SUDAN & NUBIA

The Sudan Archaeological Research Society — *Bulletin No. 8* — *2004*

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Front Cover: Uronarti: view along 'Middle Street' towards the southern defences in March 2004 (photo Derek A. Welsby)

Early Kushite Agriculture: Archaeobotanical Evidence from Kawa

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In the agricultural history of Africa, Nubia may have played a pivotal role in providing an easy dispersal route for crops and agricultural technologies between the sub-Saharan savannahs and the Mediterranean world. Nevertheless, the quantity of archaeobotanical evidence with which to understand agricultural change in ancient Nubia and its relationship with that further north in Egypt or further south remains limited. The importance of the large botanical assemblage from Qasr Ibrim (Rowley-Conwy 1989; 1991) is widely recognized. The meticulous sieving program at Nabta Playa, in the desert west of Lower Nubia, is of unique importance for considerations of Early Holocene hunter-gatherers. Systematic flotation and sieving at the medieval city of Soba East have also produced important data (Van der Veen and Lawrence 1991; Cartwright 1998), with the few bulk samples from Medieval Nauri providing important results for this period in the Third Cataract region (Fuller and Edwards 2001). Other sources on Medieval agriculture are reviewed by Welsby (2002c). The new data reported in this paper comes from recent excavations at the site of Kawa, which fills a chronological and geographical lacuna in current evidence.

Kawa was an important urban centre of the Early Kushite (Napatan) state at least from the founding of Egypt's 25^{th} dynasty (*c.* 750 BC) through to *c.* 400 BC. Kawa was excavated in the late 1920s and early 1930s by Francis Griffith (post-humously published by Macadam 1949; 1955), who focused on the stone temples and palace complex at the center of the settlement mound, which lies on the east bank of the Nile. Recent excavations by the Sudan Archaeological Research Society, directed by Welsby (1998b; 2001; 2002a; 2002b), have focused on mapping the total extent of the site and excavating areas of domestic habitation. This has included excavating at least two areas (B and Z) of likely domestic occupation, as well as a mud-brick temple (Building A1). Sieving and flotation for plant remains have been a routine part of these excavations and as such have produced the largest archaeobotanical assemblage (*c.* 200 samples) for this part of Nubia (the Dongola Reach) for this period (Early Kushite). Laboratory analyses are ongoing but results from 20 samples are now available and provide a basis for the first assessment of agricultural production in the Dongola Reach during the era of the early Kushite state.

Most of the material, preserved by charring, can be regarded as Early Kushite (8^{th} to 5^{th} century BC) on the basis of the associated cultural material. The data available to date are tabulated in Table 1. This shows actual counts of seeds and other parts for each sample. It should be noted that this table includes some material which is uncarbonized and preserved by desiccation. Such samples tend to be from levels near the surface and include animal dung. It can be suggested that such uncarbonized remains are more recent in date and derive in large part from partially decomposed animal dung of pastoral occupations after the site's abandonment, and possibly are quite recent. In the far right hand column of Table 1 is a ubiquity, in which the percentage of all the samples in which a species occurs has been calculated. Uncarbonized remains have been excluded from this calculation. In some cases different items (such as grains and chaff) from the same species are grouped together in this index, as indicated by the row borders. One carbonised sample which is also excluded, as it stands out in contents and context, is that from area HA2 in the cemetery, site R18, 1km to the east of the Kushite town. The cemetery was probably in use throughout the Kushite period and the material here studied may date to a later period than that from the townsite. It contains dates (*Phoenix dactylifera*), watermelon/colycinth gourd seeds (*Citrullus* sp., probably mainly *C. colycinthus*), broad bean (*Vicia faba*) and lupin (*Lupinus albinus*). The last species appears in Lower Nubia (at Qasr Ibrim) only in the post-Meroitic period (Rowley-Conwy 1989), and is thought to originate in the Aegean (Zohary and Hopf 2000). This suggests a later date for this sample, although it must be noted that there is no evidence for use of the town and of the associated cemetery into the post-Meroitic period.

What this evidence makes clear is that the most common crops in evidence on the site are Pharaonic winter crops. This includes emmer wheat (*Triticum diococcum*) and barley (*Hordeum vulgare*) (Plates 1-2) as well as seasonally similar pulses, especially lentils, *Lens culinaris* (Plate 3), but also fragments of the grass pea (*Lathyrus sativus*). All of these are species of early domestication in the Near East which became established in Egypt during the Neolithic and formed parts of the agricultural basis for Egyptian civilization (Zohary and Hopf 2000). It is likely that they spread to Nubia during the Late Neolithic/A-Horizon, and remained established in the Middle Nile region into recent times. An important change that occurs during the Late Meroitic period in Lower Nubia, however, is the shift towards free-threshing wheats over emmer, including hard wheat (*Triticum durum*), which dominated Nubian agriculture in recent time, and bread wheat (*Triticum aestivum*) (Rowley-Conwy 1989). Bread wheat is also recorded from the Third Cataract region from the Medieval period (Fuller and Edwards 2001). These free-threshing wheats are absent from the Kawa material.

Both of the cereals are present in the form of grains and chaff, which allows us to consider the presence of these species in relation to practices of crop processing. Particularly common are the glume bases or spikelet forks of

Table 1. Actual counts of seeds and other parts for each sample.

	Building A1							Building B5				Building B12									Building Z1			R18	Ubiquity
Area	AB4	AB4	AB4	AB5	AB5	AB5	AB5	BD3	BD3	BE2	BE4	BE1	BE1	BE1	BE1	BE2	BE2	BE2	BF1	BZ3	ZH5	ZH5		HA2	
Room			W	V	V	w		XII	XVI		IX	XXI	XXI	XVIII	XX	VII	VII	III	XX	III	I				
Level	5	22	29	29		222	94	39	63	24	53	49	51	61	64	5	64	119	70	107	53	38		27	
Samplen No.	00/19	02/8	02/45	00/1	00/3	02/4	00/23	.02/24	29	98/8	6	00/9	00/24	00/22	01/9	00/10	00/2	98/22	00/17		02/70			02/39	
cereals (grasses)																									
Hordeum vulgare grain	5	1			2	1	7			6	17		25			1	1	1			1				64%
Hordeum vulgare rachis											1	2	9				3			1					
H. vulgare chaff (dessic.)												8													
Triticum diococcum grain			3				5		2	7	3				1						3				59%
T. diococcum spikelet fork/glume base							6.5			17		3	1	8.5	1			14	2	4					
indet cereal grain frags.			3						3					1											
indet. Rachis frag.													1												
Sorghum bicolor grain cf. caudatum/durum											2		4												18%
cf. S. bicolor grain	1																								
Sorghum bicolor chaff													1												
Sorghum cf. arundinaceum/bicolor																			1						
Sorghum bicolor chaff (dessic)												57													
Panicum miliaceum													2				5								9%
Panicum sp. (small)																	6								
Setaria cf. sphaceleata type									1		1						13	19	1	4					27%
culm node											1		1						1						14%
pulses																									
Lens culinaris							2	1		1							3			1					23%
lens culinaris (dessic.)	1																								
cf. Lathyrus sativus	1																								5%
Vicia faba																								2	
Lupinus albinus																								80	
indet legume frags.							2			2				2						1				2	
other crops																									
Linum usitatissimum																		1							5%
Ricinus communis											1							1	1						14%
Fruits																									
Phoenix dactylifera							1	3										1		1				107	18%
Hyphaene thebaica				1	4					1												1.44g			18%
Ficus cf. carica																		4	8						9%
Vitis vinifera																		1							9%
pedicel cf. Vitis																				1					
Citrullus cf. lanatus																	5							2	9%
Citrullus cf. colycinthus																	10							18	9%
Cucumis cf. melo																		1	2	1					14%
wild/weed seeds																									
Acacia sp.											1	1			1		5				3				22%
Aizooaceae (larger), cf. Zaleya																	9		1						9%
Aizooaceae (Smaller), cf. Mullugo							1										1	5							14%
Apiaceae					1		2					1		1			1		3					1	32%
Asteraceae cf. Centaurea							1				5		3												14%
Asteraceae small																		3							5%
Boragniaceae												1												2	9%
Caryophyllaceae														1			12							1	14%
Chenopodiaceae														1			7								9%
Cyperaceae tuber							1						1											10	14%
Graminae indet.							1													2					9%
Graminae cf. Lolium							1																		5%
cf. Juniperus sp.																								1	5%
Malvaceae							1													1					9%
Portulaceae cf. Calindrina														1											5%
Solanaceae																	2								5%
Trifolieae/ sm. Legumes					1		4				2						10		3					2	27%
Trifolieae pod cf Ononis																	1	6		1					14%
Trigonella sp.							9																		5%
small legume cf. Vigna sp.											1		1												9%
indet multi-seeded fruit													3				1		1						14%

*Plate 1. Archaeological grains of barley (*Hordeum vulgare*), scale in mm.*

emmer wheat (Plate 4). It is most likely that emmer would have been stored in spikelet form, requiring routine dehusking through pounding and winnowing to remove the hard glumes as well as weed contaminants. The presence of wheat glume bases as well as large heavy weed seeds (such as *Centaurea,* Trifoliae legumes, Malvaceae, *Lolium* type grass seeds) suggests that routine domestic activities involved dehusking and cleaning emmer wheat. Barley by contrast tends to produce as its chaff rachis segments (Plate 5), during the initial threshing of the crop. If stored as grains, therefore, this waste will be removed in time from routine activities and is likely to be seasonally associated with the harvest. The waste from this threshing, however, may make useful animal fodder. In this regard it is interesting to note that charred dung fragments were noted in the two samples with the most evidence for barley rachis. This suggests that the burning of dung as well as disposal of routine household waste (wheat dehusking) contributed to the charred assemblage.

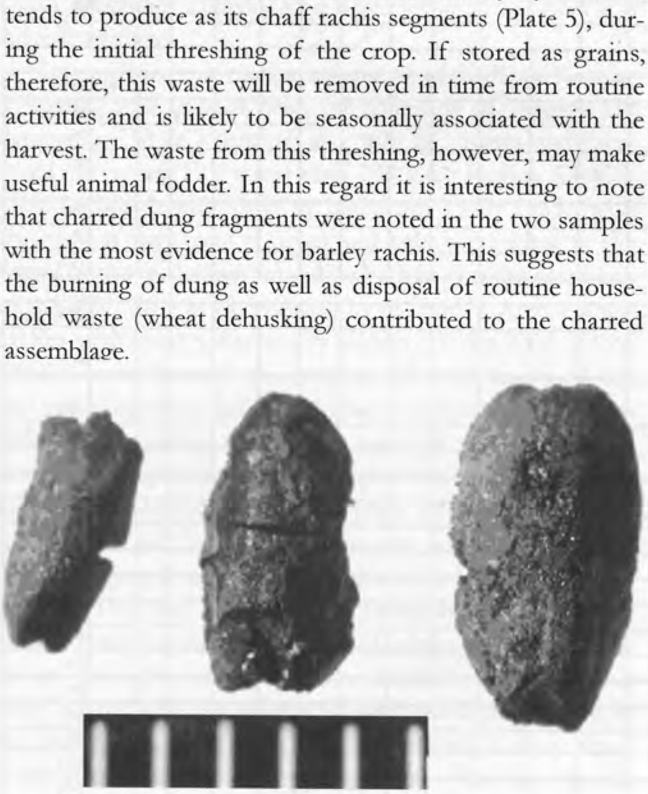

*Plate 2. Grains of emmer wheat (*Triticum diococcum*), scale in mm.*

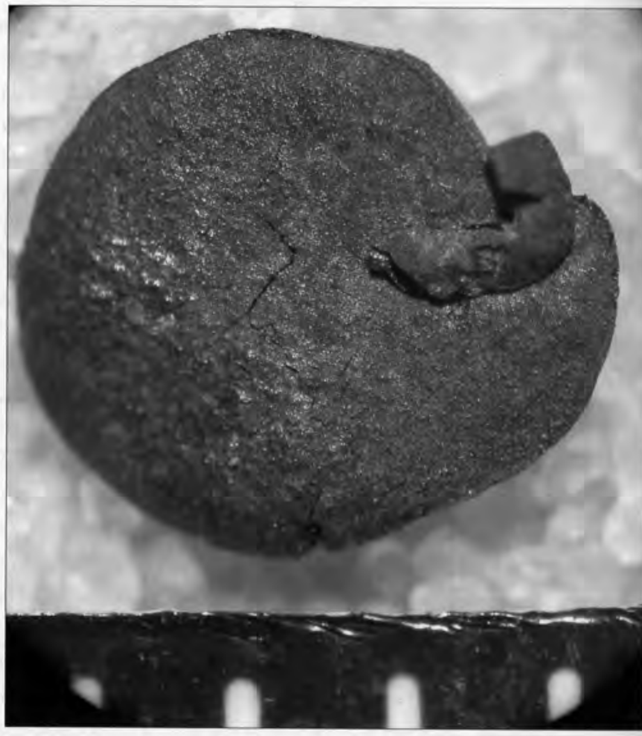

*Plate 3. Lentils (*Lens culinaris*)*

Particularly significant is the evidence for summer cereal crops, including sorghum and two small millets. In recent years there has been controversy over the antiquity of sorghum domestication, with the evidence from Qasr Ibrim for domesticated sorghum only from the Late Meroitic period onwards suggesting to some that this crop was domesticated very late, perhaps in the last 2500-2000 years. (Rowley-Conwy *et al.* 1997; 1999). Evidence for domesticated sorghum outside Africa, however, argues for its domestication before the end of the Third Millennium BC followed by long-distance transport of this and other

Plate 4. Spikelet fork of emmer wheat, scale in mm.

Plate 5. Rachis segments of barley, scale in mm.

African crops (Fuller 2003). The charred sorghum from Kawa, includes a number of orbicular plump grains, with flattened profiles (Figure 1), which suggest a more advanced, free-threshing race cultivated sorghum, such as race caudatum (or perhaps durra). If correctly dated to the Early Kushite period, before 400 BC,[1] this is significantly earlier evidence for domesticated sorghum than that from Ibrim, or indeed any reported from Africa to date. In addition this is not a primitive but more evolved cultivar. One fragment of apparent sorghum chaff is also present (Plate 6).

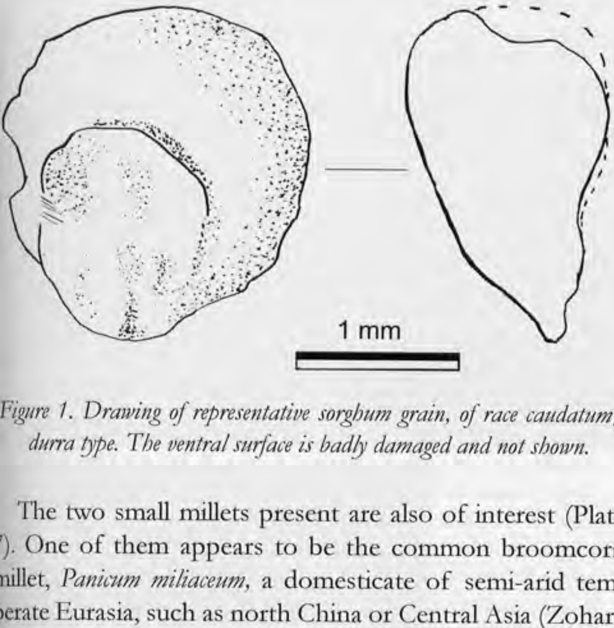

Figure 1. Drawing of representative sorghum grain, of race caudatum/ durra type. The ventral surface is badly damaged and not shown.

The two small millets present are also of interest (Plate 7). One of them appears to be the common broomcorn millet, *Panicum miliaceum,* a domesticate of semi-arid temperate Eurasia, such as north China or Central Asia (Zohary and Hopf 2000). This species must have dispersed either up the Nile or across the Red Sea prior to this time. The other species is a wild form of foxtail millet/grass. It is not the common foxtail millet crop, but rather something similar to *Setaria sphaceleata.* The same morphotype of wild-type millet was found at Medieval Nauri (Fuller and Edwards 2001). This could suggest that traditions of the use of native wild millets were long-lasting in Nubia. The presence of these millets, however, also raises the issue of whether they were primarily or exclusively human food. The sample

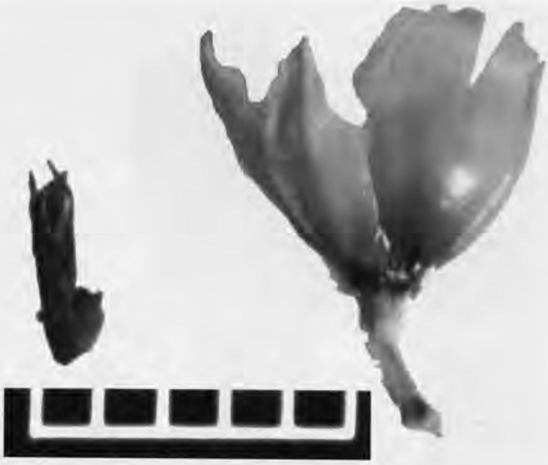

Plate 6. Charred sorghum chaff (left) compared to modern threshed spikelet (right)

that includes most of the evidence for these species also has barley rachis and charred dung, and thus could represent the burnt debris of dung fuel use. Other taxa present, however, such as lentils and watermelon seeds (Plate 8), suggest that the samples also contains at least some mixture of human food debris. While further work on disentangling the formation processes of these samples, and others yet to be studied, is in order, it can be suggested that summer cultivated crops, such as millets and sorghum were part of the early Kushite repertoire in the Dongola Reach, whereas they do not appear to have become important in Lower Nubia until the Late Meroitic or Post-Meroitic times. Perhaps these crop persisted in localities that were more savannah like in ecology on the fringes of the basins and wadis of the Dongola Reach, whereas their adoption further north in hyper-arid Lower Nubia had to await the development of *saqia* irrigation.

Additional evidence indicates a range of fruit crops, and wild fruit consumption. This includes evidence for cultivated garden fruits like melons (*Cucumis melo*), watermelons (*Citrullus lanatus*), and figs (*Ficus carica*). Orchards of dates (*Phoniex dactylifera*) are suggested by date stones, perhaps with interspersed doum palm (*Hyphaene thebaica*), the fruits

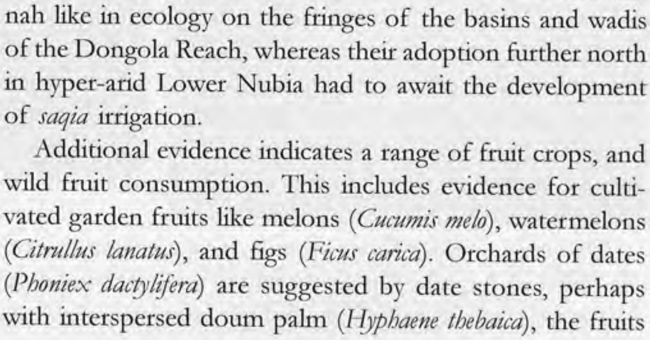

Plate 7. Scanning electron microscope images of small millets, Panicum miliaceum *(left), scale in mm;* Setaria *cf.* spahceleata *(right), scale 0.5mm.*

[1] The sorghum specimen from Kawa, is dated to 780-400 cal. BC.(Beta-194234. conventional C-14 age: 2450(+/-40) bp).

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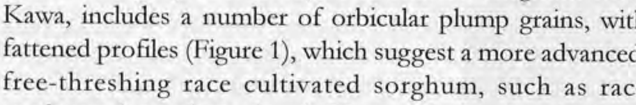

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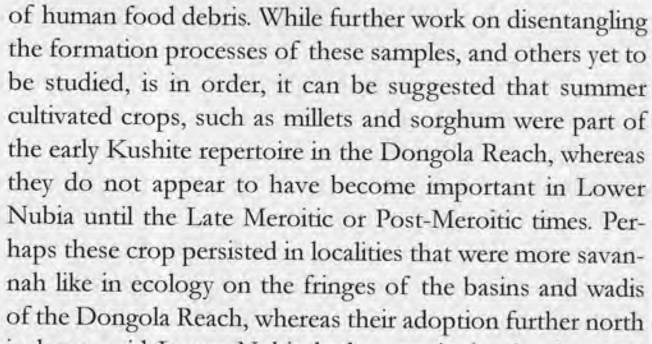

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[1] The sorghum specimen from Kawa, is dated to 780-400 cal. BC.(Beta-194234. conventional C-14 age: 2450(+/-40) bp).

*Plate 8. Watermelon seed (*Citrullus lanatus*) from sample 64, scale in mm*

of which might be enjoyed for their sugary endocarp. Indeed depictions of Nubian palm plantations of the New Kingdom period, such as that from the tomb the Nubian prince Djehutyhotep (Trigger 1976, 115), suggest that dates and doum palms were managed and harvested together. The growing and management of plantations may well be an innovation of New Kingdom Egyptian colonialism, made possible by the adoption of labour intensive *shaduf* irrigation (Trigger 1976, 130), but allowing the production of cash crops for trade and wealth accumulation by elite landowners. Another lasting influence of Egyptian colonialism may have been the growing of grapes. The Kushite king Taharqo (690-664 BC) bragged about the wine produced at Kawa (Macadam 1955, 36), and although scant, there is archaeobotanical evidence to confirm the presence of grapes. As with summer cereals, grape production in Lower Nubia may only have been undertaken at the very end of the Kushite period with the advent of *saqia* irrigation (Adams 1966; Fuller 1999, 208).

The evidence from Kawa provides a new perspective on the different regional histories of food production within the broader Nubian region. Beyond indicating the local consumption, and probable production, of cash crop fruits, like grapes and dates, it provides a window on the basis of daily subsistence routines of domestic occupation which involved cereal processing as well as animal foddering. These data provide just a small start towards addressing questions about the interregional dynamics of agricultural production and the spread of crops.

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