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North Kharga Oasis Survey 2001–2002 Preliminary Report: Ain Gib and Qasr el-Sumayra

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(Tafeln 8–9)

The aim of the North Kharga Oasis Survey (NKOS) has been to identify, record and survey the major archaeological sites of the northern part of Kharga Oasis as little work has been carried out at sites other than Hibis Temple and the cemetery of Bagawat. The area under study during the first two years of survey (2001 and 2002) included the sites of Ain Gib, Qasr el-Sumayra, the different areas of Maghatta, Ezbet Muhammed Tuleib, Ain Ain Lebekha, Ain el-Tarakwa, Ain el-Dabashiya, Umm el-Dabadib and Ain Amur (Fig. 1). The majority of these sites appear to date to the late Roman period, but evidence of earlier periods, especially the Prehistoric, has also been recorded. Most of these sites are focussed around the standing remains of small forts or religious structures, and in some cases, both.

The first season took place in 2001 and was dedicated to the basic identification and exploration of these sites (apart from Ain Amur), and the drawing of sketch maps of these areas in order to establish the criteria for a more detailed future investigation. In 2002 NKOS started a systematic theodolite survey of the area moving from north to south. The areas explored included the sites of Ain Gib, Qasr el-Sumayra, Maghatta, and Muhammed Tuleib. This preliminary report contains the preliminary results of the 2001 and 2002 seasons, with the focus on the areas of Ain Gib, Qasr el-Sumayra, Settlement A at Maghatta, Muhammed Tuleib, and their associated remains, including various necropoleis.

Methodology

Because of the variety and distribution of the remains and the nature of the landscape, NKOS adopted various methods to survey the area and to record its features. Sites with the highest concentration of standing archaeological remains were identified, sketched, and surveyed by theodolite. Any remains close to the site were also surveyed into the map. Prominent architectural features were surveyed, drawn, and studied in detail. Human remains were examined on site, whereas ceramics and small finds were collected, studied, photographed, drawn when appropriate, and stored at the Kharga Inspectorate.

Walking surveys were carried out in the surroundings of the major sites, and the areas linking different sites, while long distance exploration was undertaken by car. A Global Positioning System (GPS) was used to record the position of distant features. Some points were recorded by both GPS and theodolite to check the correspondence between the two. The results were satisfactory, so that the same methods will be used in subsequent surveys. In 2001 NKOS also experimented with aerial photography using a digital

camera attached to a kite. As the results were most encouraging, the method was used again in the 2002 season (see KNISELY-MARPOLE [R.K.-M.], p. 91 below), and was extremely helpful in identifying and mapping large areas during the course of the survey.

The Sites

The sites were explored from the north to the south starting at the fort of Ain Gib and continuing to the possible fort of Muhammed Tuleib. A brief synopsis of the work and discoveries at each site appear below.

Ain Gib and Qasr el-Sumayra

The northernmost major point of interest in Kharga is the fort of Ain Gib. The small mud-brick fort (see ROSSI [C.R.], pp. 76–79 below) surmounts a hill that commands a view of most of the north of the oasis (Taf. 8a). It is visible from the top of the escarpment, and was no doubt a major Roman lookout point. The sites of Ain Gib and Qasr el-Sumayra (Taf. 8b) taken together, may be regarded as a single complex of archaeological remains that covers an extensive, elongated area, at least 8.5 km long in a north-south direction and 3 km wide in an east-west direction. The only standing features of this site that are remarkable are the remains of two small forts, Qasr el-Gib and Qasr el-Sumayra, and a series of vertical shafts that indicate the existence of a subterranean aqueduct. However, a thorough exploration of their surroundings, carried out in 2001 and especially 2002, revealed the presence of significant archaeological remains. These include mud-brick structures, in various degrees of preservation, different types of tombs and burials, pottery, kilns, ovens, wells, subterranean aqueducts, and ancient field-systems. All the surface pottery associated with these remains appears to date to the Roman period, broadly speaking, to the 4th century AD (see DUNSMORE [A.D.], pp. 86–89 below).

The results of this investigation suggest that the area hosted a busy community that irrigated and cultivated the land, and probably controlled the northern access to the Kharga Oasis. The modern tarred road from Asyut to Kharga runs along an ancient desert track, the Darb el-Arbain (forty days road), that linked Egypt to the Sudan, and points further south. After leaving the Valley, travellers had to cross about 200 km of barren desert before reaching Kharga, and a source of water. Here the north-south route met the east-west tracks that connected Dakhla and Upper Egypt. In the 4th century AD, Ain Gib must have been the first water source for travellers coming from the north after an exhausting journey, and the last for those who departed in the opposite direction. The area directly to the south of the fort is the location for at least five large wells which presumably served as the major water source for caravans at this site.

During the 2002 survey we identified a portion of what may have been the ancient caravan route that ran west of Ain Gib and Qasr el-Sumayra, and then headed south towards Muhammed Tuleib and Ain Ain Lebekha (see A.R. below). The diminutive fort of Gib, perched on a rock outcrop, probably acted as beacon and a check-point for travellers. To the north of Gib, in line with the fort, on another high rock outcrop, we discovered the remains of a small look-out or watch-tower. This was partially rock-cut and partially mud-brick built. It no doubt provided an advance view of activities along the caravan route. Toward the north and north-west the remains of cairns were discovered. Clearly, some sort of route going in what appears to be the direction of Baharia and Farafra was in use at some time. The length of this has yet to be determined (see A.R. below).

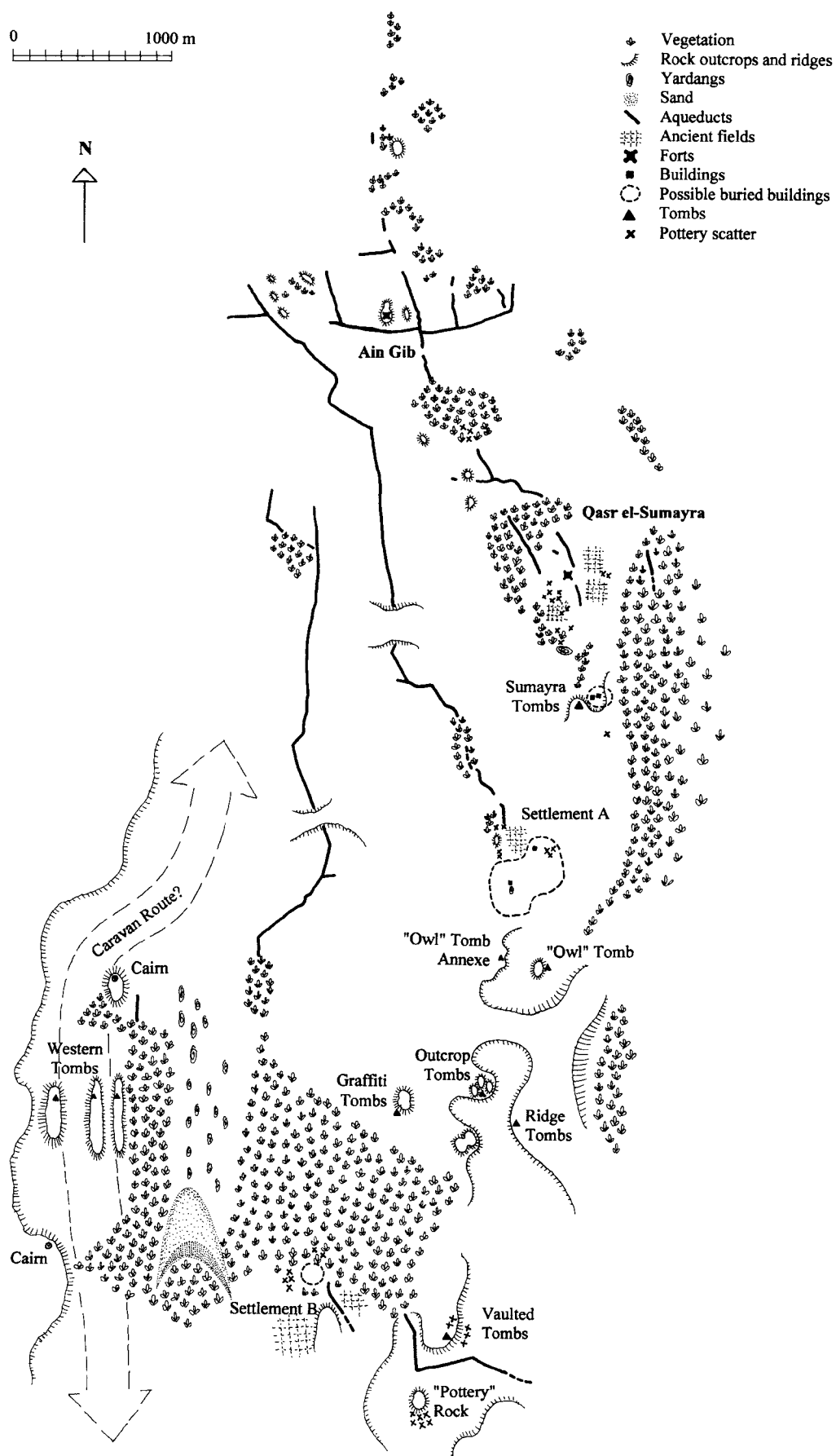


Fig. 1: General overview of the surveyed areas (Drawing by C. Rossi, ©NKOS)

Qasr el-Sumayra, a smaller counterpart of Gib, was located less than 2 km to the south of Gib. The two forts are very similar architecturally (see C.R. below). However, the nature of Sumayra seems to be dramatically different from that of Gib. Qasr Gib, situated on a prominent rocky outcrop is clearly a look-out station which controlled the caravan route and access into the oasis. Thus far, there is no indication of any other large scale settlement around the site. However, Qasr el-Sumayra is surrounded by other mud-brick structures whose presence is indicated by undulating mounds and concentrations of potsherds. Kilns, ovens, glass, faience, coins (yet to be conserved and identified), shaped granite and limestone fragments found at the site indicate an active settlement. Extensive field systems stretch to the south and east. Just to the south of the site is a necropolis (see IKRAM [S.I.], pp. 81–84 below), with an associated structure that might have been used for embalming or by embalmers, or be otherwise associated with the necropolis in some way.

The irrigation system for the two sites is a remarkable feature. These underground aqueducts have been traced from the north of Gib, going south, linking the fields of Gib and Sumayra. The presence of lines of vertical shafts near Qasr el-Gib had been noted in the past, but we discovered that those shafts are in fact part of a vast underground water system, that covered an area of at least 8.5 km by 3 km (see SCHACHT [I.S.], pp. 84–86 below), thus matching the size of the already known aqueducts of Umm el-Dabadib¹ and Dush², both in this oasis.

Remains of various activities have been located along this aqueduct. Traces of ancient cultivations have been found in at least three areas. Some plots have been included in the theodolite survey and photographed from the air (for one example see I.S., in: *MDAIK* 59, 2003, pp. 411–423). In the 2002 season we started an archaeobotanical study to establish the potential of the area. The majority of remains include olive, date, three different types of wheat, and grape (see CLAPHAM [A.J.C.], pp. 89–91 below). The results were encouraging, and further research has been planned for the future.

South Sumayra and Settlement A

The aqueducts continue to run south of Sumayra, with occasional possible field systems being identified. The area of South Sumayra is the site of Settlement A. The scattered underground aqueducts that start to the north of Qasr Gib converge at the fort and form larger, concentrated water-courses. Aqueduct Q3 (see I.S. below) ran all the way to Qasr el-Sumayra, and fed the large areas of cultivated fields that were located around the fort. The underground aqueduct marked as Q2, instead, fed Settlement A. This site, perhaps a farm, proved to be a much larger complex than was first suspected (see Warner [N. W.], pp. 80–81 below). It consists of several mud-brick structures, kilns, ovens, storage areas, possibly animal pens and a complex field and water system (Taf. 9a). The corners of many of the smaller plots were marked by a single palm, or a cluster of palm trees. Some of the large plots are delineated by dry stone walls, preserved to over a metre in height, which might have provided protection for an orchard. Immediately to the south of the site, are a few rock-cut tombs, cut into a rocky outcrop (see S.I. below), which probably provided the burial ground for the settlement.

¹ C. Rossi, *Umm el-Dabadib, Roman settlement in the Kharga Oasis: description of the visible remains*, in: *MDAIK* 56, 2000, Fig. 2.

² M. WUTTMAN ET AL., *Premier rapport préliminaire des travaux sur le site de Ayn Manawir (oasis de Kharga)*, in: *BIFAO* 96, 1996, pp. 385–451.

Maghatta Area

To the south lies a large area that is locally called 'Maghatta'. This area hosts the largest number of cemeteries (see S.I. below) found thus far. Maghatta is an interesting area, but difficult to interpret. Whilst Gib, Sumayra and South Sumayra are relatively intact, this southern area has been deeply modified by the introduction of modern watermelon cultivations, that have literally turned the soil upside down and possibly destroyed, or at least disturbed, many of the archaeological remains. An extensive watermelon cultivation, largely abandoned and half-covered by an enormous sand dune, surrounds and partly encroaches on Maghatta, thus making any close investigation difficult. Settlement B is located at the edge of one such cultivation, half covered by sand. It consists of the remains of sandstone and mud-brick buildings. The stone building might be religious, or perhaps administrative. The mud-brick buildings are well preserved, some with their plaster remaining. They are also preserved, albeit under sand, to roof height, as the intact vaulted ceilings of some of these structures are visible. The finds scattered around the area include mounds of pottery, limestone and granite fragments, faience fragments, and unfired loom weights. A variety of tomb-types (see S.I. below) were found in the area.

South of Maghatta, the desert turns flat and barren, but the water system may have continued in a south-east direction towards what is now the remains of yet another watermelon cultivation. In the northern, more intact area, patches of vegetation cover long sections of the underground aqueduct, perhaps feeding from leaks of the subterranean conduits. In the southern area, watermelon cultivations were either established where such patches of vegetation already existed, or were purposely implanted on top of ancient aqueducts. The result is that large surfaces have been obscured by the presence of these cultivations, and establishing a date for some of the few surviving water systems and their associated remains may be difficult or, in some cases, impossible. It is tempting to suggest that the Gib/Sumayra water systems were connected with Ain Ghazal, the small oasis a few kilometres to the south. Here it is possible to see the remains of what might be part of a mud-brick settlement and a cemetery, probably dating to the 4th century AD.

Ezbet Muhammed Tuleib

The site of Muhammed Tuleib is partially covered by dunes, and was therefore difficult to survey. The site is centered around the remains of a large mud-brick enclosure that might have started its life as a fort (Taf. 9b). The visible portions, however, more closely resemble a small temple enclosure wall. Unlike the forts of Ain Gib and Qasr el-Sumayra, the entrance is not on the south, but on the west. It is quite possible that the building was modified several times throughout its history, but without excavation it is currently impossible to determine. Evidence of a significant settlement surrounding the enclosed building, includes mud-brick structures, kilns, loom weights, glass, pottery mounds, cemeteries (both to the east and west), underground aqueducts and water supply systems leading to fields. This building appears to provide an east-west connection between the forts of Umm el-Dabadib, Ain Ain Lebekha, and the rest of the oasis.

Conclusion

In conclusion, it appears that the forts of Ain Gib and Qasr el-Sumayra were just one part of a large, complex, but scattered community that lived at the borders of the oasis in the Roman period. The

presence of architecture of a military appearance suggests that one of the tasks of the local population may have been controlling the northern access to the oasis. It is more likely that this required little actual military activity, but was more passport control and taxation of goods and road-use.

The large underground aqueduct, running north to south, may have been used to cultivate and to support desert travellers as well as the local communities. Given the history of agricultural exploitation of the oasis, it is logical to assume that the tradition continued, perhaps even to the extent of supplying the Nile Valley with produce in addition to purveying to the oasis' and travelling populations. The presence of a significant number and variety of tombs suggests the existence of a long-term, socially stratified permanent settlement. It should also be noted that prehistoric remains were found scattered throughout the surveyed locations, indicating that some form of habitation of this area had been in existence from the earliest times.

S.I./ C.R.

Investigation of Ancient Routes in the Study Area

The general objective of this research in the North Kharga area is to contribute to an understanding of how different sites within the oasis depression and the wider western desert may have articulated with each other via routes and tracks, and to assemble (by survey) evidence as to how such tracks may have been used. At present, knowledge about the organisation of traffic within and between the oases in late antiquity remains incomplete³.

The 2002 season of this work was to explore the area around the sites of Qasr el-Gib and Qasr el-Sumayra, although due to the prioritising of other activities only about four working days could be dedicated to this part of the survey. The investigation began on foot with a search pattern encompassing the area within an approximate two kilometre radius of a focal point at Qasr el-Gib. Once a possible route had been identified, the survey continued by vehicle, following the route and stopping to investigate and record features by GPS.

Areas lying immediately to the east of Qasr el-Gib were found disturbed both by modern agriculture and inundation by aeolian sand, and so investigation was most productive to the west. Successive traverses revealed what appeared to be a broad track following a shallow depression approximately 2 km south-west of Qasr el-Gib. The orientation of this 'track' was approximately along a north-south axis. The principal characteristic of the track was a slight difference in the shading and texture of the sand along it from that of the surrounding area. At ground level, this difference was not easily discernible, but from an elevated position it was clearer, giving the impression that the soils had been compressed over a long period of time. A similar phenomenon can be observed along the length of the old Darfur caravan route running south from Baris. Working on the assumption that this surface anomaly was in fact some kind of track, an attempt was made to follow it. The route continued north beyond the latitude of Qasr el-Gib but then it (or a branch of it) appeared to swing to the northeast and was lost (Fig. 2).

³ R. MORKOT, *The Darb el-Arbain, the Kharga Oasis and its forts and other desert routes*, in: D. BAILEY (ed.), *Archaeological research in Roman Egypt. Proceedings of the Seventeenth Classical Colloquium of the Department of Greek and Roman Antiquities, British Museum, held on 1-4 December, 1993*, Ann Arbor 1996, pp. 82-94.

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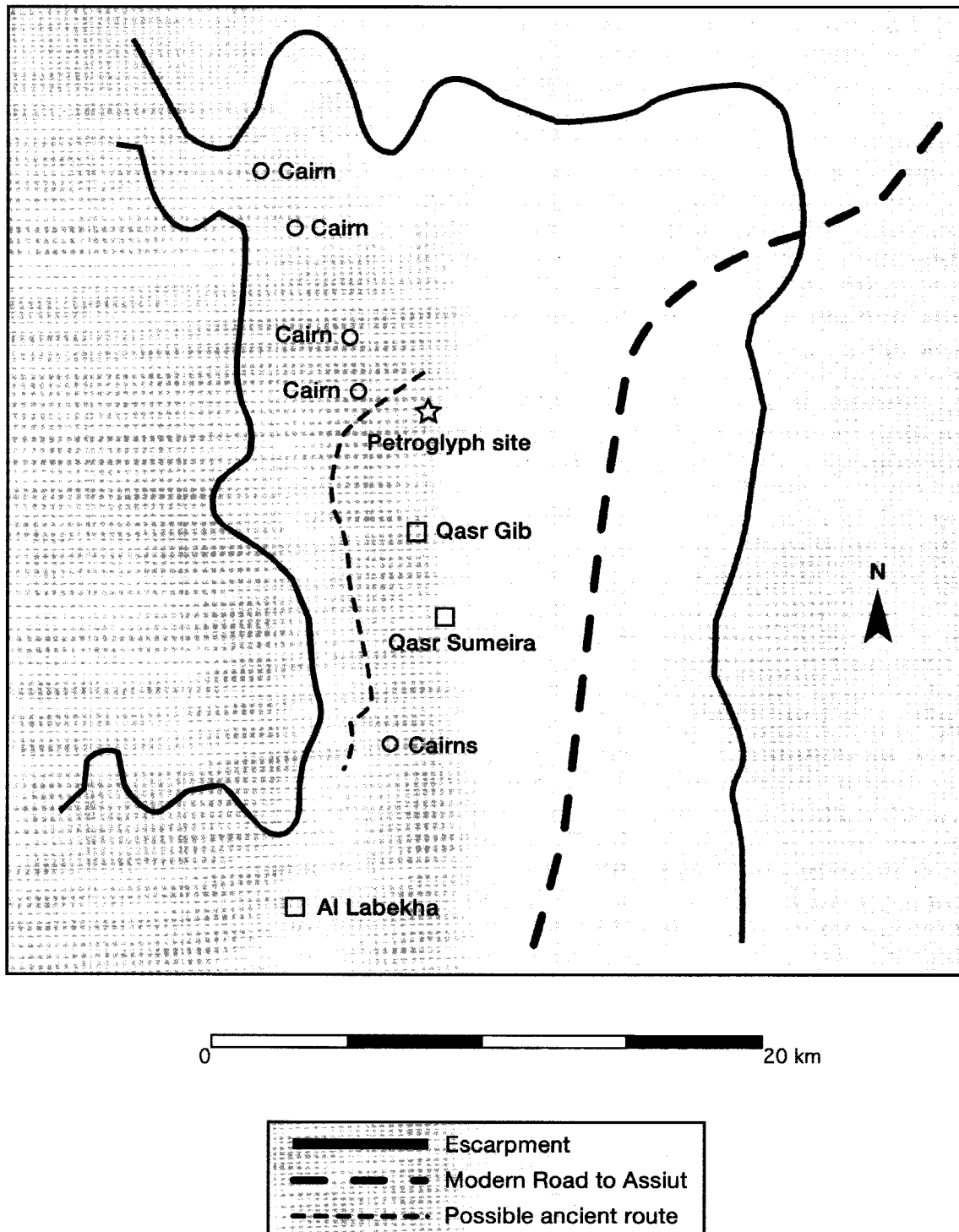


Fig. 2: Possible caravan routes in North Kharga (Drawing by A. ROWE)

Archae-
iquities,

A further 2 km east in a broad sandy depression, a sandstone outcrop was found bearing numerous inscriptions and petroglyphs (Taf. 9c). The petroglyphs appeared to represent many periods and styles, the oldest of which seemed to be a large engraving of a boat on the summit of the rock. The most striking of the petroglyphs were unusual human figures, apparently dancing. From the patina of the rock surface, these figures appeared considerably more recent than the boat and their costume (including a figure wearing a bird's head mask) uncharacteristic of anything from later Egyptian history. These figures seem to have no parallel in any of the published engravings recorded on the Darb el-Ghubari⁴ or at Gebel el-Teir⁵. A separate rock drawing, clearly showing a camel rider mounted in a style unique to Africa west of lake Chad⁶ raises the possibility that the site may have been a resting place for caravans passing through from that region⁷. Although a Greek inscription was found on the outcrop, it seems probable that the majority of the petroglyphs are more recent than the sites of Qasr el-Gib and Qasr el-Sumayra.

Visible on the north-western skyline from Qasr el-Gib (approximately 6 km), is a single cairn on a hill, not far from where the aforementioned 'track' was lost. Beyond this cairn was found a sequence of three more cairns, each just visible from the previous which spanned a distance of 15 km in the north-west corner of the northern Kharga depression. The final cairn was situated at a wide opening in the escarpment wall that serves as an inlet to a second depression lying to the west. These cairns obviously served to mark a route. However, it was judged that at least some of these cairns were not ancient and their function and origin remains unknown.

South-west of Qasr el-Gib, traces of a route were discernible for a further 4 km before passing below a hill with a large collapsed cairn at the peak. A vertical shaft tomb and several other burials were located on hillsides overlooking this part of the way. After an additional 2 km the route was finally lost beneath aeolian sand, heading in the direction of the Roman site of Ain Ain Lebekha 8 km distant.

Evidence for a route up the western side of the North Kharga depression is at present largely circumstantial. Although it seems highly probable that a direct route linking Ain Ain Lebekha with Qasr el-Sumayra and Ain Gib (and possibly proceeding on to the eastern escarpment) was used in antiquity, only extensive fieldwalking and collection of datable artifacts would provide the necessary proof. While it seems possible that the petroglyph outcrop may have been visited by successive travellers over a long historical period, no evidence links it to the neighbouring Roman sites. However, it is not inconceivable that medieval travellers followed earlier routes when they were still more clearly defined than they are today.

A.R.

Military Architecture: Qasr el-Gib and Qasr el-Sumayra

Qasr el-Gib and Qasr el-Sumayra were briefly investigated in 1978 by J. GASCOU, G. WAGNER and P.J. GROSSMANN, who then published a short report accompanied by a plan of Qasr el-Gib⁸. One of the

⁴ H. WINKLER, *Rock drawings of Southern Upper Egypt II*, Oxford 1938.

⁵ A. FAKHRY, *The Rock Inscriptions of Gabal el Teir at Kharga Oasis*, in: *ASAE* 51, 1951, pp. 401-434.

⁶ R. WILSON, *The Camel*, London 1984.

⁷ A more detailed discussion of these unusual rock drawings is currently in preparation.

⁸ J. GASCOU/G. WAGNER/P. GROSSMANN, *Deux voyages archéologiques dans l'Oasis de Khargeh*, in: *BIFAO* 79, 1979, pp. 16-20.

aims of NKOS 2002 has been to prepare plans and sections of both buildings and to attempt a reconstruction of their original appearance. In this preliminary report only the two plans have been included, as the sections and reconstructions require a detailed discussion that is beyond the scope of this preliminary report.

The architecture, the building technique and the materials employed in the construction of the two small forts of Gib and Sumayra are so similar to one another that it appears likely that the two buildings were erected in the same period, for a similar purpose, and according to a common design.

Their plan is very similar, Qasr el-Sumayra being a 'reduced' version of Qasr el-Gib (Fig. 3). Both consist of a thick enclosure wall pierced by one single entrance from the south, and completed by round buttresses at the four corners. In both cases, the upper part of the wall hid a protected passage that ran all the way around the fort. Inside, the stairs were immediately to the left of the entrance, and the rest of the space was divided into two rows of vaulted chambers facing each other across a small central space. They were both built principally of mud-brick, whilst limestone and sandstone was used for the lintels above the entrance, and perhaps for other elements such as thresholds and steps that are now buried or have since disappeared.

The main difference between the two buildings concerns their size and their position. Qasr el-Gib covers an area of about 16 x 16 m, and consisted of three levels (including the ground floor) arranged around a central courtyard. Even if the latter is nowadays almost entirely occupied by debris, several ground floor chambers are still accessible. These are rectangular rooms, covered with plastered parabolic vaults, provided with one doorway and one little window, both facing the interior of the fort. The remains of several niches are visible in some chambers and in the courtyard.

The stairs were located to the left immediately after the entrance, and were arranged around a central rectangular pillar. The design of the first floor appears to have been slightly different, with a passage running all around the courtyard and thus reducing the depth of some of the chambers⁹. By comparing GROSSMANN's and our plan, it is clear that in the last twenty-five years the locals must have used the northern wall as a source of bricks. About half of the thickness of the wall has been quarried away, and a passage has been opened at the bottom. This hole in the wall, that channelled a very strong wind into the interior of the fort, thus contributing to its deterioration, was bricked up by NKOS in 2002.

The lack of windows and its raised position makes Qasr el-Gib look larger than it is. There is no doubt that its principal aim was to mark the entrance to the oasis and to control the caravan route that descended from the plateau. Another function may have been to guard the first and northernmost shafts of the large underground water system that covered an elongated north-south area of at least 6.5 x 2.5 km.

The diminutive Qasr el-Sumayra covered an area of only 11 x 11 m. In 2001 the interior of the fort was completely filled by debris, but between April 2001 and January 2002 someone removed tons of loose mud-bricks from the fort, and threw them outside the east face. This operation exposed more of the interior, and allowed a glimpse of the internal arrangement of the building. The fort probably consisted

⁹ *Loc. cit.*, Fig. 1.

of two floors only (ground and first), both in turn consisting of two rows of vaulted chambers facing each other. The stairs, in the south-west corner, were supported by a series of arches and ran around a small central shaft. Because of the ruined state of the building and the amount of debris, several details of its internal arrangement are still unclear.

The position of Qasr el-Sumayra is not as impressive and commanding as that of Qasr el-Gib. It was built on a flat terrain and is barely visible from the distance. Its position, at the end of the line of *qanats* (underground water system) that starts around Qasr el-Gib, might be related to the control of the water system (Fig. 1). The cultivated area extended southwards well beyond Qasr el-Sumayra, but the *qanats* between the two forts might have had a special strategic importance, being the first water source encountered by travellers descending into the oasis after an exhausting trip from Middle Egypt. It is possible that the area of Gib and Sumayra was a gathering point for caravans departing from and arriving at the oasis. Qasr el-Gib and Qasr el-Sumayra may have acted as military checkpoints, where travellers and goods were inspected and taxes collected. In conclusion, it may be suggested that the two small forts were part of a precise strategic design to control the northern area of the oasis¹⁰.

As noted by several authors, Kharga is dotted with constructions that may be loosely classified as forts¹¹. MICHEL REDDÉ, however, argued that not all of them must have been originally planned as military installations for the Roman army. Dush, for instance, may have been conceived as a group of strongly defended magazines, and then reused by the army in the 4th century AD. Only a few buildings show an unmistakable military character, and Qasr el-Gib and Qasr el-Sumayra are among them¹².

The evidence gathered in the area suggests that Gib and Sumayra were active during the 4th century AD (see A.D. below). These two small installations may have been the Roman answer to a specific local threat or, from a wider perspective, may have been part of a much larger scheme to reinforce the border of the Roman empire, that was started by Diocletian at the beginning of the 4th century AD and was continued by several Roman emperors after him¹³. The 4th century was a century of intense Roman activity in Kharga and Dakhla (grouped together as the Oasis Major), but the 5th century witnessed a significant reduction of the occupation of several major sites, including Dush in Kharga¹⁴ and Ismant el-Kharab in Dakhla¹⁵. The area of Qasr el-Gib and Qasr el-Sumayra, with its lack of clear evidence of any 5th century activity, seems to have shared the same destiny.

C.R.

¹⁰ Cfr. R. BAGNALL, in: *JARCE* 14, 1977, pp. 71–72.

¹¹ See for instance G. WAGNER, *Les Oasis d'Égypte*, Cairo 1987.

¹² M. REDDÉ, *Les oasis d'Égypte*, in: *JRA* 2, 1989, pp. 288–289; ID., *Quinze années de recherches françaises à Douch. Vers un premier bilan*, in: *BIFAO* 90, 1990, p. 288; ID., *A l'ouest du Nil: une frontière sans soldats, des soldats sans frontière*, in: V.A. MAXFIELD/ M.J. DOBSON (eds.), *Roman Frontier Studies 1989*, Exeter 1991, p. 491.

¹³ P. SOUTHERN/K.R. DIXON, *The Late Roman Army*, London 2000, pp. 41–45.

¹⁴ G. WAGNER, *Le camp romain de Douch (Oasis de Khargeh – Égypte)*, in: *Studien zu den Militärgrenzen Roms III*, 13. Internationaler Limeskongress, Aalen 1983, Stuttgart 1986, p. 672.

¹⁵ C.A. MARLOW/A.J. MILLS (eds.), *The Oasis Papers. Proceedings of the First International Symposium of the Dakhleh Oasis Project. Dakhleh Oasis Project Monograph 6*, Oxford 2001, p. 57.

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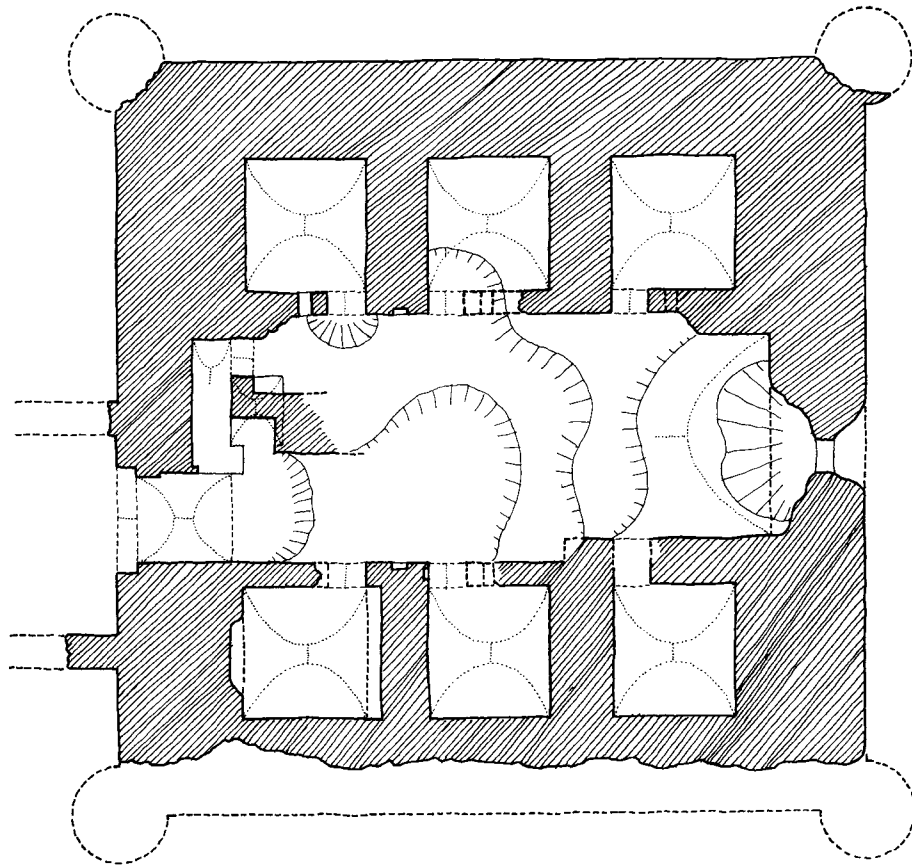
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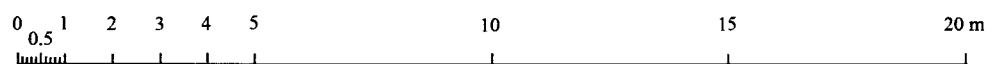
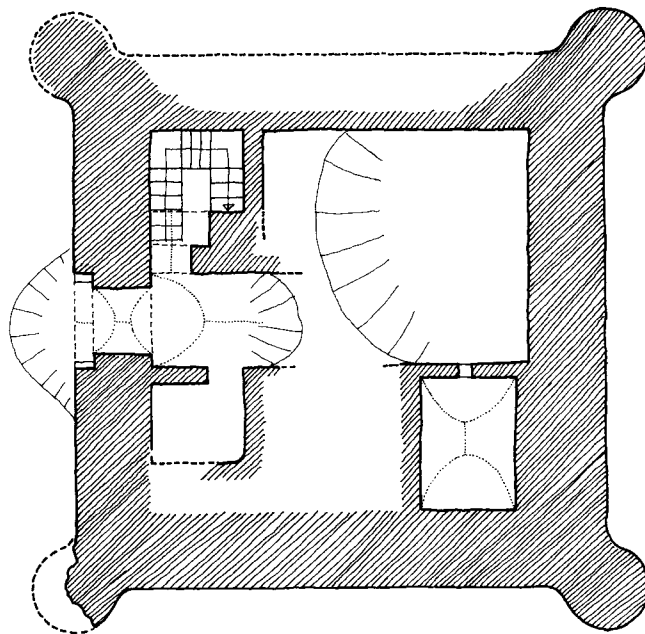


Fig. 3: Plans of the two forts of Sumayra and Gib (Drawing by C. Rossi, ©NKOS)

Domestic Architecture

The essential and omnipresent building unit used in Roman period domestic architecture of the Kharga Oasis is the mud-brick barrel vault. Vaults can be superimposed to create extensive multi-storey structures, many of which survive intact. Vaulted spaces vary enormously in size from the small (1.4 m x 3.2 m) to the vast (9 m x 19 m), although the largest vaults are reserved for non-domestic buildings. These vaults tend to be elliptical in profile, and are in most cases laid in inclined courses that allow for construction without the use of formwork (the traditional vernacular vaulting method still employed in the south of Egypt). The mud-bricks themselves are of a sandy composition, and are most probably made from eroded yardangs in the vicinity, with the inclusion of significant quantities of chaff temper. The size of the bricks used on all the sites is 33–34 cm long x 16–17 cm wide x 7–8 cm thick: considerably smaller than pharaonic mud-bricks. Mortar joints in vaults are typically reinforced with shards of pottery or stone. Lintels for doors and niches are formed either by locally quarried rough sandstone blocks, locally available acacia/tamarisk/palm wood (mostly destroyed by insects), or by a variety of mud-brick solutions including arches. Living units have at least a ground and a first storey, and in some cases an additional storey can be postulated. Some units contain double-height spaces. The upper floors are accessed by mud-brick stairs supported on arches, with rough sandstone often being used for the stair-treads. Wall niches provide the most obvious form of interior spatial articulation, and these vary considerably in design (flat-headed, round or pointed arched, apsidal, square etc). Some niches clearly contained wooden shelves (and were perhaps faced with doors), while others are of a more decorative nature with applied mud brick framing in the form of colonnettes and cornices. At many sites, traces of lime plaster with chaff temper can be found that had fallen off walls, and the floors are also presumed to have been plastered with mud: an expectation that could only be borne out by the excavation of collapsed mud-brick and wind blown sand.

At the site of Ain Gib, no surface evidence for subsidiary structures or domestic settlement survives. This situation, however, is not the same at Sumayra, where remains of kilns and destroyed structures can be seen particularly to the south and south-west of the fort. The most obvious standing remains are located at Settlement A, to the south of the fort itself, where a complex of mud-brick buildings survive, apparently grouped around a cultivated area or farmstead, with its own water supply fed from an underground aqueduct. These buildings have been dated through pottery analysis of sherds used in their construction to the 4th century AD.

The most unusual of this group is an isolated structure oriented on a north-south axis, which is composed of five rooms at ground level (Fig. 4). This building was originally a two-storey structure, and traces of the staircase vaulting and sandstone treads can still be seen at the north-east corner. The entrance to the house, for this is the most obvious interpretation of what the structure's function must have been, is from the south – away from the prevailing wind – and leads to a small vaulted anteroom. Beyond this, accessible through a door with a stepped double palm log lintel, is the separately enclosed stairwell, which was supported by a series of eccentric mud-brick arches. Another door, again with a roughly shaped palm log lintel, leads into the principal room of the house. Although the interior is largely filled with collapsed mud-brick and wind blown sand, requiring an estimate to be made of the original height, enough details survive to permit a reconstruction of the design of this space. The room is double-height and is cross-vaulted in a distinctive fashion, with paired broad (north-south) and narrow (east-west) intersecting vaults. This design is paralleled at other sites in the oasis, notably at Ain Ain Lebekha and Ain Umm el-Dabadib. An honorific square-headed niche flanked by colonnettes, which may have been the emplacement for a figurine of a local god, faces the entrance to the room at high level

slightly off its east-west axis. Subsidiary niches of different designs (arched and fronted by a straight lintel or pointed arched) can be seen at the lower level, which would have been more immediately accessible for day-to-day use. One of these niches has the emplacement for a timber shelf. Two small high level rectangular window openings survive in the south wall. No traces of the lime plaster or lime wash that most likely finished the interior survive. To the west of the principal room, and directly accessed from it, are two smaller elliptically vaulted rooms, which may have functioned as sleeping spaces. These are also furnished with niches that cut into the springings of the vaults. The precise configuration of the upper floor of the house is unclear due to collapse, but it is likely that further vaulted rooms superimposed on those of the ground floor were located here. These may have served as spaces for storage or food preparation.

The very exact parallel of the distinctive central room of this house at other oasis sites would suggest that such a standardised element was the mark of some kind of official architecture which followed an *a priori* design. Further work will attempt to gather more evidence to support this theory, which is advanced in order to explain the manifestation of such a sophisticated architecture with a clearly developed spatial hierarchy in the Oasis Magna.

N.W.

Funerary Architecture and Mummification in North Kharga

Tombs were the most common feature found during the course of the survey, second only to the *qanat* apertures. Three basic tomb types have been thus far identified in Kharga Oasis: rock-cut, shallow holes, and a combination of poor quality rock/gravel-cut and mud-brick construction.

Cemeteries were noted at Sumayra (to the south of the fort), at Settlement A (at Sumayra South), west of Settlement B, at several places in the Maghatta area (the Vaulted Tombs, the Ridge Tombs, the Outcrop and Graffiti Tombs), and to the east and west of Muhammed Tuleib, at Umm el-Dabadib (to the east) and at Ain Ain Lebekha (to the south, the north, and the west). Only a few isolated tombs were found to the south of Ain Gib.

The simplest (and most difficult to identify during a survey) type of tomb is the shallow hole variety. A shallow hole is dug into the desert surface and a body deposited within, and then covered over. The few identified south of the fort at Ain Gib were easily identified as they had been robbed and the bodies exposed. Some other possible tombs were also noted in this area. The orientation of the graves could not be established as they had been so badly disturbed. Some of the graves found at the Ridge Tombs were similarly constructed.

Rock-cut tombs appeared wherever suitable rock was available. As most of the oasis stone is friable sandstone and shale, such tombs only appeared at sites where the escarpment was close, or where more solid sandstone outcrops were found. Rock-cut tombs were found in a few instances south of Settlement A, at Ain Ain Lebekha, the Outcrop and Graffiti Tombs, and at the site of the Western Tombs, west of Settlement B. These tombs are cut into the rock and consist of a single rectangular chamber measuring between 2.5 m and 4.5 m in width, and 2.5 m to 4 m in depth. Many are destroyed by internal rock-falls, so that it is difficult to determine their precise shapes. No decoration remains on the walls (internal or external) of these tombs. Bodies were placed in the tombs, although there is some indication of shafts in the Western Tombs and the Umm el-Dabadib cemetery. An exception to these simple

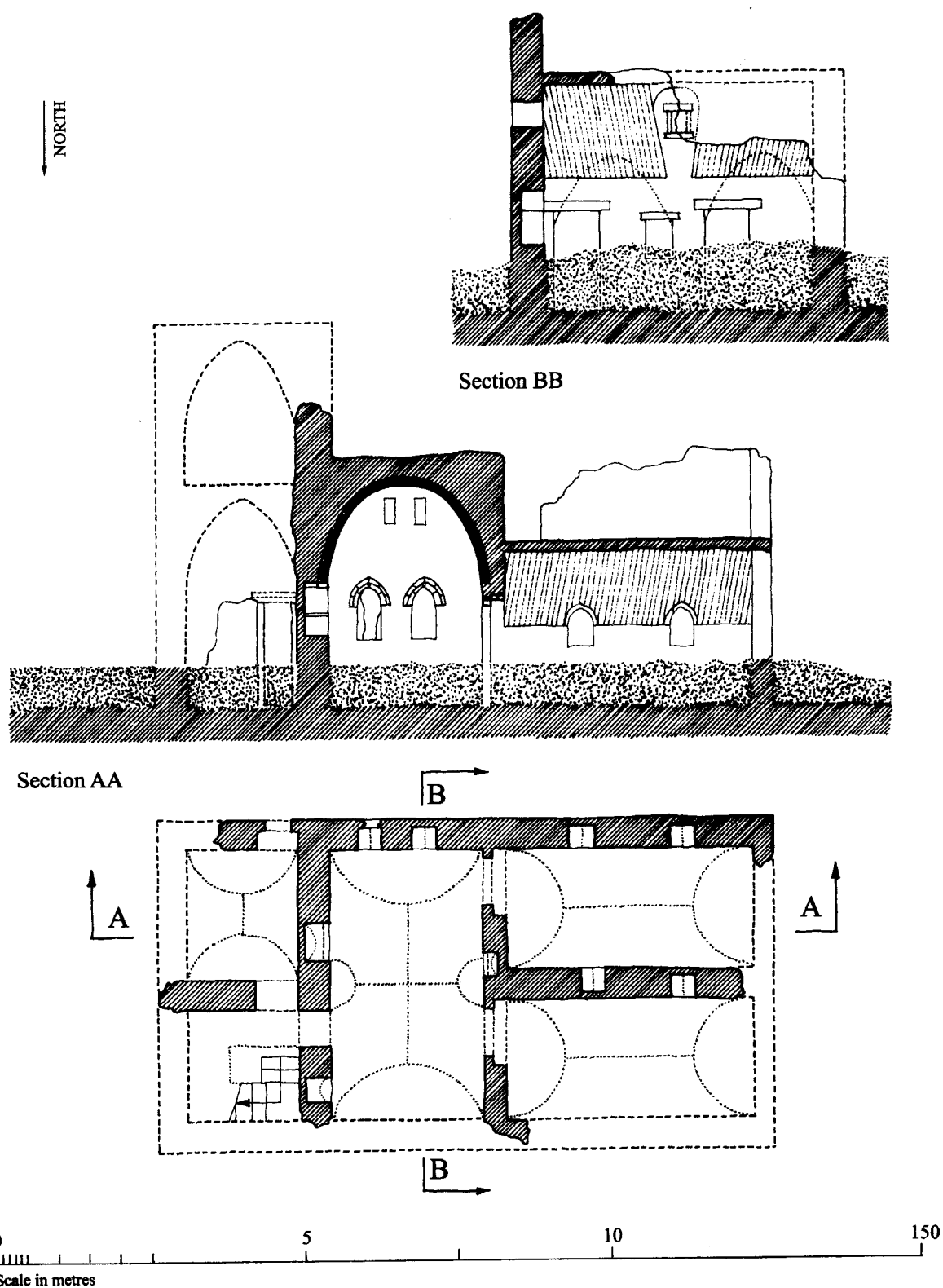


Fig. 4: Plan and section of a house, Settlement A, Sumayra (Drawing by N. WARNER, ©NKOS)

tombs is the so-called 'Owl Tomb' located south of Settlement A, and named for its current occupant. The tomb is carved into the eastern face of a sandstone outcrop, and has plain niches carved into the northern and southern walls. The exterior had a small courtyard created by mud-brick walls. A horizontal recess carved above the exterior of the doorway suggests that it was originally the location of a decorated limestone lintel, perhaps inscribed with the name and title of the tomb-owner(s).

Shaft tombs are also found in some of the sandstone outcrops. These are simple shafts cut straight down (as far as can be seen without clearance of the sandy rubble within) into the rock, presumably opening into a larger chamber that contained the body and grave goods, if any. Examples of these have been located at the Western Tombs, although it is quite possible that more remain undetected at other sites.

The most common tomb-type found at Kharga Oasis is the combination of poor quality rock/gravel-cut and mud-brick construction. The majority of the oasis is devoid of solid rock, so rectangular tombs were cut into the poor quality rock/gravel/*tafla*, and then lined with mud-brick and covered by a vaulted roof, similar to the roofs found in houses. This tomb type, common throughout the oasis, was found south of the Sumayra fortress, at the Vaulted Tombs, at Muhammed Tuleib, and in some areas of the Ridge Tombs. Originally the interior (and perhaps also the façade) of these tombs was covered by mud-plaster and whitewashed. This might have further been decorated with paint. The location of the burial chamber is not established as none of these tombs have been cleared by NKOS. However, the burials could not have been very deep as the robbed remains of the bodies have been scattered around the tombs by thieves. The method of vaulting and the bricks used in these tombs are identical to those found in the settlements and forts in style, measurements, and consistency.

The dating of the tombs is currently under study. Due to their disturbed nature and the fact that they are in most cases only partially cleared, dating depends on basic architectural features and associated surface remains. One must remember, however, that many of these tombs can be multi-period as they were quite possibly reused. The majority of the surface pottery is of the Roman Period, but in some instances the fineness of the painted cartonnage fragments suggests an earlier date, most probably late Ptolemaic.

The position and orientation of the tombs is as might be expected, given the geology of the oasis: they are dug wherever there is a possible location. Almost all the tombs are oriented east-west, regardless of whether they are cut into the western or eastern side of a settlement. A few tombs are carved into the southern side of a protruding rock, no doubt to protect the tomb from the strong north wind.

It is hoped that future work will provide more information concerning social stratification as evidenced in funerary architecture, as well as answers to chronological questions.

Observations on Mummification

The majority of the human remains show evidence of mummification of different types. Remains of men, women, and children are all represented at the different sites. Some corpses were excerebrated, and most appear to have been eviscerated, although a few corpses showed no signs of either procedure. When present, the evisceration incision is on the left side, as usual.

Generally the arms lay along the body with the hands next to or covering the genitalia. This seems to be the case for both men and women. Oils, resins, and possibly bitumen were used during the course

of mummification; until now no chemical tests have been carried out to determine the precise materials that were used.

Linen bandages of different qualities are present. Some examples of pink and red bandaging, associated with the Late Ptolemaic and Early Roman Periods were also found. No mummy thus far discovered shows the highly elaborate outer coffered bandaging so common in the earlier Roman periods. Fragments of painted wooden coffins and cartonnage were recovered from the Western Tombs.

S.I.

Survey of Hydraulic Systems

Survey work during the NKOS 2001 season revealed the presence of well-preserved and extensive water systems in the area of Qasr Gib and Qasr Sumayra, Ain Ain Lebekha, and also at Umm el-Dabadib. An examination and survey of the hydraulic systems in the project area began during the 2002 season with the aim of recording the geographic extent and nature of the remains. The survey also hoped to begin building an understanding of their origin, construction and utilisation.

During the 2002 season, extant remains on the ground were examined in detail at Ain Gib and Qasr el-Sumayra and preliminary investigations were undertaken at the sites of Ain Ain Lebekha and Umm el-Dabadib. The nature of the remains at all sites is consistent with the appearance of the hydraulic systems found elsewhere in the Middle East and Africa, known as *qanats* (also described in specific regions as *foggara*, *kareez*, *falaj*, *khettera* and *manwar*). The *qanats* in Kharga tap the waters of the Nubian Sandstone Aquifer and in the project area they tap the aquifer at the foot of the escarpment at the northern edge of the oasis. A sloping underground tunnel moved the water by gravity flow to where it was needed at settlements and fields. The most obvious remains of the *qanats* are the circular mounds of spoil on the surface that mark the openings of the shafts that access the underground tunnel. These shafts aided in the construction of the *qanat* tunnel (providing ventilation and access to the workforce at the tunnel) and could be used afterwards for its maintenance and cleaning. In some areas the survey was also able to examine the surface channels which conveyed water from the *qanat* to fields and settlements. At Ain Ain Lebekha and at Umm el-Dabadib it was possible to examine the tunnels and shafts of the *qanats* below the surface.

The methodology of this season's study of the water systems was firstly to identify the archaeological remains of potential hydraulic systems and then to record their location with Total Station survey equipment (or GPS) where time and terrain allowed. Accurate readings were recorded by Total Station for the *qanat* shafts located in a 600 metre radius of Qasr el-Gib and Qasr el-Sumayra and also for those in the 4 kilometre distance between the two sites. GPS readings were taken for shafts lying outside of these easily accessible areas by recording every tenth shaft on a *qanat* line, with distances between individual shafts paced using a known and measured step.

Using these recording methods the survey was able to record the locations of over 600 *qanat* shafts on three major *qanat* lines, covering an area 8.5 km north to south and 3 km east to west. From these results the NKOS has produced initial plans of the geographical location and distribution of the hydraulic systems over a large part of the NKOS project area.

Preliminary Results¹⁶

The major feature of the remains that were examined were the openings of the *qanat* shafts at the surface (and their associated mounds of spoil) indicating the course of the *qanat* below ground.

Qanats Q₁, Q₂ and Q₃

Three main *qanat* lines were identified by the survey in the area around Qasr el-Gib and Qasr el-Sumayra (Fig. 1). Q₁, which ran north-south in the area of Qasr el-Gib, seems to be associated with the two forts and their related fields and settlements. Q₂, to the west of Q₁, supplied a settlement and field systems in its area. Q₃ ran north-south further to the west of these systems and at this stage no specific field systems or settlements have been identified with it. At various points along the length of all three *qanat* lines, short branches diverged from the main *qanat* line into nearby slopes to collect additional water to supplement the supply of the main line.

Q₁, Q₂ and Q₃ had been sited to take advantage of the surrounding topography, their courses favouring the lowest contours and the sides of wadis. The *qanat* lines never lay closer to each other than 400 metres, reflecting not only the influence of topography but probably also a desire to avoid depleting the yield of a nearby *qanat*. Due to time constraints, mother wells (i.e. the first shaft of a *qanat* line) were not identified this season and neither were the *qanat* termini, although evidence indicated that they may all have continued beyond the forts, settlements and field-systems they supplied to destinations further to the south of the area examined this season.

The number of shafts recorded for each *qanat* line ranged from 205 to 214 shafts and the distances between individual shaft openings was most commonly 15–20 m, but did range from 12–21 m. The distance between shafts seemed to remain constant for groups of 20–40 shafts.

The majority of shafts were cut into the natural sandstone, which forms the floor of the depression in most of this area, in some cases first cutting through the shale that overlies the sandstone in some places. Nearly all of the openings examined had been secured by lining the upper part of the shaft and the opening itself. A variety of materials had been used, with cut sandstone blocks being the most common, but a variety of other local stone was also present, and in some cases even fired bricks and cement. The shaft openings were further protected from erosion and structural damage by the mounds of spoil (some up to 2 m in height), excavated during the construction of the *qanat*, and piled up around the mouth of the shaft. The size of the shaft openings varied from 50 cm to nearly 2 m in diameter.

The shafts were originally covered with stone slabs to protect the tunnel from falling debris and wind-blown sand and to prevent water contamination and evaporation. Most of the shafts examined were covered with sandstone slabs, which lay scattered around the opening, and in some cases were still found *in situ*. At some openings, especially where the *qanat* line travelled over terrain where the sandstone was scarce or non-existent, shafts were covered with slabs of other local stone, including limestone. Depths of the shafts could not be obtained without excavation since all of the shafts examined on Q₁, Q₂ and Q₃ were filled with wind-blown sand.

¹⁶ For a more detailed discussion of these results see I. SCHACHT, *A preliminary survey of the ancient qanat systems of the northern Kharga Oasis*, in: *MDAIK* 59, 2003, pp. 411–423.

The length of the *qanats* as measured above ground, along the route of the shafts, was approximately 7 km for Q1 and Q2 and 11.5 km for Q3.

Associated with the *qanats* the survey located a number of surface channels that conveyed the water from the *qanats* to the fields and settlements where it was used. In the area around Qasr Sumayra the survey located a long, narrow channel cut into the sandstone, flanked by mounds of spoil from its construction, and possibly from subsequent clearances. Another channel, also cut into the sandstone, with its upper part built of sandstone blocks, was covered with slabs of sandstone and other local stone, secured in a rough mortar. This covered channel was punctuated along its length by small access shafts (for maintenance and cleaning) constructed of unfired mud-bricks surmounted by local stone. These shafts were 45 cm in diameter and rose 30 cm above the height of the covered channel.

Origin and Dating

Without excavation it is almost impossible to date the hydraulic systems examined for the first time this season. Surface pottery at the associated forts, settlements and fields has been dated to the Roman period, and more specifically to the 4th century AD making it very likely that the *qanats* were being utilised during these periods.

The original construction date of the *qanats* is still a matter for investigation. Evidence from Egypt and elsewhere indicates that *qanat* technology was introduced to Egypt during the Persian period¹⁷ and that *qanats* may have even been in use in Egypt before this¹⁸. The systems examined by the NKOS strongly resemble Persian examples¹⁹. It is possible that some of the *qanats* were constructed during the Persian period and later maintained and expanded by the Romans. The variety of architectural forms utilised in the construction of the *qanats*, and the large mounds of spoil (which may indicate phases of clearance and reuse) seem to support the idea that the *qanats* were the product of more than one origin and owner. Nevertheless, the association with Roman period sites in the oasis, not Persian, seems to suggest a stronger Roman influence in their construction and maintenance.

I.S.

Preliminary Report on the Pottery from Qasr Gib and Qasr el-Sumayra

During the 2000 and 2001 seasons of the North Kharga Oasis Survey pottery was collected and studied from the sites of Ain Gib and Qasr el-Sumayra. As the aim of the project is surface survey only, the ceramics were collected from the surface within the forts and the immediate area surrounding them. Thus, the pottery has no stratigraphic context to speak of but one can be confident that the pottery relates to the activity of the forts as there is no other architectural evidence, except for the *qanats*, within the immediate vicinity of the forts to suggest human activity.

¹⁷ D.R. LIGHTFOOT, *The Origin and Diffusion of Qanats in Arabia: New Evidence from the Northern and Southern Peninsula*, in: *The Geographical Journal* 166.3, 2000, p. 218; A.T. HODGE, *Roman Aqueducts and Water Supply*, London 1992, p. 21.

¹⁸ A. FAKHRY, *The Oases of Egypt: Bahriyah and Farafra*, Cairo 1974, p. 34.

¹⁹ See A. SMITH, *Blind White Fish in Persia*, New York 1953; H.E. WULFF, *The Qanats of Iran*, in: *Scientific American*, April 1968, Figs. 4, 7.

Methodology

Both seasons were short and intensive and it was necessary to have a methodology in place beforehand in order to make best use of the time available. After initially looking over the surface of both sites it was decided to undertake a controlled collection of sherds from each site but also to make a random surface collection of diagnostic pieces, in particular rims. The purpose of the controlled collection was to have a sample of material which would indicate the range of fabrics present at the sites, the relative quantities of these fabrics to each other and the proportion of diagnostic sherds to body sherds for statistical purposes. It was also expected that the sample would indicate the type and range of shapes present and suggest a date range. The random collection of rims was undertaken to augment the controlled sample, expanding upon the diagnostics with better preserved pieces, primarily for dating purposes.

The location for each controlled collection was decided upon by the degree of density of the sherds on the surface and its relative proximity to the fort. An area of the highest density was chosen and a square of two by two metres was laid out. As the sherd scatter within the forts was relatively minimal compared to the surrounding surface, something not surprising given that both forts contain a large amount of their own collapse, the areas chosen were on the surface outside the forts. Every sherd was collected within the square, with the exception of those less than 1.0 cm square in size. The diagnostic pieces were then extracted and the body sherds were sorted according to their fabrics, counted, and thrown away. All the diagnostics were kept for recording. As much of the pottery was badly eroded, due to the exposed nature of the sites, it was decided not to record every diagnostic in detail but only those that were well preserved and large enough to draw. Nevertheless, a note was made of every diagnostic regardless of its eroded condition.

Fabrics

After the initial collection of sherds a field fabric classification system was devised. All identifications were made with a hand lens of $\times 10$ magnification. No sherds were tested with hydrochloric acid for their calcareousness and no Munsell readings were taken. Six local fabrics and six Nile valley fabrics were identified, though of all 12 fabrics only six occurred commonly, in particular two local fabrics. One non-Egyptian amphora fabric was also identified.

The overwhelming majority of sherds were made of local clay which PASCALE BALLET describes as a kaolinite clay²⁰. In describing the pottery fabrics from the site of Dush and its neighbouring villages in the south of Kharga Oasis BALLET states that “la production de Kysis et des villages avoisinants consiste en céramique façonnée à partir des kaolinites locales; la texture est caractérisée par la présence de plaquettes d’argile silicifiées, abondantes dans les productions du Haut-Empire”²¹.

Despite not having compared sherds directly with those from Dush, one can still be confident that the clay BALLET describes from the south of Kharga is the same, or very similar to that occurring

²⁰ P. BALLET, in: O.E. KAPER (ed.), *Life on the Fringe. Living in the Southern Egyptian Deserts during the Roman and early-Byzantine Periods*, Proceedings of a Colloquium Held on the Occasion of the 25th Anniversary of the Netherlands Institute for Archaeology and Arabic Studies in Cairo, 9–12 December 1996, Leiden 1998, p. 34.

²¹ *Loc. cit.*

further north at Ain Gib and Qasr el-Sumayra. The local fabrics occur in varying degrees of coarseness, ranging from an extremely coarse, poorly mixed clay with large 'plaquettes' of shale²² and abundant quantities of sand dominating the fracture, to a very fine, dense, well-sorted fabric with very few inclusions. The middle of these extremes, i.e. a reasonably well-sorted clay with occasional calcareous particles and shale 'plaquettes', and abundant quantities of sand is the most commonly occurring fabric. The surface has a gritty feel to it and fires either cream or orange. The fracture fires a range of colours, including pale grey, pink, beige and orange. The most common surface treatments are red, cream and yellow coatings.

Oasis Red Slip Ware also occurs at both sites. This is a local fineware imitating the red slip finewares produced at sites along the North African coastline. This fabric occurs in the south of Kharga at Dush²³ and is also common at late Roman sites in the Dakhla Oasis²⁴ so it is not surprising to find it occurring at Ain Gib and Qasr el-Sumayra.

Very few Nile valley sherds were found. Those that appeared included a few amphorae sherds, their fabric termed M3 under JANINE BOURRIAU's fabric classification system for the Nile valley (personal communication) and a few silt sherds comparable with Nile silt B and C under the Vienna system²⁵.

The one non-Egyptian amphora fabric identified is the so-called 'Nr' amphora, once again referring to JANINE BOURRIAU's fabric classification system (personal communication). This is a very well sorted, fine, dense clay containing medium scatters of sand and calcareous particles. The amphora is distinctive in its shape and manufacture, with a broad bulbous body, round base, two handles joined from the short neck to the shoulder and pronounced ribbing all over the body. It was once thought to be a Nile valley marl amphora but is now recognised as a Mediterranean import which HAYES suggests may be from Cilicia in south-east Turkey or possibly from Cyprus²⁶.

The Sites

At Ain Gib the pottery scatter was concentrated in two areas over the hill slopes around the fort, one over the east slope and the other over the south-west slope. Each concentration was relatively thick on the ground and a controlled collection was made from both areas. 564 sherds were collected from the east slope of which 87 were diagnostics, i.e. 15%. 324 sherds were collected from the south-west slope, of which 39 were diagnostics, i.e. 12%.

²² The word 'shale' is used here for convenience, being a term that is used commonly in the literature to refer to the large, 'platy' fragments common in oasis pottery. It is not necessarily shale however and may be mudstone or claystone, cf. M.A.J. ECCLESTON, *Early- and Mid-Holocene Ceramics from the Dakhleh Oasis: Macroscopic, Petrographic and Technological Descriptions*, in: R. FRIEDMAN (ed.), *Egypt and Nubia: Gifts of the Desert*, London 2002, footnote 4.

²³ M. RODZIEWICZ, *Introduction à la Céramique à Engobe Rouge de Kharga*, in: *Cahiers de la Céramique Égyptienne* I, Cairo 1987, pp. 123–136.

²⁴ C.A.H. HOPE, *Pottery Manufacture in the Dakhleh Oasis*, in: C.S. CHURCHER/A.J. MILLS (eds.), *Reports from the Survey of the Dakhleh Oasis 1977–1987*, Oxford 1999, pp. 235–236.

²⁵ The writer acknowledges that the Vienna System was not devised to incorporate Roman Period fabrics and this reference is given here only to indicate what has been found. The Nile valley fabrics will be incorporated into the fabric system and described fully within the full report of this pottery.

²⁶ J. HAYES, *Handbook of Mediterranean Roman Pottery*, London 1997, p. 33, pl. 1.

At Qasr el-Sumayra the sherd scatter was concentrated mainly to the south of the fort. The scatter was noticeably thinner than that at Ain Gib and the sherds were much more eroded and broken up. Only one controlled collection was made here. 585 sherds were collected but only 54, or 9% were diagnostics. It is interesting that although the scatter appeared to be thinner at Qasr el-Sumayra, the number of sherds collected was comparable to that from the east slope at Ain Gib, although the number of diagnostics is noticeably less. It is regrettable that the pottery was not weighed as well, which would have provided another means of comparing the pottery between the sites.

The types of vessels found at both sites are extremely similar, something which is to be expected given the forts' proximity to each other and the fact that they appear to be contemporary in date. The shapes represent a range of domestic vessels including small and medium shallow bowls, large deep bowls, standard late Roman globular cooking jars with out-turned rims, necked storage jars, gargoulettes and water kegs.

Dating

All the pottery studied from Ain Gib and Qasr el-Sumayra is Roman in date. No pottery of earlier periods was identified from the surface. The pottery from both sites appears to be contemporary and a date range from the late 3rd century through to the end of the 4th century, possibly extending into the early 5th century AD is suggested. This is based upon comparison with late Roman assemblages from the Nile valley and Dakhla Oasis. The majority of shapes appear to date to the 4th century.

A.D.

Archaeobotanical and Botanical Assessments

There were two aims for the 2002 season of the North Kharga Oasis Survey, firstly, to carry out a preliminary modern vegetation survey and secondly, to assess the archaeobotanical potential of the area.

Modern Vegetation – Preliminary Investigation

In the area of Ain Gib and Qasr el-Sumayra, two areas of vegetation can be distinguished: one of abandoned cultivation – both ancient and modern – and another that follows the underground irrigation systems.

The modern cultivation consists of hollows excavated in the sand, in order to reach the water table. Here watermelons (*Citrullus lanatus*) are grown with varying degrees of success. The vegetation associated with these depressions includes halfa grass (*Imperata cylindrica*) and goat's thorn (*Alhagi maurorum*), which is dominant. Both species are invaluable fodder for domestic animals. Other species include *Cynodon dactylon* and *Hyoscyamus muticus*. Apart from watermelons, date palms (*Phoenix dactylifera*) are also present. The date palm is grown for its fruit and leaves which are used to make baskets. The midribs of the leaves are used in the manufacture of furniture and crates.

Abandoned cultivation (it is difficult to determine if this represents modern or ancient cultivation) can be identified by the presence of date palms. In these areas, drifting sand accumulates around the trunks gradually burying the trees.

Other species associated with these areas include halfa grass, but the dominant plant is the spiny leguminous perennial goat's thorn. In order to reach the water table, the goat's thorn can produce very deep roots which in turn creates a fixed point for the accumulation of drifting sand. The result is hummocks of sand topped by goat's thorn. Species which can be dominant locally include the rush (*Juncus rigidus*) and the grass (*Panicum turgidum*). These can form areas of dense vegetation in places and help to stabilise the drifting sand. In other areas, which tend to have less drifting sand, the dominant species is *Zygophyllum coccineum*.

In some areas, it is possible to trace the underground irrigation systems by a line of dense vegetation. The tree/shrub species present include tamarisk (*Tamarix nilotica*) and the occasional sunt (*Acacia nilotica*), an important fodder source. The lower vegetation layers are dominated by goat's thorn and halfa grass. The halfa grass often appears burnt; this is done by the local population in order to encourage new growth which is then eaten by livestock.

In conclusion, this preliminary botanical survey has shown that there are few plant species in the area and that in general, they are restricted to the new or abandoned cultivation areas and to the path of the underground irrigation systems.

Archaeobotanical Studies

Due to unforeseen circumstances, this season was cut short and therefore the collection and assessment of archaeobotanical material was limited. Those samples collected can be divided into two categories:

1. Mud-bricks

Loose mud-bricks from the fort and the two mud-brick structures further south were collected for the analysis of the plant remains contained within. As mud-bricks were taken from all the structures it may be possible to detect differences in the plant remains used in each building phase. A preliminary study has shown that plant material has been preserved within the mud-bricks. These include twigs of *Tamarix* sp., leaves and fruitstones of olive (*Olea europaea*), fruit stones of date, grain and chaff (mostly straw and articulated rachis) of bread wheat (*Triticum aestivum*), chaff (straw and rachis fragments) of barley (*Hordeum vulgare*) and grape pips (*Vitis vinifera*).

It is most likely that other cultivated and wild plant remains will be identified from the mud-brick when further analysis is carried out. The presence of the cultivated species could suggest that they were grown in the local area at the time of construction. These provided sustenance for the local population, military and travellers visiting the area.

2. Desiccated remains

Sub-surface deposits (less than 10 cm below the surface) were found at South Sumayra. Two deposits were discovered and a total of three samples were taken.

On the south side of the house, a deposit of desiccated remains were found at the base of a mud storage bin at the south-east corner of the building. It appears to consist of a mass of straw and other

plant debris. The deposit spreads for approximately 60 cm to the south of the building. The depth of the deposit is unknown. One sample of two bags was taken from the top (closest to the bin) of the deposit and a second (1 bag) was taken from the southern end of the deposit. A second deposit of desiccated material was found at the north-east corner of the building, north of the collapsed wall. The material seems to be in a layer sitting on a sandstone shelf on which the building is located. The deposit has a similar content to that found in the south-east corner.

The antiquity of the material is unknown and whether the two deposits are contemporary also needs to be determined. The source of the material is also difficult to ascertain. There are several possibilities, including the result of crop processing and the degradation of mud-brick. Future studies may help elucidate the origin of deposit.

In conclusion, the area surveyed in 2002 has proved to have some potential for archaeobotanical studies. The analysis of the mud-bricks and the desiccated material may help to determine past agricultural activities in the area.

A.J.C.

Aerial Survey Report

Kite Aerial Photography (k.a.p.) is a useful method for obtaining aerial views of archaeological sites where the normal usage of an aircraft is unfeasible. Aerial photography provides a different perspective on a site, and is particularly useful in setting it into its environment and surroundings, and allowing the archaeologist to study the layout of the site in a way that would be impossible from the ground. Furthermore, many features that are invisible on the ground appear when seen from an aerial perspective, such as the field systems revealed at Sumayra South and Sumayra itself.

The technique used for k.a.p. is not precise, unfortunately, as the kite is very much at the mercy of the elements; however a strategy was developed for optimal results. The camera (Olympus C3030Z digital camera) was attached to the kite string approximately two metres from the kite bridle itself, and operated by radio control. The kite used was a Stratoscoop sparless aerofoil, especially designed for k.a.p. Several images were taken during a single flight. The resulting images were checked in the field, so that more flights, if needed, could be immediately taken. Although imperfect, this method of aerial photography was sufficiently successful to be used in future seasons at the oasis.

R.K.-M.

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Team members: DR CORINNA ROSSI (co-director, military architecture), DR SALIMA IKRAM (co-director, human and animal remains), AMANDA DUNSMORE (ceramicist), RICHARD KNISELY-MARPOLE (chief surveyor), NICHOLAS WARNER (architect, domestic architecture). The team was assisted in the

field by MAHMOUD MAHDI, Inspector and SAAD FUAD, desert guide, and was helped by IBRAHIM BAHGAT, Chief Inspector.

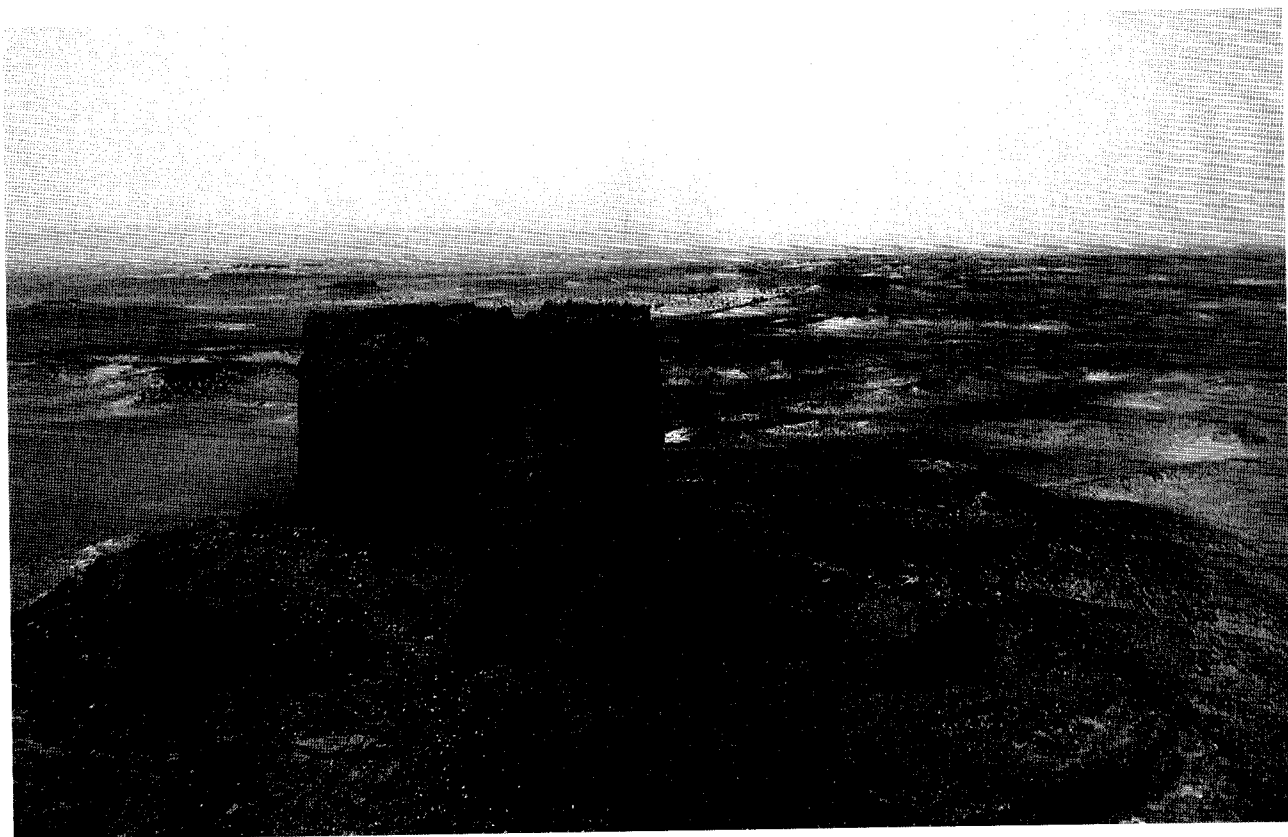
NKOS 2002

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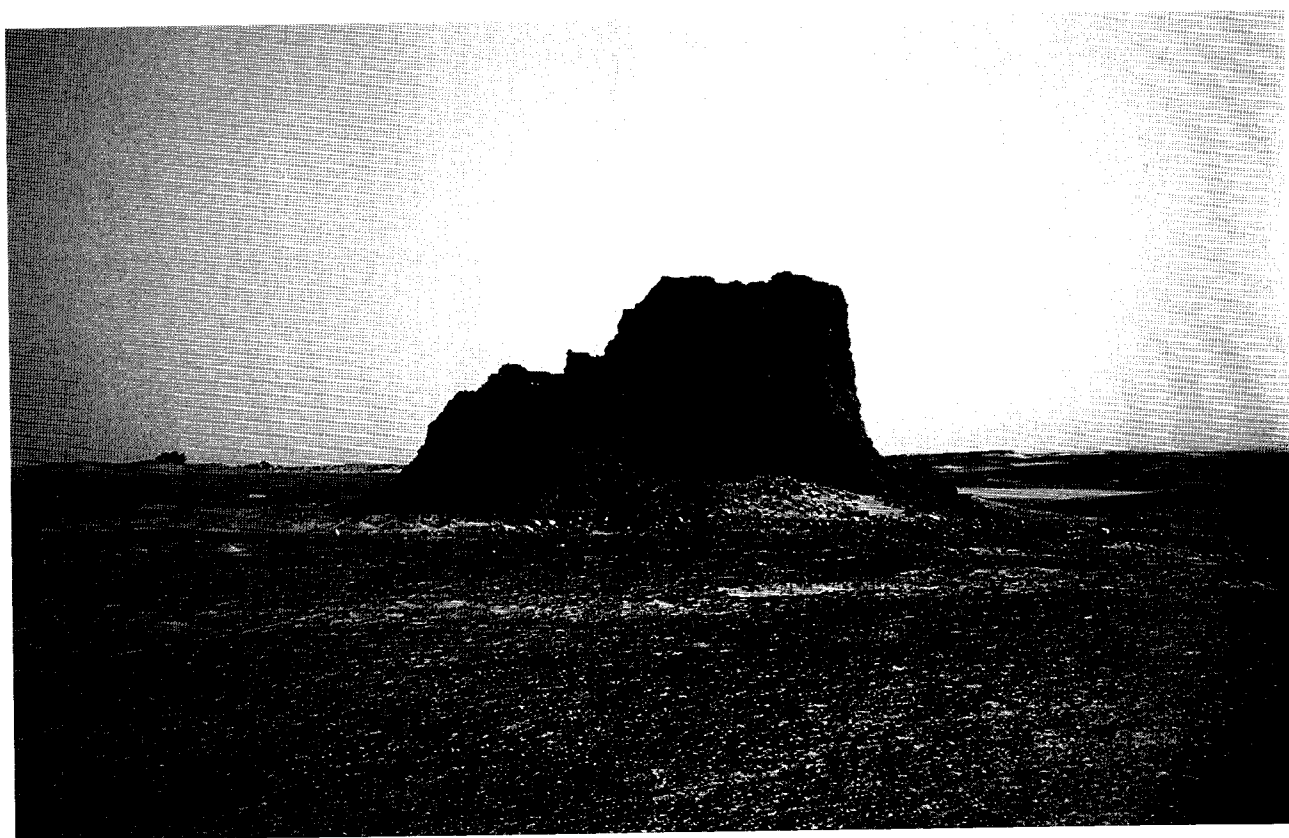
Team members: DR SALIMA IKRAM (co-director, mortuary archaeology), DR CORINNA ROSSI (co-director, military architecture), DR ALAN CLAPHAM (archaeobotanist), AMANDA DUNSMORE (ceramicist), RICHARD and ANGELA KNISELY-MARPOLE (chief surveyors), DR ALAN ROWE (routes and ethnography), ILKA SCHACHT (hydraulic specialist), NICHOLAS WARNER (architect, domestic architecture), LESLIE WARDEN, KATHERINE BANDY, HALA SAID and HIROKI ISHIYAMA (surveying assistants). The team was assisted on the field by MAHMOUD MAHDI, Inspector and MUSTAPHA ABD EL-SATTAR, Policeman, and was assisted and supported by IBRAHIM BAHGAT, Chief Inspector.

Abstract

This article contains an overview of the first two seasons of work of the North Kharga Oasis Survey. The survey area includes several archaeological sites at various degrees of preservation. The first season was dedicated to the basic identification and exploration of all sites, whilst the second focussed on the study of Ain Gib and Qasr el-Sumayra. The archaeological remains in the area include the standing remains of small forts, settlements, necropoleis, extensive water systems and traces of ancient cultivations. Theodolite, walking, and aerial survey methods were used to accomplish the aims of the project.



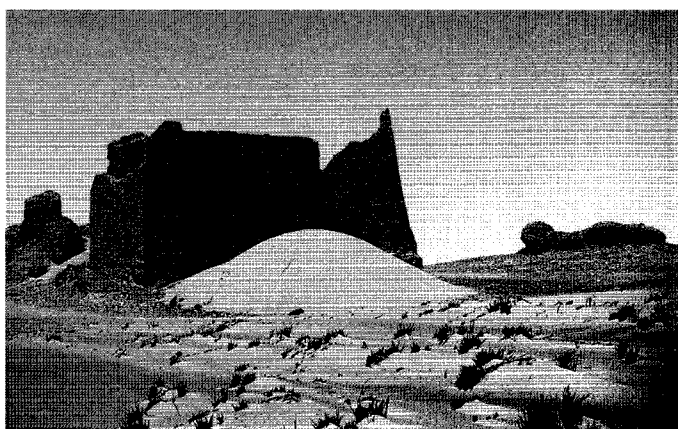
a) South-east view of Qasr el-Gib from the air, April 2001 (Photo: RICHARD KNISELY-MARPOLE, ©NKOS)



b) South-west view of Qasr el-Sumayra, April 2001 (Photo: CORINNA ROSSI, ©NKOS)



a) South view from the air of the ancient field-system of Settlement A, with a mud-brick structure visible in the foreground.
January 2002 (Photo: RICHARD KNISELY-MARPOLE, ©NKOS)



b) Mud-brick enclosure of Ezbet Muhammed Tuleib seen from the south (Photo: SALIMA IKRAM, ©NKOS)



c) A petroglyph showing a man with a prominent back-side, perhaps engaged in a dance (Photo: SALIMA IKRAM, ©NKOS)

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