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CHARCOALS FROM NEOLITHIC SITE AT NABTA PLAYA (E-75-6), EGYPT

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ABSTRACT. The results of the analysis of charcoals from *in situ* household hearths from an early Neolithic site (E-75-6) in the Nabta Playa, eastern Sahara, Egypt, are used for reconstructing the vegetation on the time and space limited scale. The interpretation of the results points to the presence of a primitive groundwater-bound oasis-like vegetation around a permanent or semi-permanent water body in the direct vicinity of the site at about 8000 yrs bp.

KEY WORDS: anthracology, Neolithic, desert, archaeology, botany, oasis

INTRODUCTION

This paper is concerned with the study of charcoals from the early Neolithic site E-75-6 at Nabta Playa. E-75-6 is a site of special interest, because it has provided a ^{14}C date of ca. 8000 bp (Wendorf et al. 1991) as well as a large quantity of charred plant macroremains (seeds and grains). The analysis of macroremains has offered a rare opportunity for the study of the exploitation of food plants by prehistoric people of the Sahara (Wasylikowa 1992, Wasylikowa & Kubiak-Martens 1995, Wasylikowa et al. 1993).

The interpretation of the results of charcoal analysis aims at the reconstruction of the vegetation in the vicinity of the site, during the later part of the Early Neolithic period.

MATERIAL AND METHODS

The recovery and sampling of charcoals

Charcoals from E-75-6 were recovered through dry sieving and sorting of exclusively bulk samples from excavated *in situ* household hearths. Sieving was carried out on 1 mm mesh standard sieve, this was followed by sorting of the carbonized material according to the method described in detail elsewhere (Barakat in press a).

As a result of this process, large quantities of charcoal, as well as plant macroremains (seeds and grains), have been recovered; as for the charcoal, a sampling procedure was necessary in order to determine the minimum representative size and the minimum representative sub-sample.

According to the results of sampling experiments carried out on charcoals from other sites at Nabta Playa, the minimal size category of a charcoal piece, necessarily examined in order to find all taxa present in the sample, was found to be 2.5 mm (the examination of smaller charcoals proved to be too time-consuming and the identifications were rarely reliable). The minimum representative sub-sample is 20% of the whole sample, however, for smaller samples, all fragments were examined.

The identification of charcoals

The charcoals were handled in the conventional way. Without prior treatement, the charcoal fragment was broken under a binocular in order to reveal the transversal, tangential longitudinal and radial longitudinal surfaces, which would allow the identification of a taxon. The fragments were then examined under an episcopic microscope (with incident light source).

The identification of charcoals was carried out using reference works on archaeological charcoals (Neumann 1989) and manuals of wood anatomy of trees and shrubs of the region (Fahn et al. 1986, Jagiella & Kütschner 1987). For the identification of the acacias to the species level, the author referred to her own study of charcoal anatomy of several *Acacia* species growing in Egypt and southern Sudan (Barakat in prep.). The identifications were confirmed through comparison with charred modern wood samples from Egypt and the Sudan in the reference collection.

THE RESULTS OF THE ANTHRACOLOGICAL ANALYSES

The results of charcoal analysis from E-75-6 are summarized in Table 1. The frequency of

Table 1. Charcoals from the site E-75-6 at Nabta Playa

Taxon	No. of fragments	Frequency %
Tamarix sp.	294	100
Acacia raddiana	273	100
A. ehrenbergiana	137	100
A. nilotica	78	80
Acacia sp.	114	
Cassia senna	11	100
Capparis decidua	31	100
Unidentified	11	
non-charcoal	27	
Total no. of fragments	983	

the taxa in the samples examined is considered as an indicator of the reliability of the sampling procedure, but is by no means representative of the importance of each taxon in the vegetation and is not going to be used quantitatively.

DISCUSSION OF THE RESULTS

The taxa assemblage consists of: *Tamarix* sp., *Acacia ehrenbergiana, A. nilotica, A. raddiana, Capparis decidua, Cassia* cf. *senna*. All the above mentioned taxa, except *Acacia nilotica*, grow in the eastern Sahara and form part of the natural desert vegetation:

1. *Tamarix* to which several species belong, is considered to be an azonal vegetation, its presence is related to a typical desert conditions. It grows in the Sahara where it forms phytogenetic hillocks, it pioneers around open water bodies, around wells, in depressions and in wadis, provided that the groundwater table is no deeper than 7–8 m from the surface. It tolerates well brackish and saline water. Under favourable conditions where the water table is close to the surface during most of the year, tamarisk forms a sort of closed forest (gallery forest), where individual trees may reach a height of 10 m and the trunks are as large as 1.7 m in diameter (Bornkamm 1986, White 1983, Quézel 1965).

2. *Acacia* spp. formation: the acacias constitute an essential part of the arboreal desert vegetation, they comprise characteristic formations in wadi beds and on gravelly soils; almost all ligneous desert plants belong to the *Acacia* formations. The *Acacia* species typical of the Sahara are sahelian elements and are confined to localities with good water supply. The most important among the arboreal species of the *Acacia* formation are: *A. raddiana* (*A. tortilis* subsp. *raddiana*) *A. ehrenbergiana, Maerua crassifolia, Balanites aegyptiaca, Capparis decidua, Salvadora persica* and *Ziziphus* spp. These formations when well-developed, could resemble an *Acacia* wooded grassland of the northern Sahel.

The *Acacia tortilis-Panicum turgidum* formation in the tropical western Sahara, by rainfall >30 mm, could be of special interest in the case of Nabta, due to the presence of characteristic grasses in the carbonized macroremains from the site (Wendorf et al. 1992).

3. *Acacia nilotica*: the species does not belong to the natural desert vegetation, it is a very common riparian tree on the Nile borders. Away from the river, it belongs to the *Acacia* tall grass country (Smith 1949), in the Sudan in areas receiving 250–750 mm annual rainfall within the Sahelo-Saharan, Sahelo-Sudanese and Sudanese zones. It often constitutes woody belts around permanent or semi-permanent fresh water surfaces (Baumer 1986) or is associated with seasonally flooded basins (El Amin 1976, 1990).

RECONSTRUCTION OF VEGETATION OF THE NABTA PLAYA DURING THE SECOND PART OF THE EARLY NEOLITHIC BY 8000 YRS BP

The vegetation at Nabta Playa by 8000 yrs bp, as reflected from E-75-6 (Wendorf et al. 1991), could be compared to that of uninhabited oases in the Western Desert, in southern Egypt and northern Sudan (Kehl 1987), where the permanent vegetation is clearly bound to above or near-surface ground water but owes its establishment to earlier rainfall events. The structure and dynamic of floristic composition of the vegetation over a certain time period result in a characteristic stable population diversity, a slight increase or decrease in the groundwater table would greatly affect the vegetation of the oasis.

A close example is to be found in Nukheila (Merga) oasis in northern Sudan, which lies at the southern limit of sporadic summer rainfall. The oasis depression harbours a lake, the water salinity varies from fresh water in the centre to brackish on the edges. The vegeta-

tion zonation is quite distinct; in the immediate vicinity of the lake shore, *Phoenix dactylifera* and *Phragmites australis* dominate the vegetation. The depression vegetation includes *Tamarix mannifera* and *Acacia raddiana*. The vegetation outside the depression is mostly accidental and occurs in shallow depressions and runnels. The relatively high rainfall, compared with more northerly oases, is indicated by the presence of some Sudanian elements in the flora, e.g.: *Capparis decidua*, *Acacia ehrenbergiana* and *Maerua crassifolia*, growing on the lower playas and on the surrounding plateau landscape.

One could imagine a similar situation in the Nabta during the second part of the early Neolithic period; the depression acts as a catchment area, in the lowermost part of the basin rain-water is accumulated. Under favourable climatic conditions this would have led to the development of a permanent open water body, or a semi-permanent, ensuring a close access to the surface groundwater-table (geological evidence for such ephemeral lakes in Haynes 1980).

The arboreal vegetation developed around the depression, as seen in the taxa assemblage from the identified charcoals from the site, resembles that of uninhabited oases in northern Sudan except for the two main differences:

1. The presence of *Acacia nilotica* as identified in the charcoals, indicates that the water body was most probably permanent; it also suggests a higher rainfall than that prevailing at present in Nukheila (Merga).

2. The absence of *Phoenix dactylifera* from the anthracological material, which is not only the case in E-75-6, but also in the other sites at Nabta and all other Neolithic sites in the eastern Sahara. The lack of the species in prehistoric archaeobotanical samples confirms the point of view that the date palm is a latecomer to the Sahara, and the primitive vegetation of the oasis comprised no *Phoenix dactylifera* (White 1986, Walter 1971). Date palm is nowadays, and has long been, an important component of the oasis vegetation (Bornkamm 1986, Fakhry 1950, 1990, Barakat in press b, Barakat & Baum 1992) and its presence in the oasis seems to be directly related to human activities.

CONCLUSION

The identification of charcoals recovered from the household fires at Nabta Playa (site E-75-6), provides the evidence for the presence of a primitive groundwater bound oasis-like vegetation around a permanent or semi-permanent water body during the early Neolithic period in the vicinity of the site. These ephemeral lakes are the result of pluvial episodes in combination with the presence of the depression acting as a catchment area. The specific microhabitat thus created permits the area to harbour more southerly elements, e.g. *Acacia nilotica*.

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