Pollen analysis from Early and Middle Holocene archaeological sites in the Blue Nile area, Central Sudan

Análisis palinológicos en yacimientos arqueológicos del Holoceno Inicial y Medio en el área del Nilo Azul, Sudán Central

José Antonio López Sáez, Pilar López García

Laboratorio de Arqueobotánica, Departamento de Prehistoria, Instituto de Historia,
Consejo Superior de Investigaciones Científicas, Duque de Medinaceli 6, 28014 Madrid, Spain.
alopez@ceh.csic.es; cehpl99@ceh.csic.es

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ABSTRACT

Palynological analysis has been carried out on six samples collected from two Early Holocene sites (Sheikh Mustafa and El Mahalab) and one Middle Holocene site (Sheikh el Amin) in the Blue Nile area, Central Sudan. The taphonomic problems derived from the sedimentary contexts studied here are discussed. The results of the analysis indicate that natural (and to some extent anthropic) factors shaped a savanna-grassland type of environment during Early-Middle Holocene in the area being studied.

KEY WORDS
Archaeopalynology, Holocene, Central Sudan

RESUMEN

Se han realizado análisis palinológicos de seis muestras procedentes de dos yacimientos arqueológicos del Holoceno inicial (Sheikh Mustafa y El Mahalab) y uno del Holoceno medio (Sheikh el Amin), en el área de Nilo Azul (Sudán Central). Se discuten los problemas tafonómicos derivados de los contextos sedimentarios aquí estudiados. Los resultados del análisis indican que, tanto factores de índole natural como antrópica dieron lugar a un paisaje del tipo sabana-pradera durante el Holoceno inicial y medio en el área estudiada.

PALABRAS CLAVE
Arqueopalinología, Holoceno, Sudán Central

1. Nature of the samples

This paper focuses on the study of some pollen samples collected from three prehistoric sites in the Blue Nile area of the Central Sudan. Two of these sites, namely El Mahalab and Sheikh Mustafa are dated to the Early Holocene and the third site, Sheikh el Amin, is dated to the Middle Holocene (see Fernández, Jimeno and Menéndez 2003).

It should be emphasised here that the archaeological sites from which the samples are obtained are situated within the present semi-arid zone in the Sudan. The conditions are not favourable for the preservation of pollen. As the soil is predominantly sandy, abrasion and vertical mouvements of the pollen are also expected. In addition, the sites are badly disturbed by post-depositional processes, and hence possibilities of finding *in situ* pollen are meagre. Therefore, the pollen samples taken from the sites are not meant for a thorough pollen analytical study, but rather to examine the possibility of finding pollen and generally assess the type of flora that existed in the area during the occupation of the prehistoric sites.

2. Material and methods

We opted for showing the results of the pollen analysis (Table 1) in a form of absolute values, given the anthropic and disturbed context from which the samples come, as well as the interpretative difficulties of pollen spectra from arid environments (e.g. Horowitz 1992; Ritchie 1994). Two samples were selected from each site. The archaeological deposits from which the samples are obtained were divided into 10-cm artificial levels. The pollen samples from Sheikh el Amin and Sheikh Mustafa were taken from levels 1 (- 10 cm) and 5 (- 50 cm), and those from the El Mahalab site were taken from levels 1 (- 10 cm) and 8 (- 85 cm). Given the type of disturbed context from where the pollen samples are collected (see *Excavations*), we decided to assemble the results of the pollen analysis from each site (Table 1).

For the palynological analysis, sediment-samples (each one of 30 grams) were treated with HCl, NaOH, HF and concentraded with Thoulet Liquor as described by Girard and Renault-Miskovsky (1969). Pollen types have been identified according to Bonnefille and Riollet (1980).

POLLEN TYPES	ARCHAEOLOGICAL SITES		
	Sheikh el Amin	**Sheikh Mustafa**	**El Mahalab**
Acacia sp.	0	0	4
Gramineae	39	32	44
Cerealia type	3	2	0
Asteraceae tubuliflorae	11	1	13
Cichorioideae	19	10	13
Chenopodiaceae/Am.	10	3	0
Cardueae	6	2	15
Boraginaceae	1	0	0
Capparidaceae	11	1	58
Urticaceae	0	6	4
Cyperaceae	0	0	6
Balanites aegyptiaca	0	0	5
Filicales triletes	2	3	34
Chaetomium sp. (type 7A)	8	27	0
Type 55 (Sordariaceae)	5	33	6
Glomus cf. *fasciculatum*	2	14	5
Pseudoschizaea circula	3	0	0
Indeterminate	5	4	7

Table 1.- Absolute values of the pollen analysis from three archaeological sites in the Blue Nile area, Sudan.

3. Results and discussion

Since post-depositional processes have disturbed the context from which the samples were taken, the association and origin of all the pollen types cannot be assessed. Therefore the pollen spectra (Table 1) most likely represents a mixed flora from different periods of time, ranging from the period when the sites were occupied to perhaps modern times. As a study of macrofossil plant remains from these sites has been carried out, mainly impressions of plants in pottery (cf. Magid in this volume), we are able to cross-examine the macrofossil finds with the results of pollen analysis. Accordingly we have found that some of the pollen types retrieved could be contemporary with the occupation of the prehistoric sites. However the pollen data we studied is not adequate for quantitative pollen analytical study, and hence it is not possible to carry on a study on the vegetation history of the area. In order to obtain some information on the past vegetation history and environment of the region, a proper pollen analytical study should be carried out on samples collected from natural (non-cultural) contexts in the vicinity of the sites.

The results of the pollen analysis indicate that the vegetation in the area of the sites was an open savanna grassland. The main woody constituents were *Acacia* species (only identified in the site of El Mahalab), the herbaceous vegetation being mainly a grass cover (Gramineae) with xerophytic elements (Chenopodiaceae/Amaranthaceae, Capparidaceae: *Capparis*, *Boscia*, *Maerua*). Recurring fire events have been evidenced by the presence of carbonicolous fungi ascospores (*Chaetomium* sp.) in the site of Sheikh Mustafa (López Sáez *et al*. 1998). The low cover of arboreal vegetation could indicate the development of felling processes of anthropic origin, which could have also implied the use of fire.

The results of our palynological analysis at the Blue Nile area (Sudan) are similar to those obtained from another Middle Holocene site, namely the Neolithic site of Kadero, also in the Central Sudan (Barakat 1995), as well as to some pollen spectra from the Early and Middle Holocene periods in the Sudan (e.g. Mehringer 1975; Ritchie 1987, 1994).

Pastoral activities in the surroundings of the Neolithic site of Sheikh el Amin have been revealed by means of the identification of coprophilous ascospores of the type 55 (López Sáez *et al*. 2000), corresponding to some Sordariaceae species which live normally in anthropic areas where domestic cattle exists. As for the presence of the same type at the Mesolithic sites of Sheikh Mustafa and El Mahalab, more data is required to address this issue.

On the other hand, some indicators of human impact are present in the pollen spectra, such as Cichorioideae, Asteraceae tubuliflorae and Cardueae.

Some non-pollen palynomorphs related to eroded and altered soils, like *Glomus* cf. *fasciculatum* and *Pseudoschizaea circula*, have been identified at the Sheikh el Amin and Sheikh Mustafa archaeological sites, possibly related to agricultural activities or another kind of anthropic impact. In fact cereal pollen was identified from the archaeological deposits at the two sites. The presence of cereal pollen could be taken as an indication of a local development of some type of agriculture. The abundance of *Chaetomium* sp. in Sheikh Mustafa can be also related to cleared areas by means of fire of the landscape.

The proximity of a fluvial system helps us to explain the presence of some hygrophilous elements like spores of Filicales triletes, Cyperaceae or *Balanites aegyptiaca*, specially in the site of El Mahalab.

We therefore suggest that the vegetation in the vicinity of the three archaeological sites represents an anthropogenic or at least human-influenced ecosystem, with the presence of grazing and the possible recurrence of controlled fires. Grazing is directly related to the control of fire, and has played a significant role in shaping the grassland, savanna and woodland ecosystems (Barakat 1995). In the case of Sheikh el Amin, this role has been especially important ever since hunting of wild game was replaced by herding of domestic livestock, hence marking the beginning of pastoralism during the Neolithic period (Krzyzaniak 1980).

This type of vegetation, a dry savanna ecosystem, might have already been under a strong human impact, as a result of human activities (anthropic landscapes) in the form of controlled fires and pastoralism, and possible felling.

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