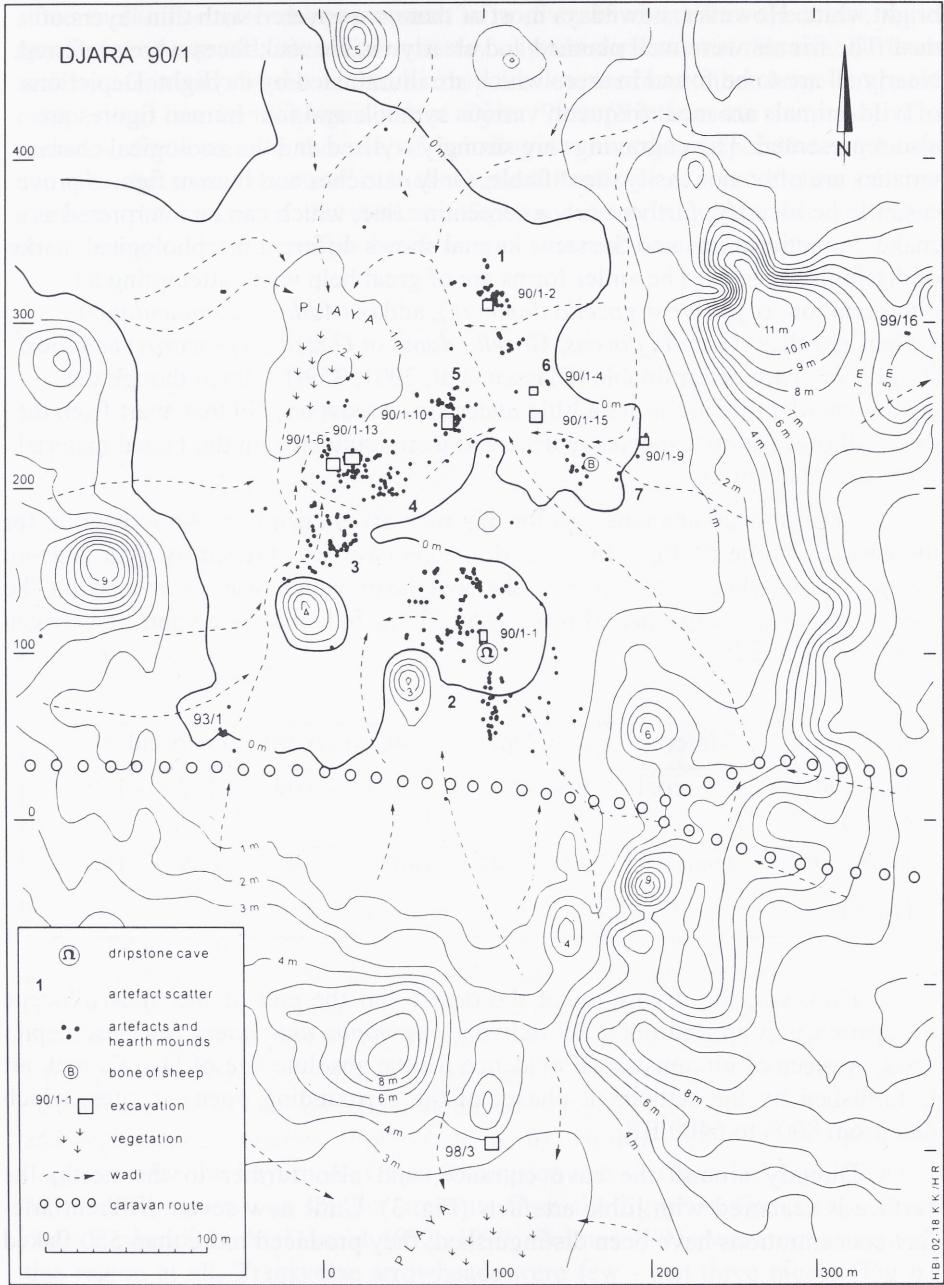


Fig. 3. Djara 90/1: map showing excavations and artefact scatters.

bright white. However, nowadays most of them are covered with thin layers of dust. The friezes were well planned and clearly visible rock faces were preferred. Nearly all are to be found in areas which are illuminated by daylight. Depictions of wild animals are most frequent; various symbols and four human figures are also represented. The engravings are strongly stylised and the zoological characteristics are often not easily identifiable. Only ostriches and human figures prove easier to be identify; furthermore, a serpentine line, which can be interpreted as a snake. Sometimes one and the same animal shows different morphological marks of dissimilar species. The antler forms are of great help when attempting an interpretation; oryx (*Oryx gazella dammah*), addax (*Addax nasomaculatus*), various gazelles (*Gazella dorcas*, *Gazella dama* or *Gazella leptoceros*) and ibex (*Capra ibex*) are determinable (Classen et al. 2001, 359ff.). Even though the zoological identifications are a little uncertain, it must be said that apart from the ibex - all other animal species represented were found also in the faunal material from the excavations.

Until now an absolute age for this rock art is uncertain. An indication for the period of time during which the dripstone cave was visited by man is given by two radiocarbon dates from a charcoal layer which was excavated on the terrace above the large hall (Fig 4). Both dates fall in a time span of between 8000 and 7300 BP:

Site	Material	Lab. No.	14C-years BP	Years cal BC <sup>1</sup>
Djara 90/1-3 (cave)	charcoal	Erl-2863	7303 +/- 109	6172 +/- 119
Djara 90/1-3 (cave)	charcoal	KIA-12422	8057 +/- 59	7049 +/- 186

However, the drying up of the desert and the end of the mid-Holocene occupation unit around 6000 BP delivers a *terminus ante quem* for these depictions. A piece of circumstantial evidence for the absolute age of Djara's rock art is furnished by the settlement phases of the surrounding open air sites, which date from 8000 to 6400 BP.

Directly around the cave entrance, and also further to the north, the surface is scattered with lithic artefacts (Fig. 3). Until now seven different artefact concentrations have been distinguished; they produced more than 550 flaked

<sup>1</sup> calculated by 2-D Dispersion Calibration Program Version Cologne 2001 (B. Weniger)



stone tools. The assemblages consist of a diversified artefact spectrum, which speaks for a long and often recurrent stay of prehistoric man at this site. Different activity areas and phases of use, as they are known from other large temporary camp sites, can be distinguished at Djara 90/1 (Kindermann in press). This includes, for example, the use of grinding stones, the preparation of hunted animals, the manufacture of ostrich eggshell beads or the production of stone artefacts. All stages of the stone artefact production sequence occur at Djara 90/1: testing and initial stages, blank as well as a tool production.

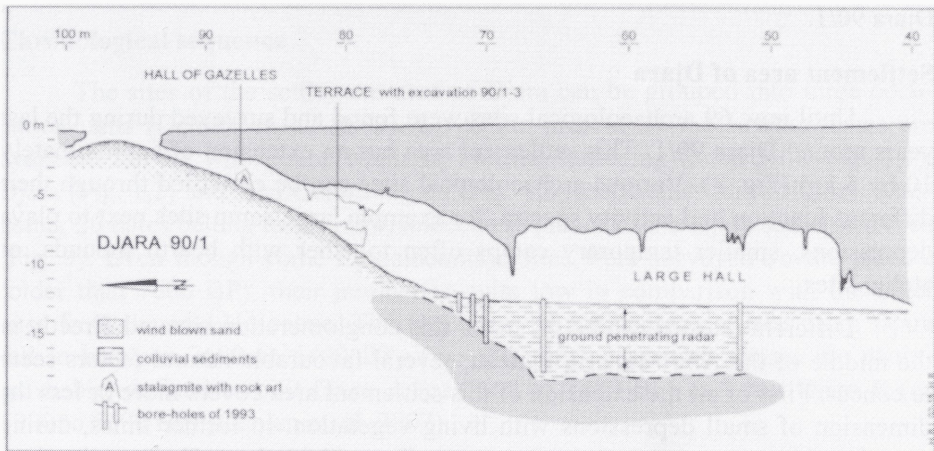


Fig. 4. Schematic cross-section through the dripstone cave Djara 90/1.

Lithics make up the largest part of the artefact inventories. Local flint with a wide range of different colours – from yellow over red to brown – dominates with more than 90% of the raw material used in the production of stone artefacts. Only very few lithic tools are made of other materials, e.g. quartzite or limestone. The tool kit is dominated by facially retouched stone implements, often made by a fine pressure flaking technique; these are, e.g. knives (Fig. 5.1 to 5.4) and especially projectile points, including stemmed, winged (Fig. 6.1 to 6.5, 6.11, 6.12) and leaf-shaped varieties (Fig. 6.6 to 6.10). Hollow based forms which are diagnostic for the Fayum A (Caton-Thompson and Gardner 1934, pl. 11 and pl. 39) and also known in smaller amounts from the Egyptian Oases (e.g. Dakhla oasis Bashendi B; McDonald 1992; 1999; Holmes 1991) were not observed in this region at all. Transverse arrowheads were few - just three pieces (Fig. 6.13 and 6.14). Side-blow flakes (Fig. 7.1 and 7.2), side- and circular scrapers (Fig. 7.3 and 7.4) as well as borers and planes (Fig. 6.15 and 6.16) are frequent.

A chronological pattern is visible in the distribution of the artefact scatters. Nearly all notched or strangulated blades and backed retouched artefacts come from the northern concentration 1. All Epipalaeolithic radiocarbon dates also come exclusively from this part of the site. An exact differentiation of the various facially retouched artefacts from the mid-Holocene is much more challenging, as clear artefact types as chronological markers are difficult to ascertain. Both facially retouched arrowheads and side-blow flakes, which are suggested as characteristic lithic forms of the "Late Neolithic" (around 6500-5600 BP after CPE-chronology; Wendorf and Schild 1984, 417ff.; Schild and Wendorf 2001; Wendorf and Schild 2002, 43) are spread over the whole site Djara 90/1.

### Settlement area of Djara

Until now 69 archaeological sites were found and surveyed during the last years around Djara 90/1. This settlement area has an extension of approximately 10 by 5 km (Fig. 8). Various archaeological sites can be classified through their different function and activity spectra, for example large camp sites next to playa depressions, smaller temporary camps often together with hearth mounds, or atelier sites.

Different reasons can be given for this conglomeration situated directly in the middle of the Abu Muhariq Plateau; several favourable natural factors seem to concur. First of all the extension of this settlement area covers more or less the dimension of small depressions with living vegetation. In former times, during more humid years, open water was temporarily available here. Today only playa sediments and sometimes small shrubs bare witness to these ephemeral lakes. The archaeobotanical determination of charcoals from Djara shows a broad spectrum of different plants of the mid-Holocene pluvial. Beyond the typical desert vegetation of *Acacia* and *Tamarix* species, different types of *Cappari-dacea* taxa were determined at site Djara 90/1, which can be seen as an indicator for more humid ecological conditions.

Moreover, various local flint deposits document an abundance of raw material for the stone artefact production. Exploitable deposits were noted foremost within the Minia-Formation (Tei-Formation) at the latitude of Djara and also to a smaller extent within the Naqb-Formation (Tetn-Formation), a little further to the west. Frequently the flint weathered out of small limestone hills; at most sites flint blanks are naturally produced by frost- and salt weathering. Due to a clever choice a blank production can be reduced to a small amount because naturally weathered flint sherds were often used for stone implements such as side scrapers (e.g. Fig. 7.3) or planes (e.g. Fig. 6.16).



Atelier sites in the area of Djara are characterised by a lithic technology which is conspicuously uniform at all these sites. A great number of artificially tested and prepared flint nodules or natural flint shatters were found. Here and there a few blank products and modified pieces were registered. Archaeological remains indicating a longer stay, an intensive lithic tool production, and the usage of grinding stones or hearth mounds are completely absent. Apparently the people stayed only for a short time at these sites. In the surrounding areas, probably in a perimeter of a day's walk, were the camp sites. For the Djara region these distances are easy to estimate. Atelier sites or flint deposits lay in a distance of up to 15 km from the larger camp sites of the Djara settlement area.

### Chronological sequence

The sites of the settlement area of Djara can be grouped into three occupation units (Gehlen et. al. 2002). Up to the present 24 radiocarbon dates are available for the whole Abu Muhariq Plateau, including Seton Hill (Fig. 1,1), Djara (Fig. 1,2) and Abu Gerara region (Fig. 1,3; see Riemer this volume). Altogether 20 dates belong to the mid-Holocene sequence of the Djara settlement area (Fig. 9). Even though some Epipalaeolithic sites were surveyed on the plateau (older than 7600 BP), their number is quite low in comparison with the other sites from the mid-Holocene. The vast share of archaeological sites from Djara fall in between 7600 to 6400 BP. Two different occupation phases are distinguishable, defined as unit Djara A (ca 7600 to 7250 BP) and unit Djara B (ca 6900 to 6400 BP) (Gehlen et. al. 2002).

Grinding implements appeared for the first time within Djara A as did facially retouched arrowheads. Characteristic for this unit are also facially retouched pieces, borers (Tixier 1963, type 12), simple end scrapers on flakes (Tixier 1963, type 1), side scrapers on weathered flint sherds and laterally retouched arrowheads.

Side-blow flakes and bifacially retouched knives appear for the first time during the unit Djara B (Gehlen et. al. 2002: 87-91). Over and above that facially retouched planes are characteristic. Stone implements were preferred to be made out of flakes or weathered flint sherds; this was often observed at circular scrapers which are frequent in the artefact material. The dominant tool type in the assemblages of unit B are facially retouched arrowheads. Although facially retouched points occur for the first time during the unit Djara A, their spectrum appeared much broader in Djara B. Technological aspects, which already emerge in the unit A, like the facial retouch, gain much more importance in Djara B. It is the predominant modification technique in this unit which is frequent in all inventories. In many cases the facial retouch is executed very regularly, so separate retouch scars run parallel to each other on the surface of the artefacts (pressure

flaking). Moreover it has been observed that a regular pressure flaking did not occur in the unit Djara A.

During the mid-Holocene wet phase the number of sites increased, whereas during the Epipalaeolithic only smaller sites were known. Although a higher diversity of the site sizes is visible in the unit Djara A and Djara B, little is known about their economic conditions. Most sites from the Abu Muhariq Plateau belong to the mid-Holocene, however it is uncertain when exactly the pastoral way of life replaced the hunter-gatherer subsistence. Cattle and small livestock occur in a lot of archaeological sites of the Eastern Sahara around 7000 BP (Wendorf and Schild 1994). In the Dakhla Oasis cattle has been determined for the late Bashendi A around 7000 BP (McDonald 1998) and in the Farafra Oasis small livestock dates around 6700 BP (Barich and Hassan 2000). At site Djara 90/1 a bone fragment, classified as domesticated sheep, was found in a mid-Holocene surface concentration (Berke 2001). Apart from that, only bones of wild animals, such as *Gazella dorcas* and *Gazella dama* were excavated, these having been the most hunted animals.

After 6400 BP a clear break off in the radiocarbon dates is visible. The drying trend of the desert in the mid-Holocene probably became noticeable already around 6400 BP on the plateau. Two single samples from hearth mounds verify only sporadic human activities. There are no younger radiocarbon dates than 5900 BP and the area of Djara seemed to be depopulated now.

### Chronological markers

For a further chronological subdivision of the predominantly mid-Holocene assemblages of Djara and for an exact delimitation against artefacts from other units it is necessary to look for unambiguous chronological markers, understood here likewise as distinct key forms of prehistoric periods. At the present level of knowledge more data is available for Djara B, therefore chronological markers of this unit will be described below. Ceramics and three different types of lithic tools from the Djara sites are of further interest: arrowheads, side-blow flakes and knives.

### Ceramics:

Although pottery is suggested as an important cultural marker for most of the mid-Holocene localities in the Western Desert, it is almost unknown in the Djara region. Among more than 69 sites studied during the surveys of the last years, Djara 00/65 is with approximately 10 potsherds an exception. All sherds are of a thin-walled ware with a grey coloured, fine textured paste and can be assigned to fabric 1A of Abu Gerara (see Riemer this volume) and Eastpans 95/2 (Gehlen et. al. 2002). A refitted and reconstructed vessel indicates a pointed base.



An age around 6000 BP for this ceramic is suggested by the pottery from East-pans which corresponds to the final Djara B unit. Site Djara 00/65 is situated within a complex of very large assemblages on playa-terraces in the east of the settlement area. A 14C-date is not available at the moment but the stone artefacts were attributable to unit Djara B. Nevertheless, the proportion of potsherds found on sites of Djara are extremely small.

### Arrowheads:

For the absolute dating of Djara's facially retouched points, the site Djara 90/1-1 is of particular interest. Situated only 14 m north of the cave entrance (Fig. 3), this site was selected because many different facially retouched tools, as well as flakes and chips were observed on the surface. Despite its size of only 2 by 6 m, two hearths were found with several facially retouched stone artefacts within; three arrowheads and one side scraper (Fig. 7.4) were found in situ. These points include a lens-shaped piece (Fig. 6.10), a stemmed one (Fig. 6.3) and a stemmed point with barbs (Fig. 6.5). Arrowheads are the predominant tool category for this excavation unit. Four different charcoal samples were dated by radiocarbon method and placed this assemblage of facially retouched tools at between 6800 and 6400 BP (Djara B).

Site	Material	Lab. No.	14C-years BP	Years cal BC <sup>2</sup>
Djara 90/1-1	charcoal	KN-4601	6448 +/- 69	5407 +/- 61
Djara 90/1-1	charcoal	KN-4600	6685 +/- 90	5600 +/- 76
Djara 90/1-1	charcoal	HD-16313	6685 +/- 90	5659 +/- 46
Djara 90/1-1	charcoal	HD-16311	6786 +/- 49	5679 +/- 38

Comparable tips of arrows are known, for example, from different mid-Holocene sites of Kharga like Umm el-Dabadib, Ghuata Basin, Yebsa and Abu Sighawal Pass (Caton-Thompson 1952, pl. 95; 97-100; Holmes 1991) and the mid-Holocene units Bashendi A and B of the Dakhla Oasis (McDonald 1982, 1990, 1999), from the Western Desert site Lobo 81/55-5 in the Abu Minqar area (Klees 1989, Fig. 4) and the Fayum Depression (Caton-Thompson and Gardner 1934, pl. 48).

<sup>2</sup> calculated by 2-D Dispersion Calibration Program Version Cologne 2001 (B. Weniger)

### Side-blow flakes:

These wide, edge retouched flakes were modified as side scrapers (Caton-Thompson 1952), sometimes also as knives. They are defined by their curvo-convex form, comparable with a wing.

A whole reduction sequence associated with these implements from site Djara 90/1-6 was excavated (Fig. 10). The manufacturing process, which requires an exceptional technique for the production of curved flakes is visible. An oval but flat flint nodule was used as raw material for the sequence. The flaking began from one side. Wide flakes were produced which all possess cortex on their distal edge and on their striking platform. They were not satisfying enough for a further tool preparation. Afterwards the core was rotated 180° and another reduction took place on the opposite side. Only flake number seven seemed to be a satisfactory blank for a tool on a side-blow flake. A preparation of the striking platform for obtaining a significant working edge is not visible. This is conformed by all other side-blow flakes found on the Abu Muhariq Plateau. If a modification was observed it derived either from a later edge retouch or from use traces. All this led us to presume a hard percussion technique for the production of side-blow flakes. A special core preparation does not seem to be necessary. This was also confirmed by a knapping experiment (conducted by H. Berke). With a hard and direct powerful blow it was easy to produce wide flakes. Only the last flake seemed to be good enough for a further modification. The side-blow flakes as well as the modifications observed on site Djara 90/1-6 seem to be fairly rough made. Likewise there are also side-blow flakes that resemble in shape and form examples from Fayum sites (Caton-Thompson 1934, pl. 43), with a standardised and controlled blank production and a very regular retouch of the platform and the distal edge (Fig. 7.1).

Side-blow flakes are always classified as a typical lithic form of the “Late Neolithic” (around 6500-5600 BP after CPE-chronology; Wendorf and Schild 1984: 417ff.; Schild and Wendorf 2001; Wendorf and Schild 2002: 43), together with bifacially retouched projectile points, ground and polished stone celts (Wendorf and Schild 1984: 417ff.; Wendorf and Schild 1994: 121f.). Most side-blow flakes belong to surface scatters and were dated through the artefact inventories itself. At Nabta Playa site E-75-8 (Banks 1984) and Makhadma 4 in the Nile Valley (Vermeersch et. al. 1992), these tools are associated with dates around 5900 BP (Nabta Playa E-75-8: 5810 +/- 80 BP, SMU-473 and Makhadma 4 (hearth 9): 5990 +/- 70 BP, GrN-12983). Affiliated charcoal samples from the excavation of site Djara 90/1-6 produced an earlier age, between 6900 and 6700 BP (Djara B).



Site	Material	Lab. No.	14C-years B	Years cal BC <sup>3</sup>
Djara 90/1-6	charcoal	Erl-2859	6696 +/- 94	5608 +/- 79
Djara 90/1-6	charcoal	UtC-9462	6900 +/- 50	5778 +/- 48

### Knives:

Of chronological interest is also the dating of bifacially retouched knives. These knives are known from Predynastic and Early Dynastic sites of Egypt. With the "Gerzean Flint Knives" their technological perfection is unequalled around the 5th millennium BP during Nagada II (Kelterborn 1984; Midant-Reynes 1987).

In the Djara region also a large number of knives was found in different archaeological sites. A diversified spectrum of shapes is remarkable for the Djara settlement area, so symmetric, nearly leaf-shaped knives were found as well as asymmetric types (Fig. 5.1 to 5.4). A few pieces show attachments for a handle (Fig 5.1 and 5.2). Quite a few were resharpened after usage while others were used apparently only once and were rejected afterwards. As a raw material for the production of knives mostly tabular flint or sometimes weathered flint sherds were used. Both parallel pressure flaking and rough retouch with traces of re-sharpening is known from the modification technique.

A direct date for this artefact category is still lacking from the Abu Muhariq Plateau. On the basis of different radiocarbon dates from sites in this region, these knives seem to belong to the Djara B unit. At the moment there is no reason for dating these bifacially retouched tools in the region of Djara as Predynastic because 14C-dates and human settlements during this period are completely absent.

### Conclusion

In conclusion it can be said that during the Early and mid-Holocene the Abu Muhariq Plateau, just as was the case with other parts of the Western Desert, was not an easy environment to live in. The vegetation was sparse and concentrated around ephemeral lakes, nowadays often preserved as playas. Many mid-Holocene sites were discovered in the Western Desert in the vicinity of playsediments.

Even though some Epipalaeolithic sites were found on the plateau, their number is low in comparison with sites from the mid-Holocene. The vast share

<sup>3</sup> calculated by 2-D Dispersion Calibration Program Version Cologne 2001 (B. Weniger)

of archaeological sites from Djara fall in a period of time between 7600 to 6400 BP. Two different occupation phases can be distinguished, unit Djara A (around 7600 to 7250 BP) and unit Djara B (around 6900 to 6400 BP). Human groups stayed only seasonally in the area of Djara. They lived in semi-stationary encampments - camp sites - which were situated in particularly ecologically favoured locations. A permanent settlement is not conceivable for the whole Abu Muhariq Plateau because permanent water reserves are here missing. Features that made the Djara region attractive comprise the abundance of the easily available raw flint and especially the favourable environmental conditions. After 6400 BP the occupation seems to have ceased. The dry trend experienced at the end of the 7th millennium BP, which interrupted the relatively moist mid-Holocene conditions in this area, was possibly responsible for the people leaving this region to more humid lands as the Oases or the Nile Valley.

### **Addendum**

The fieldwork in the area of Djara has been continued during the years 2001 and 2002. Further excavations, especially in the dripstone cave itself, were carried out during this time period. The work undertaken has focused in particular on botanical and animal remains, combined with archaeological features. An emphasis has been also made on geomorphological and sedimentological examinations. The analysis of the samples is still in progress.

### **Acknowledgements**

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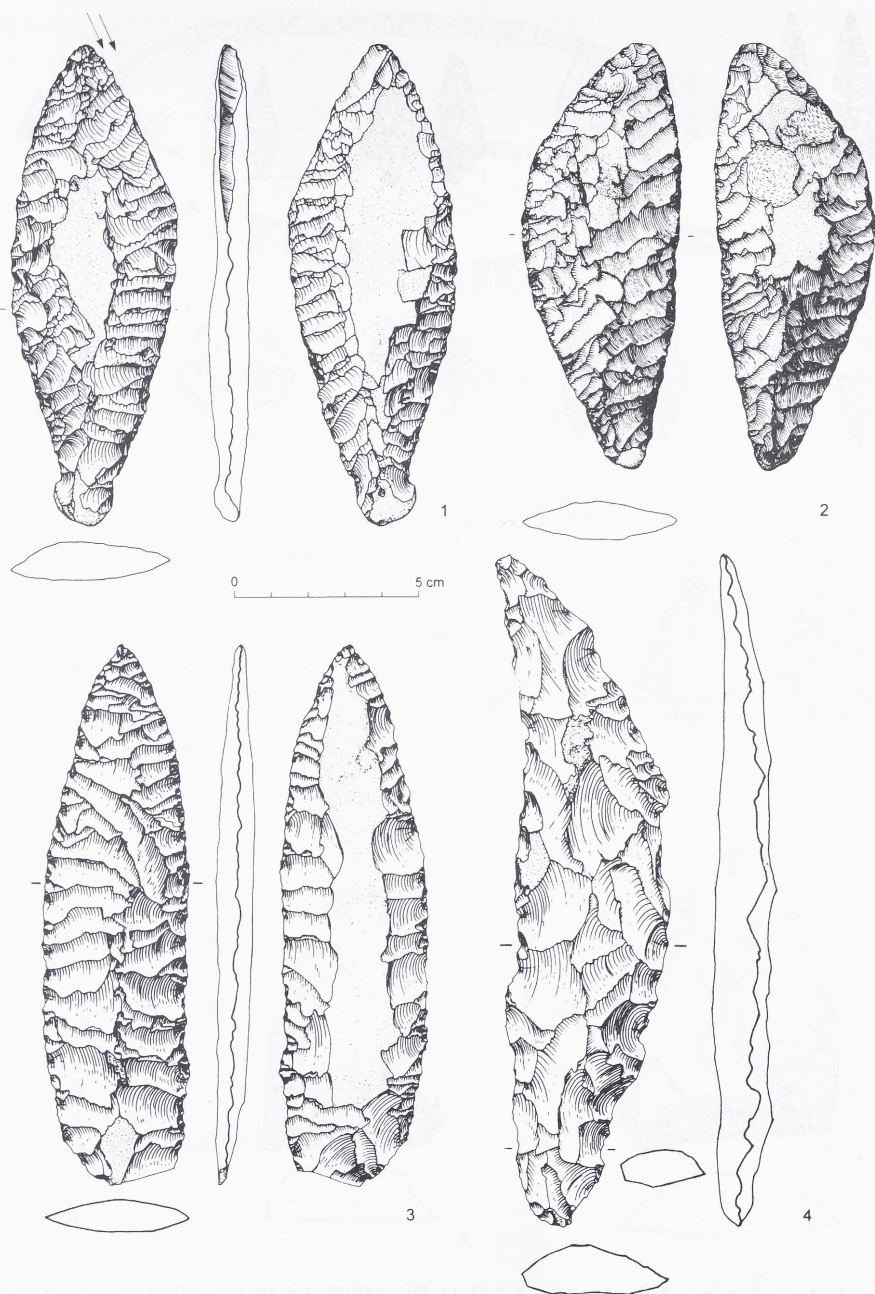


Fig. 5. Bifacially retouched knives. 1-2 Djara 90/1; 3-Djara 00/91; 4-Djara 99/22.

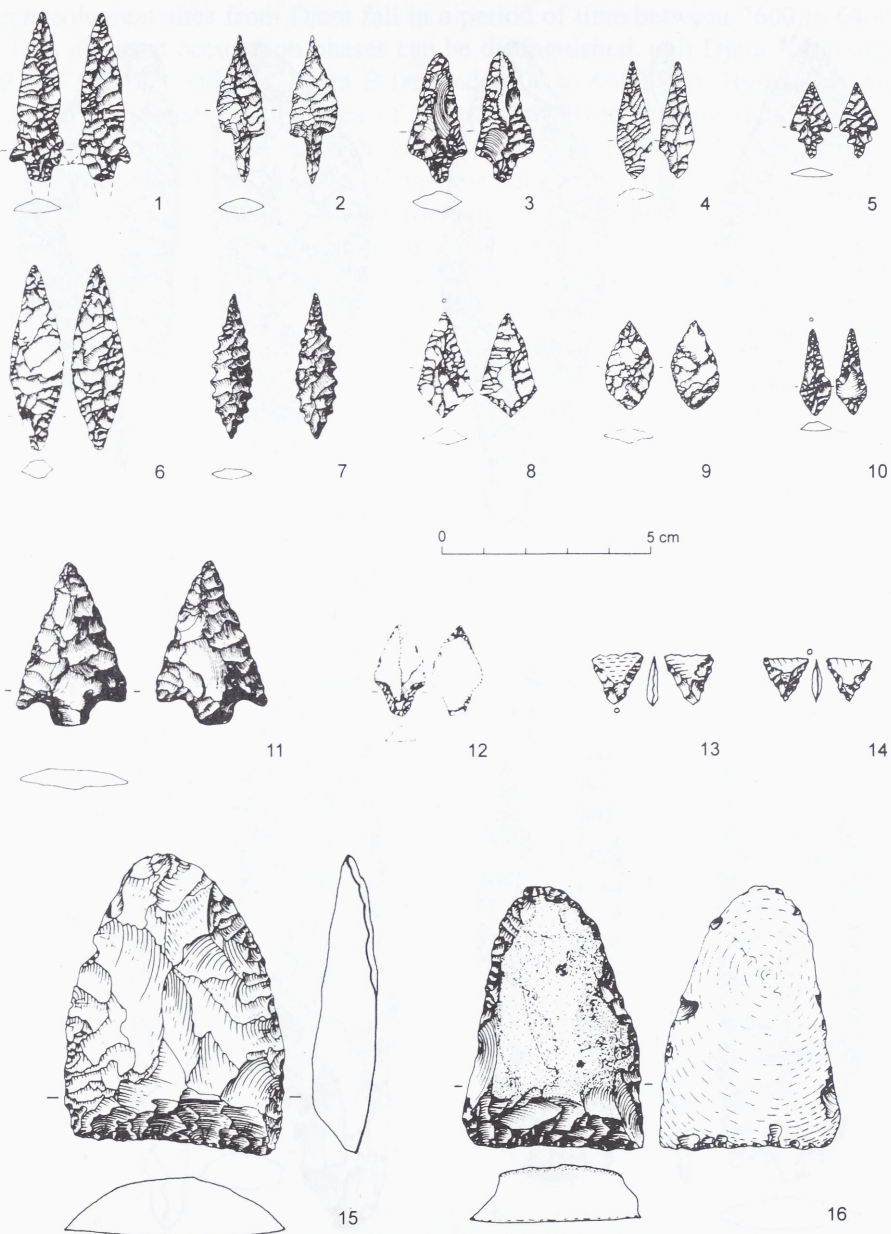


Fig. 6. Arrowheads and planes. 1.2.4.6.7.11.16-Djara 90/1; 3.5.10-Djara 90/1-1 excavation;  
 8.12-Djara 90/1-1, surface; 9-Djara 90/1-2; 13-Djara 90/1-15; 14-Djara 90/1-10;  
 15-Djara 99/22.



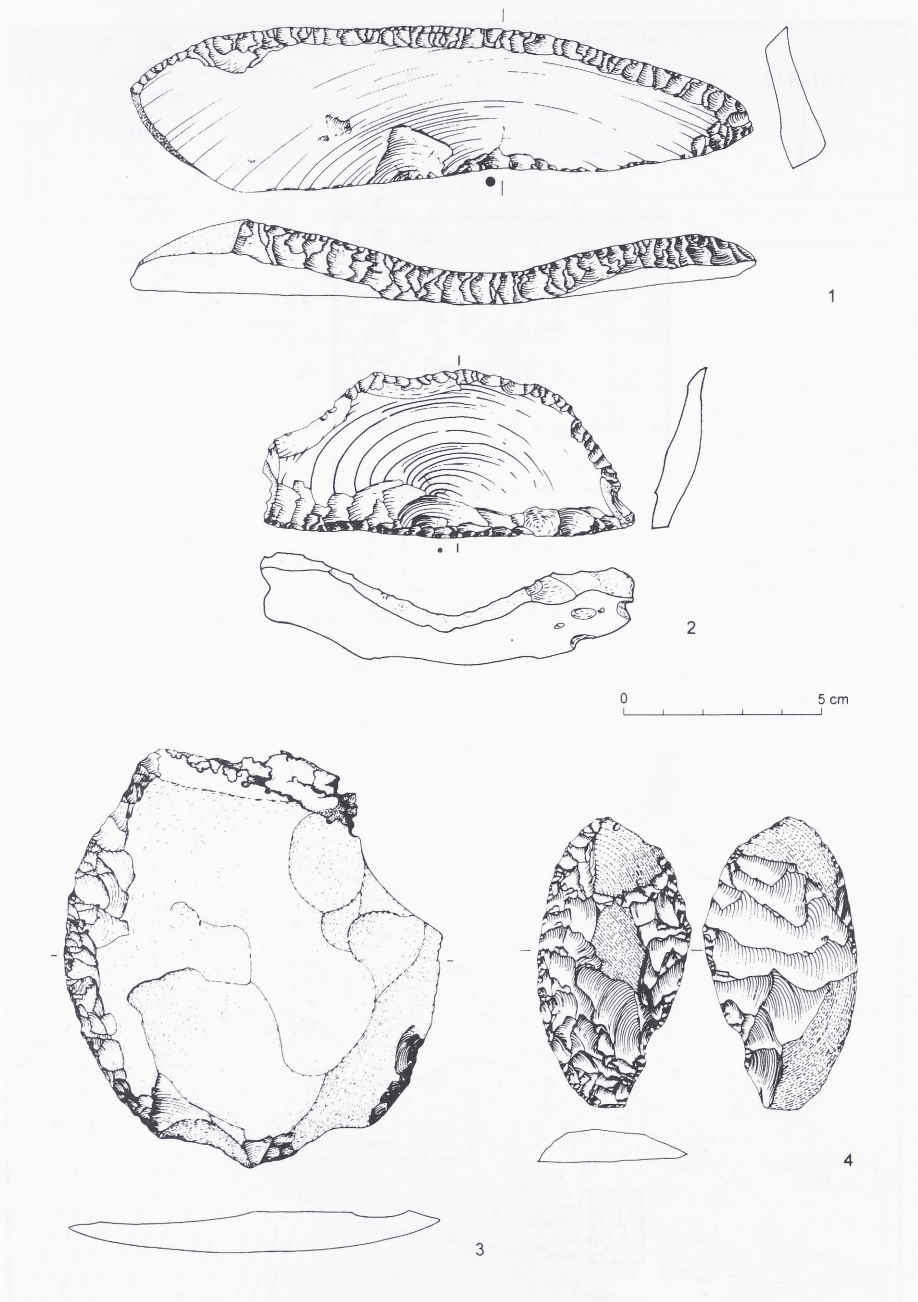


Fig. 7. Side-blow flakes and side scrapers. 1-Djara 98/4; 2-Djara 00/55; 3-Djara 90/1; 4-Djara 90/1-1.

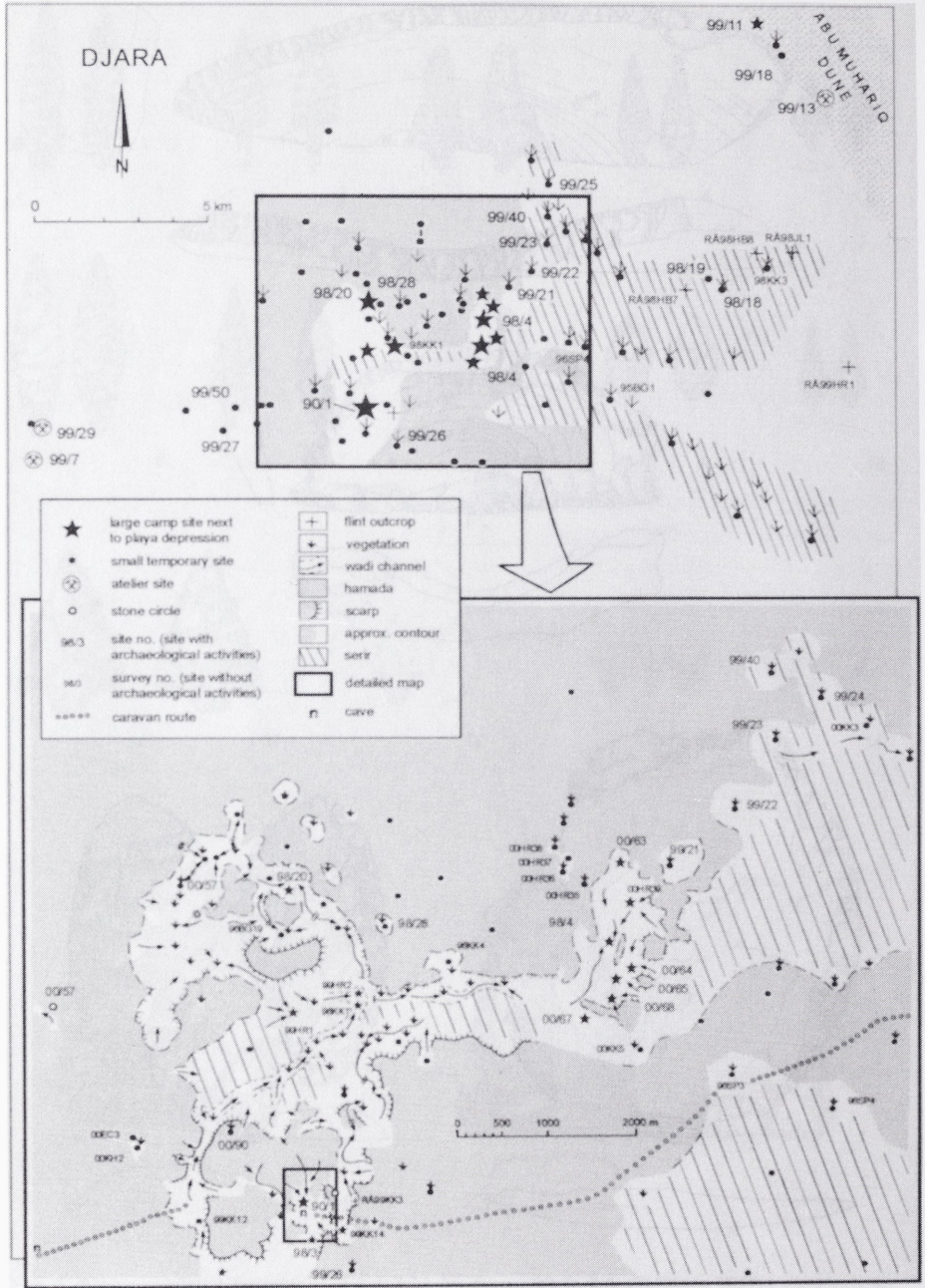


Fig. 8. Settlement area of Djara.



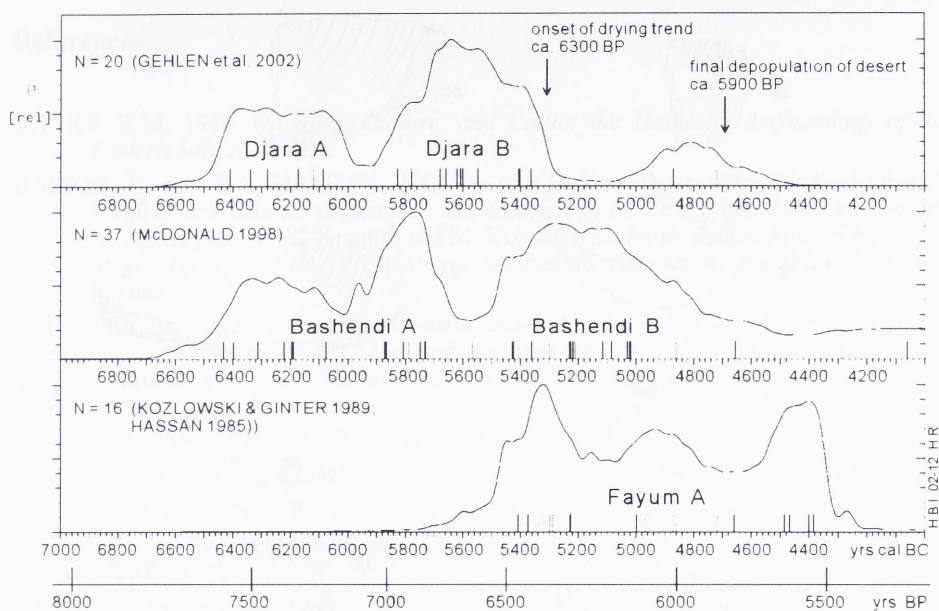


Fig. 9. Histograms showing the probability distribution of 73 mid-Holocene 14C-dates from Djara (including dates from units Djara A and Djara B), Dakhla Oasis (units Bashendi A and Bashendi B) and the Fayum (Fayum A); x-scale: calibrated dates in cal BC (Calibration by 2-D Dispersion Calibration Program Cologne 2001, B. Weniger, Radiocarbon Laboratory, University of Cologne).

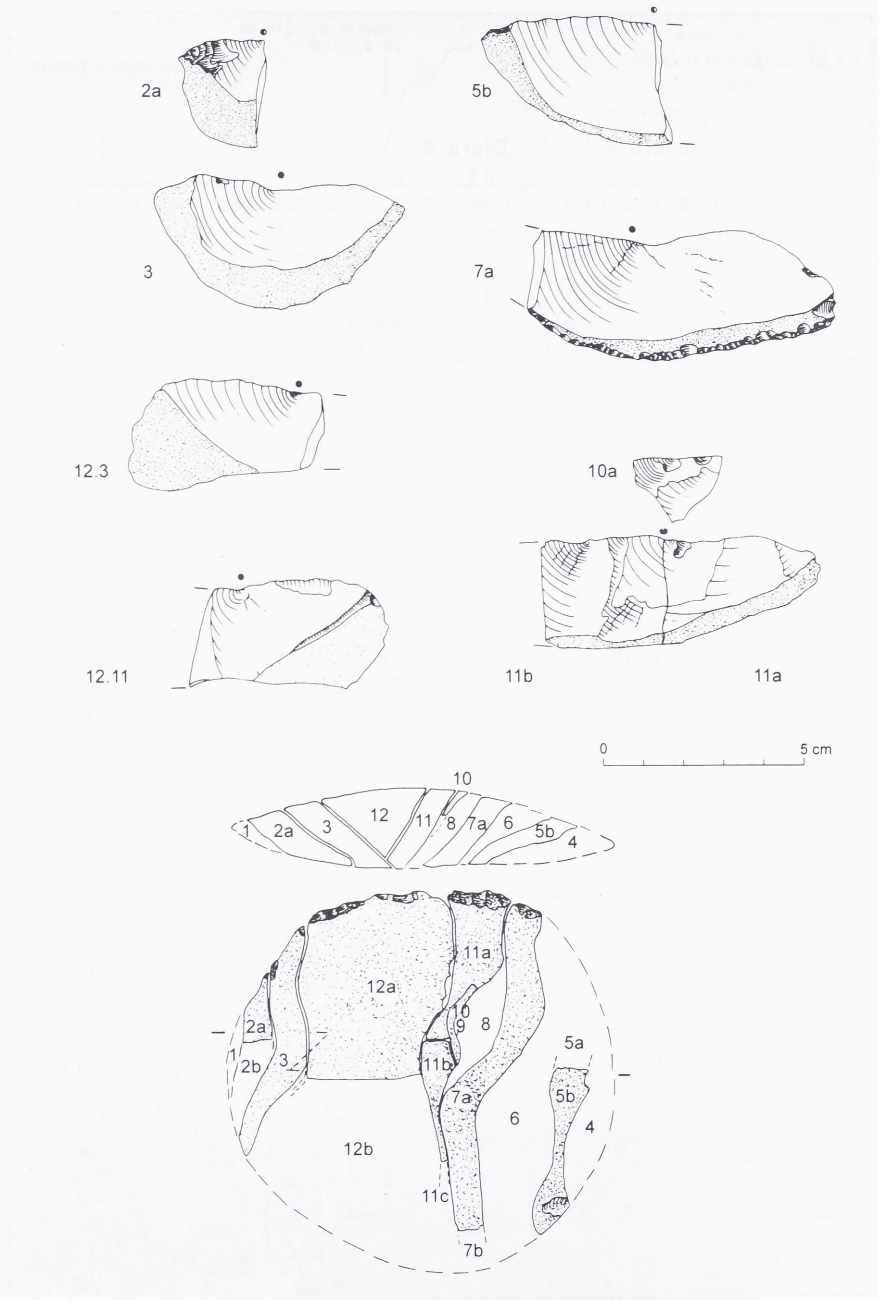


Fig. 10. Exploitation sequence of side-blow flakes (site Djara 90/1-6).



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