Hunter-Gatherers and Early
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Filling a Gap: Early Holocene Evidence from Central Libya

Introduction

While the Holocene occupation of the Eastern Sahara[1] is reasonably well documented in the Western Desert of Egypt (Wendorf *et al.* 2001; Gehlen *et al.* 2002; Kuper and Kröpelin 2006) as well as in the far west of Libya (Barich 1987; Cremaschi and Di Lernia 1999; Garcea 2001), there is an approximately 1,000 km wide gap of relevant evidence between these regions. In this area, which has generally received little attention from archaeologists, only some artefacts from the site of "Dora 42/8" – already collected in 1942 – apparently bridged this empty space (Fig. 1). However, nothing more than an approximate location of the site southeast of Jebel Haruj and its exceptional history of discovery during World War II were known (Richter 1952). The initially collected stone artefacts suggested an Epipalaeolithic or Early Holocene age, though neither does any documentation of their sampling exist nor can their affiliation to a single site be securely stated. With the objective of clarifying the origin of the Dora assemblage and obtaining more precise chronological as well as economic and environmental information, the Heinrich-Barth-Institute, Cologne carried out an expedition to central Libya in 2008. This paper briefly summarises the project's outcome and reports on results from a short excavation undertaken, focusing on the spatial and chronological context of Dora 42/8.

[1] According to Pachur and Altmann (2006), the Sahara east of 10° East Longitude is referred to as Eastern Sahara.

Site Dora 42/8

The site presented here is located at the foothills of Jebel Haruj, a basaltic mountain in central Libya which covers a broad 45,000 km² area and thereby constitutes the largest volcanic field in the entire Sahara (Klitzsch 1968). Southeast of the massif is a small depression, which is embedded in Eocene limestone bedrock. Along its northern and eastern slopes a dense and almost homogeneous scatter of knapped stone artefacts stretches for about 300 m lengthways (Fig. 2). Within this scatter, which covers an exceptional large area of about 13,000 m², grinding equipment as well as fragments of ostrich eggshell, some of them decorated or worked into beads, were observed. In some sectors fragmented bones and ashy sediments were visible at the surface. Within the main artefact concentration lithic material appeared very homogeneous and, by means of diagnostic finds, could be assigned to the Epipalaeolithic period. To gain a fairly comprehensive insight into the site's structure – given the limited time frame for investigation –, several small trenches were spread across the site. A total of 27 m² were excavated in units of 50 x 50 cm down to a depth of 15 cm below the modern surface. Most artefacts were recovered from the uppermost centimetres, only a couple of pieces were found deeper in the sandy sediment. Evident features were almost absent, except for eroded fire pits, concentrations of bones as well as a knapping place consisting of broken tabular flint slabs, large blade cores and related debitage.

The artefacts

The excavated artefactual material consists of knapped and ground stone (including large lower grinding stones as well as palettes showing traces of colouring), ostrich eggshell and bone artefacts. Pottery was not observed. Knapped stone constitutes by far the most frequent artefact category at Dora 42/8 and thus forms the focal point of the analysis and of this short overview. The remaining material as well as a detailed analysis of the lithic assemblage will be published elsewhere.

Due to an artefact density of about 1,000 pieces per square meter, the analysis of knapped stone is mainly based on material from only one of five trenches, i.e. trench 42/8-1. This trench measures 6 m² and contained 6,179 pieces of knapped stone. This sample represents just 0.05% of the assumed total population at Dora (N=13 million), but because of the even spreading of the lithic material and its apparent homogeneity – apart from a very few probably Middle Stone Age (Aterian) stray finds – this sample can be considered representative of the chronological determination of the site.

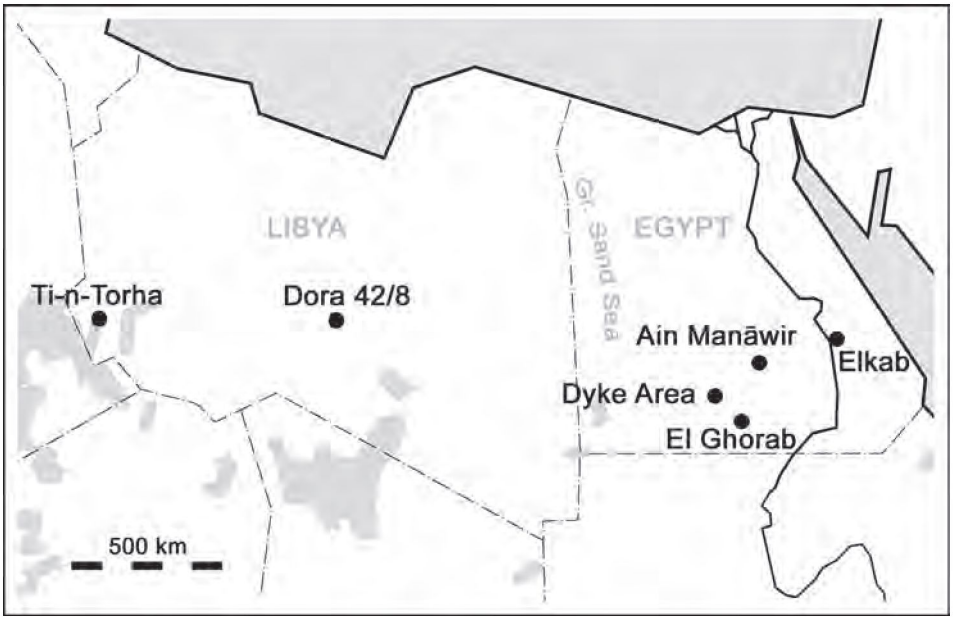

Fig. 1. Location of Dora 42/8 and other Epipalaeolithic sites mentioned in the text

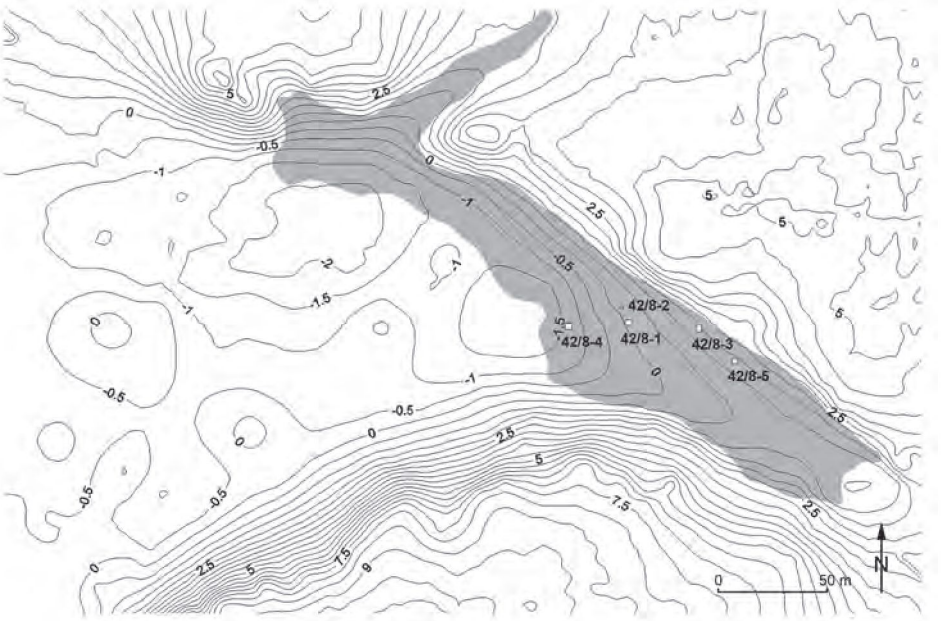

Fig. 2. Topographic plan of Dora 42/8 showing the main artefact concentration (light grey) at the northern and eastern slopes of a small depression and the location of five trenches excavated in 2008

The majority of stone artefacts (93.5 %) are made from a brown to grey flint, which is available in the immediate vicinity of the site. In those cases where a determination was possible, only the tabular variety of the flint was processed. The manufacturing of blanks was clearly aimed at producing blades, which outnumber flakes > 15 mm with a distinctly higher proportion (31.3 % and 23.8 %, respectively, of all blank types). Blades, defined as flakes > 15 mm, being at least twice as long as wide and having almost parallel sides and ridges, are relatively small (average length: 37.6 mm) and regularly made. They were, unlike flakes – which were produced using hard-hammer percussion – struck by soft-hammer direct percussion mainly from single (44.1 %) or opposed (26.5 %) platform cores. Such blades served as blanks for the prevailing microlithic toolkit (Fig. 3).

While shorter blades were processed into straight backed and pointed bladelets (Tixier 1963, Type 45) (Fig. 3:2), longer blades were mainly used, employing the microburin technique (Fig. 3:18), for the production of elongated scalene triangles with short, small sides (Type 95) (Fig. 3:15-17). The latter dominate the toolkit with 17.8 % – apart from microburins (36.2 %), which are not tools *sensu stricto* but were considered here for the sake of comparison with other assemblages classified according to the typology of Tixier (1963). Macrolithic tools, however, are rarely present and are mainly represented by notched blades (2.4%, Type 76) (Fig. 3:19).

Whilst taking additionally into account the lithic assemblage of trench 42/8-5, it was possible to reconstruct the *chaîne opératoire* of knapped stone production, comprising all stages from the initialisation of the core to the completed and eventually discarded tool (Fig. 4). The production sequence is reconstructed as follows: After the off-site procurement of tabular flint slabs, large blades – as testified in trench 42/8-5 – were struck from the slabs only after a rough preparation as cores. Once the cores were reduced to a certain size, further preparation and blank production followed – as noticed in trench 42/8-1 – until they had to be abandoned due to reduced size or knapping accidents. The selection of blanks for modification occurred mainly in a later stage of the reduction sequence, at a stage at which small blades required for the production of microliths were obtained. When these tools, used as projectiles as indicated by impact fractures (Fig. 3:17), were damaged, they were again brought to the site and may have been replaced by new insets. Thus, it is possible to reconstruct the major part of the *chaîne opératoire*. Apart from the procurement of raw material and certainly the use of the projectiles, all stages of the operational sequence were carried out at the site.

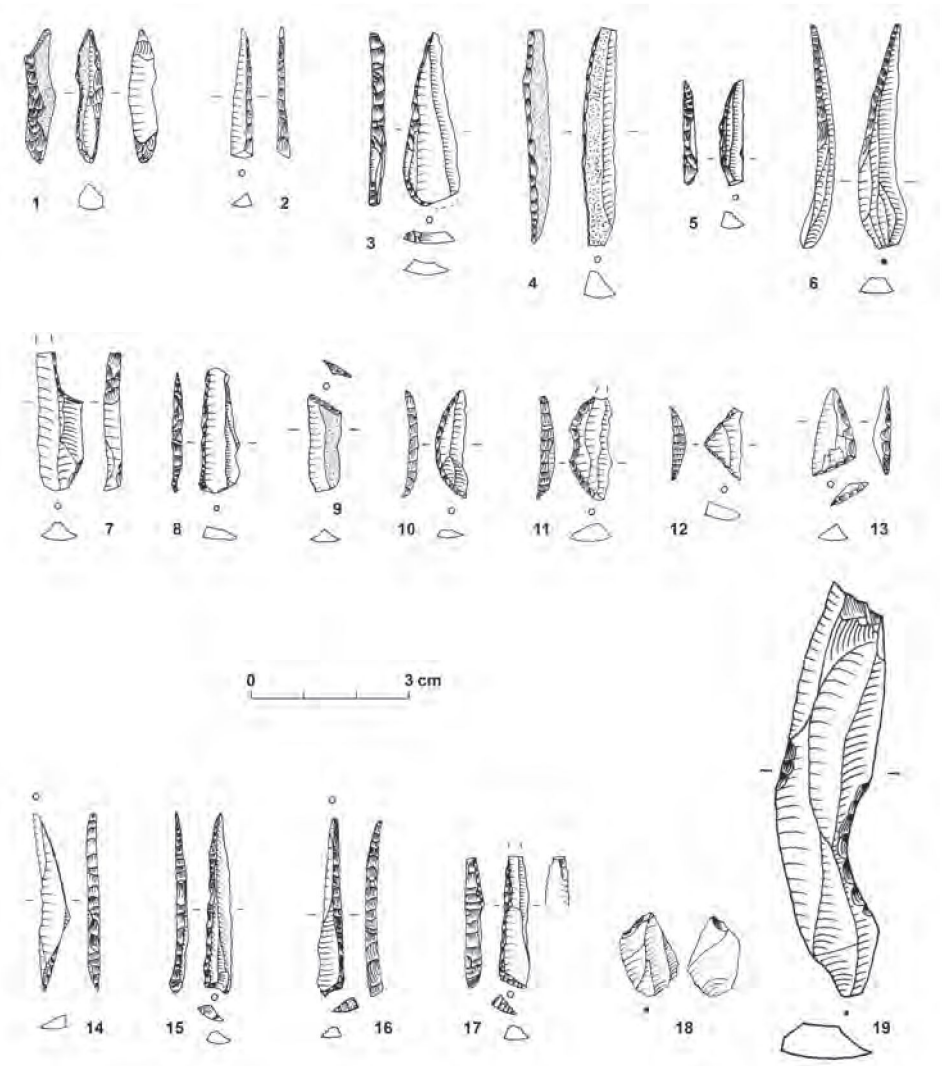

Fig. 3. Dora 42/8: 1 - perforator; 2-8 - backed bladelets; 9 - truncated piece; 10-17 - geometric microliths; 18 - microburin; 19 - notched blade. Types acc. to Tixier (1963): 1 – type 16; 2 - type 45; 3 - type 46; 4 - type 54; 5 - type 56; 6 - type 63; 7 - type 64; 8 - type 67; 9 - type 80; 10 - type 82; 11 - notched trapeze; 12 - type 89; 13 - type 90; 14 - type 94; 15-17 - type 95; 18 - type 102; 19 - type 76

Faunal and floral remains

The analysis of the faunal assemblage, including bone remains from four trenches as well as individual surface finds, was conducted by J. Peters and N. Pöllath (Munich) as well as H. Berke (Cologne). Results are so far only available as a preliminary species list. This list contains exclusively non-domesticated animals, among which are gazelle (*Gazella cf. leptoceros*), addax (*Addax nasomaculatus*) and oryx antelope (*Oryx dammah*). Besides these common bovids at Saharan sites, several remains of ostrich (Struthio camelus) were identified. Contrary to its frequent evidence in the form of eggshell remains, the direct proof of ostrich is exceptional, since up to now ostrich bone finds are not very numerous in the Sahara. In contrast to the here presented Early Holocene ostrich remains, the hitherto reported finds almost exclusively originate from younger, Mid-Holocene sites (Van Neer and Uerpmann 1989; Gautier 2001; Pöllath 2010). Merely the recently presented ostrich finds from Medjez II (northern Algeria) derive from a secure Early Holocene context (Merzoug 2011). Suggested explanations for the apparent scarcity of ostrich remains are a taphonomic bias (Pöllath 2010: 848), difficulties of bone determination (Merzoug 2011) and even a tabu on ostrich meat, as proposed by Morel for the Capsian of the Maghreb (Morel 1974). That the latter is not true for the dwellers of Dora 42/8 is indicated by the fact that the ostrich remains were found in context with other bones showing traces of either burning or smashing (H. Berke, pers. comm.).

Due to the poor preservation of plant remains, they unfortunately do not provide valuable information on the Early Holocene environment. Only a few pieces of charcoal could be identified as *Tamarix* (identification: S. Nußbaum, Cologne).

Dora 42/8 in a broader context

Due to its developed blade technology and its emphasis on backed bladelets and geometric microliths, the Dora lithic assemblage is of generic Epipalaeolithic character and is clearly part of the Early Holocene occupation of Northern Africa. On closer examination, however, only a few detailed similarities with inventories from climatically favourable regions such as the Western Sahara or the Mediterranean coastal area are visible. Much stronger parallels can be found in the Eastern Sahara. Here, the chronology of the Combined Prehistoric Expedition (CPE) offers the most detailed outline of the Early Holocene occupation (Wendorf *et al.* 2001). This period, labelled as "Early Neolithic" due to, among others, highly debatable remains of cattle (Wendorf and Schild 2001; Riemer 2007; Stock and Gifford-Gonzalez 2013), has been divided into three variants (El Adam-, El Gho-

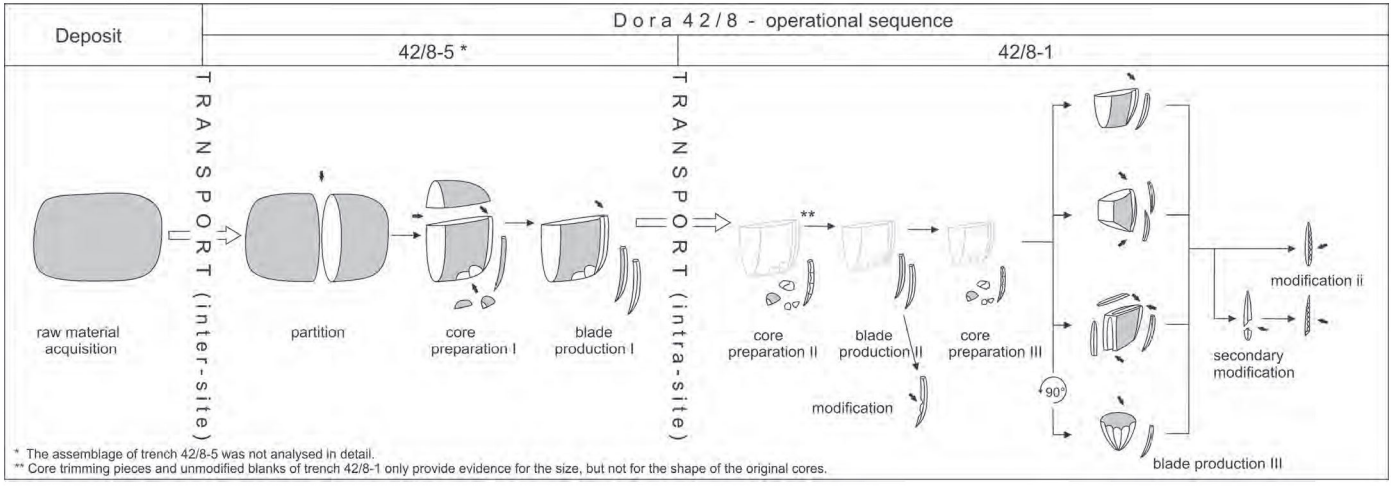

Fig. 4. *Chaîne opératoire* of knapped stone production at Dora 42/8

rab- and El Nabta/Al Jerar-Early Neolithic) of which the Early Neolithic of El Ghorab type (7,500-7,200 calBC) provides the most striking parallels to the lithic assemblage of Dora 42/8.

All assemblages available from this variant and typologically comparable lithic inventories from sites between western Libya and the Nile Valley were used for a supra-regional comparison[2]. Selection criteria for the comparison were an available tool classification following the typology of Tixier (1963) and a large enough sample for statistical analysis. These conditions are met by sites of the CPE in South West Egypt (El Ghorab E-79-4 LCL, E-79-4 CLW, E-79-4 SW; Kobusiewicz 1984) and Dyke Area E-72-5 (E)[3] (Schild and Wendorf 1977), the Epipalaeolithic site of ML1 at Ain Manâwir[4] (Briois et al. 2008), about 80 km south of Kharga Oasis and the site of Elkab, which provides the only evidence of human occupation of the Egyptian Nile valley during that period (Vermeersch 1978). West of Dora 42/8, only one site could be used for the comparison – the site of Ti-n-Torha East in the Tadrart Acacus in SW-Libya. Although the published assemblage is basically not suited for quantitative analysis (Close 1987), it is the only available lithic inventory of this type from the Libyan part of the Eastern Sahara. To set the chronological framework, two sites of the El Ghorab preceding stage of El Adam (8,800-8,100 calBC) (E-79-8 and E-80-4; Connor 1984b; Close 1984b) and two sites of the subsequent stage of El Nabta/Al Jerar (7,100-6,200 calBC) (E-79-5 and E-80-1 C; Connor 1984a; Close 1984a) from the study area of the CPE were included.

A Principal Component Analysis (PCA) of the toolkits of these sites was conducted using the frequencies of tool types. The first two components (together 47.9 % of the variance) were plotted in Fig. 5, which clearly shows the tripartition of the Early Neolithic according to Wendorf *et al.* (2001), whereas the individual stages are shown in reverse (youngest down) chronological order along the y-axis. Hence, the Principal Component 2 mirrors the chronological relevance of certain tool-types. The Principal Component 1 (plotted on the x-axis), however, mainly reflects the microlithic component of the assemblages. The site of Dora 42/8 is distinctly assigned to assemblages of the El Ghorab variant. This typo-chronological position is

[2] The only traces of Early Holocene occupation east of the Nile come from archaeological horizon 5 of Tree Shelter (Vermeersch 2008) and do not fit well to the Eastern Saharan Chronology.

[3] Only the excavated assemblage of site E-72-5 was taken into account.

[4] Even though two 14C dates place site ML1 to the mid-7th mill. calBC (Briois et al. 2008) the site will be included in the comparison since its lithic assemblage shows striking parallels to the El Ghorab variant. Briois *et al.* (2008) consider (inter alia) a lack of context between the dated ostrich eggshells and the bulk of the finds possible (see also: Riemer 2009, 595-596).

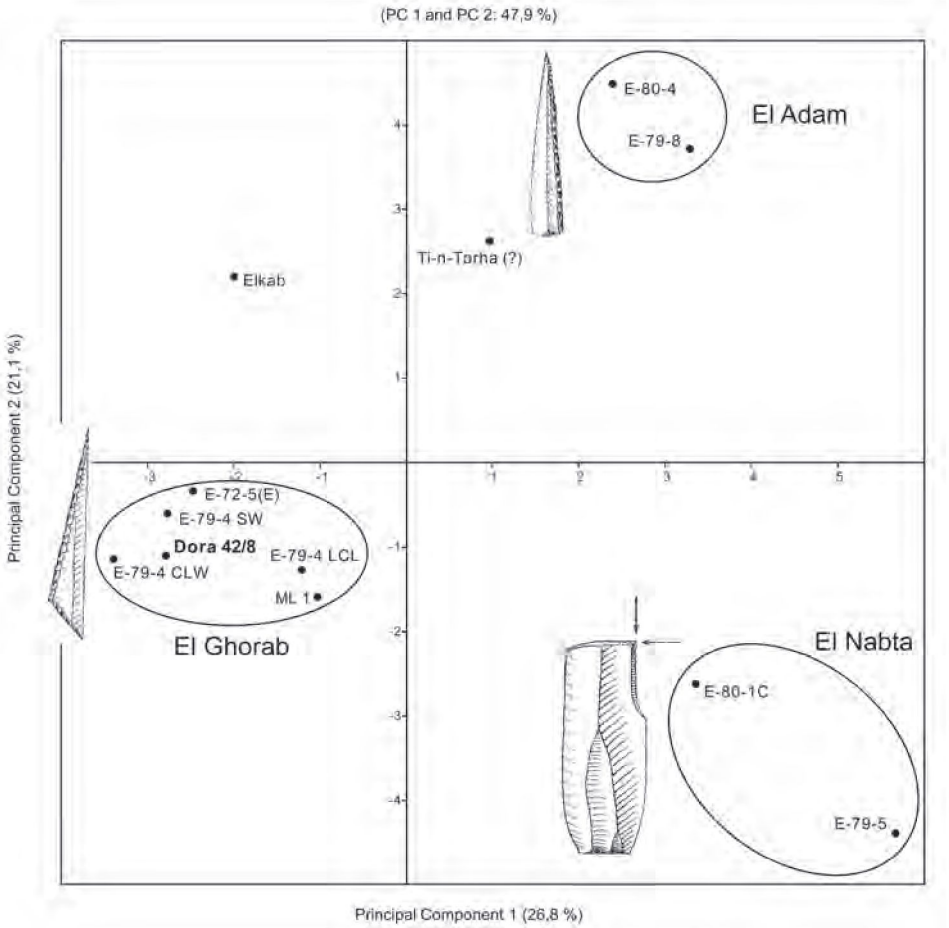

Fig. 5. First and Second Principal Components scattergram of North African Epipalaeolithic assemblages on the basis of lithic toolkits, which clearly shows the tripartition of the "Early Neolithic" according to Wendorf et al. (2001). PC 1 reflects the microlithic component of the assemblages, PC 2 the chronological relevance of certain tool-types. Also shown are typical tool-types of the three Early Neolithic variants

supported by three radiocarbon dates from charcoal samples from three different trenches, varying between 7,400 and 7,100 calBC (Table 1). Hence, the available evidence speaks for a single phase of occupation of the site, even though repeated occupation events probably occurred within decades or centuries.

The assemblages of Ti-n-Torha and Elkab are not assigned to one of the Early Neolithic clusters. An expected affinity to the stage of El Ghorab is not suggested by the plot of the PCA. Even though the assemblage of Ti-n-Torha is not a true random sample (Close 1987), thus does not provide a reliable basis for interpretation, the typological distinctions of both sites are probably best explained by their location on the fringes of the Eastern Sahara. The Nile valley and the Acacus mountain range are, beyond doubt, both ecologically favoured areas, which certainly required other subsistence strategies than the (semi-) arid core area of the Eastern Sahara during the Early Holocene – a fact that can be expected to find its expression also in different compositions of toolkits.

Discussion and Conclusion

Dora 42/8 is an open-air settlement site which was, probably repeatedly, used by foragers during the second half of the 8th mill. calBC. Animal bone finds as well as knapped stone artefacts suggest that hunting was an important food procurement strategy of its dwellers. The exclusive evidence of non-domesticated animals corresponds with the composition of the tool assemblage, which is mainly composed of microliths that are to be interpreted as arrowheads. The macrolithic toolkit can be seen as further confirmation, since it is composed almost exclusively of notched blades, which can be considered as tools for the shaping of arrow shafts. The evidence of large grinding stones – given their assumed main use for the preparation of vegetable foods – suggests that gathering of plant resources was also part of the subsistence. The significance of the two economic components gathering and hunting, however, can not be estimated on the basis of the excavated material.

Evidence for the duration of occupation at the site is offered by both, findings and finds. Fire pits containing remains of burned or processed animal bones suggest intra-site butchering and consumption of the kill. This and the presence of large lower grinding stones indicate longer lasting and more sedentary activities. The integrity of the chaîne opératoire of stone tool production from the initialisation of the core to the discarding of used pieces is another important indication for extended stays at the site. The production of ostrich eggshell artefacts points to the same direction, as it is a task that is more frequently reported from long-

Table 1. Radiocarbon dates from Dora 42/8. Laboratory dates were calibrated using CalPal 2-D dispersion calibration, version October 2013 (Weninger and Jöris 2008) with the Intcal09 dataset

Lab. ID	Trench	Material	Method	14C yrs BP	δ13C (‰)	Yrs calBC
KIA-37153	Dora 42/8-1	Charcoal	AMS	8276 ± 43	-25,11	7320 ± 100
KIA-37154	Dora 42/8-3	Charcoal (Humic acid)	AMS	8304 ± 37	-25,54	7380 ± 70
KIA-37155	Dora 42/8-5	Charcoal	AMS	8123 ± 53	-25,82	7130 ± 70

term used sites (Richter 1991, 228-234). The wide range of activities attested at site Dora 42/8 and the considerable amount of artefacts of estimated 13 million pieces of flaked stone in connection with a limited occupation period suggest that the site was repeatedly visited and predominantly used, certainly for decades or centuries, as a "base camp" (*sensu* Binford 1980).

The correlation of the typo-chronological analysis of the lithic assemblage with the results of the radiometric dating suggests a supra-regional significance of the CPE-chronology, a framework that has been developed in a rather limited study area on the eastern fringe of the Sahara. In addition, the supra-regional typological comparison presented here indicates an extremely homogenous spectrum of tools left behind by Early Holocene hunter gatherers during a relatively narrow time period. For now, it remains unclear which processes underlie this resemblance of material remains of contemporaneous sites separated by more than 1,000 km. Moreover, future research has to clarify whether the occupation of central Libya during the middle Epipalaeolithic shown here was a brief episode – conceivably fostered by short-term favourable climatic conditions – or whether it was part of a continuous cultural development, possibly running parallel to the neighbouring regions.

Acknowledgments

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