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Upper Egypt: vegetation at the beginning of the third millennium BC inferred from charcoal analysis at Adaïma and Elkab

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Abstract

Archaeological charcoals from two Predynastic sites located in Upper Egypt are studied to help reconstruct woody vegetation. "Ash-jars" from the cemeteries at Adaïma and Elkab appear to have been filled with domestic hearth residues as offerings. The results show the predominance of Acacias at Elkab and Tamarix at Adaïma. This difference may be due to the influence of more active wadis on the east bank, near Elkab. Adaïma has a more diverse and slightly more widespread vegetation compared to the present. There is some evidence for the tendency in an increase in aridity and/or human impact between the Nagada II period and the first dynasties (3500–2900 BC).

Keywords: Charcoal analysis; Upper Egypt; Northeast Africa; Nile; Palaeovegetation; Predynastic period

1. Introduction

Evidence for woody vegetation in the Nile valley during the pharaonic period is scant, due to the dearth of extensive charcoal and wood analyses. However, this state of research is currently changing, with for example undergoing studies in Lower Egypt at Giza and Memphis, and in Middle Egypt at Amarna (Rainer Gerisch, pers. comm.).

One particularity of the research subject explaining in part the lack of data is related to the nature of the Upper Egyptian ecosystems. The natural vegetation of the Nile valley forms a semi-oasian corridor in the midst of the Eastern Sahara; rainfall is irregular and nearly non-existent, and no permanent tributary to the river Nile flows within Egypt's boundaries. Thus, the vegetation is entirely dependent on the Nile, except in the wadi beds draining the occasional rains falling on the Eastern mountain range bordering the Red Sea [52]. Vegetation composition is therefore linked to temperature, species' growth habit and ability to withstand flooding several months a year. For instance, in Upper Egypt, high temperatures allow the presence of Sudanian species such as *Balanites aegyptiaca* or *Calotropis procera* usually occurring at lower latitudes. The physiognomy of the vegetation varies within the valley according to topography and proximity to the Nile or to the water table.

Charcoal and pollen analyses from central and eastern Sahara [32] point to a final stage of aridification around 5700 BP, while the study of lacustrine sediments from the Gilf Kebir (eastern Sahara) indicates a later date, around 4000 BP [36]. It is generally accepted that the present-day aridity was reached by the fourth millennium BC. As a result, vegetation changes during the middle and late Holocene in the Nile valley do not

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reflect changes in rainfall, but instead are closely related to the impact of local human activities.

Our study aims at reconstructing the woody vegetation in the Upper Egyptian Nile valley, at the beginning of the historical period (Pharaonic period) (~3500–2900 BC). The spatial variability is deduced from the comparison of two sites located in the same area: Adaïma on the West bank, Elkab on the East bank (Fig. 1). The special nature of archaeological remains available allows us to further our investigations. In fact, some of the Adaïma samples and all the Elkab samples come from funerary contexts. A comparison between settlement and cemetery samples at Adaïma was therefore undertaken, in order to assess the possible existence of choices in the funerary contexts.

1.1. The present vegetation

The present woody vegetation of the Nile valley between Isna and Idfu is found in two main habitats: canal and river banks, and cultivated fields [53]. On the canal banks, bank retainers are often planted trees and shrubs: *Acacia nilotica*, *Ficus sycomorus*, *Melia azaderach*, *Morus* spp., *Salix subserrata*, *Tamarix arborea*, *Ziziphus spina-christi*, *Alhagi maurorum* and *Arthrocnemum glaucum*. Sand-tolerant and stabilizing plants include *Casuarina equisetifolia*, *Dalbergia sissoo*, *Eucalyptus* spp., *Parkinsonia aculeata* (four naturalized taxa), *Ricinus communis*, *Salix* spp. and *Tamarix aphylla*. The plants growing within the cultivated plain are *T. aphylla*, *T. nilotica*, the palms *Phoenix dactylifera* and *Hyphaene thebaica*, *D. sissoo*, allochtonous *Ficus* spp., *Z. spina-christi* and *Acacia* spp. Near the water pumps grow *Salix tetrasperma*, *S. subserrata* and *R. communis*. Many of the taxa are naturalized and/or cultivated, thus rendering the evaluation of the natural vegetation hazardous.

Towards the desert *Tamarix* spp., *Acacia* shrubs, Chenopodiaceae, *C. procera* and *Capparis decidua* can be found. The wadi beds further into the desert support xerophilous shrubs such as *Fagonia indica* and *Cornulaca monacantha*, as well as therophytes when soil water is available.

1.2. The archaeological contexts

Adaïma lies in the Nile valley, about 9 km south of the modern town of Isna, at the present limit between the irrigated plain and the desert, and covers 35 ha. The Eastern and Western cemeteries and a large settlement area have been excavated since 1990 under the direction of Béatrix Midant-Reynes (CNRS, Toulouse, France). The occupation of Adaïma covers over 700 years, spanning from the cultural periods Nagada IC (N IC, Predynastic) to Nagada IIIC/D (N IIIC/D, IInd dynasty). The settlement area studied concerns the northern terrace (Fig. 2), from which radiocarbon dated charcoal samples gave dates between ca. 3400 and 2900 BC. These dates correspond culturally to the period between the end of Nagada II (N II, Predynastic) and Nagada IIIB/C (N IIIB/C, Protodynastic, dynasties I and II) [30]. The features excavated between 1997 and 2000 are mainly pits dug into the substratum of the terrace, filled with a loose mixture of sand and silt, where no clear vertical stratigraphy can be observed.

The ceramic material from the terrace seems to indicate that the material from the western sector is globally older (N IIC in majority, ~3400 BC) than that from the eastern sector (N III in majority, ~3200–2900 BC) (Buchez, Bavay 2001, unpublished report). The mixed nature of the archaeological material and sediment in square 7001 does not allow us to consider the charcoal from this context as representing a single

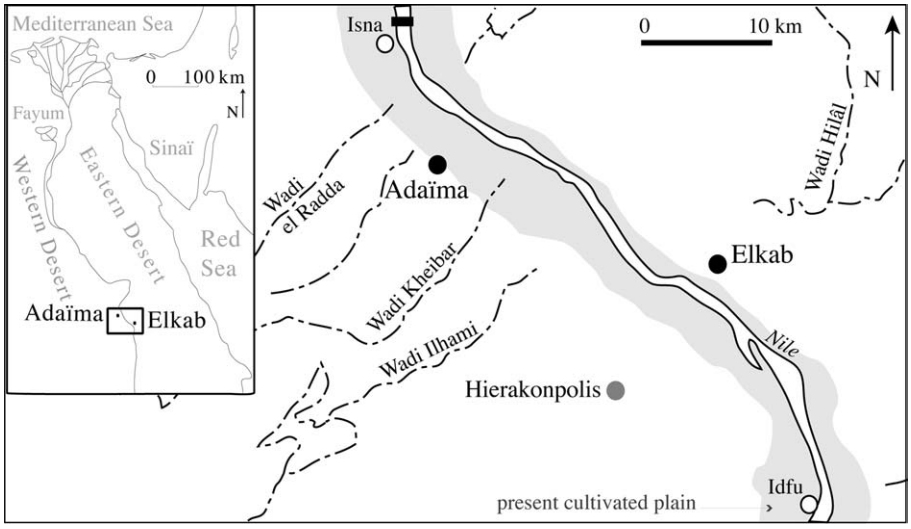

Fig. 1. Regional location of Adaïma and Elkab in the Nile valley.