

SUDAN & NUBIA

The Sudan Archaeological Research Society



Bulletin No. 13

2009





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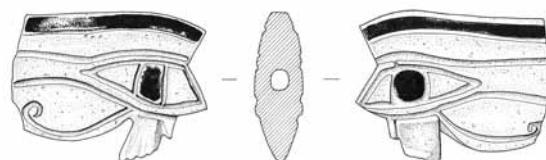
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Front cover: The head of a Kushite king, excavated in 2008, from the Amun temple at Dangeil. It has been tentatively identified as Aspelta (593-568 BC) based upon comparisons with statues of this king discovered at Jebel Barkal and Dokki Gel-Kerma. (Photo © J. R. Anderson, Berber-Abidiya Archaeological Project).



Petroglyphs under the sand – A preliminary report on the field season 2008/09 at the fortress Gala Abu Ahmed

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Introduction

The fortress of Gala Abu Ahmed, situated about 110km west of the Nile Valley in the desert of lower Wadi Howar (Figure 1), is an impressive structure with projecting towers and dry-stone walls preserved to a height of more than 4m. It encloses an area of about 120 x 180m. The fortress has been known since its chance discovery by the University of Cologne research project B.O.S. team in 1984. Archaeological work, during the ACACIA project of the University of Cologne in 2002 and 2006, revealed a human presence in Napatan times (*c.* 900 to 400 BC) and indicated that there had been wide-ranging contact with Egypt (see Jesse and Kuper 2006; Jesse 2006; Lohwasser 2006). Clear evidence of internal structures, the history of its construction and the fortress' function in the Napatan period are still to be ascertained. Tackling these questions is the main aim of a new research project established in summer 2008 at the University of Cologne. The first field season at Gala Abu Ahmed was undertaken from November 2008 to February 2009. Different strategies were employed in order to obtain as much information about the fortress and its surroundings as possible. In November 2008, two surveyors of the Bochum University of Applied Science comprised part of the field team and made an extensive survey using a laser scanner. The data should not only provide detailed plans and sections of the fortress but also a three-dimensional view. An architectural survey was also undertaken. Aerial pictures, taken with a kite (Plate 1) completed the documentation. The study and description of the fortress is hampered by the huge amount of wind-blown sand covering large portions of the walls and the interior. Therefore, several trenches were excavated to increase visibility of the important parts of the

fortress' walls (Plate 2). Trenches were also excavated in the interior of the fortress to attain a better understanding of possible internal structures. Very interesting results have been obtained here simply by clearing the surface.

The excavations

The base of the curtain walls was exposed at several places (trenches 84/95-5, 84/95-7, 84/95-12). The walls were constructed directly on the sandstone bedrock (Colour plate XXVII). A joint, discovered in the southern wall, close to the south-eastern tower (trench 84/95-14) shows that the curtain walls had clearly been divided into sections for construction. Remains of the parapet are still present which indicate that the actual top of the walls corresponds to the ancient one.

In the area of the northern gateway (trench 84/95-7) the sandstone bedrock could be exposed not only on the outside,

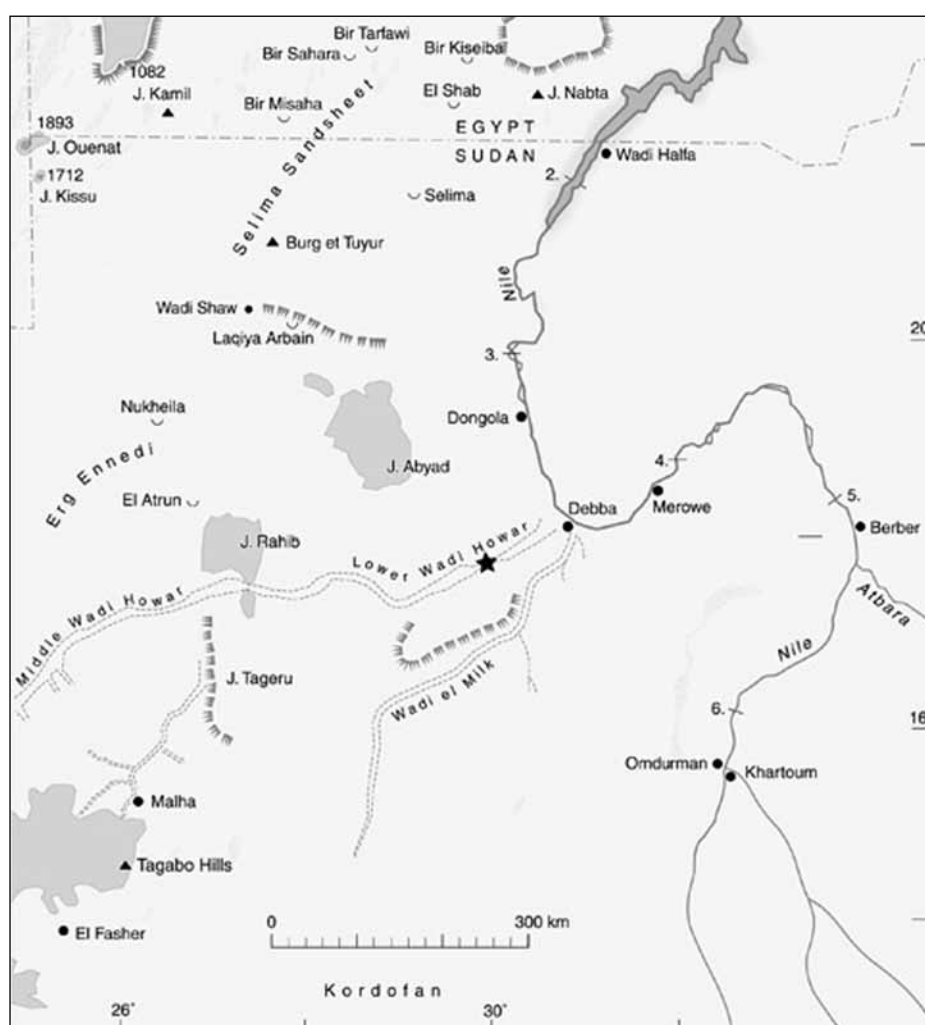


Figure 1. The location of Gala Abu Ahmed in lower Wadi Howar is indicated by the black star.

but also in the passageway. In the bedrock between the two staircases, traces of the frame for the gate became visible in the form of rectangular recesses. The western staircase (trench 84/95-8) was completely cleared of sand (Colour plate XXVII). Twenty steps made of rectangular sandstone slabs with a length of about 1.2m and a height between 110

¹ The section "The petroglyphs" is by Robin Peters, all the others by Friederike Jesse.



Plate 1. The fortress Gala Abu Ahmed seen from the north east with the photo kite in action.

and 240mm led to the top of the wall. Twenty-seven petroglyphs were found on the walls of the northern gateway and the two staircases.

In the north-eastern corner (trench 84/95-5) a fragment of a cow's skull was discovered between two *in situ* blocks of quartzite. The skull had been placed there intentionally and this, together with some sheep's long bones found nearby, probably represents a deposit associated with the fortress'

construction. Foundation deposits containing the skull and long bones of cattle are, for example, reported from the pyramids of the Napatan kings at Nuri (Dunham 1955, *passim*).

East of the fortress parallel alignments of large quartzite blocks might constitute the substructure of a porch (Jesse and Kuper 2006, 138). Excavation down to the natural sandy soil (trench 84/95-13) revealed massive "walls" about 600mm in height, made of large, rounded quartzite blocks. The function of this massive construction remains unclear. Fragments of pottery found in some parts of the construction might indicate domestic use.

In the interior of the fortress, some stone structures are visible (Jesse and Kuper 2006, 137, fig. 2). A large stone circle in the north-west corner was assumed to be some kind of water installation, probably a cistern or *hafir* (Jesse and Kuper 2006, 138). In the southern part of it, a wall about 1.4m high, constructed of several layers of rough blocks, mostly of sandstone and

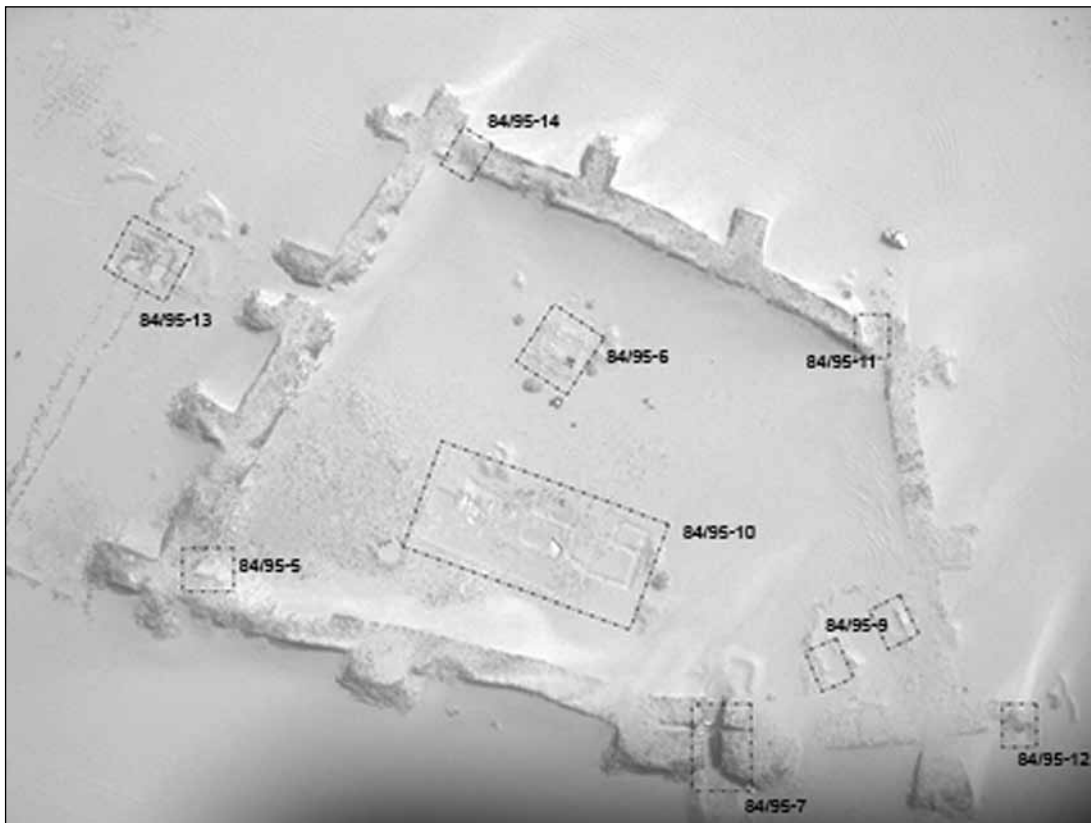
bonded with clay mortar, was excavated (trench 84/95-9). In the northern part (trench 84/95-9A) what is also probably a wall appeared, but the situation is not as clear as in trench 84/95-9 as much more rubble is present. The excavation was not able to answer the question as to whether the structure was linked with water management.

Around the stone pavement, in the south-east corner, a 13 x 16m trench was laid out (84/95-6) and the wind-blown sand

and rubble were removed. A two-roomed rectangular building, about 9 x 6m in size, became visible (Figure 2). Further walls are visible in the trench but cannot yet be assigned to buildings.

Small sondages ("Stellen" 1 – 4, see Figure 2) gave more information concerning the building's construction. The foundations of the walls were reached at a depth of 1 to 1.1m and the natural, sandy soil at a depth of between 1.2

Plate 2. Aerial view of the fortress indicating the location of the trenches excavated during the field season 2008/09.



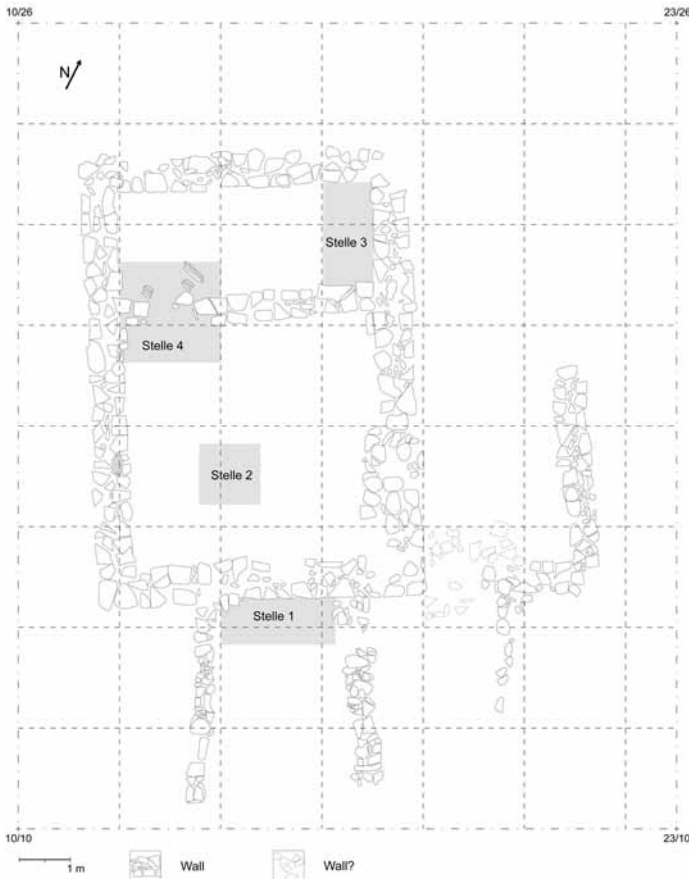


Figure 2. The plan of the building exposed in trench 84/95-6 (scale 1:150).

and 1.4m. The walls are of solid construction and consist of seven courses of sandstone blocks, almost rectangular in shape and bonded with clay mortar (Plate 3). A doorway connects the two rooms of the rectangular building (Stelle 4, see Figure 2). At a depth of about 700mm, indications for the construction of a threshold were found and at a depth of about 1m, an irregular alignment of stones became visible in the door opening. The function of this alignment is not clear.

The sandy sediment in the excavations contained ash lenses, fragments of charcoal, bones, pottery sherds, beads



Plate 3. Detail of the wall exposed in trench 84/95-6, Stelle 1.

made of different raw materials, several pieces of metal (among them two awls probably made of copper) and some stone artefacts. In “Stelle 1” at a depth of about 300mm, a nearly complete pottery vessel was found. The vessel was heavily eroded, certainly due to its coarse low-fired fabric. It was turned upside down and had a diameter of about 320mm and a preserved height of 200mm. The base was not preserved. This vessel is undecorated.

In the north-eastern part of the interior, the surface is covered by blocks of sandstone and quartzite. A trench of 30 x 15m (trench 84/95-10) was laid out for surface clearing which needed to be enlarged to the west, in order to completely expose a complex building, with one large rectangular room (A) and further rooms to the east and west (Figure 3). Except for the westernmost part, where the walls are sometimes heavily eroded, the construction of the walls is solid and careful and resembles that of the building found in trench 84/95-6. Sandstone blocks and clay mortar have been used. Inside the building, features such as ash lenses or burned sediments probably indicating a hearth are present. A trench was excavated in the western part of the large room A (84/95-10, R-A1; Figure 3). In the southern part of the trench, the sandstone bedrock was reached at a depth of about 100mm and in the northern part of the trench at a depth of about 300mm. The bedrock was incorporated into the construction and used as a foundation for the walls mostly without further preparation. Only in some areas were peckings, intended to roughen up the surface, observed. Different features, such as ash lenses, could be documented during excavation and close to the northern wall of the room the lower part of a large bin was discovered (Plate 4). The bin has a diameter of about 700mm and was made of unburnt clay. It very probably represents a storage facility which was installed in this part of the room. Similar features have been recorded from other Napatan and Meroitic sites such as for example Kawa (Macadam 1995, 211-212) or Site 6-G-9 near Gezira Dabarosa (Adams 2004, 66-67, figs 3-5).

In the eastern part of trench 84/95-10 no traces of walls



Plate 4. The probable storage facility excavated in trench 84/95-10, R-A1.

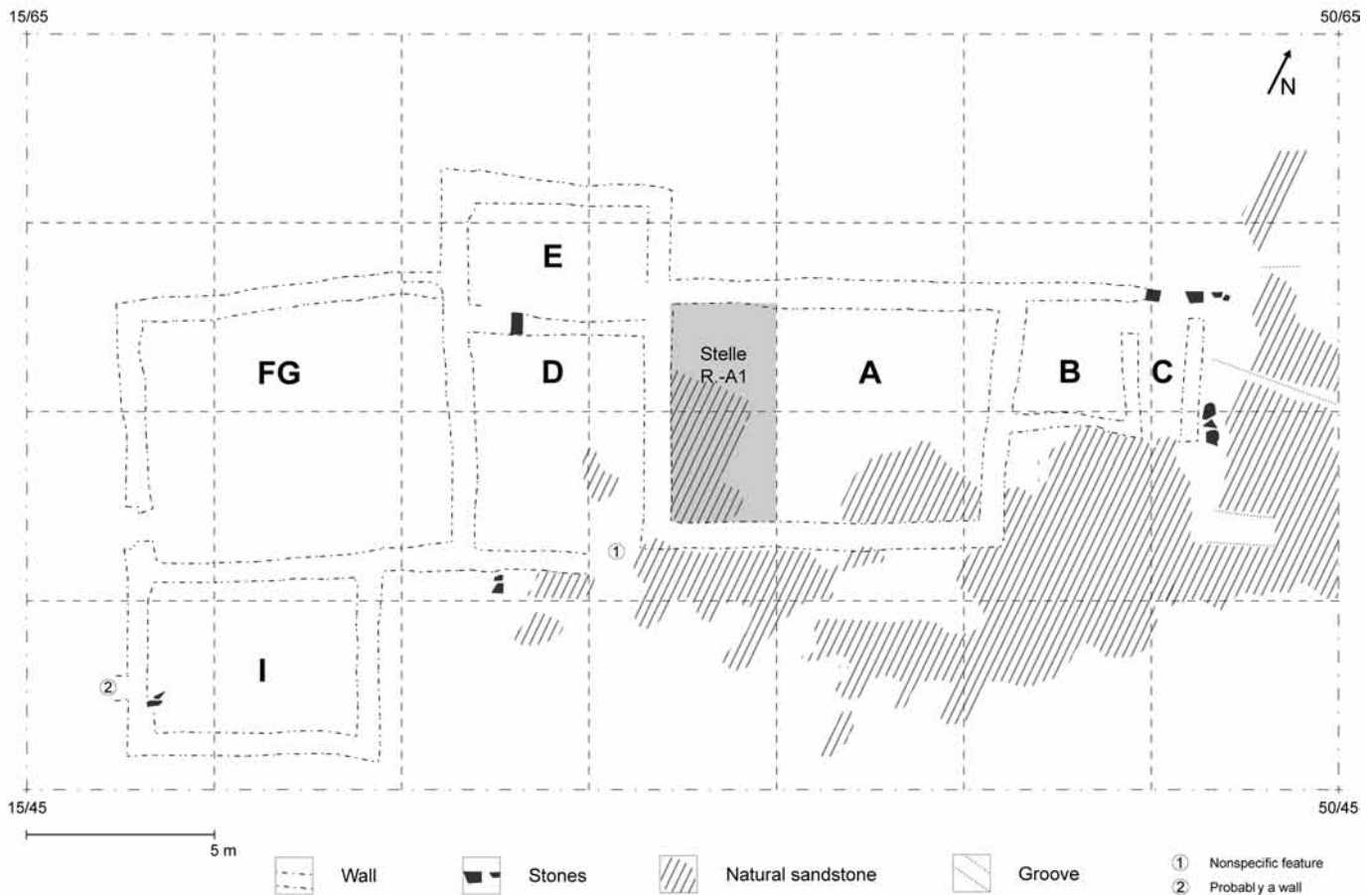


Figure 3. The plan of the building exposed in trench 84/95-10 (scale 1:200).

appeared. Here, however, the amount of archaeological material found in the wind-blown sand removed by surface clearing is rather high. Pottery sherds, stone artefacts, fragments of bones and numerous small finds, of faience, alabaster and metal were recovered.

The finds

As the analyses of the archaeological material is still continuing only preliminary remarks can be made here. The finds excavated at Gala Abu Ahmed show homogeneity and from first impressions fit well within the proposed use of the fortress in Napatan times. The small finds even allow a more precise dating to the first half of the Napatan period (middle of the 8th to middle of the 6th century BC) (pers. comm. Angelika Lohwasser 2009).

The pottery displays a large variety of wares and types. Besides the numerous handmade sherds, wheel-made examples are also present and there are fine and utilitarian wares. Some sherds have a very coarse surface and might come from cooking pots. Contact with Egypt is indicated by pieces made from marl clay. The discovery of several fragments of Greek pottery was surprising (Colour plate XXVIII).

The stone artefacts are mostly flakes of different kinds of raw material such as quartz, chalcedony and quartzite. Remarkable is the great number of arrowheads (more than 50) mostly made of chalcedony, more rarely of quartzite or

quartz, with complete retouch on both sides (Plate 5). They have mainly been found in the eastern part of trench 84/95-10. Stone arrowheads are also recorded from other early Kushite sites, such as Kawa (Welsby 2004, 153 and fig. 133), Jebel Moya (Addison 1949, pl. LXXXI) and the fortress of Dorginarti (Heidorn 1992, 60). Grinding material is present. In trench 84/95-7 fragments of lower grinding stones have been found during excavation which had clearly been used as building material, probably after they were broken and

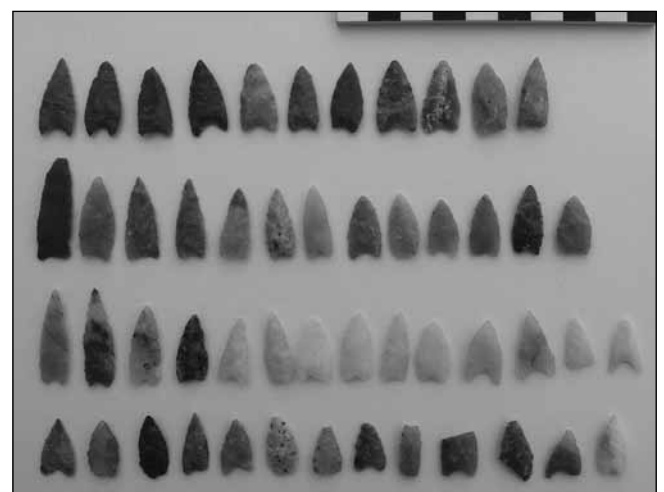


Plate 5. Arrowheads completely retouched on both sides found in trench 84/95-10.



therefore no longer suitable for grinding purposes.

A remarkable number of small finds was recovered, especially in trench 84/95-10 amongst which are numerous disc beads, made of ostrich eggshell, or faience. Fragments of alabaster and faience vessels (among them fragments of Egyptian New Year's flasks), amulets made of faience (e.g. *udjat*-eyes) and some small pieces of metal have also been found. A small metal statue representing the Egyptian god Thoth (Plate 6) is remarkable. Some inscribed pieces are of special interest, amongst which are objects with parts of kings' names, written in Egyptian hieroglyphics.² In the upper fragment of a cartouche made of faience, the name of Aspelta (a Napatan king of the early 6th century BC) can be read (Plate 7). The cartouche on a small tablet of faience is not so obvious (Plate 8). The reading *nfr-k3-r* (Shabaqo, second king of the 25th Dynasty) is possible, but also *nfr-ib-r* (Psamtik II, king of the 26th Dynasty). A restoration of the object might facilitate further inquiries.

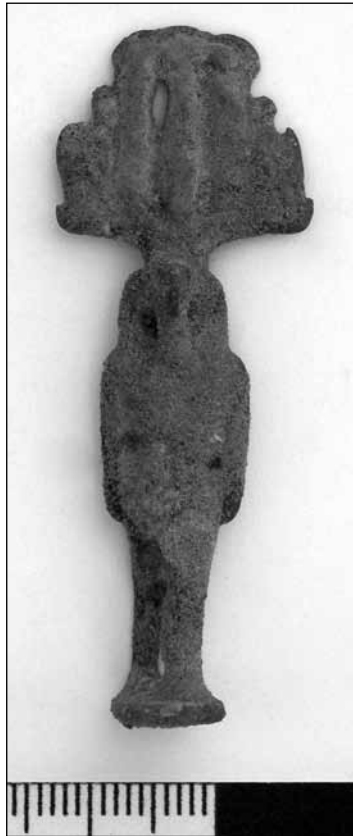


Plate 6. A small metal statuette representing the Egyptian god Thoth.

in three cases geometric forms (a circle, a rectangular form and a hollow) are represented. There are single figures, as well as scenes in which several animals, or humans and animals, interact with each other.

The distribution of the petroglyphs does not seem to follow any kind of structured arrangement. The suitability of the stone obviously was the only reason for applying depictions. The discovery of two images (PG #9 and 10; Figure 4) on the bedrock in the gateway, where they certainly would soon be covered by sand, support the idea that the properties of the substrate, or the act of pecking were most important and not the visibility.

The direction in which 12 of the animals face could be determined. No specific pattern is recognisable, as all cardinal directions are more or less equally represented (North = 4, East = 3, South = 2, West = 3). Some animals appear to enter, others to leave the fortress. Some ascend and some descend the stairs. However, as seven petroglyphs have been found on the outer face of the tower walls flanking the gateway and none so far on the inner walls, one gets the impression that the depictions lead from the outside to the inside. A single pecking on top of the southern fortress wall shows that the petroglyphs are obvi-

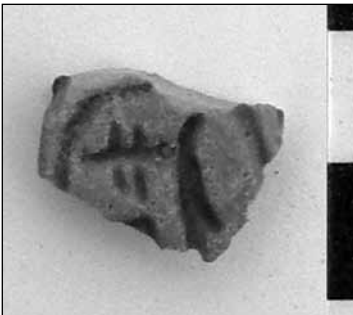


Plate 7. Upper fragment of a faience cartouche.

The petroglyphs

Twenty-seven petroglyphs were documented at the fortress, all within the area of the northern gateway. They were placed on the exterior face of the fortress walls, on the walls of the gate passage and the staircases as well as on the bedrock in the gateway (Figure 4). Some of them are poorly preserved. The pictures were pecked or engraved in the (patinated) quartzite and sandstone. At times the contour lines were completely filled with peckings. The peckings vary from fine to coarse and some are quite abraded. The peck marks are round and U-shaped in profile and were probably produced by direct or indirect pecking.

More than half of the petroglyphs show animals (Table 1) of which most can only be identified as four-legged mammals. Among the identifiable species are predominantly cattle, a dog and a giraffe. Two depictions show humans and



Plate 8. A small tablet made of faience with a cartouche in the upper right side.

² For the decipherment and comments on the Egyptian hieroglyphs I would like to thank Angelika Lohwasser, Berlin and Heinz Felber, Cologne.

Table 1. Overview of the rock art motifs represented at the northern gateway of Gala Abu Ahmed.

	(n)	Petroglyph Number (PG #x)
Peckings	6	1, 2, 4, 6, 11, 26
Geometric forms	3	5, 8, 24
Animals	19	
Unspecific mammals	12	0, 7, 9, 12, 15, 16, 18, 19, 20, 21, 22, 25
Cattle	5	3, 10, 17
Bovid	1	13
Dog	1	14
Giraffe	2	22, 23
Anthropomorph	2	13, 22

ously not limited to the area of the northern gateway.

The animals are always represented in profile. Nevertheless, single elements such as horns or legs are often shown full frontal. All animals are orientated along a horizontal base line, no animal hangs in the air.

Among the cattle motifs two different kinds of representation are distinguishable. The first is best represented by PG #3 (Plate 9). The back of the cow is depicted as a straight horizontal line turning into vertical lines which indicate the hind legs and tail. The forelegs are also depicted as a vertical line. The head is a completely pecked triangle, with a short forward curved horn. A semi-oval shaped line running from the hind legs to the forelegs indicates the animal's abdomen. A completely pecked square in the groin is to be interpreted as the udder. In short, the motif is finally composed by a



Plate 9. The representation of a cow on the outer face of the fortress wall (PG #3).

semi-oval shape (indicating hind legs, abdomen and forelegs) inserted into a rectangle (indicating hind legs, back, and forelegs). Head, tail and udder are added to this torso. A similar design is found in PG #10 (Plate 10) and possibly in PG #9.

The second depiction of the cattle motif is visible in PG #17 (Plate 11). A thick horizontal line represents the body and the head of the three cattle depicted. The extremities are added as four vertical fine lines. Two horns in full frontal view complement the picture. The horns are much longer than those of PG #3 and #10 and are depicted as vertical lines which are then bending.

Numerous comparisons for both modes of design are to be found in Egypt and Nubia (e.g. Resch 1967, pls 27b, 29a, 56a; Hellström and Langballe 1970, Corpus C). The question of whether the style is of chronological, or typological significance, has to remain open for the moment.

In PG #14 (Figure 5) an animal, very probably a dog, is reproduced by rather coarsely pecked contour lines. The dog's back and tail are easily recognisable. The legs are shown as strokes. The abdomen and the head on a long neck are barely visible, with the ears missing. The animal is reminiscent of the ancient Egyptian representation of the *tjesem*-dog: a sighthound with pointed ears and snout and an erect curved tail. The *tjesem*-dog often appears in the context of hunting scenes (Posener 1960, 110; Fischer 1980; Hellström and Langballe 1970, pls 76, 5 and 32, 6).

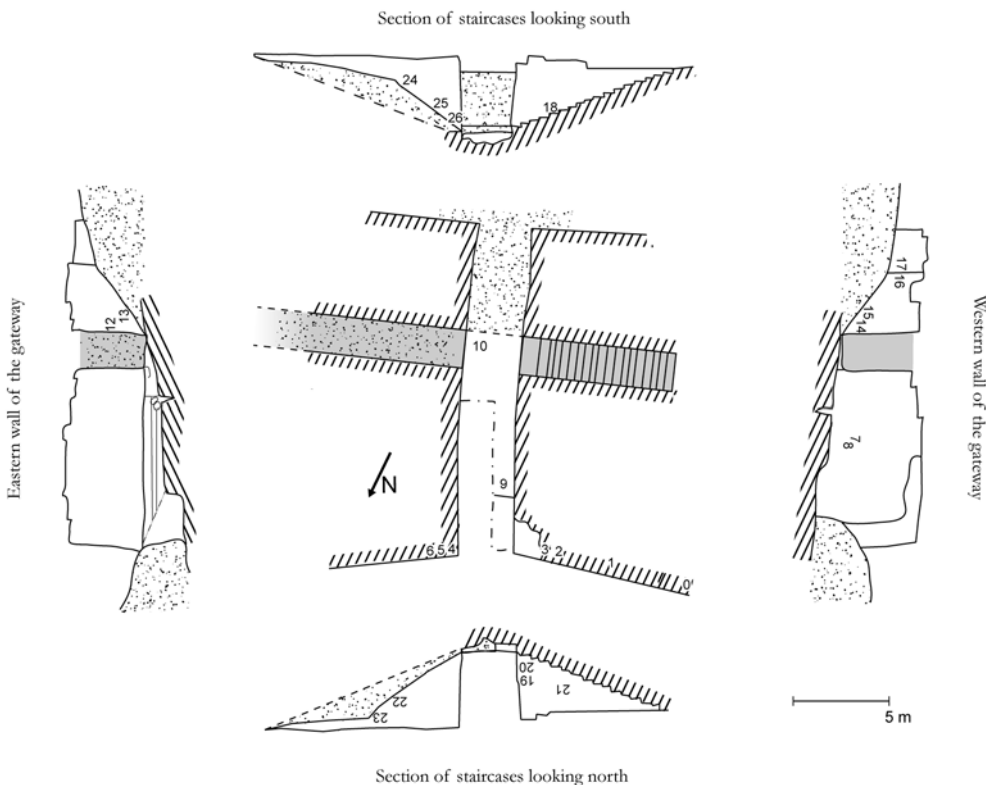


Figure 4. Position of the petroglyphs at the northern gateway of Gala Abu Ahmed (scale 1:100).



Plate 10. The engraving of a cow in the sandstone bedrock of the northern gateway (PG #10).



Plate 11. A cattle herd (PG #17).



Figure 5. The petroglyph of a dog (PG #14) (scale 1:2).

A depiction in the eastern stairway (PG #22) is difficult to interpret (Figure 6). More or less clearly visible are two mammals. On the left hand side of the picture there is possibly a feeding giraffe. The motif of a giraffe feeding from a tree is rare, but well documented (e.g. on the island of Us; Kleinitz 2007, fig. 7; Hellström and Langballe 1970, pls 54, 5 and 102, 1). Above the mammal on the right hand side is an anthropomorph, possibly a rider.

The most interesting petroglyph (PG #13) is located on the eastern wall of the gateway, south of the staircase. A human and a medium-sized bovid are displayed in interaction (Plate 12). The fully pecked anthropomorph is in the left part of the picture. The torso is an inverted triangle, giving the figure broad shoulders and a big chest. The legs are added to the torso at an angle of about 45°. This mix of profile and frontal view accords dynamism to the picture. The person is moving



Plate 12. Scene depicting a human figure with a feather headdress (a Nubian or a Libyan) interacting with an animal (PG #13).

to the right, towards the animal. The right arm is raised and holds an elongated object. The left arm ends at waist level where it holds a circular object. The head is indicated by a line for the neck and a pointed form for the face. An elongated backward-directed extension of the head is probably a head-dress of some kind, possibly a feather. The figure's focus is on the animal. The broad shoulders and triangular body suggest that the figure is a man. He follows the beast and seems to be carrying a tool or weapon with his right hand, while the left, holding a round object (a bow, a rope or a trap?), is resting at his side. His posture – broad shoulders, secure stance, left arm resting while the right is reaching back – points to a throwing or lashing motion.

The design of the animal follows the abovementioned first scheme of cattle motifs: a semi-oval shape inserted into a rectangle. The body of the animal is just indicated by a contour line. The torso is complemented by a broad, long tail, a strong neck and a small slender head. The horn is flat and curving backwards. It is a bovid, either a cow or an antelope. The animal's head is turned away from the man. Unlike the human figure, the depiction is not dynamic.

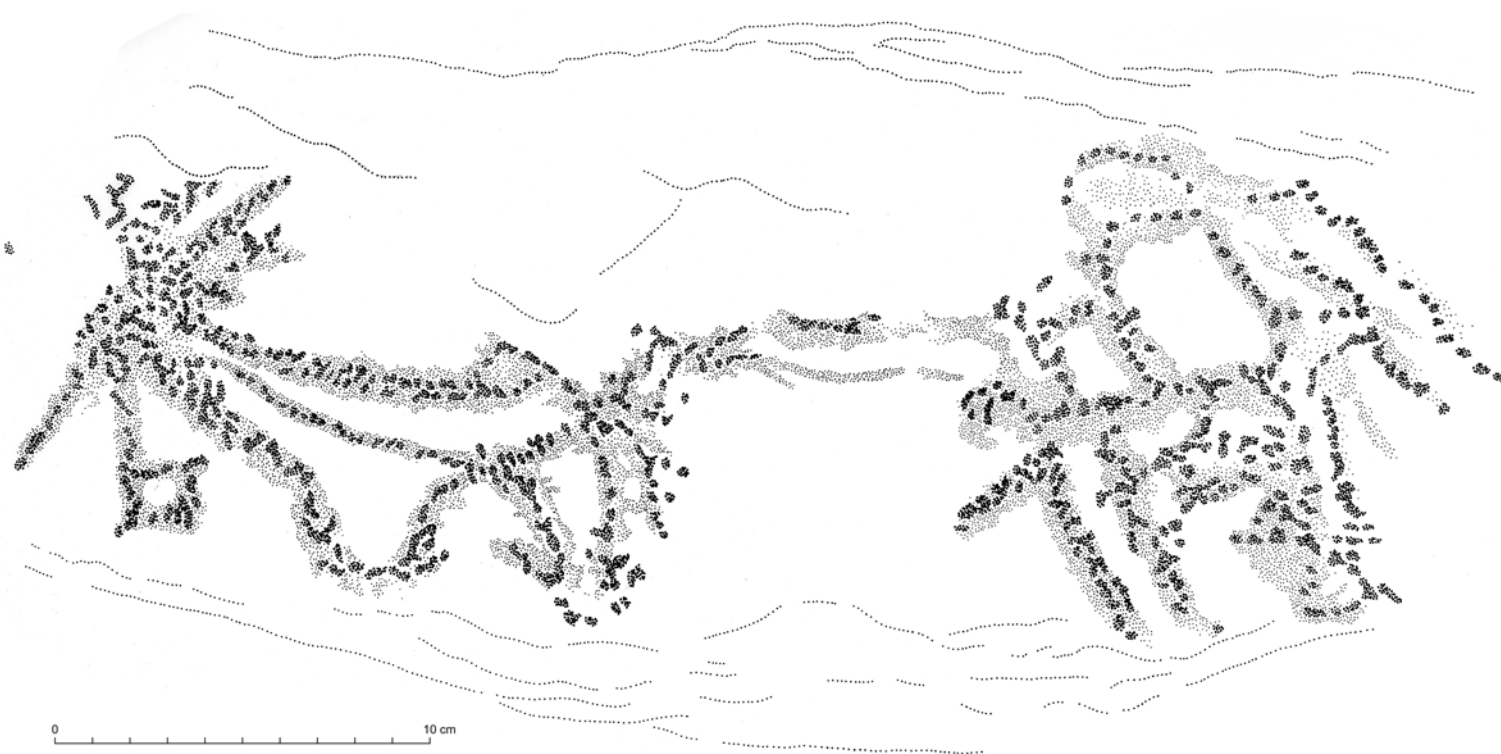


Figure 6. A petroglyph found in the eastern staircase: Two mammals can clearly be seen and probably there is a human figure (PG #22) (scale 1:2).

Here, either a hunter who tracks his prey or a herder driving cattle is shown. The feather headdress may indicate the representation of a Nubian (see Welsby and Welsby Sjöström 2006, 248 and 239, fig. 5 and pl IVa; Kleinitz in print, fig. 15) or a Libyan (Osing 1980).

The hunter-prey motif is frequently found in Egypt and Nubia (e.g. Winkler 1938, 21 and pl. XVIII; Resch 1967, pls 13b, 35 and 66; Hellström and Langballe 1970, pl. 72, 2). In these depictions human beings and animals (including gazelle and ostrich) are shown either facing each other or the man follows the beast. Bow and arrow identify the anthropomorph as a hunter. In some images, the man holds the bow in one hand and a bundle of arrows in the other. In others, the hunter has already drawn the bow. In a depiction at Abu Ballas (Förster 2007, fig. 19) a hunter with triangular torso and a feather headdress is accompanied by two dogs and follows a gazelle. This petroglyph is, however, much more finely made and more detailed than our man-beast scene. Examples of herding scenes also exist at various places in Nubia (e.g. Resch 1967, pls 7, 9, 10a and 39; Hellström and Langballe 1970, pls 32, 6 and 154, 1; Kleinitz in print, fig. 15).

In close proximity to the fortress, three rock-art sites (S02/2, S95/1 and S03/35) were discovered by the ACACIA project between 1995 and 2003 (Kröpelin 2004; Jesse 2005). The petroglyphs were pecked into the horizontal and vertical sides of blocks of sandstone and quartzite outcrops. None of these sites is directly associated with a settlement. Mostly animals are depicted, including cattle, giraffes and ostrich, but also schematic signs and rarely anthropomorphs. The composition of the petroglyphs at the four sites is interesting.

At Gala Abu Ahmed, cattle motifs clearly predominate and only a small number of wild animals is shown. In contrast, at sites S02/2 and S03/35 wild animals are frequent and the species are diverse. Anthropomorphs can be found at all four sites, but they are only observed as part of a scene at Gala Abu Ahmed. Schematic symbols, typical for site S95/1 with its approximately 500 depictions, are missing at the fortress.

The petroglyphs documented at the fortress are probably not on blocks brought from the other rock art sites, but pictures applied directly to the masonry. To make petroglyphs requires little labour; it requires no special tools and not much time (Sierts 1968; Whittaker *et al.* 2000). The question as to who was allowed to peck pictures in the stone walls of the fortress cannot be answered. Also the chronological relation and the meaning of the petroglyphs are still open issues. Regarding the question as to why petroglyphs were made, very different suggestions can be made. The ideas vary from ritual purposes to marking the landscape, or ‘l’art pour l’art’, to simply while away the time.

The surroundings

Work during the field season 2008/09 not only concentrated on the fortress itself (Colour plate XXIX). Several hundred metres to the north-east of the fortress, a settlement site is known from survey: site S01/7. A detailed survey of the site was made using a total station. All features recognisable at the surface, as well as single finds, such as grinding material, bones, concentration of pottery sherds and/or lithic artefacts were recorded and partly collected. Some pieces of metal such as awls of iron have also been found. A trench



of 4 x 5m was excavated around a stone setting. The natural soil appeared immediately below the layer of wind-blown sand. Pottery sherds, lithic tools, animal bones and pieces of ostrich eggshell have been found. Analysis of the material will facilitate an understanding of the age of the site and its possible function as a supply depot for the fortress.

In the area of the settlement site, the remains of a well of unknown date are visible (see Kröpelin 1993, 139). During our stay at Gala Abu Ahmed workers from ed-Debba re-excavated this well. At a depth of about 6.5m the bedrock was reached and the work was stopped. This well had clearly never been used and might be of rather recent age. In January 2009, a geoscientific group of the Technische Universität Berlin was part of the field team at Gala Abu Ahmed and studied the geological section of the well to get more information about the local ecological development during the Holocene.

A second attempt to locate water by the workers of ed-Debba in January 2009 proved to be of great interest. About 80m north west of the fortress and immediately beneath the wind-blown sand a massive stone wall of ancient appearance, delimiting an area of about 6.5-7m in diameter, became visible. During our stay at the fortress, the structure (site S09/1) was excavated to a depth of 4.6m and the bottom has not yet been reached. The wall is made of irregular stone blocks (mainly sandstone but also quartzite) and is well-preserved in the southern and eastern part (Plate 13). In the northern and western part the upper sections of the wall collapsed in ancient times, with only the lower parts being still preserved. No stairs which would have allowed access are visible. The structure certainly is connected with water management.

Concluding remarks

The field season 2008/09 provided abundant new information about the fortress of Gala Abu Ahmed. A first glance at the numerous fragments of charcoal found during the excavations showed that the ecological situation was much better then, than today. A savannah-type vegetation, as is actually still present in upper Wadi Howar, can be presumed to have existed (pers. comm. Barbara Eichhorn 2009). The analysis of the pedological samples taken at site S01/7 is under way at the Technische Universität Berlin and will certainly add information about the climatic situation.

A multifunctional role of Gala Abu Ahmed (see Jesse and Kuper 2006, 145-147) seems increasingly probable: as a stronghold, a symbol of power and as controller of trade routes. The buildings exposed in the interior point to different uses based upon the archaeological material found within them. Small finds and "luxury goods" are much more prevalent in trench 84/95-10 than in trench 84/95-6, where more "domestic" remains (pottery sherds, lithic artefacts and animal bones) have been found. The scarcity of knowledge about secular architecture of the Kushite period hampers comparison and interpretation. The early Kushite settlements known in the Nile Valley are built of mud bricks and stone architecture in the secular domain is extremely rare (e.g. Site 6-G-9 near Gezira Dabarosa; Adams 2004).

The archaeological material, especially the pottery and small finds, give evidence for long distance contacts. What existed to the west or south west, which was of such interest or such danger as to motivate the construction of a fortress? This question becomes increasingly intriguing. Was it the ivory, animal skins and slaves, which were imported from the south and sent to Egypt and the Mediterranean that passed through Gala Abu Ahmed, or was it the Libyans, or another group in the west, threatening the Nile Valley, who prompted the construction of the massive defences? Additional fieldwork is planned for autumn 2009 and hopefully will shed more light on these questions.

Acknowledgments

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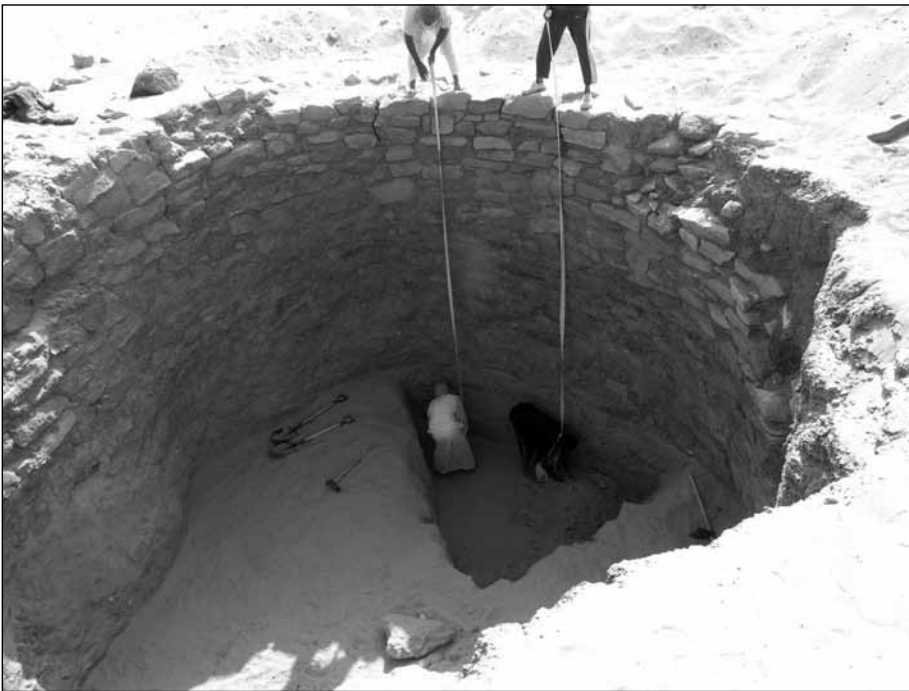


Plate 13. The stone structure S09/1, very probably linked with water management.

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*Colour plate XXVII.
Gala Abu Ahmed. The northern
gateway (trench 84/95-7) with the
natural sandstone visible beneath
the western wall and the completely
excavated western staircase
(trench 84/95-8).*



*Colour plate XXVIII. Gala Abu
Ahmed. Fragment of Greek pottery
found in trench 84/95-10.*

*Colour plate XXIX.
Gala Abu Ahmed. The
fortress and its immediate
surroundings.*





*Polish excavations within the Cathedral at Faras in progress
(SARS Adams Archive, ADA S001.05).*



*Wall painting depicting an eparch under the protection
of Christ within the Cathedral at Faras
(SARS Adams Archive, ADA S001.08).
This painting is now in the National Museum,
Warsaw no. 234033.*



*The New Kingdom temple dedicated to Dedwen and
Sesostri III within the fortress at Semna
(SARS Adams Archive, ADA S002.04).*

*Aerial photograph of the Semna
Cataract looking downstream
(SARS Adams Archive,
ADA S002.02).*

