Sudan & Nubia

The Sudan Archaeological Research Society

Bulletin No. 19 *2015*


ASWAN
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2nd cataract
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Kurgus
El-Ga'ab Basin
Kawa
Jebel Barkal
4th cataract
5th cataract
el-Kurru
Dangeil
Berber
Debba-Dam survey
ED-DEBBA
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Hamadab
Atbara
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Front cover: QSAP Dam-Debba Archaeological Survey Project. Site DS7, Ganati: the re-erected columns in the church (photo: Fawzi Hassan Bakhiet).

Sudan & Nubia is a peer-reviewed journal

Plant Macro-remains Recovered from El-Hamra Christian Complex Excavation in El-Ga'ab Depression, Sudan

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Introduction

Archaeobotany is the study of plant remains from archaeological sites to better understand the environmental context of past societies and how the environment was exploited and modified (Hastorf 1999). Many archaeobotanical studies have been conducted in the north of Africa. Most of them were ecologically oriented focusing on environmental reconstruction and landuse and identification of the level of agricultural impact on the landscape (Watson 1989; Krzyżaniak 1991; Haaland 1992; Gremillion 1993; Jones 1994). In Sudan, the study of plant macro-remains in desert areas has improved our knowledge of past environments and economic plants, as well as processes involved in plant domestication.

Klichowska (1984, 221) studied the seed impressions of plants on potsherds at Kadero's Neolithic settlement (north to Khartoum), a site dated to *c.* 5030-5280 BP (3080-3330 BC). He identified impressions belonging to grasses; the most frequent impressions were the cereals sorghum and millet. Martens (2011) studied 76 samples from the Neolithic settlement and graves at Kadero; these samples being dry-sieved through 1mm and 0.5mm sieves. The botanical assemblages contained mainly small pieces of charcoal; the only types of plant remains other than charcoal were fragments of fruit stones of *Zizphus* and hackberry (*Celtis*).

Magid (1991) identified some plant remains recovered from a Neolithic cave (S1-A) at Shaqadud. The specimens included *Pennisetum* sp., *Sorghum* sp., *Panicum turgidum, Grewia tenax, Zizyphus spina-christi, Solanum dubium, Sida alba, Crotalaria* sp., *Setaria* sp., *Cruciferae, Chenopodiaceae and* Leguminosae.

Rowley-Conwy (1991) stated that evidence of domesticated sorghum, *S. bicolor*, occurs very late at Meroe dating to 1970 ± 127 BP. Exploitation of sorghum was practiced from the sixth millennium BP but domesticated sorghum in Khartoum area emerged only around 2000 BP (first half of the 1st century BC) (Haaland 1992, 43).

Beldados and Constantini (2011, 37) stated that archaeobotanical analysis of the ceramic data from Kassala (Mokram Group) showed that during the second millennium BC sorghum was widely cultivated in the eastern part of the Sudan. Fuller (2004) believed that the sorghum there is dated by ceramics and associated material to 1500-500 BC. This is an important point, as it suggests the cultivation of sorghum earlier than any of the finds in the Nile Valley, which are mainly Meroitic, with possibly earlier Napatan sorghum at Kawa.

The radiocarbon-dated phytoliths from the burial samples from R12 (Seleim-Dongola) and the cemetery of el-Ghaba (Shendi) (Madella *et al.* 2014, 2) show the presence of Near Eastern domesticated cereals in northern Sudan at least 7000 years ago. Phytoliths also indicate the exploitation of wild, savannah-adapted millets in central Sudan between 7500 and 6500 years ago. The calculus samples contained starch grains from wheat/barley, pulses and millets, as well as panicoid phytoliths. This evidence shows that Near Eastern domestic cereals were consumed in northern Africa at least 500 years earlier than previously thought (Madella *et al.* 2014).

Magid (2003) presented the archaeobotanical data derived from impressions in prehistoric pottery recovered from the sites of Sheikh Mustafa and Sheikh el-Amin in the Blue Nile area. The procedure for identification was mainly based on comparisons of the external morphological features (i.e. shape, size and surface pattern) of the positive casts with reference to a collection of extant plants, and with results of experimental plots showing changes in dimensions of grain impressions as seen in their positive casts. The specimens include: *Setaria* sp., Wild sorghum sp., *Cassia* sp., *Grewia* sp., *Celtis integrifolia*, *Solanum dubium*, *Cucurbitaceae*, (flattened)? glume, *Echinochloa* sp, *Carex sp.* and *Grewia tenax* and *Solanaceae.*

Lopez Saez and Garcia (2003) studied some pollen samples collected from three prehistoric sites along the Blue Nile, el-Mahalab and Sheikh Mustafa dated to the early Holocene, and Sheikh el-Amin dated to the middle Holocene. The pollen types included *Acacia* sp, *Gramineae*, *Cerealia* type, Asteraceae, Cichorioideae, Cardueae, Boraginaceae, Capparaceae, Urticaceae, Cyperaceae, *Balanites aegytiaca*, Filicales triletes, *Chaetomium* sp, Sordariaceae, *Glomus cf. fasciculatum* and *Pseudoschizaea cirula.*

Cartwright (2001, 557-560) examined archaeobotanical remains from Kerma graves and from a building on the eastern bank of the Nile between Eimani and Mulwad (Dongola Reach). The species noted were *Acacia* spp., *Phoenix dactylifera, Salvadora persica, Faidherbia albida, Balanitis aegytiaca, combertum sp., Tamarix nilotica, Capparis decidua, Celtis integrifloia, Cassia sp., Hyphaene thebaica, Zizphusspina-chrsti and Borasssus aethiopum.* Other grasses, cereals and weeds were *Hordeum sp., Triticum sp., Portulaca oleracea, Cleome gynandra and Cyperus rotundus and Caltropis procera.*

Badura (2012) presented preliminary results from carpological analysis of cultural layers in Napatan settlement HP736 in the Fourth Cataract excavated by GAME in 2006. The archaeobotanical samples were obtained from five structures and included large amounts of mineralized seed and fruit remains as well as sheep/goat coprolites. The analysis of this material revealed the presence of both cultivated and wild plants including *Triticum* cf. *dicoccum, Citrullus lanatus, Citrullus colocynthis, Panicum turgidum, Echinochloa* type, *Setaria sp.*, *Arnebia* cf. *hispidissima, Solanum nigrum; Eleusine* cf. *indica, Zaleya* cf. *decandra* and *Tribulus* sp.

Shinnie found, during excavations of the Royal city at Meroe in Temple M 720, a dense layer of burnt domestic

material, including charcoal, grain, dom palm nuts, date stones, bone and carbonized fragments of basketry similar to the woven grass mats and baskets in use in the area today (Shinnie and Anderson 2004, 34). *Triticum turgidum*, *Hordeum* sp., *Sorghum sp., Phoenix dactylifera* were recovered from these excavations (Shinnie and Anderson 2004, 366).

Fuller and Edwards (2001) published preliminary results of a study of archaeobotanical evidence from medieval buildings at Nauri (Third Cataract Region). The samples were sieved to separate them into manageable sized fractions and then sorted under a binocular microscope and studied at magnifications between 6x and 40x in order to identify the taxa present. Identification focused on the economic plants, which dominated all the samples and included:

1) Cereals: *Triticum* sp. (wheat grain), *Triticum* sp. (glume), *Triticum estivum* (rachis), *Hordeum vulgare* (barley grain*), H. vulgare* (chaff), *H. vulgare* (sterile spikelet), *H. vulgare* rachis segment, *Sorghum bicolor* (sorghum grain), *S. bicolor* (spikelet base), *S. bicolor* (husk fragment), *Pennisetum glaucum* (Pearl millet involucres), *P. glaucum* (grain), *Setaria italica* (foxtail millet spikelet), *S. italica* (lemma/palea), *S. italica* (rachis segment w/bristles), *Setaria* cf., *sphaceleata* type (spikelets/chaff) and Culm node (grass/cereal).

2) Grain legumes: *Vigna unguiculata* (cowpea), *Pisum sativum* (pea) and *Lens culinaris* (lentil).

3) Other crops: *Carthamus tinctorius* (safflower), *Ricinus communis* (castor) and *Gossypium* sp. (cotton), *Citrulus lanatus* (watermelon), *Vitis vinfera* (grape*), Phoenix dactylifera* (date, fruits /stones /parts) and *Ficus* cf. *carica* (fig seeds).

4) Wild seeds: *Acacia* sp. (type seed), small and medium sized seeds of wild legumes, Malvaceae, *Malva* cf. *Neglecta* seeds, Capparaceae cf. *Cleome* sp. seeds, Apiaceae type seeds, and wild grass spikelet.

Nussbaum and Darius (2012) published the first archaeobotanical results from Boni Island in the Fourth Cataract, their study based on material from a number of trenches and test pits dug down in three sites, S05/140 and S 05/142 with early Khartoum /Neolithic occupation, and site 05/141, a tumulus cemetery of the *Kerma Classique,* and at site 04/57, a late Christian site. The sediments, sieved through a 2mm sieve, included the following species: *Acacia* sp., *Chenopodiaceae*, *Capparis decidua*, *Faidherbia albida*, cf. *Ziziphus* sp., *Cupressus/ Juniperus* type, *Tamarix* sp., cf. *Hyphaene thebaica*, *Moringa* cf. *peregrina sp.*, *Acacia nilotica*, *Citrullus colocynthis, Medemiaargun* and *Phoenix dactylifera.*

Fuller (2004, 71) studied the plant remains from early Kushite contexts at Kawa, an important urban centre where excavations had focused on domestic structures and a mud-brick shrine. Sieving and flotation for archaeobotanical remains was a routine part of this work. The plant species recovered were as follows: Cereals *(Hordeum vulgare*, *Triticum diococcum, Sorghum biocolor,* setaria cf. *sphaceate* type, *Parinum millacum*); Pulses (*Lens culinaris*, *Vicia faba, Lupinus albinus Lathyrus sativus*); Other crops (*Linum usitatissimum, Ricinus commuinis*); Fruits (*Phoenix dactylifera, Hyphaene thebaica, Ficus sp, Citrullus* cf. *lanatus.*, *Citrullus* cf. colocynthis, *Vitis sp.m Cucumis* cf. melo.) and wild seeds (*Acacia s*p., and many other species).

Ryan *et al.* (2012) in the Amara West Egyptian settlement in Upper Nubia (Pharaonic occupation *c.* 1500-1070 BC) used different archaeobotanical techniques to elaborate plant species from the remains. The recovered plant species were: Cereals – wheat (*Triticum dicoccum)*, barley (*Hordeum vulgare*); Other crops – domesticated lentils (*Lens culinaris*), flax (*Linum usitatissimum*), small legumes, cf. *C. fascicularis* (*mulukhiyah)*; Fruits – (*Ficus sycomorus)*, dom palm (*Hyphaene thebaica*), *Phoenix dactylifera,* white cross berry (*Grewia tenax*), Christ's thorn (*Z. spina-christi*), *Cucumis* sp., colocynth (*Citrulllus colocynthus*), watermelon (*Citrullus lanatus*), Sycomore, *G. tenax* berries; Seeds – sedges (Cyperaceae), (*Fimbristylis* sp.), (*Cyperus* sp.), rushes (Juncaceae), (members of the Amaranthaceae family), (*Portulaca leracea*); Seeds – (*Acacia nilotica)*, (chloridoid subfamily of the Poaceae)} and desiccated wood and charcoal – *(F. sycomorus),* (*Tamarix* spp.).

Study Site

The study area is el-Ga'ab (Figure 1) which is a great depression west of the Dongola Reach flooded during the early Holocene when a lake was formed. The lowest portion of Wadi el-Ga'ab must be considerably lower than the level of the Nile (214m above sea level) so that the water table ranges from 1-2m below the surface in some areas while elsewhere there are springs, as at Gaab et-Thowani, where the water is of usable quality and quantity. Ga'ab el-Mowlih is situated in the northern third of the depression south west of Ga'ab el-Mangour, and the land is covered with sand dunes in most parts especially in el-Hamra area. More than 70 archaeological sites were registered in Ga'ab el-Mowlih. In el-Hamra area there is a Christian complex formed of six visible buildings with possibly other buried ones. Site EH-4-008 consists of the ruins to the south/east of el-Hamra church; archaeological excavations were carried out in this building in the 2014-2015 season. The building is formed of four rooms; it seems to have been an important house with a kitchen (Plate 1). During the excavations some carbonized seeds were recovered.

Plate 1. El-Hamra, kitchen.

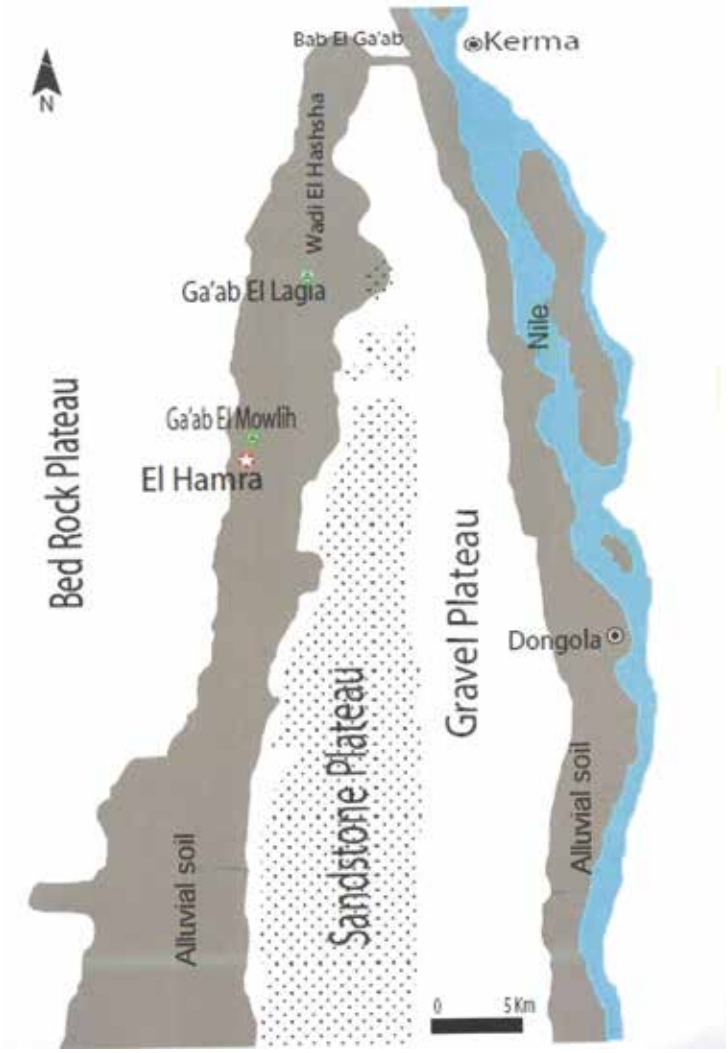


Figure 1. Map of the el-Ga'ab depression.

This study was conducted within the framework of the Archaeological, Ethnographical and Ecological Project of El-Ga'ab Depression in Western Dongola (Northern Sudan) which was launched by the Department of Archaeology, Faculty of Arts, University of Khartoum in 2007. It will be the first archaeobotanical investigation in the el-Ga'ab area. The aim of this study is to identify the plant macro-remains encountered during excavations at el-Hamra Christian complex (EH-4-008), an important source of information for the reconstruction of past environments and human activities including agriculture in the area.

Material and methods

Ten soil samples containing carbonized plant macro-remains were collected during excavations at el-Hamra Christian complex (EH-4-008) (January 2015). They were taken from three different squares (EH-4-008-C2, C3, B2). Samples were separated by flotation and sieved through 2mm and 0.5mm meshes. The collected carbonized plant macro-remains were then studied in the laboratory of the Botany Department, Faculty of Science, University of Khartoum. They were morphologically analyzed using a stereo microscope (Wild, M5A, HEERBRGG, 194683, Switzerland) and identified by consulting relevant plant morphology publications. A study collection of modern seeds and fruits was also used to confirm the identity of samples. Identified plant remains were photographed beside their corresponding modern counterparts for comparative purposes.

Results

Six plant species which were encountered as seeds or fruits were identified from their remains. Table 1 shows the Latin names, local names, common names and family names of the determined species. Plates 2-7 show the morphological details used as taxonomical characteristics for identification of each species.

Table 1. List of identified species at el-Hamra Christian complex (EH-4-008).

Family names	Latin names	Local names	Common names
Poaceae	*Triticum aestivum* (L.)	*Gamih*	Wheat
Poaceae	*Hordeum vulgare* (L.)	*Shaeer*	Barley
Leguminosae	*Cicer arietinum* (L.)	*Kabkabi*	Chickpea
Leguminosae	*Phaseolus vulgaris* (L.)	*Phasolia*	Common bean
Arecaceae	*Phoenix dactylifera* (L.)	*Balah*	Date
Arecaceae	*Hyphaene thebaica* (L.) Mart.	*Dom*	Dom palm

Plate 2. Triticum aestivum. *1: Scar of the embryo position.*

Discussion

The building excavated is formed of four rooms, one of which seems to have been for storage and preparation. It contained many pottery jars, one *gossi* (mud-built container) and grinding stones. In another room, abundant ash and charcoal were found so it may have been the kitchen. It is seems that this building was the catering site for the whole complex and seeds associated with the human diet were recovered.

Although the evidence is not entirely conclusive, it appears that abandoned *matara* (waterwheel well) are one of the archaeological features of el-Ga'ab Depression. Three *matara* were reported in el-Hamra region (sites E H-3-001, EH-4-008 and EH-4-0012). *Qadus* (*saqia* wheel pot) sherds

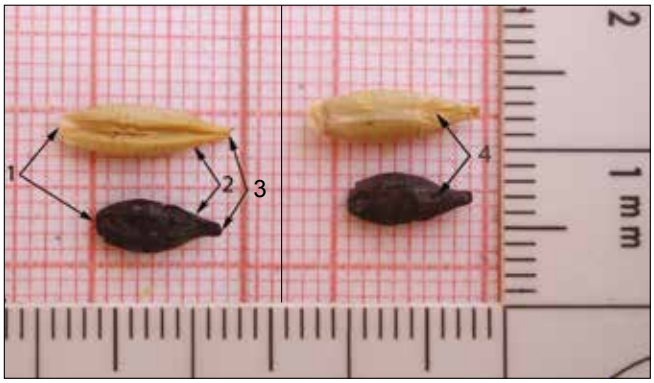


Plate 3. Hordeum vulgare. *1: basal marking, 2: Lemma, 3: Lemma awn and 4: embryo position.*

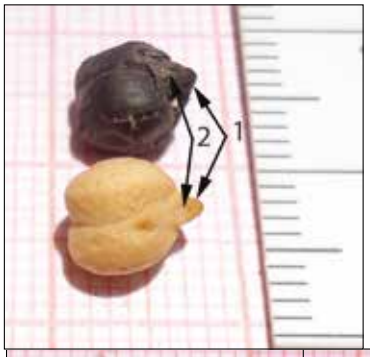
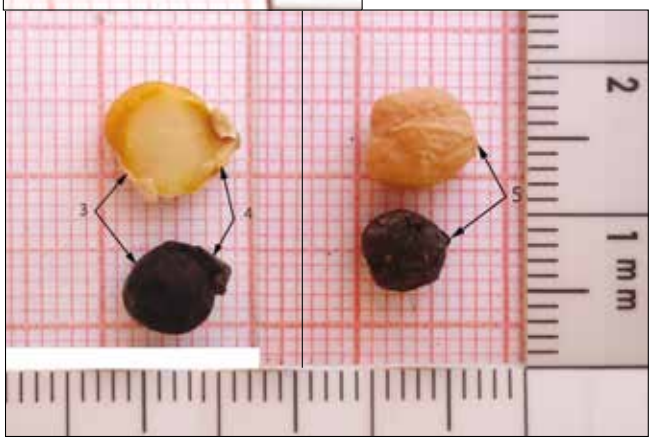


Plate 4. Cicer arietinum. *Ventral view showing 1: corona, 2: hilum; and internal view showing 3: the seed coat and 4: the radicle and dorsal view showing 5: position of the radicle.*



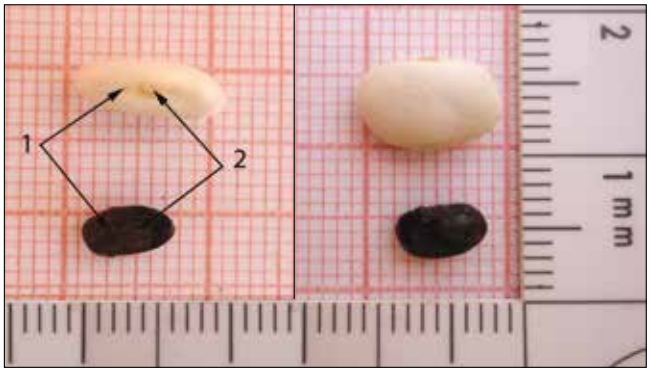


Plate 5. Phaseolus vulgaris. *Ventral view showing 1: hilum; 2: position of the radicle.*

are distributed in the vicinity of abandoned wells. Such sites may be greater in number than what has been discovered, as sand dunes hide many archaeological sites, among them

Plate 6. Phoenix dactylifera. *1: position of the radicle.*

Plate 7. Hyphaene thebaica *showing the scar of the placenta on the seed.*

perhaps *mataras*. The presence of three *saqias* in a small area is indicative of intensive agriculture practices in el-Hamra region. Another possibility for irrigation is the usage of *shadouf*. In light of this evidence for agricultural activity it is assumed that the seeds recovered are from local production.

The Chickpea (*Cicer arietinum*) and Common bean (*Phaseolus vulgaris*) legumes were recovered for the first time from Sudanese archaeological sites according to the literature reviewed. It is, therefore, pertinent in this article to enquire about the source of these two legumes and their introduction into the Nubian diet. The chickpea is the third most important pulse in the world. It is an ancient crop which is first recorded from the Middle East and subsequently spread to other countries with arid/semi-arid and subtropical environments. Use of the chickpea may date back to the early Neolithic period (7000-8000 BC) together with wheat, barley, pea and lentils. It is evidenced in the archaeological remains of carbonized chickpeas located at Çayönü in Turkey (van Zeist 1972) and Tell Abu Hureyra in Syria (Hillman 1975). The oldest large seeds of clearly domesticated chickpea plants have come

from Bronze Age sites in Israel and Jordon (Hopf 1978), Jericho (Hopf 1983) and Bab edh-Dhra (McCreery 1979). Archaeological evidence indicated the arrival of the chick-pea in Greece at the earliest from 800 BC (Kroll 1981), in Southern France by about 1000 BC (Courtin and Erroux 1974), in India by AD 1700-2000 (Choudhury *et al.* 1977; Vishnu-Mittre 1974) and in Ethiopia via the Mediterranean by AD 1000 (Ramanujam 1976).

It is now agreed that cultivated species of Phaseolus originated in Latin America (Evans 1980). Archaeological evidence is available from South America (i.e. in Peru) to trace the period of domestication of *P. vulgaris* as far back as 6000-5000 BC (Evans 1976). Brazil and north Argentina are the areas of domestication of Phaseolus species (Berglund-Brucher and Brucher 1976). *P. vulgaris* and *P. lunatus* are likely to have travelled from America through the Philippines to Asia and from Brazil to Africa. During the 17th century they were widespread in Italy, Greece, Turkey and Iran (Evans 1980). There is no clear data to document the introduction of Phaseolus to Sudan but this study dates back its presence in Sudan to at least the Christian period. The spread of the two crops to Sudan has now become a matter of debate and the future research will hopefully provide more evidence on the issue. Most probably the crops were introduced from Egypt bearing in mind the strong relationship between the Nubian and Egyptian churches during the Christian period. Although, all archaeological evidence indicates that these plant remains belong to the Christian period, further confirmation from radiocarbon dating is strongly recommended in the near future. Most historians believe that American crops were introduced into Europe after contact with the Americas in the late 15th and early 16th centuries. American crops like maize, which was domesticated in Mexico, were carried to Europe and introduced to other countries. Miracle (1965) stated that maize was introduced to Africa from the north, across the Sahara, by Arab traders, as well as along the coasts by the Portuguese in the 1500s. In 1623 maize was reported in Ethiopia (McCann 2001).

The most common botanical elements recovered on this site are cereal grains of *Hordeum vulgare* and *Triticum aestivum*. These two cereal grains were also found by Fuller and Edwards (2001) at Nauri, a medieval-post-medieval site in the Third Cataract region.

Hordeum vulgare (barley) is grown as an animal food crop today. Record of this plant in this site indicates its importance as a food source for humans in the past. Barley possess a higher ecological adaptation to salinity and drier conditions than wheat and this may be the reason behind its consideration for human consumption during dry periods.

Dom and dates are local indigenous vegetation used as fruits and commonly are recovered from Sudanese archaeological sites especially post-prehistoric periods e.g. Cartwright (2001, 557-560); Shinnie and Anderson (2004, 34) and Fuller and Edwards (2001).

Although the presence of sorghum is historically attested for Sudan and there is much evidence for its cultivation or domestication such as amongst the Mokram group (eastern Sudan), the record of spikelets during the Meroitic period and at Nauri in the medieval period, in the site under discussion here so far no sorghum remains have been recorded. This may be attributed to the fact that sampling was concentrated in the 'storeroom'; possibly sorghum might be present in other contexts.

Aknowledgement

Our thanks to all el-Ga'ab mission members specially Dr Howida M. Adam and Ust. Ahmed Hamed Nasar.

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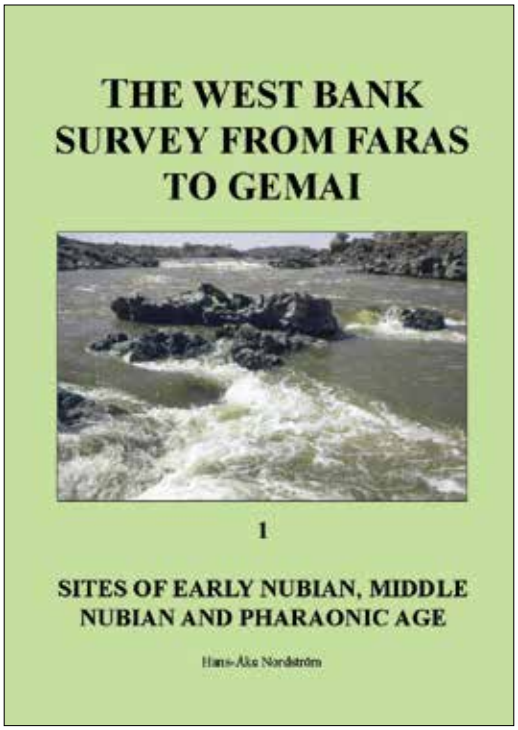

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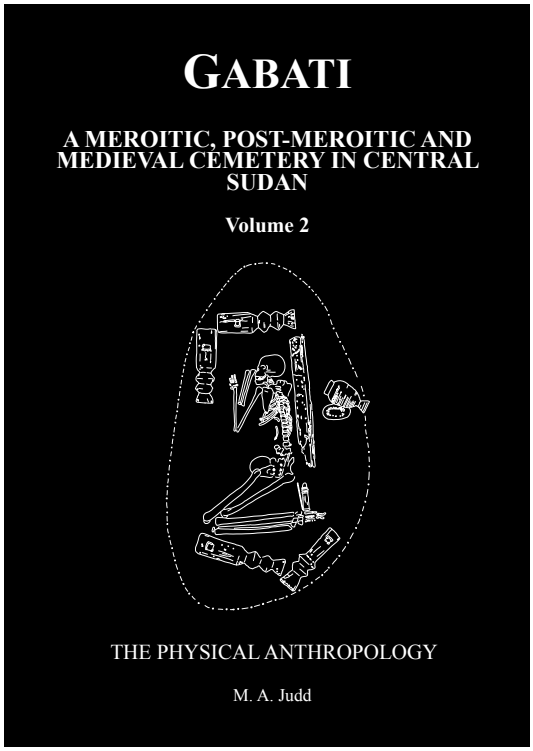

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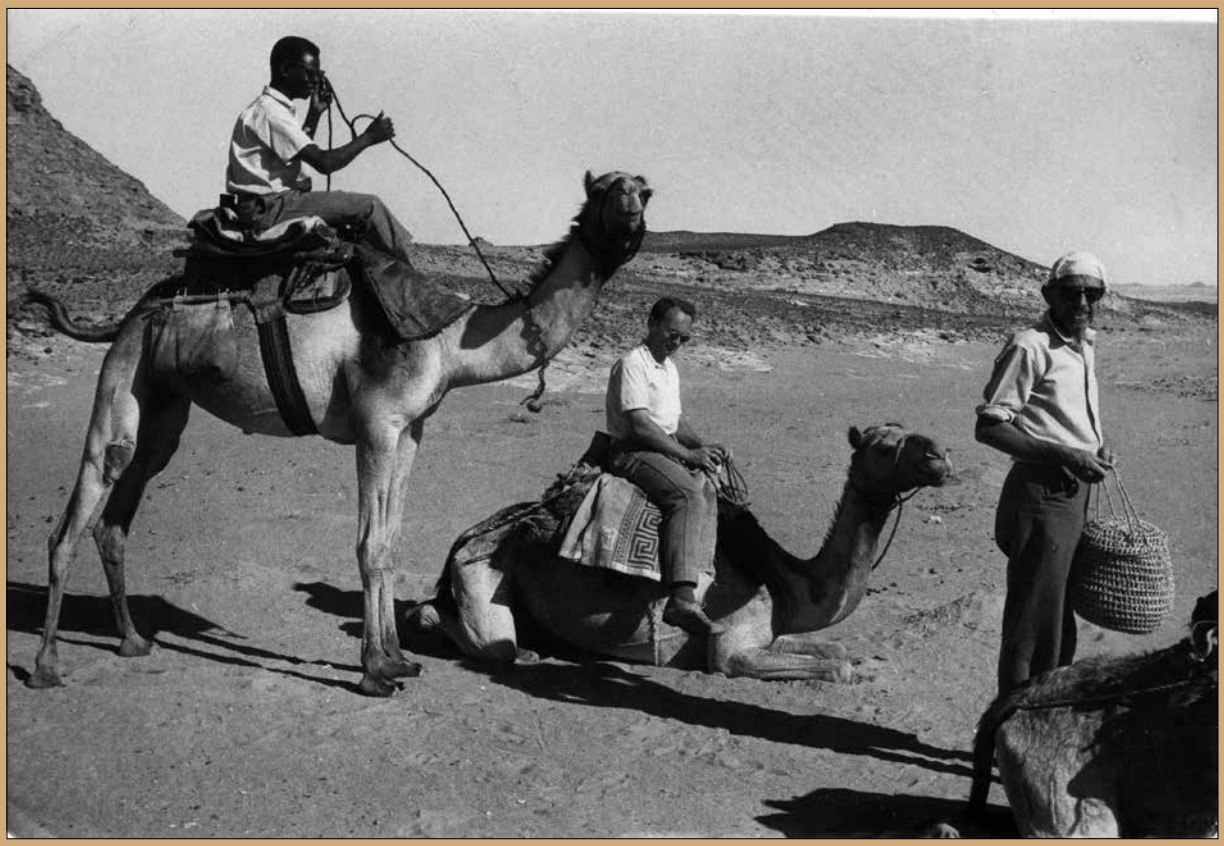
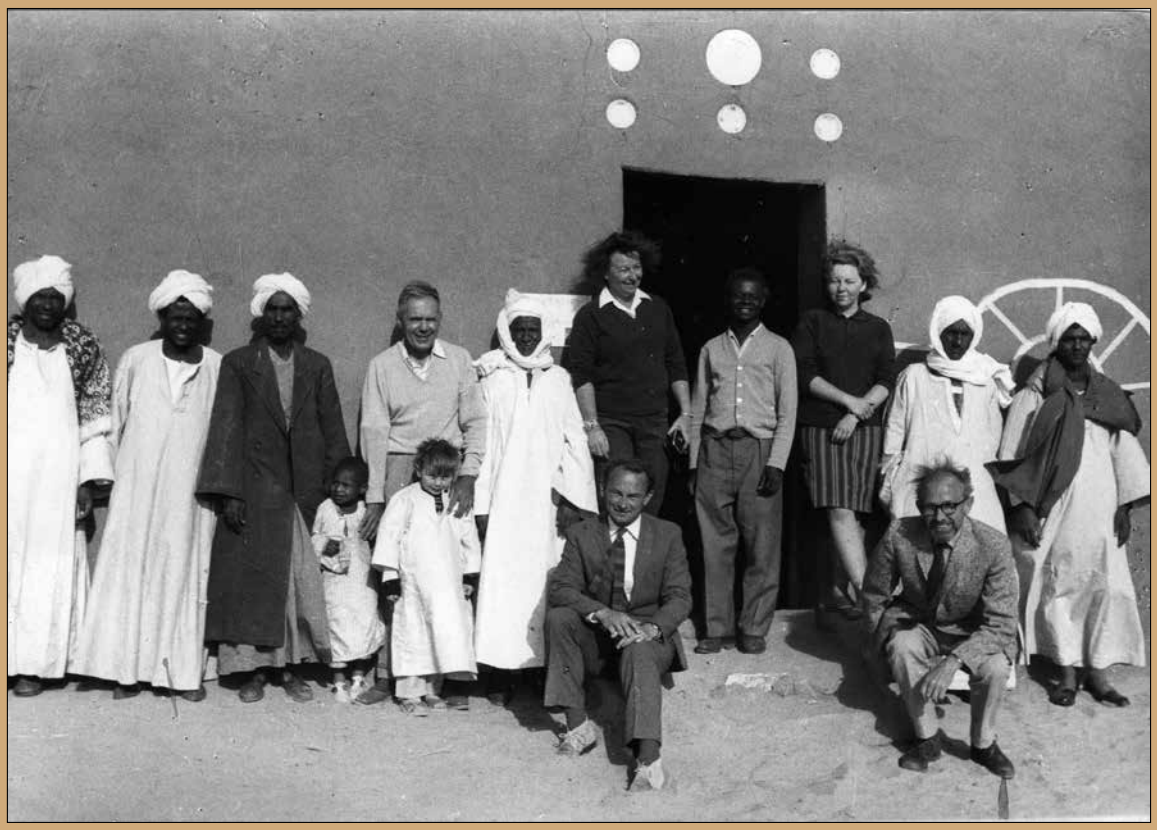


Members of the University of Ghana Expedition to Sudan. John Alexander (centre), James Anquandah (left), Tony Bonner (right) (photo: SARS Alexander Archive, ALE P003.05).



The Debeira West excavation team 1964 with amongst others, Peter and Margaret Shinnie, John Alexander, John Anquandah and Tony Bonner (photo: SARS Alexander Archive, ALE P003.04).