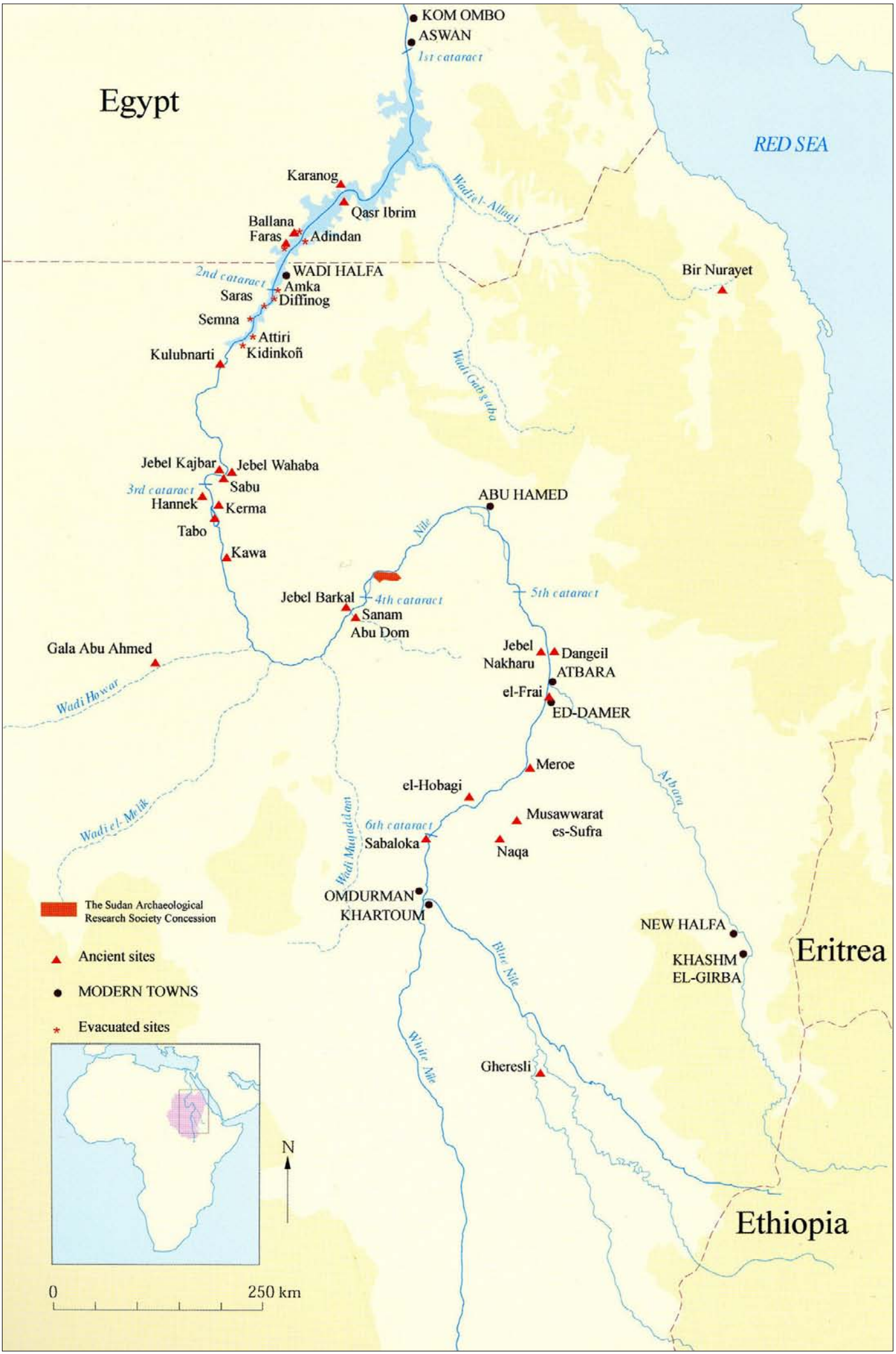
SUDAN & NUBIA

The Sudan Archaeological Research Society

Bulletin No. 10 *2006*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1st cataract
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2nd cataract
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3rd cataract
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Kerma
Tabo
Kawa
ABU HAMED
Nile
Jebel Barkal
4th cataract
Sanam
Abu Dom
5th cataract
Gala Abu Ahmed
Wadi Howar
Jebel Nakharu
Dangeil
ATBARA
el-Frai
ED-DAMER
Meroe
el-Hobagi
Wadi el-Melik
Wadi Muqaddam
6th cataract
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Naqa
Atbara
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KHARTOUM
The Sudan Archaeological Research Society Concession
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MODERN TOWNS
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Contents

Front cover: Beja man by the well at Bir Vario, Eastern Desert (photo K. Pluskota).

Bread Moulds and 'Throne Halls': Recent Discoveries in the Amun Temple Precinct at Dangeil[1]

Julie Renee Anderson and Salah Mohamed Ahmed

During the course of the 2005 field season in the Amun temple precinct at Dangeil, Nile State,[2] the Berber-Abidiya Archaeological Project investigated the northernmost room of the Amun temple and mound K, a low mound situated behind the temple to the north-east of the sanctuary.[3] The purpose was to gain a better idea of the rituals and offerings conducted within a Kushite temple and of some of the elements that formed an integral part of the temple complex (Figure 1).

As a discussion of the northernmost room of the Amun temple, the so-called 'Throne Hall', is in press elsewhere (Anderson and Salah Mohamed Ahmed in press B), only a brief synopsis will be presented here. In 2001, some of the outer sandstone casing blocks and interior fill of a dais (H185) were discovered during the excavation of the second pylon (H124) of the temple. The area was backfilled and excavation of the dais and associated room were postponed until the 2004 and 2005 field seasons when drainage from this area could be realized. A long rectangular room (27.5 x 5.5m), parallel to the temple's axis, was unearthed to the east of the second pylon and north of the sanctuary (Figure 2). Access to this room, the so-called 'Throne Hall', was gained via two entrances. One was through a short north-south corridor that led to an entrance in the north wall near the temple's north-east corner, and the other through a door in the north wall of the northernmost sanctuary chamber.

A free-standing raised dais (H185) stood at the westernmost end of the room (Colour plate XLI). It had been positioned precisely during construction and architects' guidelines were still visible incised in the soft stone of the floor and on the dais stones. A colonnade consisting of three pairs of red-brick columns stood in front of the dais. Each column drum was comprised of red-brick thirds mortared together. The eastern half of the room was largely empty, except for a small two-three course red-brick installation against the north wall. The room's floor was paved with sandstone flags and an extensive layer of charred roofing material, charcoal, and ash overlay the floor and dais. A few painted mud-plaster fragments were also recovered. Preliminary geological analysis of the quarries located in Jebel Nakharu across the river from Dangeil, indicates that the stone used within the temple originated there (Abdel Rahman Ali, pers. comm. 2005).

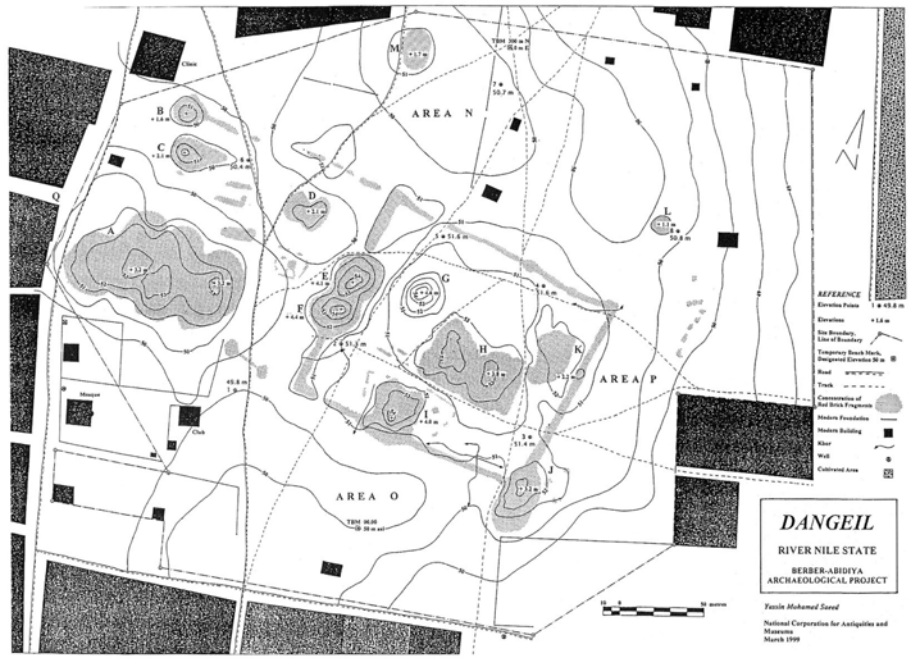

Figure 1. Site map of Dangeil.

Daises, similarly positioned, have been found in Amun temples at Kawa, Jebel Barkal B500, Meroe M260 and Naqa Temple 100 (Macadam 1955; Dunham 1970; Grzymski 2003; Kroeper and Wildung 1998-2002; 2002;). Another has been postulated at Sanam Abu Dom (Griffith 1922). The function of these rooms and associated daises is uncertain although they seem to be found in all Kushite Amun temples and are present throughout the Kushite period suggesting a continuity of religious rituals. It has been suggested that they served as sanctuaries to various solar gods including Amun-Re, Re'-Horakhty or Re' and may have been used by the king during associated religious ceremonies such as that recorded on the stele of Nastasen where the king is seated upon a golden throne (Ahmed 1988, 113-119; Eide *et al.* 1996, 479-482; Kroeper and Wildung 1998-2002, 98;

[1] The Berber-Abidiya Archaeological Project gratefully acknowledges the support of the National Corporation for Antiquities and Museums, Sudan, The British Museum, UK, The Fondation Michela Schiff Giorgini, USA and The Royal Ontario Museum, Canada.

[2] The team consisted of Abdel Rahman Ali (geologist), Julie Anderson (co-director), A. Catherine D'Andrea (archaeobotanist), Amanda Logan (archaeobotanist), Salah Mohamed Ahmed (co-director), Mahmoud Suliman (archaeologist), Rihab Khider (pottery specialist, archaeologist).

[3] For further information regarding earlier field seasons at Dangeil, see Anderson and Salah Mohamed Ahmed 1998-2002; 2002a; 2002c; in press A; in press B; Salah Mohamed Ahmed and Anderson 2000; 2005.

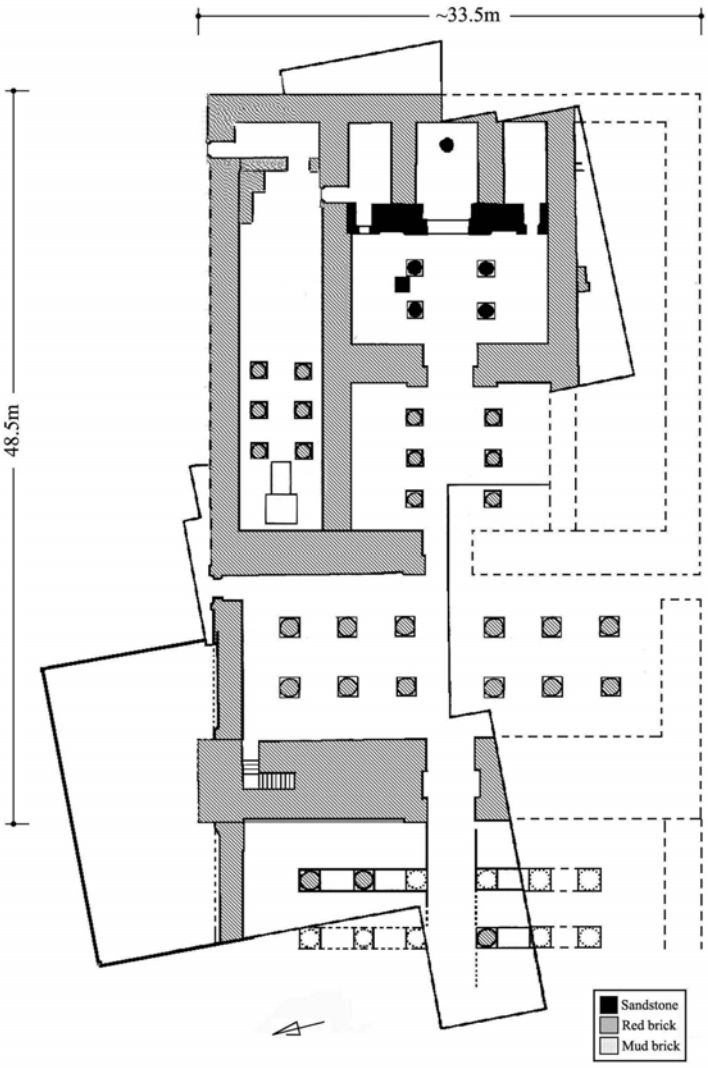

Figure 2. Plan of the Amun temple with 'Throne Hall' (scale 1:500).

2002, 139). A graffito perhaps representing a bird wearing a white crown sitting on a dais, incised in the floor near the Dangeil altar, may provide tentative support for this theory. Daises are further represented by a couple of graffiti discovered near the Dangeil altar, though no figure is depicted on top of them.

In addition to the dais, the remains of three altars were discovered within the Dangeil Amun temple. Offerings including water, milk and particularly bread, clearly formed a major component of Kushite worship and ritual. For example, the victory relief of the Kushite King Sherkaror (*c.* AD 20-30) at Jebel Geili 120km east of Khartoum, depicts a god offering prisoners and a head of sorghum, a cereal from which breads and porridges are made, to the king. During the 2005 field season nearly 1,200,000 sherds from cone-shaped bread moulds were excavated at Dangeil (Plate 1). The first 80,000 were counted by hand, then the remainder estimated by bucket-load. Further, within the main sanctuary of the Dangeil temple, two parallel grooves were discovered in the floor running east-west from the centre of the room where the altar had previously stood, towards the entrance. Presumably these were for draining liquid offerings, possibly water or milk, away from the altar during ceremonies.

Funerary offering tables such as those in Colour plate XLII (British Museum EA 1541, EA 1587) often depict bread loaves amongst other offerings and frequently show Isis and Anubis pouring libations for the deceased over an altar or table laden with loaves of bread. It is notable that these bread loaves often appear round and are likely depicted in such a way as to show their most characteristic or identifiable feature. In Egypt and Sudan, round loaves are often made by slapping a disc of bread dough on the wall inside the oven. The round shape shown in these offering tables suggests that these breads were not baked in the cone-shaped moulds typically associated with Amun temples of the Kushite period, but perhaps in this other fashion.

Within a temple context, bread baked in temple ovens was offered to the god, who would devour the spiritual essence. Presumably afterwards, the physical bread itself would be consumed by the priests and variously appropriately designated persons. Bread moulds have been noted at Amun temple sites such as Jebel Barkal, Sanam, Kawa, Tabo (Jacquet-Gordon 1981, 21), and Kerma Dokki Gel (Bonnet 2005, 233-4, figs 13, 14; Ruffieux 2005, 259) though this list is by no means complete. In every instance the moulds are found near, usually behind, a Kushite temple and are visible as scatters or mounds that are often many metres high.

Similarly, bakeries have also been found associated with a number of Amun temples. For example, at Tabo, the mound of bread moulds lay behind the temple. Upon excavation, this kom 'proved to consist of peripheral mounds of broken pots thrown out from a central area occupied by a number of ovens situated inside a mud-brick enclosure attached to the temple' (Jacquet-Gordon 1981, 21). A large complex of ovens was discovered in a long rectangular building at Dokki Gel to the west of the temple. Many had been renewed several times, often in the same location, indicating extensive use. Granaries and water jars, employed in the manufacture of dough, were associated with these installations, as expected (Bonnet 2005; Ruffieux 2005).

That bread moulds are not apparently associated with indigenous cults such as that of Apedemak suggests that this tradition of bread-making may have been adopted from Egypt, and in a religious context, restricted to the cultic practices associated with the god Amun.[4] 'The history of the penetration of forms of breads into the region [North-

[4] The 'Table of the Sun' in Ethiopia referred to by Herodotus (III, 17-19, 23), wherein cooked meat and milk were reputed to be placed on a table every night, then consumed during the day by the populace or those passing by, may have been part of a cult ritual and offer insight into the offering practices of cults perhaps other than that of Amun. However, the 'Table of the Sun' could easily have been a myth or misinterpreted in some fashion by Herodotus as his account is not based upon first-hand knowledge.

Plate 1. The mound of bread-mould sherds produced at the end of the season.

ern Sudan] is itself an interesting area of study, interlinked with the ebb-and-flow of northern influences in the region, and cultural borrowings, especially amongst elites' (Edwards 2004, 15). The earliest securely identified bread moulds in Sudan were found at Jebel Barkal and date to the early Kushite period (6th century BC) (Jacquet-Gordon 1981, 21; Reisner and Dunham 1970, 95-96, fig. 57).

However, it should be noted that bread moulds have also been discovered in the Northern Dongola Reach associated with cemeteries. These sites include E8 and R18, both of which have been dated to the Kushite period (Welsby 2001, 29, 130-131, 148-150, 276). For the purposes of this discussion, sites exhibiting any indication of occupation or settlement, and thus potentially having an associated temple, have been excluded. This may indicate that bread was brought to these sites and formed part of the funerary ritual or meal, as is further suggested by the representation of bread on offering tables. However, these incidents are rare and as bread moulds have not been identified at every Kushite cemetery the use of this particular type of bread in a funerary context, specifically that produced in a mould, may have been restricted to particular members of the community. Alternatively, some of the earlier-looking mould types may have been misidentified as Welsby Sjöström (2001, 244) suggests, or were re-deposited from elsewhere.

Conical bread moulds are the most common ceramic find at Dangeil. Helen Jacquet-Gordon created a typology of bread moulds ranging in date from the Egyptian Predynastic period through to those of the 25th Dynasty and Later Kushite period (Jacquet-Gordon 1981). The moulds begin almost as shallow bowls becoming more conical through time. Jacquet-Gordon suggests that her Kushite moulds (type E) are not found in Egypt and are restricted to the Kushite kingdom. The moulds found at Dangeil are analogous to type E, particularly Jacquet-Gordon's examples 9 and 10 from Kawa (1981, 20, fig. 6, nos 6-10), although the bases of the Dangeil vessels usually are more rounded, likely because they are slightly later in date than those Jacquet-Gordon illustrates. The moulds are a hand-made, coarse ware that ranges in colour from black or grey to a pinkish-buff or red. The bases are usually slightly rounded and frequently finished with a thumb mark impression, sometimes with the fingerprint still visible, while the rims are flat or slightly rounded, and inturned (Plate 2). It is evident that they were manufactured at speed and not with any great care. The interior surfaces were smoother than the exterior and the vessels were probably fashioned by shaping the clay around a cone-shaped form, possibly of wood or stone. White particle and organic tempers, up to 3mm in size, were used, which left large air bubbles in the fabric after firing.

The vast majority is found as sherds because it was necessary to break the mould in order to remove the bread after cooking; essentially, the moulds were for single-use only. Jacquet-Gordon (1981, 23) notes that the interior proportions of a long length combined with a small rim diameter would make it difficult to remove bread without breaking the mould. While it seems sensible to suggest that the moulds should have been greased to enable the loaves to slip out and the moulds to be reused, the porosity of the ceramic does not facilitate this practice. In 1993, a

Plate 2. Bread moulds from Dangeil Kom K.

bread-making experiment using emmer wheat was conducted in an attempt to replicate Egyptian Old Kingdom bread. The experiment was based upon the Old Kingdom bakery and artefacts discovered at Giza by Mark Lerner of the Chicago Oriental Institute. Though the vessels used were larger than the ones from Dangeil, the principle remains the same. When the test moulds were greased with fat prior to the addition of the dough, the fat permeated the ceramic and several caught fire when baked, resulting in inedible charred lumps (Lerner 1993-94; Wood 2000).

A notable number of the sherds are cracked or warped kiln wasters. Earthenware ceramics tend to be poor conductors of heat. This can cause a temperature difference

between one side of the vessel and the other during firing. This results in vitrification occurring at different rates and consequently a cracked ceramic. It is a particular problem if the vessel walls are of differing thicknesses, a characteristic many of the moulds share, resulting from the speed and method of manufacture. As kilns are intended to have relatively even temperature after preheating, this may also suggest that, at least on some occasions, the moulds were placed inside before the kiln was fully heated or the heat was not well regulated. Warping of vessels tends to occur when the kiln temperature is too high. Again this probably reflects upon the rapidity and carelessness with which these vessels were manufactured and perhaps upon the sheer volume of bread moulds produced. The number of large air bubbles in some of the wasters is also notable suggesting that the clay was not well kneaded. Some of the vessels subsequently produced could have exploded in the kiln, when the remaining large air bubbles expanded during heating. The presence of the kiln wasters mixed in with the used mould sherds is curious and suggests that the kilns and/or bonfires and ovens may have been situated in close proximity.

Due to the vast quantity of bread moulds found *in situ* at Dangeil, the mission was invited to participate in an archaeobotanical project based at Simon Fraser University and the University of Calgary, Canada.[5] The purpose of the project was to conduct an ethnoarchaeological and archaeological study of traditional bread baking and sorghum processing in Sudan and then to later place it in the wider context of East Africa.[6] The site of Dangeil provided some of the archaeological and ethnoarchaeological components for the investigation. Data compiled by this project will be used to create ethnographic and technological models to aid in understanding ancient subsistence strategies and cooking, and the origins of various crops native to East Africa.

Covered with bread moulds, charcoal, ash, pebbles, grinding stones and numerous red-brick fragments, mound K was clearly a waste heap produced by bread manufacture. Situated behind the Amun temple to the north east, it was deemed a suitable place to conduct excavations in order to provide enough sample material for study. The mound itself was roughly oval, orientated north-south, measured 55 x 28m and stood 2.2m above the surrounding plain. Excavation of an 8 x 6m square began near the perceived southern edge of the mound with the ultimate goal of locating the temple ovens. Red-brick walls and foundations began appearing just below the surface (Plate 3). Initially, it was though that these might be associated with the temple ovens, but they turned out to be part of a secondary occupation with few associated activity areas. Bricks in the foundations were laid on their ends and constructed directly upon several alternating layers of bread moulds, ash and charcoal - not a particularly firm base upon which to build a structure.

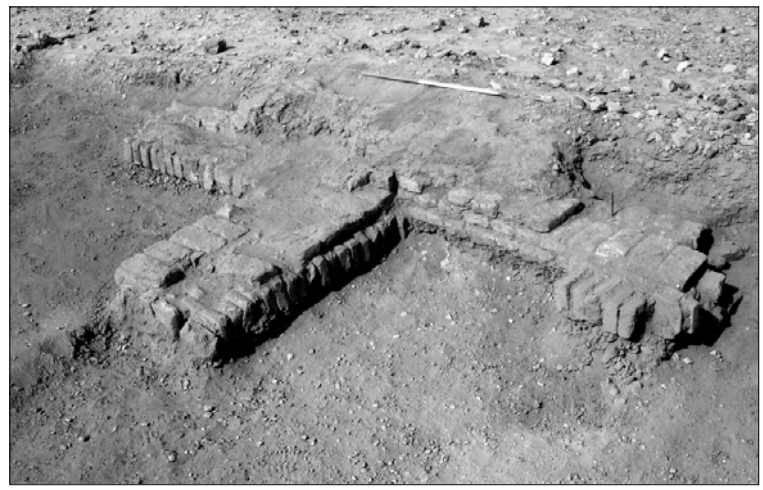

Plate 3. Red-brick walls and foundations (K21), facing southwest, Kom K.

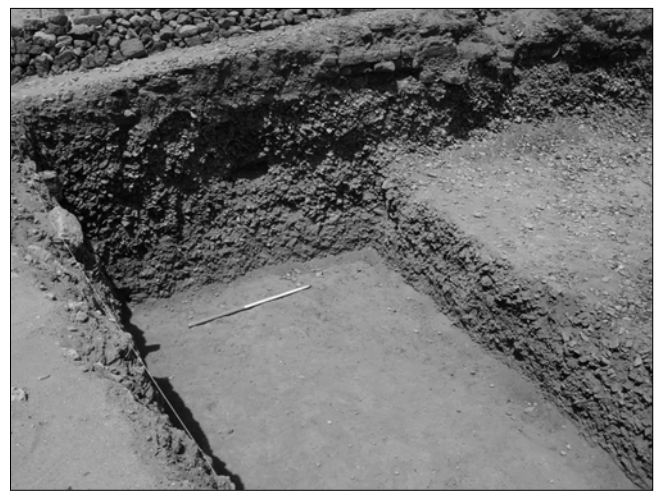

Plate 4. Kom K trench at the conclusion of excavation.

The square was excavated to the original ground surface, roughly 1.9m below the present surface (Plate 4). Regrettably, no kilns, ovens or baking installations were discovered and the sherd deposit was substantially larger than was originally anticipated. During the course of the archaeobotanical study, soil samples taken underwent flotation and dry-sieving to locate seeds and other floral remains. As part of the functional analysis of the tools used in bread-making, samples of organic residues, specifically microfossils remaining on the moulds and grinding stones, were removed by sonic washing, whereupon they became suspended in distilled water.

[5] The project is headed by Dr A. Catherine D'Andrea of Simon Fraser University, BC, and Dr Diane Lyons, University of Calgary, Alberta and supported by the Wenner-Grenn foundation. The archaeobotanical analyses at Dangeil were conducted by Dr A. Catherine D'Andrea and Amanda Logan.

[6] Cf. Butler and D'Andrea 2000; D'Andrea 2003; Lyons and D'Andrea 2003; D'Andrea and Mitiku Haile 2002; D'Andrea *et al.* 1999; Dirar 1993.

Currently, these samples are being analyzed for starch granules and phytoliths.[7]

Approximately 1,175,000 bread mould sherds were unearthed, representing some 77,000 loaves of bread, when the bases alone are taken into consideration. Roughly 3% of the total surface area of the mound was excavated. When the small size of the excavation square is compared to the area of the entire mound (Kom K), the number of loaves produced becomes truly enormous. Regrettably, several important factors remain unknown: namely, the period of time over which these moulds were produced, the amount of bread manufactured per specific unit of time, the size of the population consuming the loaves (after the god had received his share), and the number of loaves each individual might receive at any one point.

The moulds came in two sizes, large and small, with the large being the most common type found. They normally measured between 150-155mm high with an external rim diameter of 50-55mm; however, rare examples could be as big as 190mm high or as small as 116mm high. The thickness of the rim varied between 7.5 and 11.5mm and often was uneven.

The small bread moulds were a little over one-third the size of the larger ones, and only five complete or nearly complete examples were discovered. They exhibited far less variety of form than the larger type, measuring 90mm high and having an external rim diameter of around 59mm. The small vessels were uniformly grey in colour, and were carefully handmade with flat, slightly inturned rims, pointed bases, smooth exteriors and fine particle temper. Potmarks, in the form of vertical incised lines running from the rim to the base, were present on some of them. This is of note as potmarks were seldom, if ever, present on the larger moulds and Jacquet-Gordon (1981, 22) also comments that they appear infrequently on Kushite moulds (type E). A thin, undecorated, yellow sandstone cone (36/05) may have been a form around which the clay was shaped during their manufacture. It measured 79mm high, had a maximum diameter of 30mm, and was found to fit convincingly inside the small vessels (Colour plate XLIII).

Though not statistically significant due to the small sample size, by taking an average of internal heights and diameters of complete bread moulds, then applying the volume of a cone [$1/3(\pi r^2)(h)$, where r = radius of the cone and h = height] a rough idea of the amount of dough that could be contained within a single mould may be estimated. This estimate assumes that the moulds were filled almost completely with dough prior to baking, when in fact this may not have been the case. Further, it does not account for the effect of any leavening agent. The large moulds hold around 99ml, while the small ones hold about 37ml. The results indicate that the small bread moulds could contain a little more than one-third that of the large moulds and presumably this was also reflected in the bread produced. This may suggest the small breads fulfilled largely a ritual purpose, rather than being for actual physical consumption.

Table 1. Large Bread Moulds.

Provenance	Internal height (cm)	Internal rim diameter (cm)
K15	14.3	5.0
K15	13.3	5.0
K15	14.0	5.5
K15	14.0	4.8
K15	14.0	5.6
K15	12.5	5.4
K25	12.3	4.7
K25	14.5	4.0
K25	13.3	5.7
K25 (55/05)	14.2	5.7
K25 (55/05)	12.6	6.0
K27	13.3	5.0
K27	14.3	5.7
K27	13.0	5.2
K27	12.0	5.2
K27	12.4	5.2
K27	13.5	6.0
Average:	13.4	5.3

Estimated volume held: $98.5cm^3 = 98.5ml$

Table 2. Small Bread Moulds.

Provenance	Internal height (cm)	Internal rim diameter (cm)
K15 (13/05)	6.7	4.6
K15 (14/05)	6.6	n/a
K15 (14/05)	6.7	4.6
K27 (60/05)	7.0	4.6
Average:	6.75	4.6

Estimated volume held: $37.4cm^3 = 37.4ml$

As the results of the archaeobotanical analyses are not available yet, it is uncertain as to whether the grain used to make the bread was emmer wheat (*Triticum turgidum* ssp. *dicoccum*) or a free-threshing wheat (*Triticum durum* and *Triticum aestivum*). The latter was introduced into Egypt during the Greco-Roman period (Murray 2000, 513; Samuel 2000, 538). There is limited evidence for free-threshing wheats in Lower Nubia, for example, at Qasr Ibrim, and from Medieval contexts at Nauri near the Third Cataract (Fuller 2004, 70; Fuller and Edwards 2001, 98-100) but it is unlikely free-threshing wheat had been widely adopted further upstream around the 1st century AD, the period currently under consideration at Dangeil. 'In the absence of systematic studies of archaeobotanical remains within Meroitic

[7] Phytoliths are silica bodies that form in plants as they absorb soluble silica in the groundwater, and are released as the plant decays. Each species has distinctive shapes and sizes of phytolith, just as does starch and as such both can be used to identify various plant species. Much of the work on phytoliths has concerned New World crops such as maize and work on African grain crops is quite new (D'Andrea 2005, pers. comm.).

[Late Kushite] settlements, detailed evidence for agricultural practices and for the development of fully domesticated crop plants is still lacking while the chronology of such changes remains very imprecise' (Edwards 1996, 65-66).

The bread produced using emmer wheat would be rather dense, in spite of the presence of a leavening agent, largely because the proteins within the grain do not produce a good gluten (cf. Samuel 2000, 557-8). Gluten, a plant protein,[8] becomes elastic when combined with water keeping in the fermentation gases (steam/aeriation/carbon dioxide) as the dough rises and is cooked. After baking it enables the final product to keep its shape. While no conical loaves have yet been recovered from Sudan, some are depicted in Egyptian New Kingdom tomb paintings such as that of Kenamun in Thebes (Davies 1930, pl. 58).[9] Though much earlier than the Kushite period, the process of bread-making itself is also depicted in several Egyptian Old Kingdom tombs and in Middle Kingdom tomb models.[10]

A few surviving conical loaves have been found in Egypt. One unprovenanced example, dating to the New Kingdom (probably 18th Dynasty, 1550-1295BC) is currently in the collection of the Museum of Fine Arts, Boston (72.4757c). It measures 160mm in height and has a diameter of 55mm and the exterior has a rather coarse appearance. Although it has been suggested that this loaf may have been shaped by hand rather than in a mould (Samuel 2000, 564), it gives an idea as to the appearance of a mould-made cone-shaped bread loaf.

A graffito discovered on a jar sherd from Kom K appears to portray a bread mould with bread erupting from the top (Plate 5). Bread made in these moulds would cook quite quickly, as heat would be conducted directly from the ceramic to the dough (dry-heat cooking) and the bread produced, long and thin in shape. The leavening agent used in the dough likely consisted of wild yeasts and/or lactic acid bacteria. Once the initial yeasts were acquired, a small portion of the old dough could be saved and incorporated into the new bread dough to provide a leavening agent much in the same manner as sourdough breads are made today. During the bread-making experiment conducted by Mark Lerner at Giza, wild yeasts were attracted to a mixture of sterile emmer flour and water within three days of its creation (Lerner 1993-94; Wood 2000).

An interesting *ostracon* was discovered among the bread mould sherds (Colour plate XLIV) It consisted of a black grid painted on the exterior of a body sherd. Each box within the grid contained a Meroitic letter or more probably a number, with the single slash | representing one and the other character perhaps nine.[11] Exactly what these numbers denote is uncertain; however, it is possible the bakers were counting bread batches, or measures, or proportions of some commodity associated with bread making.

Considerable portions of the site and its associated cemeteries remain unexplored and may be expected to yield a considerable amount of data in future because much of the temple precinct remains substantially preserved. As such, Dangeil provides a unique opportunity to examine the fundamental characteristics of a Kushite temple complex and its associated settlement and to perhaps gain greater insight into the role of the temple, ritual and offerings within Kushite society.

Plate 5. Bread-mould image incised on pot sherd (76/05).

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[8] Gluten is a protein comprised of glutanin and gliadin.

[9] The Egyptian word for the type of bread shown in the tomb of Kenamun is *herset*. This is thought to refer to the reddish colour of the loaf and implies that at least in Egypt a fruit or seed such as fig, was added to colour the loaf (McDonald 1982, 113).

[10] Cf. the tombs of *Tjy* (Wreszinski 1936) and Mereruka (Duell 1938) at Saqqara, and *Sšm-nfr* at Giza (Junker 1953).

[11] For a discussion of Meroitic numbers see Peust 2003.

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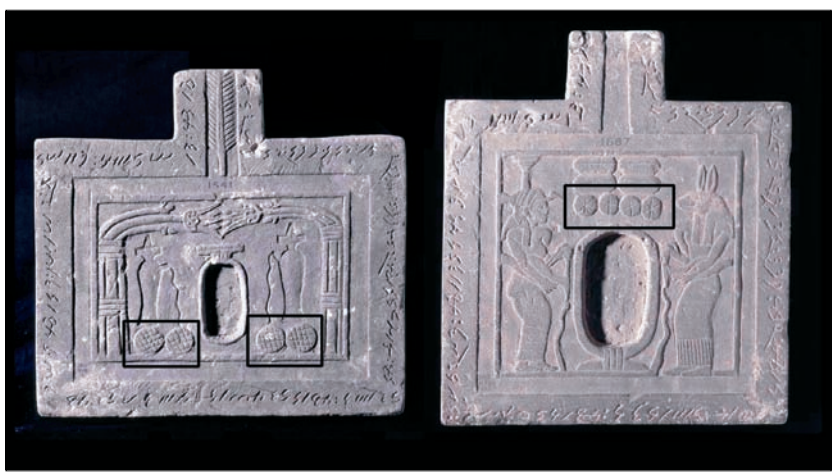
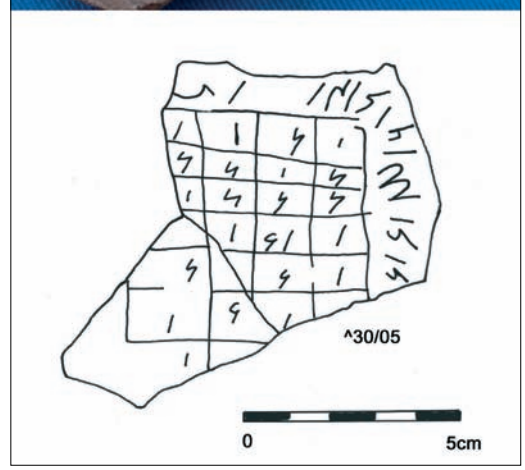
Colour plate XLI. Dangeil. Dais (H185) facing north-west.

Colour plate XLII. Dangeil. Offering tables EA 1541 and EA 1587, with images of bread highlighted (photo © The British Museum).





Colour plate XLIV. Dangeil. Ostracon *with black grid containing numbers written in Meroitic (30/05).*

Colour plate XLIII. Dangeil. Small bread moulds with sandstone cone form (36/05).