DAKHLLEH OASIS PROJECT
REPORT TO THE SUPREME COUNCIL OF ANTIQUITIES
ON THE 2004–2005 FIELD SEASON

A. J. Mills

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INTRODUCTION

The 2004–2005 field season of the Dakhleh Oasis Project began on 21st November, 2004, with the arrival of the director and several members at the ‘Ain el-Gindi camp which is the expedition headquarters. Actual field excavation work began on 24th November and continued after that until 24th March, 2005. As always, our work was varied and all of it interesting. At the beginning there was excavation at the Old Kingdom settlement, ‘Ain el Gazzareen; from there we moved to the Ismant el-Kharab cemeteries and then to the town site itself. Following work at Ismant el-Kharab, one team moved to Mut el-Kharab and another began excavating at Amhida. In addition, the environmental scientists pursued field studies in geology, zoology, and palaeobotany.

The major conservation works this season were at ‘Ain Birbiyeh, a Roman period stone temple, and at el-Qasr, a medieval Islamic mud-brick village. Other conservation efforts were at the Mammisi shrine of Tutu and Ismant el-Kharab, and in a villa with painted wall decoration at Amhida.

These various activities will be described in some detail in the following reporting.

ENVIRONMENTAL STUDIES

The work of several teams went forward this season. Their work is integrated with that of the archaeologists.

GEOLOGY

The chief geologist, Dr. Jennifer Smith, reports as follows:

We have continued our geological investigations in Dakhleh in the 2004–2005 field season in order to further our understanding of the paleoenvironmental history of the region, and to add greater detail to our reconstruction of the landscapes occupied by prehistoric people. Based on work by DOP members and others, we now understand the Western Desert region to have undergone a series of arid-humid oscillations throughout the Pleistocene, with a cyclicity of 100 ka (kilo annum, or thousand years) or, quite likely, less. During humid phases, which may have lasted 10 ka, conditions were probably semi-arid, with a savanna flora and fauna occupying this currently hyper-arid region. The enhanced rainfall during these times was likely linked to the enhanced northward penetration of the Atlantic (African) Monsoon, which currently brings rain to low latitudes of western Africa. Southward penetration of Mediterranean rain, or, less likely, north-westerly movement of the Indian Ocean monsoon may also have brought rain to this region. We hope to use the Pleistocene sediments preserved in Dakhleh to shed light on some of these issues.

The bulk of our field effort was directed at systematically examining the Pleistocene iron and carbonate deposits in the Sheikh Muftah, Balat, and Teneida areas. We also spent one morning at ‘Ain el-Gazzareen, examining a section exposed there, an afternoon attempting to relocate an archaeological site atop the Limestone Plateau in the western portion of the oasis, one day investigating and mapping the tufa discovered two years ago north of the Budkhulu Promontory. Finally, some time was spent investigating the ‘radar dark’ circular feature identified by Albert Haldemann from SIR-C (Shuttle Imaging Radar) imagery in order to investigate any potential extraterrestrial impact-related anomalies in the region.
Our principal goal for the analysis of Pleistocene basinal sediments in Dakhleh was to determine the extent to which both spatial (i.e., within individual basins and between basins) and temporal paleoenvironmental variation was recorded by these sediments. Therefore, we visited a number of localities in each basin. Elevations were established for the tops of the Quaternary deposits and, where possible, the bases of the Quaternary deposits using DGPS (differential global positioning system). On occasion, particular stratigraphic contacts within the Quaternary sediments were also documented via DGPS. Based on conditions (atmospheric, satellite geometry, etc.) during data collection, the calculated error for most DGPS positions was 30 cm vertical and 20 cm horizontal. The locations of DGPS data taken can be seen in Figure 1.

Pleistocene lacustrine sediments are primarily found to the south of Sheikh Muftah, Balat, and Teneida (Figure 1). These sediments, which primarily comprise loosely consolidated sandstones and sandy lacustrine marls, overlie the Mut and Taref formations, which are deformed into gentle, northward plunging folds. Age estimates for the sediments are between 250–300 ky B.P., as derived from the amount of deflation required to expose the outcrops at their present elevations (Churcher and Kleindienst, no date). That date is also consistent with the Early and Middle Stone Age artefacts that occur in association with the sediments (e.g. Churcher and Kleindienst, no date). These sediments have been previously described by Brookes (1993), Frizano (1996), Churcher et al., 1999, and Churcher and Kleindienst (no date) in terms of their lithology, paleoenvironment,
palaeontology, and palaeoclimatic implications. However, no high resolution inter- or intra-basinal stratigraphic analysis has yet been conducted for the purposes of constraining depositional environments and water balance throughout the lifetimes of the respective lakes. In this field season, a centimetre-scale stratigraphy was constructed for 20 outcrops in the Sheikh Muftah (Kellis Palaeolake) Basin, 35 outcrops in the Balat Basin, and nine outcrops in the Teneida Basin. Topographic control (provided by the DGPS survey discussed above) will allow for the construction of the paleogeometry of the basins so as to estimate past water balance, as well as interpret across-basin sedimentary facies changes.

Kellis Palaeolake Basin

Outcrops of the Pleistocene lacustrine sediments commonly occur as isolated hills or yardangs, overlying the Mut Formation, or Taref Formation in the southernmost outcrops in the basin. The basal contact of the lacustrine sediments with the Mut formation is typically 1–2 metres above the level of the present basin surface. The basal unit generally comprises iron-rich sandy sediments, which are commonly poorly sorted and contain abundant gravel, graded beds, as well as dewatering structures. These sediments are generally overlain by at least a metre of sandy silts which are generally orange in color, with green veins and calcium carbonate-rich horizons. The sandy silts are usually overlain by a green mud-rich siltstone. The in situ Dakhleh glass noted by Churcher and Kleindienst (no date) was observed in at least two stratigraphic layers separated by about half a metre of green silts in three outcrops in the Kellis Paleolake Basin, and as a single layer in several other deposits. The freshwater gastropods, *Melanoides tuberculata* and *Planorbis planorbis* were also found in situ in the cap of the thickest section measured.

Balat Palaeolake Basin

In the northern portion of the Balat basin, the sediments are exposed on the tops of Taref sandstone yardangs, whereas in the southeast, they occur as isolated hills atop Mut formation, and the facies exposed in these respective regions differ significantly. The sediments in the western portion of the lake are consistent with more marginal facies than those in the east, as the units of sandy silts contain abundant evaporate minerals, such as gypsum and halite. Some outcrops are capped by travertine containing stem and leaf casts. The sediments towards the east and the inferred interior of the lake that overlie the Mut formation are more consistent with deep water deposition. These sediments are typically overlain by green, muddy silts, and then by yellow-green, carbonate silts, which can reach several metres in thickness.

Teneida Palaeolake Basin

Nine outcrops of Pleistocene lacustrine sediments were examined in the Teneida Basin. Like the Balat Basin, differences in the sediments were noted, which can be interpreted to be lake marginal-to-distal differences in the strata in terms of the evaporite content of the sediments. In the Teneida Basin, the Taref sandstone is generally overlain by blocky green claystone. The claystone is overlain by green carbonate silts, in which lateral changes in the halite and gypsum content was noted. Abundant freshwater gastropods (*Planorbis planorbis* and others) previously noted by Churcher and Kleindienst (no date) were found in one deposit, attesting to the presence of fresh water within the basin during the time those sediments were deposited.
Figure 2. Spring mound in the Kellis Basin, backpack for scale.

Figure 3. Example stratigraphic section of a spring mound from the Kellis Basin.
Spring Mounds *(K. A. Adelsberger)*

Spring mounds; small and isolated hills capped by multicoloured silts, iron-rich sands, and iron precipitate; have been observed and described in a limited form by previous researchers working in Dakhleh Oasis (e.g. Brookes 1993, Frizano 1996). During the 2004–05 field season the goal was to characterize the morphology and stratigraphy of these mounds in the Kellis and Balat basins (Figures 2 and 3). In the Kellis Basin, a locally intensive examination of a single mound ‘field’ resulted in photographs and descriptions of eighty-eight separate spring mounds as well as other topographic features in the area. Each mound was measured as a stratigraphic section and mapped using GPS (global positioning system) equipment and then incorporated into a regional map using GIS (global information system) software. Elevations and precise geographic locations of all mounds and features were recorded in this way. The mounds were then described in terms of sediment texture and colour, presence or absence and character of ironstone precipitation, and other interesting features such as root casts or burrows present in the section (Figure 4).

Following this detailed examination of a single geographic area, a more random sampling of spring mounds located during a general survey of the Balat Basin was examined. In this area thirty-six mounds were described over a much larger area. These mounds were also mapped using GPS and GIS and described according to sediment character and presence or absence of ironstone. Although much of the data has yet to be analyzed, the initial impression at the end of these few weeks of fieldwork is that the overall morphology of the mounds in both areas is a good predictor of the sediments that will be found upon closer examination, and that these morphological differences may also suggest slightly different environments of origin. In the Kellis Basin, for example, the mounds take a number of different morphological forms; there are many conical mounds as well as many longer and more plateau-like hills. I suspect that the longer hills, which also maintain a thicker
ironstone cap, may have originated as ‘ponding’ areas and not necessarily as spring vents themselves. The iron-rich nature of the water led to the formation of thick layers of iron precipitate over time. This occurred in an area rich with plant life, as indicated by the root casts and plant impressions contained within these ironstones (Figure 4).

In the Balat Basin, the spring mounds seem to take three primary forms that change in a north-south line. Those farthest to the south are lower mounds with thicker ironstone caps. The mounds in the center of the ‘field’ are more conical but maintain a much thicker, and more varied, package of sediment. The mounds farthest north, in contrast, have a greater vertical height and good outcropping sections of sediment, but they very rarely contain ironstone. I suspect that this may be at least partially due to the fact that the anticlinal and dipping nature of the bedrock across this north-south line exposes more Mut Formation shales to be eroded in the north, thus allowing erosion to create more obvious outcrops and breakdown spring deposits more quickly. This bedrock structure may also have caused an initial difference between springs in the north and those in the south, as the groundwater would have had to force its way through sandstone in one area and shale in the other. Further examination of the data will be necessary to allow for a more accurate interpretation of the spring mounds.

Budkhulu tufa

In contrast to the spring carbonates of Kharga Oasis, Dakhleh spring carbonates (or tufas) are generally rather a really restricted. This may be the result simply of a preservational bias, resulting from the difference between a principally north-south trending escarpment (as in Kharga) and a principally east-west trending escarpment (as in Dakhleh). Alternatively, it may be the result of the interaction between bedrock structure and groundwater movement, with rock deformation (folds and faults) tending to move water towards the escarpment at Kharga and away from the escarpment at Dakhleh. Nevertheless, several localities of spring carbonates have been recorded from Dakhleh; it was not felt that the full extent of the Budkhulu tufa had been discovered in 2003; therefore we revisited the region, in part to examine a wider area than had previously been investigated, but also to make a detailed map of the known tufa outcrop (the completion of which will require some processing of the DGPS data). We did identify additional tufa this season, at significantly higher elevations, though only in limited quantities. We retrieved some samples with interesting plant casts for further examination by DOP paleobotanists.

Evidence for impact of extraterrestrial object(s?) in Dakhleh

In order to discover whether the radar-only circular feature identified near Balat might be accompanied by some surface anomalies, Smith walked a transect from the SW corner of the feature (~4 km in diameter) to nearly the centre, describing the landscape, surficial materials, etc.

Little particularly anomalous was observed in the outer portion of the feature, though some of the carbonate deposits exhibited localized changes in texture and color (meter-scale dark, dense regions) which could be attributed to an irregular heating. This amount of variation in carbonate appearance and structure, however, is by no means limited to the radar dark area, though this certainly does not rule out an impact related explanation for the phenomenon. On the closest carbonate-capped hill to the center of the feature (~800 m from the geometric center), there were several 10–15 cm diameter pieces of Dakhleh glass, as well as additional smaller pieces, some of which occupied a surface at approximately the same elevation as a thick (10–15 cm) layer of black
sediment. Though this layer of black sediment was examined closely in several places, no pieces of Dakhleh glass could be observed within the stratigraphic section. The section on this particular hill consisted of Mut Fm. muds overlain by 20–50 cm of blackened, weathered Mut Fm., overlain by 5–10 cm of orange mottled black-brown sediment, underling ~10 cm of black sediment, itself in turn overlain by ~0.5 m of carbonate. The black layer did not crop out uniformly along the hill; in several places it appeared absent.

Figure 5. Boulders representing the remnants of the cap of a low spring mound near Balat.

A spring mound adjacent to the hill discussed above also appeared ‘anomalous’ (Figure 5). The ferruginized sandstone cap of the low mound persists in the form of several large boulders; typically, low mounds such as this do not have such massive caps. The link between the radar dark feature and the large cap boulders of this spring mound is not immediately obvious; perhaps alteration of spring sediments by heat or pressure enhanced the resistance of the caprock to weathering. A more intriguing anomaly with this particular spring mound was the presence of a breccia, apparently composed of the grey to white silts which usually comprise the throats of the spring mounds. These were not observed at any other spring mound in the Balat or Kellis basins (over 100 were visited). Unfortunately, the breccia was not observed in place; there were several
loose blocks around resulting from some digging activity on the top of the spring mound. Interestingly, other (higher elevation) spring mounds in the general vicinity (also within the radar dark feature but not as close to the center) appeared ‘normal’ in every way.

A final, potentially relevant observation was that on two of the carbonate capped Mut Fm. hills to the west of the Dakhleh Glass-bearing hill, the surface of the Mut Fm. appeared blackened; and the fracture/mudcrack infill at the Mut Fm. surface (a common feature wherever the Mut Fm. crops out) was also black, and in some places contained oriented granule sized pieces of what appear to be the quartz concretions (quartz balls) which occur within the Mut Fm, though further study is needed to definitively identify this material.

References


Churcher, C. S., Kleindienst, M. R., Great Lakes in the Dakhleh Oasis: Mid-Pleistocene Freshwater Lakes in the Dakhleh Oasis Depressions, Western Desert, Egypt


ZOOLOGY AND PALAEONTOLOGY (C. S. Churcher)

My field season in Dakhleh Oasis was from 13th January to 8th February, 2005. My wife Bee accompanied me as my field assistant for photography and GPS readings, etc. We overlapped with Dr. Jennifer Smith for only one day as she was in Kharga Oasis when we arrived: thus we were unable to carry out any co-operative fieldwork

‘Ain el-Gazzareen – Old Kingdom Fauna

A series of 21 faunal samples from this Old Kingdom site was analysed for faunal diversity and occurrences. Cattle (Bos taurus), goat (Capra hircus) and Dorcas gazelle (Gazella dorcas) were the commonest large mammals, with the minimum numbers of individuals (MNI’s) somewhat inversely proportional to the taxon’s bone weight – numbers and weight of bone fragments (11, 21 & 17 and 9,065, 1,360 & 0.280 kg for the three major food animals, respectively). Birds recorded: – Goose (Anser anser) -2, duck (Anas platyrhynchos) -1, pigeon (Columba livia) -4, small birds - ?2, ostrich (Struthio camelus) egg shell and others – rabbit (Oryctolagus cuniculus) –5, donkey (Equus [Asinus] asinus) – 1, hartebeest (Alcelaphus buselaphus) – 1, lizard (?skink – Scincus sp.), Nile oyster (Etheria elliptica) –1, turret snail (Melanoides tuberculata) – 9.
Evidence of mice as skeletal elements or dried bodies is common, with some 4 scattered samples. However, a large sample of owl scats produced evidence of some 576 individuals on the basis of incisors or MNI = 452 individuals on the right dentaries alone. Five shrew right dentaries were also found.

The shrew that was found among the mouse bones at Ain el-Gazzareen appears to be the Egyptian Dwarf shrew, *Crocidura religiosa*, known recently only from the area of the delta and Nile near Cairo, and founded on a mummified specimens from Thebes. Also, no shrews are known recently from any of the Egyptian oases nor from the Egyptian Upper Nile. However, Wendorf et al., (1993) reports three shrews, including *C. religiosa* (+ 4 specs.) from the Middle Palaeolithic of Bir Tarfawi. Thus, this record is both ultralimital for Holocene/ recent Dwarf shrews and distant from any record for this shrew in Egypt. I have measurements to support this identification.

The mice involved are the Egyptian house mouse, *Mus musculus praetextus*, and the Large gerbil, *Gerbillus pyramidium gedeedus*.

Few tools were recovered and included two solid awls, one awl from a bone spatula. The Nile oyster shell may have shown signs of use wear but was damaged.

**Ismant el-Kharab (Kellis) – Roman 2nd–3rd Century Fauna**

A series of 80 faunal samples obtained in 2005 from Areas B (15) and C (64), plus one sample from Room G in 2000, were analysed. MNI’s from all the samples are given with those from Area B ahead of those from Area C or the area is indicated; ‘j’ indicates juveniles or subadults. As expected, cattle (*Bos taurus*) 1:9+2j, goat (*Capra hircus*) 2:13, donkey (*Asinus asinus*) 7:16, and Dorcas gazelle (*Gazella dorcas*) C 1 were the commonest large mammals, but red fox (*Vulpes vulpes*) C1, cat (*Felis catus*) C:1j, birds were pigeon (*Columbia livia*) C 1, chicken (*Gallus gallus*) 1 (egg shell): 7 (1 egg shell), duck (*Anas platyrhynchos*) C 4 (feathers), an unidentified wading bird, and molluscs apple snail (*Pila ovata*) C 3. Mice are present, probably a mix of ancient and modern intrusive animals, 2:5, and one rat C 1. Dung from donkey occurs in C 7 times, from dromedary (*Camelus dromedarius*) once B 1, and cat and man (*Homo sapiens*) once C 1.

The small number of goats and the larger relative number of donkeys are remarkable, and the absence of any pig (*Sus scrofa*) is unexpected. The buildings have been interpreted as stables and in this it seems correct. Certainly they were not styes.

**Amhida**

A visit to Amhida was made to pass an opinion on a magnetic linear anomaly on the flatland near the parking area. Nothing obvious was visible upon inspection and no surficial feature suggested any explanation. Suggestions were offered for minor expansion of the excavation to expose a broader cross-section across the lineation.

While investigating the most northerly of the Mushiya CSS hills, some crude ‘wedge’ or ‘pick’ tools, and the point end of a good hand-axe, all in a ruddy limestone, were noted scattered over the surface of the ridge among the pottery sherds and fragments of calcreted CSS. The whole tools are about 25 cm long, vary in thickness and width, and have smoothed working ends. Many tools were broken transversely, often with hinge fractures, suggestive of leverage use when broken. These
were shown to A. J. Mills and may have been tools for mining the tombs or CSS calcrete. An estimated sample of circa 40 specimens may be present.

**Romano-Byzantine Stone Sources**

While searching for beach cobbles, we found evidence of extensive quarrying activity in small gebel isolates and headlands of the Taref sandstone rim. This is the first evidence of dressed stone quarrying on the rim, and thus of the source for some of the stone for the Roman Egyptian temples at Kellis or Mut, and possibly ‘Ain el-Azizi. Evidence of systematic removal of wall blocks (circa 30 sq cm cross-section) and column drums (circa 1.2 m diameter) is widespread. Other quarry activities south of Ezbet el-Hajir recorded in previous years were to obtain larger roofing slabs and smaller building blocks. We took a party to view the site on 5th February. A. Zielinski is interested in mapping the site from the viewpoint of industrial activity.

**Asteroid Research**

Dr. Jen Smith reported a site south-west of Balat that was capped by CSS calcrete over Mut Fm. muds. A confused layer of discoloured sediments and black deposits suggested that these might represent carbonised vegetation ejected by the asteroid event that formed the Dakhleh Bow Wave Structure east of Teneida and on the north-east margin of Palaeolake Teneida. We visited the site on 15th January. My interpretation of the section is that a set of disorganised (due to slumping and/or de-watering) transitional silty basal palaeolake bottom beds rests on basal Mut red muds and supports recrystalised CSS marl deposits. The discolourations probably stem from the vent deposits that are present in nearby spring mound structures. These would provide both dark and light iron oxides, sulphides and purer black manganese oxides, thus suggesting the presence of charred materials. It is unfortunate that this site did not produce materials that would bear witness to the asteroid airburst or impact. We obtained a small grab sample for confirmatory analysis.

**Palaeolake Research**

**Cobble Hill**

Further investigation of ‘Cobble Hill’, the small gebel to the south of the Taref Fm. sandstone rim that bears remnant beach cobbles at an elevation of 167/168 m above sea level (a.s.l.), involved repeating recording its Latitude, Longitude, and Altitude. We measured 14 cobbles that lay free on the surface to obtain the following ranges and means (mm): greater diameter/length 180-54, 103; lesser diameter/breadth 107–38, 73.1; and least diameter/thickness 47-21, 35.1. The largest cobble is 180 x 102 x 41 and weighs 1 kg. We also searched other Taref sandstone gebels in the sand plain south of the oasis rim and south of Sheikh Wali, especially at the 165–170 m a.s.l. level, in the hope of finding another cobble witness gebel, but without success.

**CSS presence in Western Palaeolake Kellis**

Searches for Palaeolake Kellis/Balat CSS marl capped gebels occupied our major efforts. The gebels south of the Taref rim south of Sheikh Wali through to the aerodrome road were revisited and none bore any CSS marl icing, though some areas of CSS were noted within the rim but higher
on the Taref sandstone dipslope. None was found south-west or west of Mut or the Mut-Qalamun road. Areas south-west of Gedida were visited in 2003 and 2004 and geologically the section there is Taref Fm. sandstone bearing Mut Fm. red muds topped by grey and black shaley Duwi Fm. deposits. The southern half of the promontory that lies west of the line of four tall gebels was visited in 2003 and 2004, and is higher than the northern half. The northern part was visited and found to be Duwi shales over Mut red muds without any showing of Taref sandstone at its base. No CSS marl was observed. We were unable to venture far into the south-west basin and so have not examined either its southern or western margins. An isolated hill lies central within the northern peneplain and rises to 183 m above 177 m on the peneplain. At this height, the lone hill might have been emergent from Palaeolake Balat and certainly from Palaeolake Kellis, as would the four tall gebels south of Gedida.

Five hills lying west of Mushiya to south-west of Amhida have flat caps of calcitized CSS marl that has been so recrystallised that no fossils are likely to be preserved. These hills lie in a north-south lineation and heights of 139 to 146 m, and thus below the 167/168 beach level at Cobble Hill. Two large vent hills with iron rich ‘lateritic’ appearances lie to the west of the southern pair of CSS bearing hills. The two hills south-west of Amhida north-west of Sheikh Karvrasz’ tomb have been heavily mined for tomb chambers and their CSS crests almost completely stripped, being present mostly as free blocks of calcrete lying on the surface. It is likely that the calcitized CSS was used for lime or for doors to the tombs.

An isolated exposure of Mut clays west of the Gedida-Qasr road and north of Mushiya bears four pinnacles of CSS and transitional basal beds. Its height is 143 m a.s.l. A fragment of the vertebral arch, probably thoracic, and seemingly from an elephant (Loxodonta africana), was obtained from the basal contact beds of the north-west pinnacle. This is the first bone that is assigned to this taxon on qualitative characters as well as robustness, and thus is the first record of elephant for the Iron Balls Fauna. We may now confirm that the CSS marl unit extended as far west as the vent field west of Mushiya and as far north as the Amhida mound. However, there is no remnant of CSS anywhere west or south-west of Gedida.

The question of whether there is any CSS remnant in the north-west basin, south of Maohoub, was investigated and, although there are high emergent Duwi noses in the Sio’h Ridge, none bear remnants. The surface of the Taref sandstone south of Bir Talata al-Maohoub and D2-2 is stripped by aeolian erosion, as well as by generations of rock pickers and quarriers, and no CSS was visible. The Taref rises to a more or less even peneplain crest at about 154 m with peaks at 162 m on this ‘South Maohoub’ sandstone block. These altitudes are still below the 167/168 height of Cobble Hill and suggest that the crest might have lain below the estimated 180 m crest of Palaeolake Balat. If an estimated 20–30 m of sandstone crest has been eroded, an emergent island or peninsula at 200–210 m might have existed in the palaeolake. This would have created a two-pronged bay as the western outline of Palaeolake Balat or Palaeolake Kellis.

The details of the shorelines around these two bays need investigation and this is projected for a future season.

**Bedrock Stratigraphy of the Western Palaeolake Basin**

The stratigraphic sequence from north to south across the Maohoub bay is weathered Dakhla Fm. shale upon Duwi phosphoritic limestones and limey shales, in turn over Mut red muds with Taref sandstone at the base. The Taref sandstone rises to an almost level peneplain at *circa* 155 m. At its
southern margin the South Maohoub sandstone block quickly gives way to a lowland plain at *circa* 130 m, a descent of *circa* 25 m. On the southern margin of this plain the bedrock is Mut red muds. A problem exists therefore as to whether the South Maohoub sandstone block is an anticlinal fold or is limited by a fault along its southern margin. This is also a project for future investigation.

**Note**: the editor inadvertently omitted Professor Churcher’s 2004 field report. We add it here for those readers who wish to be kept up to date. Apologies to Professor Churcher and to his readers.

**Field Report for 2004 of C. S. Churcher, Dakhleh Oasis Project**

My field season in Dakhleh Oasis was from 25th January to 2nd March, 2004. The main foci of investigation were the shorelines and features of the Palaeolakes present in the Dakhleh Oasis depression, the features of the meteorite event in the eastern part of the oasis, and my continuing interest in the fossil vertebrates of the Late Cretaceous bedrock strata, mid-Pleistocene Iron Balls fauna in the palaeolake deposits, and Holocene pan deposits. The palaeolake and meteorite investigations involved my wife, Bee, as my field assistant, and cooperative fieldwork with Dr. Maxine R. Kleindienst in the two week period 19th February to 1st March. Identifications of faunal debris from the Romano-Byzantine town of Kellis, and from the old town mound of Mut (Mut el-Kharab) for Dr. Colin Hope, and smaller samples from the lookout site of Seth for Dr. Olaf Kaper were done as opportunity allowed.

**The Dakhleh Palaeolakes**

The stretch of shoreline along the southern margin of cultivation from south of Masara to south of Mut had not been investigated in previous years. I managed to find a way across the cultivation to the desert to the south from the DOP dighouse at ‘Ain el-Gindi, just west of Esbet Sheikh Wali, and used this access to examine the distribution of the Palaeolake Kellis marls (CSS) atop the surviving small gebels or hills. CSS is present on top of many of them, although most have only surviving remnants, and fossils or artifacts are sparse to rare.

The mounds evident on the oasis floor and which show as low, greyish hills among the cultivation or as gebels with sedimentary caps in the nearby desert to the south have been mapped as spring mounds related to past sources of water. On investigation these mounds have bases of either early bottom sediments from the oasis palaeolakes or remnant highs of Mut Formation red clays. The contact between the lake deposits and the bedrock t Mut clays is often uneven and composed of thin-to-thick stringers of calcium carbonate rich creamy to yellowish ‘marl’ similar to CSS, red-brown iron rich units that may be considered as Ferruginous Silty Sediments (FSS), and variably dark grey to black or even greenish, forming a colourful layercake contact between the two major units. They represent the infilling and prograding waters of the palaeolakes as they filled the palaeobasins to form permanent lakes. Casts of reed stems and roots, possibly *Phragmites* sp., are present in these shallow early lake deposits. The sparse fossil evidence recovered this season include a camel jaw with a last molar, resembling the extinct *Camelus thomasi*, and a horn base of an antelope with vertically placed horns as members of the Iron Balls Fauna.

Investigation by Kleindienst and me of a stack gebel south of Masara revealed a remnant cobble- and-sand beach deposit against a fragmentary cap of Taref Formation sandstone with fallen rocks amongst which the cobbles and sands. No investigation of this exposure has been attempted but
preliminary observations show the cobbles to be typically flattened, ovate and up to circa 12 cm in greatest length. This remnant confirms a beach at circa 165 m asl which was subject to moderate wave action. This 165 m elevation is in agreement with Kleindienst’s and my estimation of the elevation of the top of the CSS units.

Bee Churcher and I also surveyed west and southwest of Gedida, and along the Duwi exposure (Sio’h Ridge) southwest of Deir el-Hagar and southeast of Gebel Edmonstone looking for remnant shoreline features for the western basin of Palaeolake Kellis. No mid-Pleistocene lake features were observed although some Pleistocene Laminated Sediments (PLS) were present in the Sio’h Basin north of the Sio’h Ridge and in the depressions south of the ridge. PLS yardangs are also present in the cultivation area at Bir Talata, southwest of Maohoub, as well as at the fossil and archaeological locality of D2-2 (Loc. 006).

Meteorite Impact Feature (BLF)

The curious disturbed stratigraphic anomaly originally termed the ‘Bow Wave Feature’, lying north of the north-eastern corner of Camel thorn Basin and of the north-western corner of El Akoulah Pan, and now recognized as a meteoritic event has elicited some interest from scientists concerned with impact features on earth and her sister planets. Dr. Maxine Kleindienst has been asked by Dr. Henry Schwarcz to ascertain some parameters of distribution of the locally found ‘Dakhleh Glass’ (DG) and of the presence of heat or shock altered rocks in and around the feature. To that end, Maxine, Bee and I, sometimes accompanied by other scientists, spent time over some 10 days revisiting the area involved, taking GPS Latitude and Longitude readings of selected features, sampling surface deposits, and collecting varied rock samples that might exhibit altered states due to the effects of heat, pressure or displacement. For details of these activities, please see Dr. Kleindienst’s report.

The anomalous geological stratigraphy appears to be even more extensive than first suspected and more detailed mapping will have to be done.

Vertebrate Palaeontology

My continuing interest in the fossil vertebrates of the Late Cretaceous was not enhanced by further collecting or mapping, due to lack of time and opportunity. Searches of the exposures of CSS on the crests of hills provided few additional specimens, but did provide a partial camel jaw to confirm this animal’s presence in the Iron Balls Fauna (see above). However, limited collecting in the Holocene pan sediments on the eastern margin of Camel thorn Basin resulted in acquisition of some 20 additional gazelle elements. Collecting from the surface of the hearth middens at Loc. 406, in the area surrounding the place that yielded the ass, Equus asinus, resulted in additional gazelle, possible goat, and hartebeest postcranial elements, bedrock strata, mid-Pleistocene Iron Balls fauna in the palaeolake deposits, and Holocene pan deposits.

I managed to revise my report on the ass from Loc. 406, to cooperate with Maxine Kleindienst in updating and refining our joint paper on the great lakes in the Dakhleh Depression, and to add observations on the modern fauna of the oasis, of which two Sightings, of a male and female, separately, of the wild cat, Felis lybica, were the highlights.

C. S. Churcher, ‘Ain el Gindi, 1st March, 2004
ARCHAEOBOTANY

This year’s field seasons of the archaeobotanists Ursula Thanheiser and Johannes Walter lasted for three weeks each. During this period plant remains from one Holocene site, the Old Kingdom site ‘Ain el-Gazzareen, and the Roman settlements of Kellis and of Amhida were extracted and analysed.

Holocene Site

This year’s work concentrated on the extraction of plant remains from the epi-palaeolithic site Loc. 265, excavated in previous seasons by Dr. M. McDonald. Unfortunately, the sediment was again poor in botanical remains, coinciding with results from other areas within the location. The low frequency of plant remains on this site seems to reflect a special use.

Old Kingdom Site – ‘Ain el-Gazzareen

Ten soil and ash samples were taken at the site from ashy deposits visible on the surface plus some additional samples from excavated structures. The results are very similar to those of previous seasons: The majority of plant remains are cereals (barley – *Hordeum vulgare* and emmer wheat – *Triticum dicoccum*), and fuel (twigs, flowers, seeds and fruits of acacia – *Acacia sp.* and tamarisk – *Tamarix sp.*). The associated weedy species belong predominantly to the taxonomic groups of *Brassicaceae*, *Fabaceae*, *Poaceae*, and *Cyperaceae*.

Kellis

Several botanical samples from area C/2/8 were analysed. They contain very regularly cereals (barley – *Hordeum vulgare*, bread and hard wheat – *Triticum aestivum*, *T. durum*) and millet (*Pennisetum glaucum*) as well as other field crops like fava bean (*Vicia faba*), lentil (*Lens culinaris*), safflower (*Carthamus tinctorius*), cotton (*Gossypium sp.*), and flax (*Linum usitatissimum*). Spices (coriander – *Coriandrum sativum*, rosemary – *Rosmarinus officinalis*) and fruit (olive – *Olea europaea*, grape – *Vitis vinifera ssp. vinifera*, date – *Phoenix dactylifera*) occur regularly. The common weeds belong to the taxonomic groups of *Poaceae*, *Brassicaceae*, and *Fabaceae*. Beside these groups *Asphodelus fistulosus/tenuifolius*, *Calendula arvensis*, and *Alhagi maurorum* occur in several samples. The most common shrubs and trees, presumably used as fuel, are acacia (*Acacia sp.*) and tamarisk (*Tamarix sp.*).

Amhida

As in the previous season, an extensive sampling programme was carried out in the newly excavated areas in Amhida. Being roughly contemporaneous with Kellis we hoped to gain further insight into the provision of food for the local population plus the production of surplus for the exportation to the Nile valley. Unfortunately preservation of plant remains is very poor in Amhida
for reasons we are unable to understand so far. Therefore only charred macro remains are preserved representing the most common taxa already known from Kellis.

ARCHAEOLOGICAL STUDIES

HOLOCENE PREHISTORY

The Holocene prehistorian, Dr. M. M. A. McDonald was in the oasis during January 2005. Much of the time was spent analysing chipped stone and other artefacts. A few days also were spent in the field.

A Masara Unit site, Loc. 268, in south-east Dakhleh was the object of intense study. Several Masara sites have been recorded in the general area which are large and have several structures each. The 268 site was, unfortunately badly deflated and without much in situ material remaining. Stone slabs have been undermined and fallen over, no animal bone left, and only the larger pieces of chipped stone. The structures, being in place, were mapped and the remaining artefacts plotted in. The material included cores, tools, grinding slabs and handstones. Cores and tools were collected.

Many of the sizes and shapes of the structures were discernable. There are at least 20 structures in an area of about 70 x 40 m. It is by far the largest Masara site known. Most of the structures are crescentic, usually opening to the south, but others are ovals or circular. The largest are about 6 m in length.
98 artefacts were collected. These include ground stone items and ostrich egg-shell beads. The rest are chipped stone. The collection is bladey and with many quite complex tools. All the cores are in Dakhleh chert. It is probable that we will create a new sub-unity, ‘Masara D’, typified by assemblages at sites 268 and 265.

J. R. Smith’s team mapped an extensive gypsum outcrop SE of Teneida. Interested in human use of the area, I joined them to assess settlement in the area. On the basin floor three clusters of hearth...
mounds covered with fire-cracked rock, and associated with grindstones, ostrich egg-shell beads, some flint tools and pottery sherds. This Loc.422 is a Bashendi B site.

Finally, a day atop the plateau at Maohoub resulted in the discovery of three new sites: two are of Bashendi age, 423 and 425, and bear hearth mounds, grinding equipment, ostrich egg-shell, chipped stone and pottery. The third site, 424, a sparse scattering of flints, is of Epipalaeolithic or Masara age.

In conjunction with the work of Dr. McDonald, Mr. Ashten Warfe conducted studies specifically on ceramics from the prehistoric sites. Some of his time was spent in the field with Dr. McDonald, surveying and collecting samples. From one hearth mound, four vessels were recovered – all of typical ‘Bashendi B’ material. This narrows the dating to 6500–5000 b.p. He also made further experiments with clays from various sources in an endeavour to replicate the clays used in the prehistoric ceramics. The results are encouraging as they shed light on the sourcing of prehistoric clay beds.

HISTORICAL ARCHAEOLOGY

‘Ain el Gazzareen (32-390-K2-2)

This season’s field crew consisted of A. J. Mills, director, R. W. Mortimer, C. Beauchamp and P. Sheldrick, archaeologists, and L. Mills, recorder. The short field season lasted from 24th November until 8th December

The work of at ‘Ain el-Gazzareen (32/390-K2-2), Mushia, was concentrated on two specific areas this year, as well as a surface clearance in the area of well dredgate.

The first area of investigation was originally an illicit excavation made by ?local farmers, who reached bedrock clay after about a metre before abandoning their pit. This pit was excavated quite recently before our arrival as inspector Ahmed Goma said there had been nothing there two weeks previously when he had visited the site. As the pit was almost exactly in the place we had planned to investigate, we simply enlarged it and examined the sides and bottom thoroughly. The pit is in the mapped area G-14 to G-15, within the Building C, which is arguably a temple.

Our intention had been to excavate under the floor of this building to examine the stratigraphy beneath; to look for further architecture and floors, as well as cultural materials. The enlarged test pit we excavated used the western (inner) face of the western enclosure wall as a baulk. The test was some 2.10 metres (N/S) and 1.45 m (E/W). Bedrock clay was reached at a depth of 1.55 m. The wall was 0.76 m high, all below the ground’s surface, but below this were four distinct layers. The uppermost, directly beneath the wall foot, was a level of construction debris with plenty of cultural materials (potsherds, flints, charcoal, etc) in it, which will be of the same date as the wall’s construction and the settlement’s beginnings. Below this was another layer with less cultural materials and in which was a mixture of (?local Sh. Muftah) pottery. Below that was a third level with a small amount of pottery only, which was not obviously Old Kingdom at all. Finally, the last layer was sterile of artefacts.
At a high level, abutting the inner face of the Enclosure Wall was a short, rather poorly built wall, which gave no evidence as to the use of the rooms so produced. It is likely that this was a slightly earlier construction than the Building C, which overlies the Enclosure Wall at this point, but later than the Enclosure Wall itself. It cannot be related to a more extensive construction phase.

The second area of specific interest was a room in which a number of unbaked bread moulds was seen on the surface. This room was at a high stratigraphic level and was filled at one end with stacks of unbaked bread moulds of the type commonly associated with the late Old Kingdom. There were approximately 100 of these items, none of which was whole and complete and most were cracked and broken. They have all been collected and will be studied for assessment of the manufacturing process and an assessment of the bread industry. The northern two-thirds of the room was filled with ash and a great deal of broken pottery. The purpose of the room is not yet clear, although it would seem to have been somehow associated with the ceramics industry – there was a pottery kiln adjacent to it on the east.

In an adjoining room to the west we collected a great number of rodent bones. These were in the vicinity of a silo bottom and the probability is that it was the remains of a nest, feeding itself on stored grains. The bones have been collected for identification and for analysis for tetracycline marking, which may have been a by-product of the storage system.

To the west of this second area, we began to examine the mound of dredgate. The site is bisected by a more recent well cut, with exit channels to N and to S. On the top of the mound is a coarse red clay rubble that must have been the result of the most recent cleaning out of the well cut. This rubble is up to 0.55 metres thick and follows the contours of the mound. Beneath this is a layer of sandy clay, containing artefacts and which must have derived from the original digging of the well. Sherds from this layer may date the excavation of the well. Below this layer is original topsoil, under which is a layer of the Old Kingdom settlement of the site. This latter has not yet been excavated. We hope to excavate this next season as it seems that the cultural remains are preserved to a greater depth due to having been covered by the dredgate.

In sum, given the brief period of time spent on the site, a considerable amount of information has been collected, which will give us further insights into the functioning of this very interesting site.
Dakhleh Oasis Project: 'Ain el-Gazzareen (32/390-K2-2)
Flints

Professor Michal Kobusiewicz, was with the expedition in February and reports as follows:

This season was the continuation of flint studies undertaken in recent seasons. In 2005 following flint assemblages were studied:

A. Flints excavated at the Old Kingdom Site Ain El Gazzareen.
B. Materials collected by the team of Olaf Kaper from several watch posts located in the south-eastern part of Dakhleh oasis.

A. ‘Ain El Gazzareen 32/390-K2-2

Continuation of studies of the assemblage excavated in 2001. Units analysed: 002, 003, 009, 014, 044, 049, 050, 071, 079, 093, 110, 123, 128 and Room 1 building C, Layer 1.

Analysis revealed the same types of cores, retouched tools and debitage as known from former studies. The technology is still the same. Also proportions of types of raw materials are almost the same. Nodular chert is a bit more frequent than tabular chert. Other kind of raw materials such as quartzitic sandstone or quartz occur very rarely. Only sickle blades are made, as always, of Egyptian flint of which fine, high quality blades were obtained from single platform cores by pressure. It is probable that the raw material for sickle blades were imported to ‘Ain el-Gazzareen from somewhere else.

All materials from season 2001 were analysed. Examples are not drawn or photographed yet.

B. Watch Posts

1. The good choice of cores and retouched tools from the watch post Seth Hill (30/420-G2-1) was drawn. It was photographed in 2004. Analysis of Seth hill assemblage is completed.
2. The analysis of the assemblage collected by Olaf Kaper from site Bee’s Lookout (30/450-C-4-1) was continued and finished. A choice of cores and retouched tools was drawn and photographed.
3. Assemblage from Nephtys Hill (30/450-D4-2) from Hut A and from several other investigated squares was analysed. There were a few retouched tools most of which were drawn and photographed. At the site a good number of Middle Palaeolithic blanks and a few cores occur. Most of these blanks were reused (retouched) by the watch post inhabitants.
4. Assemblage from Venus Hill. Watch Post 12. Number of cores, no retouched tools, some flakes and chunks, mostly of nodular chert.
5. Meidum Hill.(13/12-00). Few cores and retouched tools, some debitage. Several Middle Palaeolithic blanks.

The continued study of watch post materials in large extent confirmed the results of former investigation. There are differences in typology. Watch posts contain very few sickle blades, so common in ‘Ain el-Gazzareen. Also many other types known from Gazzareen are missing here. Beside Bee’s Lookout also Nephtys Hill people were using chalcedony. Other raw materials are
nodular and tabular chert, but used in different proportions. The presence of old Middle Palaeolithic blanks collected and reused by watch post men, as well as smaller size of retouched tools found on theirs posts proved the scarcity and problems of obtaining raw material.

**Ismant el-Kharab and Mut el-Kharab (Colin A. Hope)**

Excavations conducted at Ismant el-Kharab and Mut el-Kharab were funded through Monash University, Melbourne, with the financial support of Columbia University and Australians Studying Abroad respectively. They commenced on 8/1/2005 and lasted for a period of six weeks, with three weeks excavation at each site.

**Ismant el-Kharab**

The initial focus of the excavations at ancient Kellis was within the residential sector of Area C (Figure 1), which lies on the extreme east of the site. Here, what was once a continuous area of settlement has been divided by a modern track into two low mounds. Previous work within the western part revealed a domestic unit that has been ascribed to the third century on the basis of textual material, while more extensive work in the eastern section has indicated that it witnessed activity in the second century, again on the basis of textual data. This part of the site also contains evidence of light industrial activity in the form of a potters’ workshop, an area with evidence of iron smithing – and there is ample iron slag across the area – and a small oven or kiln possibly used
either in metal working or for glass or faience. As little is yet known about the residential sectors of the site during the earliest centuries of occupation there, it was decided that the next phase of excavations (2005–7) would focus upon locations where relevant information might be acquired.

Due south-east of the area in which the potters’ workshop is located a large area had witnessed some surface cleaning to reveal a large apparently domestic unit. Further clearance was undertaken and a suit of nine rooms was selected for excavation; the complex is designated C/2/8 (Figure 2).
Figure 3: Ismant el-Kharab, Area B
They form the majority, if not all, of a residential unit that has a single entrance on the north and abuts a street or lane on the east. The structure was filled throughout with brick rubble from the collapse of both walls and roofs. Mud-plaster floors were partially preserved throughout in a number of rooms. One room preserved evidence of a barrel-vault, but others were flat-roofed. There was some evidence of replastering and some doors had been blocked. Abundant artifactual material, primarily ceramics, was discovered. Of note are fragments of papyrus inscribed in Greek and Demotic; the Greek is in small hands and quite unlike those from the late third and fourth century contexts elsewhere at the site. Several Greek ostraka were found with dates in the early second century – year 4 of Trajan, and years 3 and 10 of Antoninus Pius; both emperors are attested by coins found at the site. Parts of two inscribed wooden boards were also found: one, on the surface, is much faded, while three pieces from another are inscribed clearly on both sides with Greek numbers. The central section from a flax comb was found which bears an ink drawing of a woman wielding a stick. The ceramic, including three vessels set into the walls of a stairway, are all of the first to early third centuries.

A second excavation was conducted slightly to the south and designated C/2/9. This was laid out so as straddle the lane against which C/2/8 lay. Four spaces were exposed; two from a complex built to the east of the lane, one a part of the lane, and the fourth from a structure on its west. The fill of the rooms comprised mud-brick collapse from walls and roofs, some roofing material and, at floor levels, substantial quantities of animal manure in the two eastern rooms. This, together with the blocking of most doors in the eastern rooms and the disturbed nature of the floors, indicates a secondary use as stabling. Ceramic data indicates a period of use within the first to early third centuries.

The second area to be examined lies to the west of Area C and may once have been continuous with it; it is designated Area B (Figure 3). It comprises on the north a series of large residential complexes, several with traces of decorated wall plaster, which is separated from a very imposing complex of over 200 rooms on two levels to the south by an area of rather rambling structures. These have been designated respectively B/3, B/1 and B/2. One of the structures in B/3 was
selected for testing to determine the nature of its preservation and the extent and quality of preservation of the paintings; it is labelled B/3/1 (Figure 4)

Preliminary surface wall clearance indicates that the complex comprises a large central hall with four columns of 1.30 m diameter in its northern part and four square piers in the southern part. It is flanked on the east and west by smaller rooms laid out symmetrically and by corridors on the north, south and east, those on the north and east ending at large niches. This unit measure 30 x 30 m, but other rooms may form part of the complex; it appears to have been entered originally from the east. Four rooms on the west of the hall and two on the east were examined. Of those on the west, two are adjacent to the section of the hall with piers, abut one another and are rectangular with their long sides north-south (Plate 1). They are decorated with similar painted schemes incorporating circles or squares filled with alternating patterns of small squares or a rippling in imitation of agate, all polychrome. Narrow columns with Corinthian capitals are painted between these elements, supporting a short frieze of classic wave motif in the northern of the two rooms. The southernmost room is entered from a door at the southern end of its east wall and has a sturdy floor of gypsum plaster set upon stones overlying brick rubble. Its wall design comprises alternately a yellow or pink square within a diamond within a large square (Plate 2). Opposite the door and adjacent to it on the north the scheme is interrupted by a different design based upon intersecting circles with sections coloured pale blue and pink. The room to its immediate north has a similar floor structure and is entered from a door in the east end of its north wall. Its wall decoration is based upon circles on an alternately yellow or pink ground, within which are diamonds with scalloped sides.
By contrast with the exuberant nature of the decoration in these two rooms, the decoration in the two further rooms on the west that were examined is much more restrained. These rooms lie east-west of one another on the west of that part of the hall containing the columns, and form the southernmost two rooms of a block of four; each is entered by a door at the west end of its north wall, while that on the east communicates also with the room to its south, which is the northernmost of the two rooms adjacent to the section of the hall with piers. They are rectangular in shape, like the southern rooms, and their walls are decorated with a panel design. In the western room this is created by a series of monochrome lines on a uniform green background below a modelled toros moulding. In the eastern room the panels are alternately red or yellow and they contain a smaller red or yellow square; they are separated by double columns with Corinthian capitals and above a modelled ledge the wall is white (Plate 3). The floor of this room was partly exposed and was coated with gypsum plaster. Substantial quantities of collapsed decorated plaster were found at surface level in these rooms, much of substantial thickness and containing prolific amounts of sand. It is not from the walls and seems too thick for the ceilings, so may derived from painted floors in upper levels. Much of this plaster carries a polychrome design of small squares and has been overpainted with white. Some painted gypsum plaster was found that adhered to mud plaster, on the back of which were the impressions of beams from the roofs of the rooms.

The two rooms on the east of the large hall opposite these two rooms were also decorated in a restrained manner; they lie north-south of one another. That on the north has walls in monochrome green that have been stained through exposure to fire. Its vaulted roof was found collapsed into the room. The southern room that opens onto the hall by a door in its eastern wall, as does the room to its north. It was only partly exposed due time considerations and the fragile nature of and the quantity of fragments from plaster sculptures: sections of a leg, several hands and other parts of a body were found. The walls of the room are painted pink with a masonry design in black, comprising two narrow rectangles below a large square. Within the width of the door jambs there is a vertical modelled panel and upon the exterior of the south jamb are two narrow fluted, plaster columns. Within rubble immediately north of these columns was found the remains of a plaster capital of the Corinthian order with a central floral motif; this capital undoubtedly originally surmounted the external columns. An unusual feature within the eastern wall of the room is a narrow, plaster-lined depression that extends for the full length of the wall and clearly was accessible from the room, forming the top of a horizontal ledge. This, together with the fragments of sculpture found within the room, may indicate that some cult activity took place here.

These two eastern rooms were originally one room. The painted plaster on the west wall north of the door extends behind their common wall, and cleaning of the surviving wall tops and junctions indicates that not only the north wall, but also the east and south walls of the southern room are additions within the southern end of a once larger room. This original room had a niche within its south wall its door was wider than the existing one. That the pink design extends behind the northern dividing wall may indicate that the original room was ornamented with the same pattern and following the sub-division the southern section was painted in the same manner while the northern room was painted green. The western exterior face of the original room carried the same design as can be seen in many parts of the hall, namely intersecting circles drawn in white on a green ground with yellow dots. This is also found upon the piers; the columns seem to have supported a polychrome motif.

The whole complex appears to have witnessed various drastic modifications that paid little attention to the decorated plaster. The two interconnecting rooms on the east that were examined each had small open cupboards inserted into their walls, and the southernmost of the two had two doors cut through the northern part of its west wall one either side of a cupboard. One of these provided
access to a corridor leading to the west and which was itself an insertion within a room on the west. This corridor leads into other rooms on the west of the core of the building that may or may not have originally been a part of the complex. A door from the most north-westerly of the rooms of the core of the unit leads into an apparently open area surrounded by other complexes, but again whether this is original was not determined. In its modified state this elaborate structure may, like so many other structures in Area B, have been used for the stabling of animals as the lower parts of the wall decoration is quite eroded. Whilst there was some pottery of fourth century date from the excavations, the majority resembled that found within C/2/8–9. A single demotic ostrakon was found in the fill below the floor of the southernmost eastern room, but its text is rather faded.
Mut el-Kharab

Excavations focused in three parts of the site: the location of the Temple of Seth, in the north-western corner of the temenos and in the south-eastern corner of the temenos, in all cases extending work commenced during previous seasons. Trenches 16–18 and 21 are within the area of the temple; 14, 20 and 23 are within the north-west and 19–20 within the south-east of the temenos (Figure 6).

Trench 16 lies due south of Trench 15 excavated in 2004 and was located so as to reveal more of a substantial north-south sandstone wall in the western part of that trench. This wall may form part of an eastern wall of the temple itself, and to its west have been found sections of other sandstone walls upon a substantial mud-brick foundation. Such a brick platform was found to the east of the remains of the north-south wall in Trench 16, though it does not actually abut the wall probably as a result of later disturbance by robbers in their pursuit of stone. Excavation through the platform in the southern part of the trench revealed that it was supported by a wall at its western end, a short distance from the stone wall, and upon mud-brick fill. Within this fill was ceramic datable to the early Roman period on the basis of discoveries at Ismant el-Kharab. The supporting wall was built atop an extensive deposit of Late Period, possibly Dynasty XXV, ceramics, mostly so-called ‘beer jars’ and offering stands (Plate 4). This deposit extends under the bed of clean yellow sand upon
which the stone wall is set. To keep the sand in position a brick wall was constructed on either side of the area to contain the sand. Underlying the ceramic dump material containing Old Kingdom pottery was revealed and then sterile moist Nubian clay.

To the immediate east of Trench 16, **Trench 17** was laid out, extending to a wide mud-brick wall that runs north-south some 7.5 m to the east. Whilst the upper stratigraphy has been damaged by robbers’ pits, it is apparent that the large mud-brick platform of Trench 16 extended up to the eastern wall and that it also rests upon brick rubble. Work was restricted to the eastern part of the trench where traces of earlier walls were found below the rubble and above an eastern extension of the same dump of Late Period ceramics found in Trench 16. Earlier excavation due north of Trench 17 in Trench 8 showed that the dump of ceramics extends underneath the eastern brick wall. Interestingly, a preliminary study of the form of the rims of the ‘beer-jars’ found in Trenches 16 and 17 indicates a possible temporal difference: those in the dump within Trench 16 are necked while the majority of those from the lower levels in Trench 17 are without necks and have inverted rims, a feature that on such vessels extends back to the New Kingdom and Third Intermediate Period. Fragments from locally-manufactured New Kingdom amphorae were also found in the lower deposits of this trench.
Trenches 18 and 21 are located amongst mud-brick structures due west of the stone temple; in one of these structures (Trench 6) a decorated slab of Psamtek I was found during earlier excavations. Slightly to the north of that structure is located a single room within a series of abutting mud-brick walls and from which other walls extend. **Trench 18** was located within this room. Its inner layer of walls is of predominantly yellow mud bricks and the door lies at the east end of the south wall. The room contained brick collapse with some fragments of sandstone blocks, including part of a stela mentioning Seth and a block decorated with the head of a king, possibly of the Third Intermediate Period (?Dynasty XXV). No distinct floor level was found, and below the level of the yellow-brick walls a deposit of over 200 mostly Demotic ostraka was found mainly confined to the north-eastern corner of the area. It transpired that these lay within fill over a rectangular pit that contained a deposit of plaster and ceramic moulds for the production of inlays for an over life-sized image of Seth with a falcon head, wearing a tripartite wig, collar and kilt, and with wings (Plate 8). Such an image of Seth can be found in the Temple of Hibis in Kharga, while Amun-Nakht of Dakhleh also appears in this guise. One fragment from the mould of the wig carries a Demotic inscription and there are short notations in Demotic on several of the ceramic moulds. Amongst the moulds was a sculptor’s model in plaster of a male head, a bronze figure of Osiris and Ptolemaic coin. As it was not possible to undercut the walls of the room above, no association with any other feature was possible for the pit. The material into which it was dug contained Old Kingdom pottery.

Plate 8: Mut el-Kharab, Trench 18 deposit of moulds
Plate 5: Mut el-Kharab, Trench 21, relief of Horemheb

Plate 6: Mut el-Kharab, Trench 21, cartouches of Horemheb
As stone blocks became visible in the area between Trench 18 and the exterior wall of Trench 6, excavation proceeded in this area and to the west of Trench 18, designated Trench 21. It became apparent that this area had once been stone-paved, though most of the blocks have been removed. Fortunately amongst those found in situ were several decorated blocks taken from other earlier monuments: five blocks from a monument of Horemheb probably dedicated to Amun-Re whose image and titles are preserved along with those of the king; a block with graffiti incised into it including divine images amongst which is Seth; most of a stela of Ramesside date preserving a prayer to Seth (Plate 7); and a single block with the lower parts of the cartouches of Ramesses II (Plate 5). Also found was a headless statue of a sphinx in sandstone with a Demotic text mentioning Seth. The platform extends under the wall of Trench 6. The area is bounded upon the east by an extension of the east wall of the Trench 18 room and through which there is a wide door; another door connects the area with an inner room of the Trench 6 structure, and yet another leads
into an area on the west of the Trench 18 room. Clearly further excavation is needed here before the function and architectural sequence can be clarified. Again, under the foundation for the pavement deposits contained Old Kingdom pottery.

**Trenches 19 and 20** within the south-eastern corner of the temenos aimed to determine the function and date of a mud-brick structure set upon an earlier apparent platform. Excavation commenced within the single room identifiable as part of the latest building phase; it contained a little brick rubble within quantities of sand. The floor level was not revealed after several metres of excavation and so work was halted and recommenced outside of the building in an area between its southern wall and the temenos. In this area, **Trench 20**, at least three major building phases were identified; the base of the temenos wall was not reached. Abutting the temenos the remains of a mud-brick structure was found that contained abundant quantities of ceramics. Amongst these were imitations of Persian silverware, a locally-made *kantharos*, a painted *Bes*-vase and much painted pottery all apparently of Ptolemaic date. This structure had been cut through for the erection of the large platform-like building that dominates this corner of the enclosure and into which the room of Trench 19 extends. The final phase is attested by rather make-shift mud-brick structure that abut both the temenos wall and the large structure. Most deposits associated with the latter were disturbed so it is not possible to assign to them a date. Ceramics from the area included a significant quantity of material of the late Roman Period, to the fifth or sixth centuries, and several Coptic ostraka were found; this may indicate the date of the latest structures in the area.

In the opposite corner of the temenos excavations inaugurated in 2004, in **Trench 14**, were extended to the east with **Trench 20**. The aim was to open a large enough area to enable the dating of buildings in this region and the base of the temenos wall revealed. The latter goal was achieved in both Trenches 20 and 14. A foundation trench against the north wall was discovered, cut to irregular width and depth, and ceramics found in the trench indicate a Late Period construction date for the wall, probably Dynasty XXVII. Abutting the north and west walls is a mud-brick complex of apparently domestic nature, with walls set to a significant depth; abundant ceramic evidence again indicates a Dynasty XXVII date for the structures. The excavations were extended to the south against the west face of a large north-south brick wall that is part of the Late Period complex. More lightly-built structures were revealed, including several ovens, and the area has witnessed significant accumulation of ash. These features await further examination. Some sandstone blocks were discovered in the area, including a small block with part of a scene of a royal figure making offering to a seated god; it may be of Roman date.

**Amhida 2005**

**Conservation, Excavation, and Survey**

This report has been compiled and edited by Roger Bagnall, director of the Columbia University project at Amhida, from contributions by the archaeologists and other specialists on the team. Authors of sections are indicated at the start of those sections.

The site of Amhida (Dakhleh Oasis Project site no. 33/390-L9-1) lies a few kilometres south of the renowned Islamic mud-brick village of El-Qasr, in the northwest part of the Dakhleh Oasis. Amhida was the most important town of northwest Dakhleh in antiquity.
The excavations of Columbia University, as part of the DOP, were begun in 2004 after preliminary survey work in 2001 and 2002. Last year’s excavations were carried out with a small team, which focused on a late Roman house with a central painted room and on clearance of surface debris from two further areas in anticipation of our 2005 campaign.

During the 2005 season, a much enlarged team continued conservation and excavation work on the late Roman house (Area 2.1), began the excavation of the site of the Temple of Thoth (Area 4.1), and excavated part of a less wealthy house in Area 1.3. In addition, several types of survey were carried out for future planning and for a more complete view of the ancient city.

The excavation method has been modified on some aspects from that applied during the 2004 season. The main unit of excavation is the Stratigraphic Unit, as it has been defined by E. C. Harris, *Principles of Archaeological Stratigraphy*, London 1979; A. Carandini, *Storie dalla terra. Manuale di scavo archeologico*, Torino 1991. This system is particularly useful in multi stratified sites as Amhida is. It has been applied with success in some Graeco-Roman sites in the Fayyum by P. Davoli since 1995. The stratigraphy in Amhida is basically composed of sand and sandy soil. For this reason it is not possible to excavate closed squares with standing sections in between or narrow trenches. The open areas excavated must be wide enough to allow the reduction of the excavated area as it becomes deeper. Its progressive reduction creates a sort of staircase along the borders of the area that prevents any collapse of the standing section stratigraphy.


A number of forms have been prepared to help data collection during the field work. The most important are the Stratigraphic Unit form, with a distinction between Deposition units and Feature units (these can be negative units also); the Finds Record form; the Sample Record form and the Stratigraphic Unit Quantitative Data form. Other forms have been prepared to collect data about buildings and rooms as well as to keep trace of photographs and drawings taken both in the field and at the house.

All the data collected have been recorded in a relational database designed by Bruno Bazzani during the 2005 season. A user interface application has been built to assist team members during the data entry and in searching and navigating through the database.

The Finds Record is correlated with a list of names that form categories and subcategories in which the object must be classified. This list of names, to be automatically selected, has the function of subdividing the objects into different groups and subgroups using a predetermined terminology that will allow us in the future to find groups of objects or single kind of objects. The predetermined terminology prevents the use of synonyms for the same kind of objects and it is fundamental for automatic searching. The Stratigraphic Unit Quantitative data form summarizes the quantities and the kind of materials found in every deposition units. Photos and drawings are automatically linked to the proper database forms.
1. Area 2.1 (Eugene Ball) (Figure 1.1)

This season’s excavations of the late Roman house in area 2.1 were carried out in several new rooms and in one that had already been partly excavated last year (Room 3). On the east side of the house, rooms 6 and 7 were excavated to floor level while room 8 was excavated partly to gebel.

Room 3  This room, vaulted in antiquity, is situated in the south of the excavated area and is probably part of a different building than the other rooms described here. The inside walls of the room are mud plastered and the room shows signs of heavy usage. This is evident through the blocking of two spaces, continuous re-plastering of the walls and gouges at and just above floor level. Most of the objects found in room 3 are from the floors and the layers separating them. These include, amongst others, several coins, a bronze pin, a bone pin and a cornelian bead. The categories of artifacts thus closely resemble those that were found last year, in the eastern half of the room.
Room 6 (Figure 1.2) This rectangular room is one of the larger rooms in the building. It is fully coated with mud plaster. The west wall in the room has a doorway leading into the courtyard we call room 2 which was excavated last year. The west wall also has a large niche set into it which used to be shelved. Both door and niche were once surrounded by a strip of white plaster. In front of this opening there seems to have been a low, baked brick set of stairs.

Of particular interest is the roof construction encountered in the fill of the room. Several decayed beams, mud plaster facing, and mud plaster with palm rib impressions show that this room had a flat roof.

Room 7 Room 7 is located to the north of room 6. This small rectangular room can be entered from the area to the east of the building. This eastern doorway has a large bolt hole on the south side which suggests it may have been (one of the) main entrance(s) to the building. Room 7 also has doorways in the north wall leading into room 8, and in the west wall leading into room 2. As a result, room 7 can be seen as an important axis in the house. The room is mud plastered on the inside. The south wall of the room had a small arched niche with a ornamental appearance set into it.

Room 8 (Figure 1.3) This room, entered from the south via room 7, is rectangular in plan. Although the springing of the vault is no longer visible on the walls, it is clear from excavation of the deposits that the roof was once vaulted and the bottom parts of it would have rested on the south and the north wall.

The floor of the room was not preserved everywhere due to heavy usage in antiquity and the pressure of the collapsed vault. Several interesting objects were found in the room, including ostraca and coins.

Room 9 This room is a particularly large area to the north of the rooms described above. It has only been partly excavated. In a small test trench dug in the eastern half of the room, a circular wall and a gypsum floor level were found. The ashy deposits associated with these features and a hollow space underneath seem to point to its usage as an oven or similar feature.
From the excavation of part of the deposits present it becomes clear that room 9 was probably used as a dump area after it lost its original function. It is not yet clear if room 9 belongs to the same building as rooms 6–8.

**Figure 1.4.**

*Rooms 11, 13 and 14* One or more test trenches were dug in each of these rooms which form the west wing of the main building in area 2.1. The purpose of these trenches has already been explained above. All three rooms are completely whitewashed and their dados painted in various motifs. Little can be said about the paintings at this point in time as all test trenches ended at the top of the paintings. Only in room 11 were we able to discern the presence of both geometric and figurative motifs in the upper frieze of the paintings. *(Figure 1.4)*

Rooms 11 and 14 were vaulted. Room 13 probably had a conch on the west side.

**2. Area 4.1 (Paola Davoli and Olaf Kaper)**

Area 4.1 is the highest point of the site, more or less at its centre. During the 2004 season, two squares of the grid were preliminarily cleared to understand the kind of sediments and of the ruins present. Lumps of gypsum mortar and some sandstone blocks scattered suggested the presence of an important public building, such as a temple. A few fragments of blocks with relief decoration and hieroglyphic inscriptions from the Graeco-Roman period and nine bronze statuettes of the god Osiris were found there.

From a first examination of the surface of the top of the hill it became clear that the area had been completely ransacked. In fact, it is covered by artificial pits of different sizes now full of clean sand. Some features still survive on the surface, like a few mud-brick walls. Only one of these is still standing on the southern boundary of the area; the others are collapsed or razed. The wall on the south was part of the temenos wall and is built following the traditional system of separate
sectors. What survives above the ground level is only the core of a wall that originally measured about 3 m in thickness. Another part of the temenos has been brought to light on the east side.

Two small mounds of sand and chips of limestone lie respectively on the north and west sides of the area. Their positions and materials scattered all around them suggest the presence of two gateways, possibly opened in the temenos wall. Near the one on the west side a piece of a statue (probably part of the body of a baboon) and part of an inscription in Greek mentioning Trajan (see below, section 11) were found on the surface. The few identified ruins of features allow us to come to a preliminary conclusion that the temple area might have been surrounded by a temenos, oriented east-west, of about 120 x 67 m.

Excavation

The aim of this season was to clarify the presence of the temple and to find some remains of its walls or foundations. Toward this purpose, deeper excavations were conducted in the middle of the temple area, in squares AP and AQ 49 oriented east-west, on an area of 20 x 10 m. The surface of square AR 49 has been also dug.

The surface was characterized by the presence of sand (SU 1 and 2), a great number of grinding stones possibly of the Old Kingdom, fragments of lithic objects (such as a small stele of the Third Intermediate Period and a Predynastic palette), pottery of different periods, a few sandstone blocks and lumps of gypsum plaster. A number of pits became evident immediately under the surface sand. They have been excavated at different moments in a dark brown soil and in the sand. Parts of the sediments that were dug out have been thrown out beside the pits and formed reversed stratigraphies. These were successively dug out again during more recent excavations of treasure hunters.

In all, 18 pits were cleared this season. They have different shapes and measures; sometimes they are round or elongated. In the deepest one (F13, 2.70 m deep) a rough staircase was organized by the treasure hunters to reach its bottom. Hundreds of sandstone blocks, fragments of blocks and lumps of gypsum plaster, originally used in the masonry, were found in both the squares, particularly concentrated inside and at the bottom of the pits. The major concentration of blocks lies along the southern border of the two squares; these have been left for next season.

The stratigraphy of this area is quite complex because it is formed by deep organic layers full of pottery, mainly of the Old Kingdom, heavily destroyed by the diggers of the pits. Their contents have been spread over the area and mixed. The preserved portions of these layers are still in place waiting for future excavation. For this reason, it is not possible to give any definitive interpretation of this stratigraphy, but it seems clear that a settlement of the Old Kingdom might have been on the area.

Sunk in these sediments are a few mud-brick walls (F16, F17, F20, F21 and F22) almost completely melted by the humidity and heavily damaged by the cutting of the pits. It was even very difficult to recognize them and to follow them through the pits. The best preserved one is F16, partially collapsed on its north side, cut by at least five pits. A few bricks can be measured: cm 28.5 x 7; 32.5 x 7. Its thickness might have been about 2 m, and its orientation seems to be north-west/south-east. The visible portion is 3.70 m long and 2.92 m high. The wall is probably bonded with F22 to the east, F21 to the south and F20 to the north, but the pattern is far from clear. No foundation
trenches have been found for these walls, and the brown soil abutted to them in thin horizontal layers.

Wall F17 lies on the western side of square AQ 49. It has a north-south orientation, is visible for 4.80 m and is 1.50 m thick. It has been heavily damaged by at least two pits (F8 and F10).

At present it is not possible to give a proper interpretation and a date to these very ruined walls. No floors or habitation areas were found in the area.

Hundreds of blocks from the temple walls were found in these two squares, especially inside and on the bottom of the pits. Among them about 300, and many small fragments, are decorated in low and high relief. Three complete drums of columns, and about 10 fragments, testify to the presence of a colonnade or a hypostyle hall in the temple. They are all plain, and the diameter is 82–85 cm. Several blocks were part of the floor of the temple, and a thick layer of concreted, blackened oil covers their surfaces. The same incrustation has been noted on one column’s drum and on some reliefs which were part of the *soubassement*.

The blocks of which it has been possible to recognize the function in the original masonry were used in the lower part of the building, in the foundations, in the floors and at the bottom of the walls. No lintels, capitals or part of the ceiling have been found. This circumstance suggests that the upper part of the temple was dismantled and its architectonic elements were carried away from the site. In fact, several decorated blocks from this temple were reused in some 17th and 18th century houses at el-Qasr.

The great number of blocks still on site and inside the filling of the pits reveals that they were not considered precious building materials at any time and that the pits were not dug during that period. Therefore the pits are necessarily a more recent formation and were dug after the main dismantling of the temple, probably by people looking for other kinds of ‘treasures’.

On many blocks are chiselled lines used for alignments during the building work and marks. Some of them are simple drawings roughly traced with charcoal (Roman period), others are hieratic inscriptions in red ink, now almost completely vanished. Some blocks show rough bosses on the external sides, realized with four chiselled cornices during the building work. These blocks were not refined and therefore were part of the foundations, probably of the Roman period temple.

Unfortunately, no blocks of the floor or any part of the walls were found in situ and no traces of the foundations of the Roman temple could be recognized. Only part of a corner of the building was found collapsed in the north-east corner of square AP 49. The blocks of the corner proper show an unfinished vertical torus cornice with surfaces in rough bosses. As the Roman temple was completely refined and decorated, we have to conclude that the collapsed wall we found was part of the foundations and that a corner of the temple was there.

The collected evidence of the Roman period temple suggests that its masonry was not regular, mainly because of the reuse of blocks of different sizes. The core of the walls was not uniform and a great quantity of gypsum mortar and chips of sandstone were used. At this stage of the excavation we can suppose that the Roman period temple had shallow foundations, possibly similar to those of the Roman temple of Deir Chelouit. There, every wall had its own foundation of 4 courses of blocks (Ch. M. Zivie - M. Azim - P. Deleuze - J.-Cl. Golvin, *Le temple de Deir Chelouit, IV. Etude architecturale* [Cairo 1992] 57). In fact, we did not find any foundation trenches for individual
walls or for the building. Therefore we can suppose that the floor level of the sanctuary might have been at a higher level than today’s surface level.

A few fragmentary statues and statuettes in stone and in bronze were found in the fillings of the pits: a right foot with sandal of a statue of a woman in alabaster in classical style, part of a statuette in schist representing probably a standing king in Egyptian style, an unfinished statuette, the upper part of an Osiris bronze statuette and a bronze foot of a horse. Ostraka in Demotic, Greek, and Hieratic (see below, section 11) and 17 bronze Roman coins (those that are legible date to the fourth century) were found in the area also.

The pottery found in the two squares is mixed and ranges in date from the Old Kingdom to the fourth century AD (see the report on pottery, below, section 9).

Epigraphic work on the temple was aimed at interpreting the decorated stones and fragments discovered in the area, and their hieroglyphic inscriptions. From this material, the following new insights could be gained:

The ancient name for Amhida was Trimithis in Greek and Set-wah (‘resting place’) in Egyptian. The area around Amhida was originally called Sa-wehat (‘the back of the oasis’), as attested in the New Kingdom and the Third Intermediate Period, but it became known as Set-wah from the 26th dynasty onwards. In contrast to the Greek place-name, the Egyptian name designated an area around the town, the full extent of which is not yet clear, but which included both Amhida and Deir el-Hagar.

In the nearby town of el-Qasr several temple blocks appear reused in the houses built during the 17th and 18th centuries, and their similarity to the newly discovered blocks and fragments from Amhida leaves little doubt that the Qasr blocks derive from the same location. It seems likely, therefore, that the robbing of the temple took place in the period of the 17th and 18th centuries.

The 300 decorated stone blocks and fragments found during the 2005 excavations have led to the following preliminary conclusions about this building:

The latest phase of the temple was constructed in the Roman period. A fragment of a cartouche with part of the name of the emperor Domitian (81–96 CE) in hieroglyphs was found, which gives a date to at least a part of the temple. The style of the reliefs confirms that the building was contemporary with the latest additions to the temple of Deir el-Hagar nearby.

The temple was dedicated to the god Thoth of Set-wah, whose name appears on many blocks. At the same time, the god carries the epithet ‘Lord of Hermopolis’ which indicates his origin in the famous town in Middle Egypt.

Two phases of destruction may be distinguished: one that quarried away the Roman period temple, leaving only the lowest courses of the stonework and a later phase of destruction that removed the remaining traces of the original walls. Only the lowest two or three courses of stone of the Roman period temple remained after the first phase of destruction, because the themes encountered in the relief blocks all belong to the soubassement of the temple. Fecundity figures appear and a series of goddesses of the good new year (Rnpt nfrt), which are familiar from the temple at Edfu. No remains from upper registers or column capitals have been found.

The Roman period temple was constructed out of building blocks from an earlier temple of the 26th dynasty. Three kings of that dynasty have been found named on the blocks: Necho II (610-595),
Psamtek II (595–589) and Amasis/Ahmose II (569–526). Especially the cartouche of Amasis occurs on many reliefs. The reuse of the blocks in the later temple of the Roman period is evident from the occurrence of gypsum mortar on the faces of all earlier reliefs. Necho II is virtually unknown as a temple builder. So far, only a fragmentary Horus name (serekh) of Necho has been found, and it is as yet unclear which part of the temple’s decoration may be attributed to his reign.

Psamtek II has been attested upon several blocks found at Amhida. One of these was reused already in the time of Amasis, so that it seems that this phase of the building may not have been around for many years. His name has also been found elsewhere in Dakhleh on a temple block reused in one of the cemeteries of Mut.

Amasis was an active temple builder in the Western Desert. Apart from the recent finds at Amhida, his name is associated with the temple at Aghurmi in Siwa, and several chapels at ‘Ain el-Muftella in Bahariya. Many jamb inscriptions survive from this phase of the temple, and parts of a decorated stone vault.

The temple of the 26th dynasty stood on the same site as the Roman temple, and it was also dedicated to Thoth of Set-wah. The name of the god is found upon several blocks of Amasis.

Among the reused blocks in the Roman period temple there is also one block from a temple built by king Petubastis of the Theban 23rd dynasty. It is the first time that a cartouche of this king has been found in the Western Desert. King Petubastis ruled from Thebes contemporary with the later 22nd dynasty (around 800 BC) and not long before the Nubian king Piy conquered Egypt at the start of the 25th dynasty. It was not known before that the Theban 23rd dynasty controlled the oases of the Western Desert.

The dominance of the Theban 23rd dynasty in Dakhleh was further confirmed by the text upon an intact hieratic stela found among the remains of the temple. This monument is dated to the 10th year of one of the Libyan kings called Takelot of the same 23rd dynasty. Probably this is Takelot III, who ruled at the end of the dynasty, not long before the reign of Piy and the start of the 25th dynasty. The stela mentions the chief of the Libyan tribe who held sway in the oasis at that time, called the Shamin tribe, who bears the same name Nesdjehuty as the chief depicted upon a previously known stela from Dakhleh from the reign of Piy. The new stela records a donation to the temple of Thoth of Amhida, and it records the names of several priests from the temple of Thoth. This stela was certainly one the most important finds from the temple during the 2005 season, as it confirms that a temple for Thoth was already in existence during the Third Intermediate Period, and that the Libyan rulers of the oasis had a particular interest in this temple.
Figure 2.1: View of square AP 49.

Figure 2.2: Pit F1.

Figure 2.3: Pit F4.

Figure 2.4: Pit F14 empty.

Figure 2.5: Staircase in pit F13.

Figure 2.6: South boundary of squares AP and AQ 49.
Figure 2.7: Area with walls F16, F21 and F22.

Figure 2.8: Collapsed wall US 25.

Figure 2.9: Stratigraphy in pit F13.

Figure 2.10: Column drums.

Figure 2.11: Charcoal mark on a block.

Figure 2.12: Decorated blocks in the filling SU 11 of pit F4.
3. Area 1.3 (Eugene Ball) (Figures 3.1 and 3.2)

This season a new area, designated Area 1.3, was opened, along the broad east-west street in the north of the site. The focus was on a square building of moderate size, approx. 11 x 11 m, of which three rooms were excavated to foundation level.

The building was found to be badly eroded by the wind. In some parts of the excavated rooms approximately six courses of bricks are preserved above foundation level. In the more eroded parts only two or three courses remain. The result of this erosion is that most of the collapse, which one would expect in the rooms, was no longer present and therefore most of the room’s floors have largely disappeared. The excavation however yielded enough information to suggest that all three excavated rooms would have been vaulted. In each room a number of complete pottery vessels were found.
Also noteworthy among the finds from room 3 are several beads. Two of these were almost certainly imported as they are made of clear glass with gold leaf inside. Furthermore, in both rooms 1 and 2, several ostraca were found.

4. Topographical Survey (Fabio Congedo and Valentino De Santis) (Figure 4.1)

Introduction

This report is intended to be a general account about the topographic tasks other related activities, performed between 26 January and 25 February 2005. It was the first time we were at the Amhida archaeological site and, after a study of main publications and reports about past research and topographical analyses, we tried to contribute to the general aims and topographical needs of the mission, drawing on our experiences of many years on ancient Italian sites as Lavinium, Metaponto, Capua and others in Salento, Puglia, the extreme south-eastern region of Italy. Most of all, it was very useful that we carried out analogous topographic works at the enchanting ancient site of Soknopaiou Nesos, Dime, Fayyum, where the researches are directed by Prof. M. Capasso and Prof. P. Davoli to whom we owe our deep gratitude for the professional possibility and their trust gave us. By virtue of this trust, Prof. P. Davoli and Prof. R. Bagnall assigned us, also at Amhida, the topographic works. The experience of Soknopaiou Nesos was of extraordinary importance to understanding the urban dynamics of a Graeco-Roman settlement and the state of conservation of its structures in the present desert. At the same time, we learned to think up strategies appropriate to the difficult ambient conditions and pursuit of the mission’s aims, within the time scheduled. Our main tasks lie in managing topographic reference points in a general grid, positioning and tracing by total station new structures found and settling them in the existing plans; making some manual drawings and taking special photos of some structures and stratigraphic deposits, that could then be used for drawings obtained by photogrammetry. We acquired these skills at the Ancient Topography Laboratory at University of Lecce directed by Prof. M. Guaitoli, where we accomplished our studies and practical activities. Both of us have a Degree in Ancient Topography, and a Classic Archaeology Specialization in Aerial Archaeology. We work also in our own company specialized in survey and topographic works.

TOPOGRAPHIC WORKS

Verification state of places

On the 26th January 2005, after a first direct view of the site and especially of the areas in which the excavations activities have taken place, scientific direction and archaeologists who last year worked on the site, show us the existent fixed reference points of the general polygonal. They were still well fixed and usable also for the topographic needs of this year. We called them 100, 200, 300, respectively in Area 1, 2, 4.

Re-establishment of the grid

27th, 29th, 30th January. After an accurate check, only 57 of the 120 wooden stakes of the 2004’s grid remained and were still fixed on the ground, and, moreover, many of them had shifted. Thus, it was laid out again and we physically placed on the field a new grid, with point of departure in stake
of the square H38, orientated exactly North-South and with the same, typical chessboard pattern. Setting out stakes every ten metres, we created squares over the areas to be excavated. We maintained the alphanumeric names and progression of the squares of 2004 grid in order to guarantee continuity and congruence with general documentation. The H38 stake has been object of numerous verifications as far as its exact alignment and angulations with general orientation and reference to the areas on which excavations were concerned. After that, we were ready to ‘translate’ the new grid when necessary, framing each area within the chessboard.

The first place on which grid has been translated, was on Area 5, on the east side of the site, where a trial excavation was done, corresponding to the so-called ‘parking’ area (‘Area H’ where Tatyana N. Smekalova and Sergej Smekalov revealed an ‘anomaly’ during their magnetic survey). At the same time we set a thick network of squares at Area 4 (the temple-hill), Area 2 (the late Roman villa), and at Area 1.

Figure 4.1: Valentino De Santis at work.
Figure 4.2: Cemented steak n. 700.

Figure 4.3: Fabio Congedo at work.
Equipment and general organization of topographic works

(Figure 4.1) We used for our activities both the equipment provided by mission and our personal, complete kit consisting of: a Total Station Leica TCR 705 XR, a notebook P.C., a portable, high resolution, ink jet printer, all necessary software for downloading and elaborating data, set prism (and miniprism), with a telescopic prism staff 5 m, walkie-talkies, digital camera, and complete drawings tools for hand drawings. It was by pure chance that the mission’s total station was of the same model and brand as ours. So, we could manage both of them after the necessary adaptation of some particular settings of the mission’s Leica which had different firmware and layouts of the menu, in order to make its taken data ‘dialogue’ with our software of downloading, elaborating and converting data in DWG files. In this way, the mission’s Leica was steadily placed on Area 4, so that, just there we established two new fixed reference points of the general polygonal (named 400 and 500), from where every day it was possible set the instrument in station. Thus, while one total station is used for taking elevations, objects positions and points for drawings, the other is employed for every topographic need on the other areas. Some hundreds have been, so that, taken points, ready for a daily development, calculation and elaboration of absolute coordinates (UTM), both of the OBJ, FN points and of the elevations, from both of total stations, and we’ve developed and elaborated further on 2500 points for daily updating of general structures plans in Area 1, Area 2, Area 4 and Area 3, including also taking points and elaboration data related to areas of work for magnetic prospecting.

Before leaving the site at the end of the 2005 field season, two new cemented stakes are placed and set with general polygonal (called 700 [Figure 4.2] and 800, respectively between Area 1 and Area 2, and to NW of the hill of Area 4). The stake named 600 is a new one too, and it has been placed upon an hill on the east side of site, and facing westward the pyramid’s hill of Area 3. These stakes enable us to rely on three certain reference points placed within a sufficient visual angle for the complete topographic documentation of areas 1, 2, 3 and, eventually, others in the middle (Figure 4.3).
AREA 2 (Roman villa)

(Figure 4.4) Applying the purposes of Scientific Direction, in particular in this area, topographic works have been carried out on two different levels (though these two levels are closely related). In order to connect the newly added structures exactly with previous plans of the entire roman house (its internal rooms, but also with the buildings on the block), and in relation to the new grid (of some degree different from the past), we took again the main profile’s points of the most part of the house, but with much more detail than before. The general shape of the structures, in CAD plan, is more similar to the truth. At the same time, we daily updated new structures brought at light by the excavations activities, most of all those of the north-east side of the house. Moreover, in the last days, we have obtained two prospective sections NS (facing west and east side), through all the room of the house (22 metres each), using (as Angus Graham in 2001 also did) the Reflectorless Laser method with total station. In this way, we made two long section drawings, ‘quickly’ and with ‘very accurate’ results, avoiding the danger (for operator and ancient structures) of balancing on delicate and unsteady walls, one or two metres underneath, surrounded by ‘intrusive’ heaps of windblown sand. But, of course, the appointment with characterization by hand of the details, considered important from a draftsman-archaeologist, is only postponed. In fact, in a second step, comparing stratigraphic conclusions and reconstructive hypotheses drawn and developed by other archaeologists with our observations (just noted down on the sketch plans with a reasoned outline of the points to be taken), we can draw all those details on the internal façades of the rooms, establishing the right and reciprocal functional features of them, within the entire building organism. Both for this last operation and for analytic rendering of prospective drawings of sides by photogrammetry, we’ll use hand-drawings to 1.20 scale, of the same sides of the rooms, made last year.

Figure 4.5: Area 4. CAD plan. Pits and courses of mud-bricks.
 AREA 4 (Temple)

The complex stratigraphic situation of this area, already foreshadowed by the surface clearances of last year, has consequently posed several problems in making both CAD and hand drawings (plans and sections). The unsystematic deed of digging plunder pits created absolutely irregular structures, with profiles often very difficult to read, because they were close each other and sometimes cut one another. Roughly round or elliptic in shape, their exact edges are similar to incoherent heaping levels of the same appearance and composition. It was possible to individuate their proper shape and function only after meticulous and patient stratigraphic decoding made by archaeologists working in the area. Although they carried out regular plans of the findings (then also digitalized), it was necessary to create a more immediate positioning of the pits in connection with other surrounding findings in order to have an encompassing view. So we dealt with mainly curvilinear structures and many points to be taken by total station. Our preparatory sketch plans had to take in account all the progressive achievements of general documentation to which we concurred and that we followed until the end of fieldwork, always ready to integrate and/or rectify changes.

(Figure 4.5) Distinguishing the disjointed remains of the mud brick walls (of a Roman phase of the temple) from themselves dismantling and debris levels, it was very difficult and important also for graphic documentation (Figure 4.6). Catching directions of the surviving courses of the walls (where actually visible), we overlaid a general CAD plan of the pits (in red), a simple symbolism (in blue) rendering the general orientation of the courses, passing over the pits, in order to realize possible alignments and reciprocal relationships. This kind of maps represent (on a large scale)
inter pretative hypotheses that just during the field work can suggest additional useful interpretations though with all necessary prudence.

Figure 4.7: Area 4. Pit F1 – Section NS.

Figure 4.8: Area 4. Pit F3 – Section NS.
Figure 4.9: Area 4. Pit F13 – Section NS.

Figure 4.10: Area 4. Making hand drawings.
Figure 4.11: Area 4. Mud-brick structures around temple’s area.

Figure 4.12: Area 4. Making hand drawings.
We drew by hand a prospective section in scale 1:20 of each pit, facing the sides richest in information (Figures 4.7, 4.8, 4.9). Some of these form a single, long prospective section in scale 1:20, oriented E-W, facing the north side. The general profile of the section was realized by total station, with infrared rays and a prism operator. Prospective sections of pits (made by hand and in a proper scale), both empty pits and those that were partly filled by white buildings blocks coming from the first destruction of temple, offer a detailed reading of structures in order to understand better: (a) dynamics and position of fillings; (b) stratigraphic sequences and interactions between them, legible on internal, exposed surfaces cut by diggers, such as chronological paradigm of temple’s phases of life, destructions and abandonment (Figure 4.10).

Moreover, we carried out by total station (with prism) another prospective section EW, along the southern edge of Area 4 (further on 20 metres), on which are displayed the covering layers removed (e.g. windblown sand, scattered blocks, etc.) and rendered in CAD with different colours.

(Figure 4.11) Finally, for an accurate survey immediately around the ruins of the temple it was suggested mud brick structures slightly visible on the surface be cleaned and mapped. Parts of thick walls were brought to light and they seem to be part of a rectangular structure interpreted as temple’s temenos. In the next year we will complete the plan and verify this hypothesis (Figure 4.12).

Figure 4.13: Area 3. CAD plan.

AREA 3 (Pyramid)

(Figure 4.13) The 2005 topographic program for Area 3 was to update the plan of all the structures surrounding the pyramid on the existent 2002 plan, by taking a greater number of points. The first phase of the vectorial drawings of the fours facades of pyramid has been completed taking digital metric photos of them (see below). The documentation will be used by the Architect Nicholas Warner for the conservation project of the building.
AREA 1 (House)

(Figure 4.14) After the excavation of the building in Area 1 was completed it was planned by total station and the 2002 plan was updated.

Cartographical equipment and analysis

A thorough analysis of an Egyptian 1930s colour map at 10.000, placed at the disposal of the mission by the inspectors of SCA, yielded a lot of interesting information about the evolution of the site and some meaningful, technique details. It is the typical map for administrative uses, with symbolism of the official cartography, such as contour lines, water resources, road network, etc.

Marked by hand in red is the whole area subjected to SCA control. Among many observation two, in this occasion, are noteworthy. The first concerns the evolution of soil resources, to understand better the changes that occurred and their capacity to satisfy the primary needs of the Trimithis’s resident community. The map is rich in information about the quality of soil for cultivation, so that it could be considered a kind of ‘soil-using chart’. Some areas within which ‘soil’ or ‘sand’ are defined ‘good for planting’, are today affected by desertification phenomena. The wells that can be counted on the map, marked in bleu colour, are more than today. Different conditions of humidity and of the relative agricultural resources available during the lifespan of Trimithis have been proved by soil samples processed in 2004 and 2005 for archaeobotanical analyses.
Figure 4.15: 1930 map.

Figure 4.16: MoLAS elevations map.
A comprehensive, interdisciplinary study of geomorphology, paedology and climatology concerning settlement over a long time span, could establish why (and if) the 1930 environmental situation was more similar to the lifetime of the Roman period, than today. Perhaps, a reasonable answer lies in a combination of natural factors (e.g. desertification cycles) and human activities (e.g. ability to cultivate areas ‘wrested’ from neighbouring desert) (Figures 4.15 and 4.16 adjoined, like just below, next page).

The second observation concerns the altimetry of the site. In particular, the highest spot on the hill (temple Area 4) is marked as 125 metres above sea level (the measure refers to Alexandria). While, on the same place, on a specific elevations map made in 2002 by Geomatics team of the MoLAS, the indicated value is around 149 metres. In all likelihood, it is only an apparent gap, because we know how the Londoner team obtained that value: a GPS unit station, placed continuously just on the top of the hill for more than two weeks, with an advanced correction systems that was considered reliable. Whereas, we have no adequate information yet about the specific cartographic standards (e.g. conventional references, survey proceedings, etc.), employed by Survey of Egypt, during the Thirties of the last century. We are researching these and other information so that we hope to use them as soon as possible (Figure 4.17).

Other details coming from the Egyptian map are those directly connected with the archaeological remains. The ruins are included into schematic, dashed-lines polygons. Some notes mark ‘ancient buildings’, ‘ancient necropolis’, and ‘Roman well’ too. Moreover, a study of Arabic toponyms, could reveal some topographic persistence and other useful information.
Photogrammetry

This kind of technique is based on the possibility, to ‘straighten’ photos taken even in a much inclined position, using a software for this purpose (distortions correction). That lets us obtain metric data for vectorial drawings by photos and it allows saves considerable amounts of time, as well as providing for precise drawings for documentation. We don’t need particular devices as metric and stereometric cameras). For this purpose a good digital camera with an high resolution not under 5 mega-pixels can be considered appropriate.

We have adopted two kinds of photogrammetry: a) Prospective. Precise drawings of facades of buildings and walls in their actual condition. Pointing out of state of dilapidation (e.g. cracks, collapsing trend). This would be a necessary documentation for future restoration projects; b) Planimetric. For those complex archaeological deposits or features brought to light (e.g. collapses of walls, roofs mixed with potsherds and other subjects in important stratigraphical connection).

Setting of operations area:
   a) for prospective photos we have to provide façade with two across marks, and two upright marks;
   b) for planimetric photos we have to include the objects within a grid of squares also by simple strings.

Then, we must know two essential measurements:
1. measurement of horizontal side of square (or distance between across marks);
2. measurement of vertical side of square (or distance between upright marks);

The two sides of the square have to be also orthogonal.
To know the exact measurement between marks, we positioned them by total station.

Figure 4.18: Area 3. South façade of the pyramid.
Figure 4.19: Area 2. Room 6. West side.

Figure 4.20: Area 2. Room 2. East side.
Figure 4.21: Area 2. Room 13. Collapsed wall.

Figure 4.22: Area 4. Collapsed wall.
(Figure 4.18) We are working on the photos of the four sides of the pyramid (Area 3). They will be a useful contribution for a detailed diagnosis of current state of the building in order to create a rich information base for the conservation project.

(Figures 4.19 and 4.20) At Area 2, we took prospective photos of most interesting internal sides of rooms 2,3,4,6,7,8. In the phase of final characterizations, we’ll use hand-drawings in 1.20 scale, of the same sides of the rooms made last year. (Figure 4.21) We have documented also some collapsed walls in their exact downfall position also in rooms 7, 8 and 13. In each case, we have a
relative, detailed sketch-plan made by hand, for final characterizations. The same technique was used in Area 4 (Figure 4.22), and in Area 1 (room 1) (Figure 4.23).

5. Architectural Conservation (Nicholas Warner)

In 2005, the project architect carried out studies in two areas where building conservation is required, Area 2.1 (the late Roman villa) and Area 3 (the Pyramid). A temporary roof was placed on the most vulnerable rooms of the villa to protect them until full-scale conservation work can begin in 2006, and detailed plans were formulated for conservation work in both areas during the 2006 and 2007 seasons. The assessment and plans are set forth below.

1. Proposal for the reconstruction of the late Roman House in Area 2.1

PRESENT CONDITION

The Roman house occupies a site within the main urban area of the site. Excavations in 2004–2005 have revealed the presence of a significant number of wall paintings within the main domed room of the house that require protection. In 2005, a temporary shelter was built over this space. The total surface area of the house is 15 x 15 metres, and it is of a standard pattern (another example sits adjacent in the same block). The rooms of the house are arranged around a central courtyard with a staircase leading to the roof. There appears to be no second storey from archaeological evidence.

PROPOSED ACTION

It is proposed to reconstruct as much as possible of the mud brick superstructure of the house as possible, without threatening the stability of the surviving structure. This will require the installation of new acacia or olive wood lintels over door lintels, and new brickwork following the original brick dimensions of 8 x 34 x 17 cm for the structural walls and 7 x 32 x 26 cm for the vaults. New bricks, matching the dimensions of the original Roman bricks but without the inclusion of straw (to avoid termite infestation), will be used in the reconstruction. Existing bonding patterns will also be replicated in the new brickwork. The new bricks themselves, however, will be made of a different colour to the bricks used at the site of Amhida which are reddish, in order to make a clear distinction between the original construction and the new construction. The work will be executed in two phases over two seasons:

Phase One: install timber lintels and consolidate all walls to the height of springing of arches. Construct flat roof on timber structure with palm-rib and tafl in room to east of main room.

Phase Two: construction of barrel vaults and dome over main room. If the latter is impossible due to the fragility of the surviving brickwork, a lightweight timber roof with palm-rib and tafl covering will be installed instead.
2 Proposal for the reconstruction of the pyramid at Amhida

The pyramid of Amhida is constructed entirely out of mud brick and mud mortar, and is of the Roman period. It shares the same external characteristics and size as other pyramids in the area (notably at Bir al-Shagala in Mut): a square base or podium of approximately seven square metres, from which rises the triangular section of the structure. This has a relatively steep angle of inclination of approximately sixty degrees. Internally, the Bir al-Shagala pyramids have vaulted rooms within them (above and below ground level) that are decorated with wall-paintings on mud plaster. It is not known at present what the substructure of the Amhida pyramid contains, but it is likely that there are chambers beneath it (the superstructure appears to be solid).

PRESENT CONDITION

The pyramid stands on a low hill on the eastern edge of the site, and is surrounded by the remains of a cluster of mud brick buildings, as yet unexcavated. These are most likely the remnants of a surrounding necropolis. The podium of the pyramid is a square of seven metres, and parts of the structure survive to a height of approximately eight metres. The best-preserved faces of the podium and pyramid are those on the east, south and north sides. There has been significant wind erosion on the north side, and major areas of brickwork in lower areas (particularly in the corners) have been removed by robbers, causing further masonry collapse. The south-east corner of the pyramid itself is well preserved at high level. The remains of the west side of the structure are in a seriously unstable condition, either due to the undermining activities of robbers or subsidence caused by the structural failure of internal chambers. There is the real possibility of the collapse of this section of
the building in the near future. The building has already been surveyed and recorded through Figure 6. Pogrammetry in its present state.
PROPOSED ACTION

It is proposed to consolidate and reconstruct the pyramid to its full height if possible. The latter can only be undertaken, however, after the nature and condition of the substructure have been fully assessed. If the condition is unstable, the intervention will be limited to the consolidation of the eastern half of the structure, and the partial consolidation of the western side at a lower level. New bricks, matching the dimensions of the original Roman bricks but without the inclusion of straw (to avoid termite infestation), will be used in the reconstruction (8.5 x 17.5 x 35cm). Existing bonding patterns will also be replicated in the new brickwork. The new bricks themselves, however, will be made of a different colour to the bricks used at the site of Amhida which are reddish, in order to make a clear distinction between the original construction and the new construction.

The following suggested programme is to carry out the work in a minimum of two, and probably three, seasons.

Phase 1: To prevent any further destabilisation during clearance work of the eastern half of the pyramid requires the immediate consolidation of the north-east and south-east corners to a width of at least 1.2m. This should permit the safe excavation of these two robbed out corners to establish the limits of the internal consolidation required, which should be the next priority. Only when the eastern half of the pyramid has been fully consolidated to the full height of the original podium should further dismantling and excavation be carried out on the western side. This phase will be executed under the joint supervision of the architect and the archaeological team.

Phase 2: In order to permit archaeological investigation of the area at the base of the pyramid on its western side to proceed without risk, it will be necessary to dismantle first the unstable elements of the structure to a safe height. This will be done under the supervision of the archaeological team. Mud bricks from dismantled areas will be kept for re-use in the consolidation of inner areas of the structure in lower areas. Only when the entrance to and nature of the sub-structure of the pyramid have been determined can the podium be consolidated on the western side to its full height.

Phase 3: This phase of work is entirely dependent on archaeological findings of previous seasons, and a consensus view on whether a full reconstruction is desirable. Missing sections of the pyramid above the podium will be completed in new mud brick following the original angle of inclination. The work will be carried out from four timber scaffolding stages of decreasing size. The pyramid will be capped with a hard stone (granite or basalt) pyramidion on three masonry courses of the same stone. The choice of stone is dictated by its resistance to weathering. On the north side of the podium, it is proposed to build a ‘sacrificial’ mud brick wall 35cm thick immediately adjacent to the face of the podium in order to protect it from the wind erosion that is so severe in this area. This wall should be plastered with mud mortar, but it is not proposed to plaster any other surfaces of the structure although the pyramid was almost certainly rendered with a white lime mortar after it was originally constructed.
Magnetic survey at Amhida has been carried out in January and February 2005 during 4 weeks. Magnetic survey has been used on different sites in Dakhleh Oasis in previous years. In 1998 a big ‘industrial’ area (‘C’) on the site Ismant-el-Kharab (Roman town Kellis) and a territory in front of the temple in ‘Ain-Birbiyeh has been covered with magnetic measurements; in 1999 and 2000 almost the whole area of the Early Dynasty site ‘Ain-el-Gazzareen has been surveyed (Smekalova, 2002; Smekalova, Milns, Herbich, 2003).

On Amhida parts of the ‘Main’ hill and ‘ceramic’ quarter, investigated by Dr. Colin Hope in the 1970s, have been surveyed in January and February, 2000. Some of the results of the work of 2000 are re-considered and presented in this report.

**INTRODUCTION**

**The idea of magnetic survey on archaeological sites**

Magnetometry is a non-destructive means for quick investigation of archaeological sites, which allow revealing underground structures, if their magnetic properties are different with the magnetic properties of surrounding soil.
If the earth were composed of uniform material, the Earth’s magnetic field on a certain area will be uniform. But local concentration of soils, rocks, and iron objects magnetised by the field of the Earth alter slightly the magnetic field nearby. These local disturbances of the global magnetic field are called magnetic anomalies.

Magnetic anomalies of the archaeological objects or naturally occurring rocks are due chiefly to the presence of the main magnetic iron oxide - magnetite, or related minerals, which could be presented in rocks in the amount of several percent to a small fraction of percent. Volcanic rocks (basalt, gneiss, tuff, etc.) demonstrate the most strong magnetic properties. Sedimentary rocks (limestone, chalk etc.) are almost nonmagnetic. Granite, which is rather widespread rock, could be very magnetic one. It is important, that granite, as the other igneous rocks, has its own remanent magnetisation.

Iron oxides and hydroxides, which normally are existing in clay and soil in nonmagnetic forms, during heating are transformed into more magnetic forms. Therefore one could observe rather strong positive anomalies over fireplaces, kilns, bricks, heaps of ceramics, slag blocks or pieces, ovens etc.

There are also variations in magnetic properties of topsoil and subsoil: topsoil is normally more magnetic than subsoil. That makes possible to reveal ancient depressions (ditches, pits, pit dwellings, wells, big post holes and other silted-up features), filled with topsoil, mixed with ceramics, organic material etc., by weak positive magnetic anomalies they create on the surface of the archaeological site.

Method and Equipment

Method of magnetic survey of archaeological sites is to measure Earth’s magnetic field point by point with a small step (not more than half a metre), close to the surface, and present the measurements on the magnetic map.

A co-ordinate system was set on the site for data collecting. There were plots 40 m wide and as long, as it is necessary to cover the area of this or those part of the site. Small wooden sticks were put each metre along two opposite sides of the plot and 40 m-strings with metre marks were used between the sticks.

The magnetic survey has been carried out with an Overhauser magnetometer from Gem systems GSM-19WG (Ontario, Canada), a model GSM-19WG. The measurements were made along straight and parallel lines (strings with metre marks); the space between the lines was 0.5 m. The magnetometer was operated in so-called ‘walking mode’ measuring every 0.2 second, and the distance between the measurements along the lines was not more than 0.2 metre. The height of the mapping sensor above the surface of the ground was about 0.3 metre.

Because of the large area of the archaeological site, it was necessary to continuously monitor the daily variations of the Earth’s magnetic field. The second magnetometer of the same type (Gem systems) was used to control any temporal changing of the magnetic field. It’s sensor was installed

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1 It is necessary just briefly notice some properties of the local anomalies from archaeological objects. Assymetry of the anomaly is due to the direction of the magnetic flux lines. Depth dependence – the deeper the source, the broader the anomaly is.
at a base (reference) point in a zone of a normal magnetic field, while the other (working) magnetometer was moved about the site. The signals from both sensors were used for removing of daily (temporal) variations of the Earth’s magnetic field.

The data were stored in the memory of the magnetometer; after the survey they were transmitted to a portable computer. Two different presentations of the magnetic data were prepared with help of Surfer software (Colorado, Golden): coloured contour maps and grey-scale maps. On the contour maps the positive anomalies were marked with blue colour, negative ones - with red colour. On the grey-scale maps the positive anomalies are marked with dark colour, the negative ones – with light colour. The contour interval was normally 2, 3, 5 or more nanotesla (nT).

Figure 6.P1: Overhauser gradiometers GSM-19WG.  
Figure 6.P2: Cesium magnetometer PKM-1.

For the archaeological prospecting on Amhida the following magnetometers has been used in 2005: - two Overhauser gradiometers GSM-19WG of GEM systems Inc. (Canada, Ontario) as main instruments (Figure 6.P1); - a cesium magnetometer PKM-1 of ‘Geologorazvedka’ (Russia, St. Petersburg) as an additional tool (Figure 6.P2).

**Typical magnetic anomalies on archaeological sites**

Archaeological earthen structures typically show local magnetic anomalies in the range of 1÷20 nT, more rare fired clay structures - 10÷1,000 nT, quite rare ferrous archaeological objects including slag - 20÷2,000 nT. Mud brick walls, situated in a cultural layer, could be seen on the magnetic map because of a weak negative anomalies (from -2 to -30 nT, depending on the magnetic properties of surrounding ground). Limestone walls, buried in soil, could give negative magnetic anomalies of the values of about -2÷ -20 nT.
Figure 6.1: Western part of the Dakhleh Oasis.
Figure 6.2: A topographic map of the site of Amhida. Contour interval 1 m. Survey of Amhida project, 2004.
Figure 6.3: Amhida. Topographic map of 1930.
About the site

The citizens of ancient Trimithis have chosen the western part of the Dakhleh Oasis (see Figure 6.1) to place their town, probably, because of the good soil and plenty of water in this area. On the old Egyptian map of 1930 one could see many wells on the site and around it. Neighbouring areas are marked mostly as ‘good soil’ (see Figure 6.P3).

The main wealth of the oasis consists of two things: the land, which could give rich harvest twice a year, if it is watered enough; and the water, available all the time (Figure 6.3). But there are almost no other natural resources, which were necessary for the normal life of the people, particularly no metals and comparatively little wood. To control the oasis meant to control the water wells. The ancient people of Amhida built their houses on a big natural hill (Figure 6.2). The material of the hill was very good for mud brick construction, except for its salty character. But one of the main reasons for the building of the town on the higher places was possibly that the citizens of the ancient town wanted to save the lower horizontal levelled areas for their agricultural fields.

Therefore it should not be too surprising for us, that to save lower areas for fields, people of Amhida used small hills around the site for brick and ceramic debris. One can see such heaps of ceramics on the eastern edge of the site, on the most western-southern and northern-eastern corners of the site and in other places. The heaps of ceramics are reflected in the magnetic field as a ‘mosaic’ picture, a mixture of sharp positive and negative anomalies.

The use of clay from the hill for mud brick buildings has the result that for the magnetic survey that there is almost no contrast in the magnetic properties of the houses walls and surrounding soil.
Therefore the magnetic survey could help only a little for the detail investigation of the planning system of the streets in the living quarters. On Amhida, the state of preservation of the houses is rather good, and the modern surface of the site corresponds to a level of the roofs of the houses. Thus, the level of the floor is, normally, quite deep, and the magnetized objects (ovens, kilns, ash layers, big ceramic vessels etc.), which could ensure quite a big contrast of magnetic properties in comparison with nonmagnetic mud brick walls, are far away, so, a magnetometer almost could not feel them.

But on the other hand, nonmagnetic mud brick walls are a good background for the revealing of highly magnetized structures like pottery kilns, furnaces, bread ovens, hot parts of baths houses, ceramics, backed bricks etc. All these objects acquired their magnetization during firing, and they create so strong magnetic anomalies, that it is possible to see them even on a big distance from the objects themselves.

Therefore one of the aims of the magnetic survey on the site of Amhida was to reveal the industrial areas, where the high temperature technologies were used (kilns and furnaces), to find the structures of backed bricks, to locate the bath houses, bread ovens and so on. Of course, we also tried to find any structures on the town, especially to understand the planning systems of different times, to prove the existence of earlier strata, and so on. It was important to determine the extension of the site.

It was interesting to find places on the area of the town of Amhida, where backed brick has been used. Because of the lack of wood and fuel for charging pottery kilns, backed brick was rather expensive and it was used very ‘economically’, only for some special reasons or purposes. Therefore it would be interesting to find such structures, which could correspond to some ‘outstanding’ buildings, or parts of buildings or other constructions.

**Magnetic ‘noise’ on the site**

There is almost no magnetic noise on the site: no modern iron objects on the surface and, fortunately, almost no modern destruction. Among the disturbances, which hampered the magnetic survey one could mention a layer of ceramic fragments and sand dunes.
There are very many potsherds lying on the surface of the sand, especially, in some parts of the town (Figure 6.P4). They create quite a ‘mosaic’ structure of the magnetic field, especially, if to measure close to the surface. Therefore it is better to carry out magnetic survey on a height of about 0.3 m, or higher.

It is quite an interesting phenomena, why there is such a layer of ceramic fragments, while below is almost pure sand. It could be explained in such a way, that the sand is denser and heavier, than ceramics. Ceramics is a rather porous material, therefore it is appeared on the surface, like a foam, on the surface of water, as a lighter matter, while heavier small particles of fine sand penetrate below the potsherds.

The sand dunes cover the remains of the site with thick layer of sand, and the magnetic anomalies from the archaeological objects became very weak, when measuring from the surface of such a high dune. For example, there is a very big dune at the southern-western part of the site, which buried a considerable part of the southern quarters of the town (Figure 6.P5).
RESULTS

First of all, the area of the site was inspected with help of ‘free search’ method. It means, that the magnetic field has been measured with a step of about 1–1.5 m without any grid. If some anomalies have been noticed, the position of them has been marked with a GPS receiver (Figure 6.P6). The co-ordinates of the traces of ‘free search’ were also recorded by GPS device. The results of the application of the ‘free search’ method are presented on the Figure 6.4.

The detail measurements with using of the co-ordinate grid have been performed on the areas, which are of the special interest or which have been chosen by the ‘free search’ because of the big anomalies.

Eight areas have been covered with detail magnetic survey (see Figure 6.5):  
A - Main or Temple Hill;  
B - South-East area;  
C - North-East pottery quarter;  
D - South area;  
E - Western kilns or furnaces;  
F - Southern-Western Hill;  
G - Western Hill;  
H - ‘Parking’ area.  
The dimension of the whole area, which was surveyed on Amhida, was 6.3 ha.
Figure 6.6: Amhida. Area A. Main or Temple hill. Magnetic map of 2000. Contour interval 2nT.
Figure 6.7.
Figure 6.8a. Amnida. Area A. Main or Temple hill.
Magnetic grey scalp map of 2000.
Contour interval 2 nT.

Figure 6.8b. Amnida. Area A. Main or Temple hill.
Interpretation map.
Figure 6.9: 'Ain el-Gazzareen. Magnetic map. Survey of 1999–2000. Contour interval 2 nT.
Area A. Main or Temple Hill

The magnetic survey has been carried out on a big area of the Main hill in 2000 (see Figure 6.5 and the Report of 2000). In 2005 we have re-considered the data of 2000 and draw them again presenting them as a color contour map (see Figure 6.6 and Figure 6.7a) and also as a grey scale map (Figure 6.8a).

On the color contour map some structures became more evident, if to compare with the former presentation, used in 2000. Thus, it was possible to reveal a big rectangular structure, the sizes of which are about 108 x 56 metres in the central part of the hill. The orientation of the short axis of this structure is about 37 degrees from northern direction towards east (see interpretation map on the Figures 6.6a, 6.7b and 6.8b).

It would be possible to interpret this rectangular structure as an enclosure, which is earlier, than the Roman Time buildings on the site. Indeed, it has quite different orientation and consists of a group of rather broad local anomalies.2 As it is known, the material of earlier periods have been found on the Amhida site, but there were no pre-Roman structures revealed there. May be now we have found the traces of an earlier layers of Amhida site? The remains of still standing tall mud brick walls of Roman time, have quite different orientation (almost west-eastern). They are marked on the interpretation map as yellow lines (see Figures 6.6a, 6.7b and 6.8b).

It is very interesting, that the neighbouring Early Dynasty site ‘Ain el-Gazzareen, which was investigated in 1999 and 2000 with help of magnetic survey, has almost the same dimensions and orientation of the walls (see Figures 6.9 and 6.10) (Smekalova, Mills, Herbich, 2000, 132). The dimensions of the enclosure in ‘Ain el-Gazzareen were approximately 112 x 54 metres, and orientation of the walls was about 25 degrees from the north towards the east (see interpretation map on the Figure 6.11). Another walls further to the north, parallel to the northern side of the main enclosure are to be seen on the magnetic map on ‘Ain el-Gazzareen site. There is also another big rectangular structure (?) to the south-east of the main enclose (see Figure 6.11). The clear geometric shape, right angles of the walls, big size of the main enclosure, the existence of a temple inside the enclosure – all these indicate an important role of ‘Ain el-Gazzareen (Mills, Kaper, 2000, 123).

Let us continue the comparison between the sites ‘Ain el-Gazzareen and Main hill on Amhida. On the site of ‘Ain el-Gazzareen there were several different quarters inside the enclosure walls. The characteristic feature of the site is, that there are many local positive anomalies, which were grouped in some quarters inside the big rectangular of the enclosure, especially along the back (WWN) wall and in the middle part, close to the SSW wall, to the south of the excavations of 1998 (see Figures 6.9 and 6.10). As the further archaeological investigations showed, many of these anomalies correspond to the ovens for backing bread, fire bases, hearths, kilns, ashes etc. (Mills, Kaper, 2000, 124). The big number of ovens for backing bread there could, probably, be explained by the fact, that the ‘Ain el-Gazzareen site has the most western position in the western part of the oasis. Further to the west is a desert and a caravan road, which went through the desert. It was, evidently, necessary for ancient travellers to have a lot of bread with them for their long way to the next oasis.

2 Because the deeper the source, the broader the anomaly is.
There are also quite many local positive anomalies on the Main hill of Amhida, which are situated along the back (WNW) wall, forming two linear groups (see Figures 6.6, 6.7a and 6.8a). The anomalies on Amhida Main hill are broader and weaker, than the anomalies on ‘Ain el-Gazzareen, which means, that objects, created the anomalies are situated deeper on Amhida, than on ‘Ain el-Gazzareen.

The walls of rectangular enclosure on ‘Ain el-Gazzareen are built of mud bricks. Possibly, the walls of the enclosure on the Main hill on Amhida were also built of mud bricks. A very wide negative anomalies are situated at the SEE part of the Amhida ‘enclosure’. It is not excluded, that there were gates there with some massive mud-brick walls and, perhaps, stone parts of the walls (see Figures 6.6a and 6.7a).

Figure 6.12: Amhida. Central (‘Temple’) hill. Area A. Yellow squares 10 x 10 m are according to the new co-ordinate system. Magnetic map (re-survey of 2005). Contour interval 3 nT.

One of the most interesting feature, which has been found on the Amhida Main hill, is a strong magnetic anomaly on the top part of the area. This anomaly has been re-surveyed in 2005, using the co-ordinate system of the archaeological excavations (see Figure 6.12). The value of the anomaly is +100 and -60 nT, the area occupied by it is about 10 x 10 m. The possible source of the anomaly is some big clay feature, which was fired on the place, and which is still in situ. We tried
to calculate parameters of possible object, which could correspond to this feature. It could be prism-shape body, which have the dimensions of about 4 x 5 metres, 1,3 m thick, on a depth of about 2.5–2.8 m. Another possibility is, that it could correspond to a very big kiln (?). In any case, this is a big mass of hardly fired clay.

It would be very desirable to check the supposition about the presence of an earlier structures on the Main hill with the excavations.

Figure 6.13: Amhida. Area B. Eastern and Southern parts of the town. Magnetic map. Contour interval 5 nT.
Figure 6.14: Amhida. Area B. Eastern and Southern parts of the town. Magnetic map. Contour interval 3 nT.
Figure 6.15: Amhida. Area B. Eastern and Southern parts of the town. Magnetic map. Contour interval 5 nT.
Area B - South-East area

The magnetic survey has been carried out on the big area south and east from the Roman villa, which was excavated in 2004-2005. This area has been chosen because of the presence of a big amount of very strong local magnetic anomalies, revealed by the method of ‘free search’ in 2005. The results of magnetic survey are presented on the Figures 6.13-15, (Figure 6.P7).

It seems, that there is a big industrial quarter at the north-east corner of the plot (see interpretation map on the Figure 6.15). The industrial area is limited by four streets, which are visible on the map as long positive anomalies. In this part of the site the magnetic anomalies over streets have positive sign, because the street are covered with a layer of slag, pieces of ceramics etc, which is very magnetic material. The most eastern ‘street’ serves as an eastern edge of the town, behind of which, further to the east, there was kiln debris.

There are at least seven or eight industrial furnaces or kilns situated within the industrial quarter. Some of them create stronger anomalies, which could, probably, mean, that they are metalworking furnaces (see Figure 6.15). Heaps of slag debris and ash were placed at the end of streets, at the eastern side of the site. It is more probable, that these objects are metallurgical or other furnaces, rather than pottery kilns, because otherwise there will be much more kiln debris around them, which we do not observe in this part of the town.

An interesting feature within an industrial quarter is a possible workshop (blacksmith, bronze or glass-working ?), the walls of which are marked as dark green lines on the Figure 6.15, and which has at least two kilns inside. A floor of a rectangular workshop (a courtyard ?) is covered with some magnetic material (ash and/or hummer scale), therefore it gives us a wide positive anomaly.
It is quite difficult to find out only by the value and shape of magnetic anomalies, which industry was there in the ancient time. It is quite impossible that there were iron smelting or extracting workshops there, not only because of the lack of iron ore in the oasis, but also because such kind of production demanded a big amount of good charcoal, which was, evidently, a problem for the oasis people in antiquity as well as now.

It is rather probable, that there was a glass production on Amhida. One could, possibly, try to find evidences of it on the surface of the site: different types of slag, pieces of metal or glass, moulds, crucibles. There are some possibilities to distinguish between different high temperature industries on the site by the findings of fragments of different crucibles on the surface of the monument. We cite below several quite useful general suggestions from the article of Thilo Rehren (even the article is devoted to Late Bronze Age industry). “The bronze melting crucibles had to keep heat generated inside, and allow the casting of the metal, thus, they had to be insulating, strong and moveable. This was achieved by an organic temper and a thick wall to improve the insulating properties, and a hemispherical shape to withstand mechanical stress from outside. The spout finally allowed the metal to be poured in a controlled manner, into any given mould. The glass crucibles, to the contrary, had to conduct the heat through the their fabric from the outside due to the indirect heating of the charge. Direct heating like the metal pots would have contaminated the glass with ashes and charcoal dust, and had, therefore to be avoid. Consequently, they were made without organic temper, and thin walled; the inevitable vitrification of the fabric at the temperatures applied (\textit{circa} 1000–1050°C) promoted the conductivity of the fabric”. (Rehren, 1995, 105).

There are quite many pottery kilns on the Amhida site. On the area B they are mostly situated at the southern-western part of the area. There is one pottery kiln of good stage of preservation. The upper part of this kiln was visible on the surface. The other kilns are quite badly destroyed, which is visible on the magnetic map: the anomalies over destroyed kilns are weaker and not so ‘solid’ in their shape (see Figure 6.15).

The pottery kilns are situated also on Area C (see Figure 6.5), which we are describing below. The total amount of the pottery kilns on the site is about two tens. For the comparison, one could estimate the number of pottery kilns in ancient Kellis as a smaller one. Probably, on both sites the ancient people produced ceramic vessels not only for everyday needs, but also for transporting the olive oil, which was one of the main trading subject (together with dates) of the Dakhleh people during Roman time, and other goods.
The construction of pottery kilns were, probably, rather special in the oasis. They could have open space above, without a close dome construction, which is characteristic for Ancient Greek pottery kilns. Because of the lack of wood in the oasis, people had to use a special fuel there – tamarisk or straw, which gives a short-lived, but intense fire (see the bunches of tamarisk, prepared for charging the pottery kilns on the modern workshop in el-Qasr, Figure 6.P8). It was, perhaps, not possible to operate with the atmosphere inside the kiln, one could operate only with a temperature, putting more or less bunches of tamarisk brunches or straw into the kiln. Perhaps, it was too much smoke of this fuel, which means lack of oxygen, and therefore quite often the ceramics became black during firing (Smekalova, 1995).

There were no tile kilns on Amhida, presumably because tile was not used in the oasis because of the lack of rain. There are also no underground cellars in the houses. Ancient people probably stored wheat, barley and other grain in a jars atop the roofs, because of hyperarid climate. Perhaps the water-table on the site was quite high; therefore it was not practical to dig underground cellars, especially, because, in any case, it would be necessary to built mud brick walls along the sides of cellars, to prevent the clay sides of the pit from destruction.

A possible bath house (or even two bath houses) has been found at the south part of the area by the big positive-and-negative anomalies of an oblong shape (see Figure 6.15). It is possible to compare the magnetic map of the bath house in Kellis and ‘bath houses’ on Amhida (Figure 6.16a, b). The difference in the shape of the magnetic anomalies could be explained by the fact that the orientation of heating channels of the hypocaust system is different on the sites: on Kellis it is east-western, and on Trimithis it is north-southern (see interpretation maps on the Figure 6.17a, b).
Figure 6.16a and b.

Fig. 16 a. Amrida (Trimitris). Bath house? Magnetic map. Contour interval 5 nT.

Fig. 16 b. Helis. Bath house. Magnetic map. Contour interval 5 nT.
Figure 6.17a and b.

Fig. 17 a. Armenta (Trimithis). Area B.
"Bath house I?"
Magnetic grey scale and interpretation map.
Contour interval 5 nT.

Fig. 17 b. Kollos.
Bath house.
Interpretation and grey scale map.
Contour interval 5 nT.
There are other objects visible on the magnetic map of Area B: The heaps of ceramics are situated at the eastern part of the plot (marked with dashed oval lines on the interpretation map – Figure 6.15). They are seen because of mosaic structure of the magnetic field above them.

A round-shape backed brick structure with an inner diameter of about 6 m, and outer diameter of about 8 m was found close to the Roman villa, just south-east of it (see violet circle on the interpretation map – Figure 6.15).

There is an interesting feature revealed close to the pyramid. It is built partly of baked bricks, partly of stone. Some part of this structure seems to be fired in situ. It could be a kiln for firing ceramic coffins (?) (see violet rectangle on the interpretation map – Figure 6.15, Figure 6.P9).

Quite many positive anomalies at the most southern part of the plot could be an indication of the presence of different structures there, including buildings (see Figure 6.15).

Concluding the description of Area B, one could notice, that it is quite logical, that the main industrial areas are situated at the eastern and southern part of the town (to avoid smoke from the furnaces), because the prevailing winds on Amhida are northern and western ones.
Figure 6.18: Amhida. North-eastern part of the site. Exposed pottery kilns are shown as black circles. Magnetic contour map. Contour interval 10 nT.
Figure 6.19: Amhida. Area C. North-eastern part of the town. Magnetic map. Contour interval 3 nT.

Figure 6.20: Amhida. Area C. North-eastern part of the town. Magnetic grey-scale map. Contour Interval 3 nT.
Area C - North-East pottery quarter

Area ‘C’ is situated on the North-East part of the site, south of the wide street and of a group of pottery kilns, which were investigated in late 1970s by Dr. Colin Hope (Hope, 1980) and surveyed by us in 2000 (see Figures 6.5 and 6.18). The magnetic maps, obtained on the area are presented on the Figures 6.19-20. At least three (or four) pottery kilns of a good preservation are revealed by the magnetic survey. They are marked on the interpretation map as orange circles (see Figure 6.21). There are also several destroyed pottery kilns on area ‘C’ (see white-and-orange circles on the Figure 6.21).

Three or four strong and sharp local anomalies, which are marked on the interpretation map as green circles, (see Figure 6.20) could correspond to iron objects or magnetic stones. It could be interesting to check these strong anomalies with small excavations.

As it is already mentioned above, the number of pottery kilns on Amhida seems to be bigger than at Ismant el-Kharab, even it is difficult to compare, because some of the areas on Ismant el-Kharab are still not investigated by magnetic survey. But it is not excluded that there was a bigger amount of pottery produced at Trimithis than at Kellis, if we may judge by the number of pottery kilns.
Figure 6.P10: Area D.

Area D - South area

Area D has been chosen for detailed magnetic measurements because of several quite strong anomalies, found there by the method of ‘free search’. It is situated at the southern part of the site, on a very small hill with rather flat surface (see Figures 6.5 and 6.P10).

The magnetic field on Area D is quite anomalous. A furnace or kiln and some linear structures have been found there (see Figures 6.22, 23 – maps and 24 – interpretation map). It is rather interesting that the direction of the linear structures, which could be walls of the houses, is slightly different with the direction of the streets on the main part of the Roman town (compare the drawing of the visible streets on the Figure 6.5 and possible walls on the interpretation map – Figure 6.24). Thus the structures on Area D may belong to a different planning system than the other part of the town.

It is necessary to notice, that there are several quite strong positive anomalies on the low and flat neighbouring area immediately to the west of Area D. These anomalies have been found by the method of ‘free search’. There was not time enough during the expedition of 2005 to investigate these anomalies with help of detail magnetic measurements, but it would be worthwhile to measure them in the future.
Figure 6.22: Amhida. Area D. Southern part of the town. Magnetic map. Contour interval 3 nT.
Figure 6.23: Amhida. Area D. Southern part of the town. Magnetic grey-scale map. Contour interval 3 nT.
Figure 6.24: Amhida. Area D. Southern part of the town. Magnetic grey-scale map. Contour interval 3 nT.
Figure 6.25: Amhida. Area E. West-southern part of the town. Magnetic map. Contour interval 5 nT.
Three furnaces or pottery kilns are visible.
Figure 6.26: Amhida. Area E. West-southern part of the town. Magnetic grey-scale map. Contour interval 5 nT. Three furnaces or pottery kilns are visible.
Figure 6.27: Amhida. Area E. West-southern part of the town. Magnetic map and its explanation. Contour interval 5 nT. Three furnaces or pottery kilns are visible.
Area E - Western kilns or furnaces

A group of several strong anomalies have been revealed by the method of ‘free search’ quite far away from the Main hill and other part of the town, at the southern-western corner of the site. The results of further detail magnetic survey (Figures 6.25 and 6.26) revealed three or four kilns of furnaces there (see explanation map on the Figure 6.27). A big amount of ceramic fragments, which are lying on the surface of the site in this part of town, including the high southern-western hill (Area F, see below), could be the result of acting of these kilns, perhaps.

It is quite interesting, that these several kilns or furnaces have been found rather far away of the main industrial area, which is situated at the eastern, north-eastern and southern-eastern part of the town. It would be important to excavate them to understand why it was so, and to see what are the specific features of the kilns and furnaces and their production (Figure 6.P11).

Another object which it is necessary to mention is a linear anomaly at the northern part of the plot. This is long positive anomaly with the negative part from the northern side. Such a shape of the anomaly could correspond to a linear structure of clay, which was fired in situ. We have found a more or less similar object at the eastern part of the town, on Area H (‘Parking place’, see below). It is rather difficult to tell, what type of archaeological objects this structure could belong to. One could only suppose, that it could be a primitive clay water channel, or a road (marked with yellow dashed line on the Figure 6.27).
Figure 6.28: Amhida. Area F. South-western Hill. Magnetic map (with time corrections). Contour interval 3 nT.

Figure 6.P12: Area F: large ceramics.
Area F – South-Western Hill

Area F is correspond to a SW hill, which is quite high, especially if seen from the south, and has very sharp slopes. The mutual location of Areas E and F of magnetic survey is shown on the Figures 6.26 and 6.5.

There are a lot of big pieces of ceramic vessels on the surface of the South-Western Hill (see Figure 6.P12), which gave us rather ‘mosaic’ structure of the magnetic field measured there. We lifted a sensor of a magnetometer on a bigger height to avoid this ‘noise’, but it helps only a little. It is difficult to see any structures on this hill; there are mostly ‘point’ anomalies from the fragments of ceramics there (see Figures 6.26, southern part, 6.28). Some linear structures could, perhaps, be seen only on the edges of the hill, but we are not very certain, that they are really some structures, not influence of the relief (Figure 6.29).
Area G – Western Hill

An interesting result has been obtained on the Western hill, which is situated to the west of the main or Temple hill, not far away of it (Figure 6.P13). There are quite strong anomalies found there by the method of ‘free search’. The results of further detail magnetic survey are presented on the Figures 6.30 and 31. The picture of the magnetic field on the southern part of hill is quite different with the northern one. In the northern part of the hill we can see only usual ‘mosaic’ picture from the big pieces of ceramics, lying on the surface. To the contrary, the strong anomalies at the southern part of the hill could be created by the structure of backed bricks (see interpretation map on the Figure 6.32). It is interesting, that the orientation of this possible structure is different from the orientation of the walls of the Roman time, and it is corresponds to the orientation of the rectangular structure, which we revealed on the neighbouring Main hill (see Figure 6.33). That means, that they could correspond to the same planning system.

There are also very strong and wide positive-and negative anomalies at the central part of the plot, from the western side. The sources for them could be kilns, may be, destroyed ones (see Figs. 6.30, 6.31, marked with bright rose circles on the interpretation map- Figure 6.32).

Area H - ‘Parking’ area

A most surprising result has been obtained on the big flat area outside the town, to the east of it (so-called ‘parking’ area) (see Figure 6.5, Figure 6.P14).
A long positive anomaly has been revealed there (see Figs. 6.34, 6.35). The small trial trench revealed a linear structure of fired clay. After part of the fired clay has been removed, the magnetic field has been measured again (see Figure 6.36). One can see, that the anomaly decreased very much on the place where the backed clay has been removed. It proves, that the source of the magnetic anomaly is the fired clay of the linear structure.

It would be interesting to try to reveal similar structures at the other sides of the town as well. But during the season of 2005 there was not time to do this work. One could only notice, that a little bit similar long anomaly has been found on the western side of the town (see Figures 6.25, 6.26, 6.27).

CONCLUSIONS

Magnetic survey proved to be an efficient method for the investigation of Amhida, to reveal different parts of the site, especially for the revealing of the industrial quarters, possible baths houses and the structures of backed brick.

It would be useful to continue magnetic survey for finding the linear structures, like the one revealed on the ‘parking’ area, and also for the detail investigations of the magnetic anomalies, which were found by the method of ‘free search’, but did not surveyed yet with detail measurements.

There are several rather strong positive anomalies on the southern part of the area, west of Area D, which would be interesting to investigate with the detail measurements.

It would be good to continue geophysical investigations on the site. Magnetic survey could be complemented by resistivity measurements, which could allow to find the areas, where water is closer to the surface, and also to find mud brick and stone structures.

It is also possible to use magnetic survey for the exploring of the neighbouring areas around the site of Amhida. It would be important to find closest farmsteads or settlements, which could belong to the agricultural area of the town, and to measure the GPS co-ordinates of them. It would also be desirable to understand the character of each site with using of geophysical survey, because it is quick and non-destructive means for the investigation of the buried structures.

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7. Paintings (Helen Whitehouse)

During the 2005 season the fragments of wall-painting retrieved during the clearance of this room with a domed ceiling in the 2004 season were studied in relation to the published record of the décor in the NE sector of the room, revealed by the DOP’s partial clearance in 1979 (Leahy 1980), and the Figure 6. Graphic record made when the whole room was cleared to floor level in 2004. Both the paintings in situ and those recovered as fragments pose considerable conservation problems, a fact already recognised at the time of the DOP’s preliminary work; the paintings have been executed on a very thin layer of white lime plaster with no effective substratum to support them.

The fragmentary material recovered in 2004 falls into three distinct groups: four substantial pieces of wall-painting still attached to a mass of brick masonry (three fragments from the upper W. wall and part of the apron decorated with erotes from the niche in the S. wall); smaller blocks with areas of painting still attached to bricks (83 in all); and a large number of very fragmentary and friable pieces of painting, mostly with little supporting material still attached, stored in 48 x 48 cm wooden trays with a note of the fragments’ find-spot, where known. This latter material was the particular focus of this season’s study: the fragments were examined in detail and sorted, to establish joins within the boxes and also with the larger fragments still attached to bricks; the trays were relabelled with the find-spot information and a brief indication of the pictorial matter, to facilitate further study; and the contents of densely-packed trays were redistributed between two or more trays, resulting in a new total of 133 trays. These have been regrouped for storage according to their find-spots.

The decoration of the room can be categorised as four principal areas above a shallow, plain dado: on the lower part of the walls, still in situ, is a series of panels painted with a variety of geometric designs, the patterns of which can be paralleled in contemporary mosaic pavements, but are here executed in a greater profusion of colours. Two of these panels show two phases of decoration, with a second layer of white plaster and a new pattern superimposed on the first. Above this panel zone, the wall is decorated with figure scenes; on the E. and W. walls these are divided into discrete compartments by black linear frames, which also serve as ground-lines and in one case carry Greek captions to the pictures (E. wall: Leahy 1980; only one fragment with Greek letters has been identified amongst the detached pieces). Larger figure scenes are painted on the N. and S. walls, that on the W. half of the N. wall (below Perseus and Andromeda) having an unrelated (and more crudely painted) sub-zone of two panels, that at the left showing a servant in a decorated tunic
standing beside wine jars in a rack, then at the right a nude child reclining on a bolster - probably a depiction of Harpocrates, originally featuring a snake (cf. his association with the infant Herakles, attested in bronzes) which has been obscured by the later overpainting of cherub-like wings. A number of the boxed fragments retrieved from this part of the room are clearly related to these figures - much pink/brown skin and drapery - but do not hold out the likelihood of substantial additions being made to the imagery of what survives in situ. From the central part of the wall come fragments of a colourful geometric pattern based on lozenges which was apparently above the doorway.

Of the figure scene on the S. wall, to right of the niche, there remains in situ only a horse’s head some distance above a reclining turbaned woman, details reminiscent of scenes in which an Emperor rides in triumph above prostrate barbarians, but not as yet clearly identifiable as such here. The large number of painted fragments related to this wall show foliage and dark ?clothing, but they are in bad condition, some of them much weathered, and no coherent picture has so far emerged from them.

The pendentives of the dome, where the plaster coarsens, each contained a standing female figure with nimbus and green wings, arms upraised and hands holding the ends of a pink petal garland arching overhead, and a red-brown ribbon falling in a descending arc. Whether these ribbon/garland motifs formed a continuous ornament around the lower part of the dome is not yet clear from the numerous detached fragments. The upper part of two of these pink and smiling figures can be partly reconstructed from the fragments. They can be recognized as sisters to the winged females who support zodiacs and portrait tondos in Palmyrene art, as well as the supporting figures of painted zodiac tomb ceilings at Muzawaqqa and Salamuni, but the nature of their interaction with the design of the domed ceiling is not yet confirmed (see below).

In situ on the W. wall is a scene of a family at table; the three large detached blocks from this wall display material of a more mythological kind comparable to that already known on the E. wall: Orpheus with the animals, in a composition echoing contemporary mosaic pavements; a chariot scene which is evidently not the most commonly-encountered subject of this kind (the abduction of Persephone) but features a male figure in military dress standing beside a female who is not being carried off protesting (a scene of apotheosis, perhaps); and a group of figures including a woman restraining another person who is brandishing a sword. These are all in an incomplete state, but many further related fragments have been identified amongst the smaller detached pieces, and reassembly should aid specific identification. This is a priority in conservation of the detached pieces but will require some highly complex work. Most surprisingly, there are also fragments of a second lyre-playing figure comparable to Orpheus.
Detached fragments of the E. wall recognizably belong to the upper register of figure scenes, of which the lower part remains in situ, as well as the further southward extension of the lowest register of ‘captioned’ mythological scenes; but despite their lively content, no identifiable subject-matter has yet emerged from these very disjointed survivors, even when individual figures are recognizable, such as a satyr and maenad in lively dispute (Figure 7.1), or the upper part of a goddess, probably Isis in one of her syncretistic forms, a purple veil arching over head. The eclectic nature of the room’s décor, combining hectic patterns, literary and mythological subjects, and popular religion, makes it difficult to predict likely subject-matter.

Most problematic is the decoration of the dome, surviving in numerous but shattered fragments which give evidence of three quite different themes: polychrome scale-pattern; a geometric design of interlocking shapes outlined in black on yellow to brown backgrounds, suggesting the imitation of wooden panelling; and a black-ground design with repeat floral motifs sketched in red and yellow. There is little evidence on the fragments for significant junction points of these three designs, to suggest their interrelationship and original layout. The scale-pattern was most likely in the circular ‘shield’ format familiar in many Alexandrian mosaics, and would thus have formed the centrepiece of the ceiling, as it does in the mammisi of the temple of Tutu at Kellis, and also in the dome of tomb-chapel 25 at Bagawat, where the circle is supported on the outspread wings of the eagles painted in the pendentives. No fragments show a direct relationship between the female supporters here and the scale-pattern, nor is there anything to indicate a central motif (which would typically be a gorgoneion or a portrait) framed within the scale-pattern.

Detailed work on the iconographic minutiae of these fragments, and the significance of their find-spots, is needed before a fuller picture can be obtained of this remarkable room, and its highly-
coloured mélange of pictorial and decorative themes. A carefully-thought-out conservation strategy will also be needed to deal with this very frail material.

8. Painting and Plaster Conservation (Constance Silver)

This report describes research that was begun in 2004, as part of the comprehensive program for the conservation of the mural paintings of the ancient site of Amhida, Egypt, and its continuation in 2005.

2004 LABORATORY RESEARCH

During the 2004 field season, samples were collected from the reception hall of the villa, a locus of on-going excavation and research. Other samples were collected from various areas of the site. The samples were sent for laboratory analysis. There were three principal research questions:

1. Samples of salts removed from the reception hall. What is the composition of the salts that are present throughout the masonry and mural paintings in the reception hall of the villa?
2. Samples of salts removed from other points in Amhida. What is the composition of salts found in other areas of the site? Do they differ from the salts found in the masonry of the villa?
3. Samples of paint and preparation from the murals of the reception hall. Can analyses identify the media that was used to paint the murals?

SUMMARY OF FINDINGS

Salts from the Reception Hall

Eleven samples of salts were analyzed by x-ray fluorescence. This method of analysis provided basic data on the composition of the salts. All the salts appear to be very common, carbonates, silicates and sulfates. There is no indication of the presence of unusual salts. Specifically, it was posited that magnesium chloride might be present because this salt is found in many other areas of Egypt and is notorious for its deleterious effects on cultural property. Magnesium chloride will deliquesce at about 32 percent relative humidity, provoking damage both from water and salt efflorescence. However, there is no indication of the presence of magnesium chloride thus far at Amhida.

It must be stressed that exact identification of the salts will require another type of analysis, by x-ray diffraction. X-ray diffraction is a very specialized method of analysis that requires complex equipment and a highly trained operator.

Salts from Other Areas of the Site

Five samples of salts were removed from various points in the site, at a distance from the villa. The goal was to ascertain if there is any difference in composition of the salts in the masonry of the villa, compared to salts found in other areas of the site. Differences in composition could indicate, for example, that the masonry was created from sources of materials that have a highly localized origin.
The same types of very common salts were identified. These results allow two initial conclusions. First, it would appear (as one would expect) that the bricks were being made from earthen materials collected in the oasis. Second, it seems that no unusual salts are present. However, it must be stressed that these are very preliminary observations. Further studies will be required.

**Samples of Mural Paintings and Plaster**

Six very small samples of mural paintings and preparatory plaster were collected from various points on four walls of the reception room. Some areas of the murals have been ‘over-plastered and over-painted’ and the hands of at least two, and perhaps three, different artists can be discerned. Samples were taken from earlier and later strata and from areas that seem to indicate the work of different artists. These samples were studied as cross sections mounted in bioplast resin. The samples were stained with agents that will fluoresce if lipids, proteins, carbohydrates are present. Four out of the six samples stained positively for the presence of oils or of oils and proteins together. These results indicate that much of the paint media has survived and can be identified. No carbohydrates were identified, indicating that gum-based paints were not used in the villa. It is interesting to note that this consistent use of media, oils and proteins but no carbohydrates, was identified in all strata and areas of the murals.

Two samples appeared to lack any paint media. This is an interesting result because it strongly suggests why so many areas of the murals are in such fragile condition: the pigments remain unbound. During execution of the murals, binder would have been present in all the paints. However, in some areas the amount of binder must have varied so much that very little was used. Over time, that small amount of binder was degraded to the point where, at present, it cannot be identified.

**SITE WORK IN 2005**

**Villa**

**Reception Hall**

During the 2005 field season, backfill was removed from a section of mural paintings that were conserved in 2004. The condition of the mural in 2005 was compared to Figure 6. No change in condition could be discerned.

Most of the conservator’s time during the season was devoted to cleaning and consolidating fragments of the wall paintings found detached in the fill of the room during the 2004 season. (See Helen Whitehouse’s report on the paintings for further details of the fragments.) Particular attention was paid to the very large pieces of wall that had fallen to the ground bearing large painted scenes. A strategy has been devised for the 2006 season for detaching the paintings from the mass of brick, which makes them impossible to move safely; this will involve Professor Richard Wolbers (University of Delaware/Winterthur Museum), a noted expert in this field.

**Villa**
Three Small Painted Rooms

Three small rooms with exquisite mural paintings were uncovered to the north of the Reception Hall. Because each room will require individual and simultaneous conservation services during excavation, excavation of the rooms was suspended until 2006, when additional conservators can be engaged.

2005 ADDITIONAL ANALYSES

During the 2005 field excavation, carved stone masonry fragments of the successive temple were excavated and taken to the excavation facility for processing. A very subtle dark layer was perceived over much of the surface, under but also incorporated with, the grime. It was posited that this dark layer might be lead-white paint that had altered over time. Samples were sent for analysis. The analysis indicated the presence of a lead-based pigment bound in an oil medium. This is a significant discovery because often it is difficult to discern the difference between discoloured lead paint and soiling, especially in the field.

9. Pottery (Gillian Pyke)  Figures for this section had not been received by the time of posting onto the web.

Pottery is the most abundant type of cultural material to be found on most sites in Egypt and Amhida is no exception to this observation. The abundant excavated ceramic material was processed and recorded by Gillian Pyke (ceramicist) and Ashraf Senussi (ceramics illustrator) with a rota of student assistants and the invaluable assistance of other members of the excavation staff when time permitted.

RECORDING METHOD

The pottery from each area excavated during the 2005 season was processed separately in order to establish the main fabrics and forms of pottery present at each location. The pottery was sorted on site, recording for each unit the total weight of the sherds of each recognised fabric, in order to study the proportions of each fabric and for what types of vessel they were used. Within each fabric group, the number of diagnostic sherds (rims, bases, handles, spouts) of each broad vessel shape was noted. Diagnostic and other interesting sherds were kept for further analysis and as a record of what was found in each unit.

Within each area, every kept sherd was recorded individually, drawn if it represented a new shape, or a reference made to a similar shape if one had already been drawn. Drawn sherds were identified using a designation combining the site code (A) and year of excavation (05) followed by the area code, then the context number and lastly the sherd number, all separated by slashes (e.g. A05/2.1/36/4417). A catalogue of drawn vessels was compiled for each site. In this way, it is possible to show the range of types that were found, estimate the number of vessels of each type, where they were found and the frequency of the type’s occurrence. Significant concentrations of specific types, such as storage jars or cooking vessels can also help to determine the function of particular rooms or areas. The finding of dated ostraka and coins can offer a date range for the pottery, which can also be placed in a temporal context through comparison with finds at other sites, both within the Dakhleh oasis and in the Nile valley. This is particularly important with regard to
the very mixed deposits found in the temple area, which appear to be composed of pottery from a wide date range.

THE POTTERY

The pottery from each of the three areas had its own character, to the extent that it was easy to recognise the pottery from a particular area as it was laid out on the sorting mats before consulting the label on the bucket. This observation supports the decision to record each area separately, which though time-consuming, allows the pottery from each site to be considered both as a self-contained unit and in comparison with the other locations at Amhida, within the oasis and elsewhere.

Area 2.1 (Villa)

This multi-roomed mud brick structure was designated as an urban villa as a result of excavations in 2004. The many coins found in room 4 of the villa in 2004 suggest that although the settlement of Trimithis was still active in the 360’s, this house might have gone out of use not long after the middle of the fourth century (Bagnall, 2004: 1).

The pottery from the villa is, indeed, of approximately fourth century date, as is the surface pottery over much of the site of Amhida. No later material was found, and the few fragments of earlier pottery are chiefly of Old Kingdom conical bread moulds, perhaps used as chinking in the vaults. If the dates provided by the coins can be taken as indicating the date of the end of the use of the villa, is likely that this pottery assemblage represents a snapshot in time, giving the repertoire that was in use in the mid fourth century.

A number of commonly occurring fabrics were identified in area 2.1. These were correlated with designations within the Dakhleh Oasis Project fabric classification system (Dunsmore, 2002: 129–38; Hope, 2000: 194–6) with the kind assistance of Colin Hope, whose generosity with his time and expertise is much appreciated. The majority of pottery is made of a dense iron-rich fabric (A1) with inclusions of sand and small-medium limestone and occasional black and dark red particles, firing an orange-red or grey colour. This fabric is, in fact, the most commonly occurring fabric in all periods, and the main coarse ware fabric.

Several calcium-rich fabrics were noted, all occurring quite infrequently compared to the dominant iron-rich fabric, A1. The most common of these (A11, also known as early Christian brittle) is characterised by its dense cream-orange fabric, often with a grey core, with medium fine calcareous particles, rare fine dark red and black particles. The exterior of vessels of this fabric, which are characterised by their thin walls, are often red slipped, firing grey. Another fabric found regularly in the villa is a green-grey calcium-rich fabric (B10) that is extremely porous and light weight. It contains abundant fine to coarse sand, common medium to coarse irregular limestone particles and rare fine dark red and black particles. Few diagnostic sherds were found in this fabric, which seems to be associated with relatively small closed forms.

Another easily identified, if not very common, fabric (P37) has a pinkish surface and core with abundant fine to coarse limestone fragments giving the surface and core of the sherd a mottled appearance. It is not clear whether this fabric should be identified as iron- or calcium-rich (Hope, personal communication, 2005). No diagnostic sherds of this fabric were found.
Finally, a single complete vessel and a number of sherds of Oasis Polished Ware (OPW) were also found in area 2.1. This ware is described by Rodziewicz (1987: 123–36) and production ascribed to the Kharga oasis, but Hope (personal communication, 2005) prefers to see this ware as produced somewhere in the Dakhleh oasis. This ware has a dense red-brown fabric, similar to the African Red Slip (ARS) ware produced in Tunisia (Hayes, 1972: 287–92) with inclusions of medium irregular-shaped unmixed clay. The vessel forms are generally copies of an eclectic range of wares, including the sigillata forms of ARS, some Nubian and Nile valley wares and even vessels of metal and glass (Rodziewicz, 1987, 127). The vessels are often poorly made in comparison with their prototypes, and are generally either coated with a red slip of a similar colour to the clay from which the pot is made, or left unslipped. Vessels are then burnished, the burnish lines usually clearly visible and carelessly executed.

Several forms are characteristic of the assemblage found in area 2.1, the overwhelming majority of which are made of the iron-rich A1 fabric. These include table and cooking wares as well as storage vessels and lamps, giving a repertoire of forms that is consistent with a domestic context. A few units, particularly in the domestic rooms (4 and 8) to the north of the entrance vestibule, contained an unusual number of footed bowls and large fragments of baggy jars, perhaps linked to the function of this area.

The selection of vessels shown here give an overview of the most frequently occurring types in area 2.1, many of which have close parallels at the nearby settlement of Ismant el-Kharab (see Dunsmore, 2002, 129–42). These can be conveniently divided into open and closed forms. Many vessels were probably multi-functional, for purposes such as food preparation and table ware, cooking and storage of small items. Some of the open forms could be used as bowls, lids or lamps, and it must be remembered that a vessel could be employed for several purposes during its lifetime. The most frequently occurring table wares are relatively small bowls (Figure 1) in an A1 fabric and a variety of shapes: simple (1), deep (2–3), flared (4–5), carinated (6–7) and footed (8) bowls. Decoration is regularly found on these bowls. This is mainly restricted to the rim top and consists of red rim ticks that are sometimes on a cream rim band. Very few examples of more complex decoration, usually also in red slip, were found, this tending to be on the upper interior of a particular type of carinated bowl, with a moderately high-placed carination and flared simple rim. Small bowls also occurred in the OPW fabric, all in the sigillata tradition. These included a complete flange-rimmed bowl (9). The presence of this ware at the villa might suggest that the inhabitants were perhaps of relatively high status.

**Figure 9.1:** Vessel types from area 2.1. 1–9: bowls.

4. Flared bowl with flared sides, ledge rim and flat base. The rim top is decorated with red rim ticks. Fabric A1. Diameter 19 cm. A05/2.1/33/4666.
5. Flared bowl with pronounced flare at rim, which is simple with an interior ledge, and a ring base. The interior of the base is decorated with a cross formed of two intersecting wavy lines. Fabric A1. Diameter 15.5 cm. A05/2.1/95/5668 & 5467.

7. Carinated bowl with moderately high-placed carination below a flared simple rim. Interior of flared part of bowl decorated with a wavy line above a complex design including running loops and circles, all in red. Fabric A1. Diameter 23 cm. A05/2.1/F73/4990.


So-called mixing bowls (Figure 9.2.10), in an A1 fabric, are typically of a very large diameter, often 40-60 cm, often with an elaborate folded-down rim which is often strongly inverted. This form is common among the surface material at Amhida and is common in the fourth century both here and at other sites in the Dakhleh oasis (Hope, personal communication, 2005; Dunsmore, 2002: Figure 6.5a) and is also found in the Nile valley (personal observation, 2005).


Cookers (Figure 9.3.11–13) are quite frequent, perhaps because their thin walls, globular form, constant handling and frequent exposure to heat meant that their life expectancy was relatively short. Perhaps as a consequence of the high turnover of this type, there are many subtle variations in the body-shapes and rim-forms of these vessels. Two key traits can, however, be identified in both the body and rim characteristics. The bodies can be either ribbed or unribbed, and the necks/rims tend to be either relatively tall and gently flared with a simple or slightly modelled rim (10), or short and steeply flared with an internal ledge and a bevelled rim (11). The latter rim type appears to be associated only with smooth sided cookers. Vertical strap handles are preserved on some vessels, and transverse lug handles on one or two examples. Many of these vessels had traces of exterior blackening and sometimes had burnt food adhering to the exterior. A very small number of cookers (12) are made in the A11 fabric, characteristically having very thin walls and an exterior red slip fired to a grey-brown colour. Unfortunately, none of these vessels had enough profile length preserved to give a clear indication of their shape.


13. Cooker with a ribbed body and relatively long neck with a turned down rim and slight internal ledge. Fabric A11. Diameter 13 cm. A05/2.1/58/2204.

Figure 9.2: Vessel types from areas 2.1. 10: mixing bowl. 11–13: cookers.

The most common form of long-necked jar (Figure 9.3.14–17), made of an A1 fabric, has rounded shoulders and a long, slightly inclined neck. There is usually a ridge at the base of the neck, and the rim is often folded down, with either a rounded (14) or squared off (15) edge. A variety of other jars were found, of various shapes and diameters, none of which could be reconstructed below the shoulder. Some of these vessels have quite complicated ridged rims (16). It is likely that some of these rims are associated with large baggy storage jars of which body sherds were found in room 9.
15. Long-necked jar with rounded shoulders, ridge at base of neck and in-turned folded-down rim with squared off edge. Fabric A1. Diameter 9 cm. A05/2.1/36/4416.

In the area 2.1 assemblage, bottles (Figure 9.3.17–18) are characterised by their long narrow necks, sometimes with a filter and/or single handle. These relatively uncommon vessels are usually made of an A1 fabric.

17. Bottle with long narrow neck, with a pronounced carination about half way down the neck and an upright simple rim. A1 fabric. Diameter 2 cm. A05/2.1/107/6901.
18. Bottle with long narrow neck, at the base of which is a simple three-hole filter. The rim is simple with a groove below. The upper handle attachment of the single handle is at the rim and its shape suggests that the lower would be on the shoulder of the vessel. A1 fabric. Diameter 3 cm. A05/2.1/33/4698.

The kegs found in area 2.1 (Figure 9.3.19–20) have short upright necks with no filters and externally thickened rim that may be simple (19) or double (20). These neck and rim forms are consistent with forms c–i in Hope’s typology (2000, Figure 6), and the short necks are generally indicative of a Roman period or later date (Hope, 2005, personal communication).


A small number of lids (Figure 9.3.21) were identified, some of which were blackened on the exterior. All were made of the calcareous A11 fabric and had extremely thin walls.


A number of small fragments of mould-made ceramic lamps (Figure 9.3.22–3) in a variety of fabrics were found in area 2.1. The simplest vessel (22) is of an OPW fabric and is round with a burnished exterior. Several examples of lamps with complex impressed decoration (23) were also found, in both A1 and B10 fabrics, one of the A1 examples with polished red exterior surfaces.

22. Circular mould-made lamp with post handle placed opposite the spout (not preserved). The upper surface has a centrally placed circular aperture set in a circular depression surrounded by a ridge. The surfaces are burnished. Fabric OPW. Diameter 8 cm. A05/2.1/98/5159.


Sherds were also often used as chinking in the mud brick vaults, and could be seen in situ in several of the rooms, especially the small rooms (11 and 14) on the west side of the house where parts of
the vaults were quite well preserved. These sherds tended to be body sherds of a similar size and shape, usually from large closed forms of the ubiquitous A1 fabric. It is hoped that the study of this aspect of the ceramic assemblage will be fully addressed in the forthcoming excavation season if rooms 11 and 14 are excavated.

Area 1.3 (House)

Four days were spent in the excavation of a less wealthy house in area 1.3 and it was not possible to catalogue all the material before the end of the season. Despite the fact that the three rooms that were cleared had suffered from considerable erosion compared to those of the villa in area 2.1, a surprising number of intact vessels were recovered. As at the villa, the assemblage consists of table, cooking and storage wares, and lamps, the range of forms and fabrics at first appearing to be very similar at the two sites. However, as more material from area 1.3 was processed, various differences were noted. The slight variation between the repertoires in areas 2.1 and 1.3 could be explained by several factors. The most obvious is that, judging by the size, architectural complexity and decoration, the house in area 2.1 was occupied by people of a relatively high status, while the same factors argue for a lower status for the occupants of the house in area 1.3. There is also the possibility that the subtle differences in the pottery might indicate slightly different dates for the two sites, a proposition on which more light might be shed by other finds such as ostraca and coins.

The main fabric type, as at the villa, was A1, the hard sandy iron-rich clay, making up over 90% of the sherds. Other fabric types that were represented at the villa were extremely rare in Area 1, such as A11 and OPW. However, the limestone rich fabric (P37) that was rare at the villa was much more common in Area 1, and was often associated with the large baggy storage jars.

The range of vessel shapes, at first sight, was similar to that at the villa, with a range of small bowls, mixing bowls, cookers, long-necked jars, large baggy jars, kegs and lamps all well represented. While generally similar, there were clear differences in details of these shapes between the two habitation sites, vessels in Area 1 often being simpler in shape and decoration than those in Area 2 (for example the cookers are almost always smooth sided rather than ribbed), and were sometimes quite poorly finished. The presence of several unfired vessels perhaps suggests that this house was functioning at the same time as nearby pottery kilns, some of which were excavated by the Dakhleh Oasis Project in 1979 (Hope, 1980: 307–11, plates xxiv–xxv – probably slightly later in date).

Apart from the lack of OPW vessels, the range of small bowls is quite similar to that at the villa, with a variety of shapes occurring quite frequently. These include simple (24–6), flared (27–8), carinated (29) and footed (30–1) bowls. The form equivalent to the deep bowls found in area 2.1 has the same flared sides, simple rim and optional interior ledge, but has a wider diameter compared to its depth. It is not usually decorated. A wider range of sizes of flared bowls with ledge rims appear in the area 1.3 assemblage, sometimes with ticks or bars on the rim top. The footed bowls are generally of two shapes, either flared with a flat base and simple rim (sometimes used as a lid) or with rounded sides and a flat or recessed base and an in-turned simple rim. Unlike at the villa, the only decoration on small bowls is in the form of rim ticks or bars.

Figure 9.4: Vessel types from area 1.3. 24–31: bowls.

29. Carinated bowl with high-placed carination, recessed base and upright tapering simple rim. The interior of the rim is decorated with rim ticks. Fabric A1. Diameter 12 cm. A05/1.3/2/7641.

Mixing bowls (Figure 9.5.32) in an A1 fabric are well represented in the assemblage of area 1.3, again having a range of sizes and the characteristic in-turned folded down rim.


The greatest difference between the assemblages of areas 1.3 and 2.1 is seen in the cookers (Figure 6.9.5.33–7). There appear to be few with a tall neck (33), and the necks of these vessels tend to be quite upright with a more modelled rim. Some of these vessels have lightly ribbed sides. There seem to be a number of shapes which are intermediate between this form and that with the short and steeply flared neck, either with an externally thickened (34) or simple rim (35) and smooth sides. The vessels with short and steeply flared necks, internal ledge and bevelled rim seen in area 2.1 are present but not frequent in area 1.3, the most frequent form having the same external features but having multiple ledges on the interior (36–7).

Figure 9.5: Vessel types from area 1.3. 32: mixing bowl. 33–7: cookers.

36. Cooker with short flared neck, smooth sides and interior multiple ledges at rim. Diameter 13 cm. A05/1.3/12/7864.
37. Cooker with short flared neck, smooth sides and interior double ledge at rim. Diameter 16 cm. A05/1.3/2/7583.

The long-necked jars (Figure 9.6.38–9) in area 1.3 are very similar in character to those of area 2.1. They have rounded or sloping shoulders, usually with a ridge between the shoulder and the neck, a long inclined neck and a down-turned or externally thickened rim, sometimes with one or more ridges on the exterior.

39. Long-necked jar with sloping shoulders, ridge at the base of the inclined neck and an externally thickened rim with a ridge on rim top. Fabric A1. Diameter 12 cm.
Kegs (Figure 9.6.40) are relatively poorly represented at area 1.3 but seem to be of a simple- rather than a double-rimmed form.


Several complete lamps (Figure 9.6.41–2) were found in area 1.3. These are of the moulded variety in an A1 fabric with impressed decoration. An undecorated lamp fragment (Figure 9.6.43) in the same fabric seems to be similar to the circular OPW lamp found in area 2.1.

42. Complete mould-made lamp with no visible handle, and impressed decoration. Fabric A1. A05/1.3/21/8748.

Figure 9.6: Vessel types from area 1.3. 38–9: long-necked jars. 40: kegs. 41–3: lamps.

The few sherds collected from the bottom of the deep trench were all of an iron rich fabric, with abundant organic material, fired to a low temperature. The technology visible on the surface of the sherds suggests that they are of dynastic date. A single body sherd of a thin-walled vessel with polished red slipped surfaces was also found, the fugitive nature of the slip perhaps suggesting a Late Period date, possibly around the sixth century BC (French, 2005: personal communication).

Area 4.1 (Temple)

The tentative identification in the 2004 season (Bagnall, 2004: 11) of the mound in the centre of the site as a temple was confirmed by the extensive excavations of the 2005 season (Bagnall, 2005: 3–4). The many stone blocks included the cartouches of a number of kings of the Third Intermediate period, Late period and Roman period thus indicating a clear minimum date range during which the temple was functioning, and pottery was presumably being used in the vicinity.

The ceramics from Area 4.1 also give an interesting view of the history of this part of site. The identification and dating of the individual vessels is still in its early stages, but broad comments can be made on the composition of the assemblage. The surface material consisted mainly of fourth century types similar to those in areas 2.1 and 1.3, but with a few recognisable Dynastic vessels, such as a New Kingdom oasis amphora. Sub-surface deposits over the whole excavated area, including the many pits, were extremely mixed, with both fourth century and dynastic types present. The pottery in these deposits was often heavily salt damaged due to the high water content in this area. No pottery was found that might correspond to the 17th and 18th century robbing of the temple was identified among either the surface material or that in the pits. A few contexts, most notably unit 32, were found to contain entirely dynastic material, though the date range of the individual vessels covered the Old Kingdom to Second Intermediate period. It is hoped that further, more secure stratigraphic units can be found next season.

Two in situ vessels were found within a wall in area 4.1. The vessels were severely damaged by the weight of the wall, which had both crushed and caused considerable warping to their shapes. The presence of water and salts in the wall and surrounding deposits had also made the very chaffy A4 fabric of the vessels extremely friable, resulting in their disintegration in an attempt to remove
them. Both vessels were closed forms, one with a short neck and out-turned simple rim, which Janine (2005: personal communication) was unable to identify from Figure 6. She did, however, agree with a probable dynastic date for the vessel.

The dynastic pottery was distinguished from that of the late Roman period by the manufacturing techniques and surface treatment, fabrics, forms and firing. The on-site sorting and recording strategy was modified to distinguish between the main iron-rich fabric of the late Roman period (A1) and that of the dynastic period (A4). This latter fabric was in use from the Old Kingdom onwards and its inclusions are characterised by an abundance of organic material (Hope, 2004: 103). A number of types, covering several broad periods, were readily identified by Colin Hope, whose generosity with both time and expertise is much appreciated. The identification of more of the dynastic forms will be the subject of ongoing library research between excavation seasons.

**Predynastic period to First Intermediate Period**

A single vessel was tentatively identified as belonging to the Predynastic period on the basis of its form and surface treatment. This vessel has yet to be drawn, but the notebook description states: “A05/4.1/11/2468 – red slipped and polished bowl, exterior surface quite uneven, especially towards the rim due to modelling. Orange-red slip. Section orange-brown. Dense moderately hard fabric with abundant fine white particles and rare medium sand. Not clear if this is a local production or from the Nile valley”.

A number of vessel types were identified that are consistent with material of a late Old Kingdom date found elsewhere in the oasis (Hope, 1999: 221–2), although a few of the fine wares might be of an earlier date. Unlike the vessels of the Predynastic period, these wares are comparable to those produced in the Nile valley at this time, suggesting a considerable amount of influence on pottery production from this area (Hope, 1999: 224). The significance of the presence of a substantial amount of material of this early date at the temple site is not clear due to its association with redeposited material in the pits.

The forms identified as Old Kingdom in consultation with Colin Hope include examples of fine wares with a reddish-brown fabric with sand inclusions (A1) and a polished red slip (Hope’s group 1 for this period: Hope, 1999: 222), the majority of which are of local production. The majority of vessels are carinated bowls (Figure 9.7.44–5) with a slightly flared simple rim, commonly known as Meidum bowls. The evolution of these bowls can be used as a chronological indicator, with the form becoming progressively squatter with a higher-placed carination (Ballet, 1987: 1–16; Op de Beek, 2004: 268–71). The vessels found in area 4.1 are generally of a form (44) consistent with a 4th–6th Dynasty date, probably at the latter end of the range (Hope, 2005: personal communication), but the lower-placed carination of other vessels (45) perhaps indicates that earlier forms might also be present.

An Old Kingdom fine ware form that occurred only rarely was the table bowl (Figure 9.7.46). This type, well known from the Nile valley (Senussi, 2005, personal communication) and the Dakhleh oasis (Hope, 2005, personal communication) consists of a flared bowl with a flange rim set atop a tall pedestal base with a similar shape. Only base sherds of this type were identified among the material from area 4.1.

45. Medium bowl with relatively low-placed carination and slightly flared simple rim. Exterior polished orange slip and uncoated interior. Section zoned, mostly grey with an orange band at the external edge. Dense medium hard fabric with abundant fine sand and rare fine limestone, some of which is burnt out. The fabric has the appearance of a local clay. Diameter 21 cm. A05/4.1/2/5516.


A range of bread moulds (Figure 9.7.47–9) was also found (Hope’s group 2, 1999: 222), made in an iron-rich A4 fabric, and usually poorly fired, containing sand and abundant organic material. The conical moulds (47) are well known from the Nile valley (Senussi, 2005, personal communication), and have been found elsewhere in oasis (Hope, 1979: plate xxi.2; 1999: plate 14.10). These vessels were probably made either over a mould or on a wheel (Hope, 1987: 105–6). The shallow flat-based moulds are more roughly finished and appear in both single (48) and double (49) versions. Both types can be inscribed with simple incised and punctate motifs. Similar vessels with comparable motifs have been found at Mut and Ain Gazzareen, where the Old Kingdom date for this type is confirmed (Hope, 2005, personal communication; Koek, 2005, personal communication). The shallow single and double bread moulds were an extremely common find in the pits of area 4.1, their total weight being nearly 80 kg. The significance of a ‘wall’ of double bread moulds, consisting of four courses of 5 examples on their sides on top of the ashy fill of a pit (context 39) has yet to be explained.

Figure 9.7: Vessel types from area 4.1. 44–6: Old Kingdom polished wares. 47–9: Old Kingdom bread moulds. 50: Old Kingdom shale-tempered ware.


49. Shallow bread mould with flat base and two small deep bowls, the interior of which are quite smooth with some finger marks, the exterior less well finished, with extensive wiping and finger marks over the uneven surface. Fabric A4. Average diameter of each bowl 7 cm. A05/4.1/2/2227.

A small number of shale-tempered vessels, consistent with Hope’s group 3 (1999: 222) can also be attributed to the Old Kingdom. It is likely that vessels in this fabric indicate continuity of the indigenous Sheikh Muftah pottery production into the Old Kingdom (Hope, 1999: 224). The shale-tempered ware consists of hand-made vessels often have quite thin walls and the fabric (B3), probably calcareous in origin, contains abundant fine to coarse irregular shale particles. Hope (1999: 222) notes that the forms are generally large deep bowls, to which hole-mouth jars (Figure 9.7.50) can be added on the basis of finds at area 4.1. The well-finished appearance of this vessel suggests an Old Kingdom rather than a Predynastic period date.


Old Kingdom or Second Intermediate period
Despite being a frequently occurring group, spouted hemispherical bowls with a bead rim and a tapering spout in an A4 fabric (Figure 9.8.51) remain difficult to date. These vessels are dated to the late Old Kingdom (Hope 1979: pl. xx.4 and 1999: pl.14.6) at site 33/390-19-2, where they occur with a range of forms of this date. At site 31/435-D5-2 they form part of an assemblage dated to the Second Intermediate period (Hope, 1983: Figure xx.k–l and 1999: 226, plates 13.16–17).


**Middle Kingdom to New Kingdom**

Very few forms could be attributed to this period, which is sparsely represented in the pottery record throughout Dakhleh (Hope, 1999: 225).

A single form is tentatively ascribed to the Middle Kingdom on the basis of vessels seen at sites in the Nile valley (Senussi, 2005: personal communication). These are large zir-type vessels with rounded shoulders and roll- or bead rims in an A4 fabric (Figure 9.8.52).


The technology of a number of closed forms with rounded bases (Figure 9.8.53) suggests that they should be attributed to the Second Intermediate period. The pronounced scraping on the base is a secondary modification following the vessels’ manufacture on a pivoted wheel (Hope, 1999: 226).


**Figure 9.8:** Vessel forms from area 4.1. 51: Old Kingdom/Second Intermediate period spouted bowl. 52: Middle Kingdom (?) zir. 53: Second Intermediate period closed form. 54. Pan Grave sherd. 55. New Kingdom bread mould. 56. New Kingdom oasis amphora.

A small number of body sherds of a fabric and technology suggesting that they might belong to the Pan Grave culture. No diagnostic sherds were found, but one tiny fragment (Figure 9.8.54) is decorated with fine incised lines in a cross-hatch pattern, comparable with examples from recent excavations of Pan Grave cemeteries at Hierakonpolis (Giuliani, 2001, 19 and 26). The iron-rich fabric of these vessels is quite soft and porous, containing abundant medium organic material, and often fires black.


The most frequently occurring form of this period is the New Kingdom bread mould, as might be expected at a temple site, and was also seen at the temple site of Mut el-Kharab (Hope, 1983: 147). These bread moulds (Figure 9.8.55) are narrow and cylindrical in form, hand made and of an A4 fabric. The base is rounded and the simple rim usually very uneven and often cracked, as is the exterior surface.

A number of body sherds of New Kingdom oasis amphorae were also found in the excavations of area 4.1. The only diagnostic sherd (Figure 9.8.56) was a surface find. The fabric of this vessel type is described by Hope (2002: 96) as: ‘a medium-fine textured clay that contains numerous inclusions of oxidised limestone of fairly small size, quartz grains of varying sizes, and red particles that may be identified as mudstone; voids of varying sizes and shapes occur. There is the occasional larger piece of limestone. It has a variable firing pattern: there may be a bluish-grey core with oxidised zones coloured light orange to red on either side; two zones, one bluish-grey and the other light orange to red; or it may be fired grey throughout. In all cases the oxidised limestone inclusions are quite distinct. Exterior surfaces may be uncoated and a greyish-brown or red colour, or they may have a red or cream coating’.

56. Base of an oasis amphora, with flattened appearance. Extreme base of vessel mould made, joining onto a wheel made body. Fabric B23. Diameter 4.2 cm. Similar to Vessel 28 at Amarna (Hope, 2002: Figure12.b). A05/0.0/1/2107a.

Several medium-sized jars in an A4 fabric with flat bases that are poorly finished, often with excess clay and heavy finger marks at on the lower exterior are reminiscent of jars of the New Kingdom (Holthoer, 1977: form BB 4), but a lack of evidence for the rim shape makes this identification extremely uncertain.

Third Intermediate period to Roman period

Finds of statuettes and inscribed temple blocks confirm that a temple was functioning at area 4.1 at this time. Hope (1999: 229) identifies several characteristics of the pottery of the earlier part of this period (Third Intermediate period and Late period); including manufacture using a fast kick wheel and an increased density of the fabrics.

Unfortunately few forms could be attributed to this period, covering some 1000 years, with any degree of certainty. No vessels could be securely attributed to the Roman period. A small number of vessel types (Figure 9.9.57–9) could be easily assigned to the earlier part of the date range, on the basis of close parallels at sites in the Nile Valley and Delta, others with a more local character were identified by Colin Hope (2005: personal communication).

The easily identified forms included several so-called fire dogs, consisting of a conical base with a thickened rim, from which sprout two horn-like projections. The function of these vessels remains unclear, but Aston (1989: 27–32) suggests that they were used as stands for cooking pots and Spencer (1993: 48) notes that they might be connected with baking on the basis of a heavy concentration of this vessel type in association with a bakery. However, these vessels are seldom blackened or burnt (Aston, 1989: 28; Spencer, 1993: 48; personal observation, 2000–2005).

Figure 9.9: Vessel types from area 4.1. 57: Late period Levantine storage jar. 58: Late period dimple bowl. 59: Late period frying pan.

Examples of this form have yet to be drawn, but a comparable example, dating to the late Saite-Persian periods have been found at Elephantine (Aston, 1999: 228, pl.71.2016), and others dated more broadly to the Third Intermediate period at el-Ashmunein (Spencer, 1993: 47–8, plates 75–8, plate 112.3) and Amarna (personal observation, 2003).
A number of body sherds and a rim (57) of Levantine storage jars (Bourriau’s class 1B at Buto: 2003: 227–8, Figure 8.4–6), the well-known transport amphora of the Third Intermediate and Late periods were identified. The presence of these vessels, ubiquitous at sites of this period in the Delta and Nile valley, at the temple site suggests that the Dakhleh oasis was included in the trade routes linking Egypt with the Levant at this time.

57. Levantine Storage jar with slightly sloping shoulders, upright neck and externally thickened rim. Hard dense fabric with abundant fine and rare coarse limestone particles, rare fine black particles and rare unmixed clay. Diameter 11 cm. A05/4.1/14/6188.

A group of small bowls (58) with rounded, slightly pointed bases and upright sides were identified as dimple bowls dating to the Late period by Colin Hope (2005: personal communication). These correspond to Patten’s series 1 form 43, occurring in both iron and calcium rich fabrics, which she dates to the eighth to sixth centuries BC (Patten, 2000: 29–30).


Another form attributed to the Late period by Hope (2005: personal communication) is the so-called frying pan (59), consisting of a shallow round-based bowl with a long, thick shaft handle attached to one side, in an A1 fabric. The exact shape and proportions of both elements of this form seemed to vary from vessel to vessel. This vessel type does not appear in Patten’s typology.

59. Shallow bowl with rounded base and in-turned simple rim, with a wide, thick hollow shaft handle attached to one side. Traces of cream slip. Fabric A1. A05/4.1/1/2139.

Late Roman period

Ceramic material of the earlier late Roman period, comparable to that found at areas 2.1 and 1.3 was abundant on the surface in area 4.1, but was also incorporated in the mixed deposits in the many pits below the surface, suggesting that these were dug in the late Roman period or later. The range of forms and fabrics is very similar to those found at the two domestic sites.

A small number of African Red Slip (ARS) fine wares (Figure 9.10.60–1) were found on the surface close to a well preserved wall towards the south end of area 4.1. The fact that these vessels were not worn, and were collected together in a group suggests that they were perhaps collected by members of the expedition in an earlier season. The date ranges of these forms are consistent with that of the flourishing of the town of Trimithis (Bagnall, 2004: 1).

60. ARS bowl with complex stepped sides and externally thickened rim with an incised groove on the top. The interior and over the rim are slipped orange-red and highly polished, the exterior is slipped a paler orange-red and is unpolished. Fabric ARS (coarse). Diameter 28 cm. A05/0.0/1/2106. Hayes’ (1972) form 67, first group, dating to the mid fourth to early fifth century.

61. ARS bowl with flared sides and an out-turned simple rim and an inset base. The interior and exterior are red-orange slipped but too worn to comment on the extent of any polish. Fabric ARS (coarse). Diameter 38 cm. A05/4.1/2102. Hayes’ (1972) form 60, dating to the mid to late fourth century.

Figure 9.10: Vessel types from area 4.1. 60–7: late Roman bowls.
Vessels in the local OPW were also found, the majority being flange-rimmed bowls comparable to (9) above. A slightly different form, with a greater diameter and more strongly angular rim decorated with two incised lines on the rim top (Figure 9.10.62) was picked up from the surface in this area.

62. OPW flange-rimmed bowl with flared sides and angular rim, with two incised lines on the rim top. Fabric OPW. Diameter 22 cm. A05/0.0/1/2101.

A similar range of small bowls (63–7) in an A1 fabric was noted in area 4.1 as was found in the excavations at the villa and house, some with red rim ticks or dots. As was the case in the domestic assemblages, there was a tendency for more elaborate decoration to be used on the interior of flared and ledge-rimmed bowls, which in some cases have evolved towards a very upright ledge (63).

64. Relatively shallow deep bowl with flat base, flared sides and simple rim with interior ledge. The rim top is decorated with red rim ticks. Fabric A1. Diameter 18 cm. A05/4.1/2/4623.
65. Ledge rimmed bowl with upright ledge, the interior of which is decorated with an elaborate curlicue motif in red on a cream slipped surface. Fabric A1. Diameter 31 cm. A05/4.1/10/2889.

Mixing bowls, often with a very large diameter (up to about 60 cm) were again common, exhibiting the characteristic inclined turned-down rim. The vessels from area 4.1 were noted to often have quite thin walls (Figure 9.11.68).


The range of closed forms is again similar to that at the domestic sites, but with less variation within the cooker types (Figure 9.11.69–71). These consist of both the long- and short-necked versions (69), the latter including examples with the multiple internal ledges (70) that seem to be especially associated with area 1.3. Cookers were made of both the iron-rich A1 fabric and the calcareous A11 fabric (71). Long-necked jars (Figure 9.11.72) are again similar to those seen in areas 2.1 and 1.3. A decorated jar (Figure 9.12.73), of which only the body could be reconstructed, can be compared to those found at a residential complex at Ismant el-Kharab (Dunsmore, 2002: 137–9, Figure7).

**Figure 9.11:** Vessel types from area 4.1. 68: late Roman mixing bowl. 69–71: late Roman cookers. 72. late Roman long-necked jar.

**Figure 9.12:** Vessel types from area 4.1. 73. late Roman decorated jar. 74. late Roman bottle. 75. late Roman keg.


As was the case in areas 2.1 and 1.3, the late Roman assemblage in area 4.1 contained a number of bottles, some of which had a single handle. The most elaborate of these was a single handled flask with a simple filter (Figure 9.12.74). Kegs also appeared (Figure 9.12.75 and Figure 9.13.76), in both the double-rimmed form (75) seen in area 2.1 and the simple-rimmed form (76) associated with area 1.3.

74. Single-handled flask with ribbed body, long neck with distinctive bulge at upper handle attachment, turned-down rim and simple filter at neck base. Fabric details not available. Diameter 3.7 cm. A05/4.1/7/2479.


76. Keg with short neck and simple, slightly externally thickened rim, with pronounced rilled lines around the circumference of the body. Fabric A1. Diameter 5.2 cm. A05/4.1/22/7179.

The rim, shoulders and one handle of an LRA 4 amphora (Riley, 1979: 223–4), also known as a Gaza jar (Figure 9.13.77), is the only late Roman amphora type to be found in area 4.1. This amphora type, thought to have been used in the transport of Gazan wine and oil around the Roman world, was in circulation between the fourth and sixth centuries AD (Peacock and Williams, 1986: 198–9). The rim shape and fact that the upper ribbed band starts at the base of the upper handle attachment is consistent with Majcherek’s form 2, which is the earliest form to occur in Egypt, dating to the fourth and fifth centuries (Majcherek, 1995: 166–8, plates 3 and 5).

77. Rim and upper body of an LRA 4 amphora, including upper part of one handle with post firing hole near its lower attachment. Exterior ribbing starts at lower handle attachment. Extra clay wiped around exterior rim. Fabric: LRA 4. Diameter 12 cm. A05/4.1/2124.

Only a handful of lamps were found in the temple area. The majority of these are of a mould-made type (Figure 9.13.78) with an elongated shape and recessed wick emplacement with no decoration, made in an A1 fabric.


**Figure 9.13:** Vessel types from area 4.1. 76. late Roman keg. 77. late Roman LRA 4 amphora. 78. late Roman lamp.

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10. Archaeobotany (Johannes Walter)

In this second season archaeobotanical samples from four areas of the Roman site Amhida were analyzed: area 1.3, 2.1, 4.1 and 5.1.
From the total of 78 samples recovered this season, 60 samples were analysed: 51 soil samples plus hand-picked ones and contents of jars. The matrix samples were sieved through a set of four sieves with mesh-widths of 4 mm down to 0.5 mm. For large soil samples rich in charred material electrostatic extraction was applied. From other samples the macro remains were picked out manually. Plant macro remains comprise fruits, seeds, flowers or inflorescences, leaves, twigs, and bark. Up to now the taphonomic processes on this site have not been understood. Some moisture seems to exist at least in area 2.1. As a result no wood is preserved except for rare disintegrated pieces. Mainly charcoal was recovered in Amhida.

Area 2.1 – Late Roman House
The majority of soil samples taken in 2005 comes from this area: rooms 3, 6, 7, 8, and 9. They were taken mainly from the floors, except in room 7, where the floor level was not excavated. Samples from this room represent fill. Most of the plant remains are charred. Usually wooden material is absent and the rare pieces found in this area easily disintegrate (Figure 10.1).

The results of the analysis are similar to those from rooms 1–4 excavated in the first season. The matrix is very poor in botanical remains. The dominant cultivated plants are olive, date, grape, and the cereals barley and free-threshing wheat. Lentil seeds and rosemary leaves occur rarely. The dominant weeds are Canary-grass, rye-grass, small seeded species of the pea family (medick, clover), asphodill, sea club-rush, and nettle-leaved goosefoot. Furthermore, seeds from mustard and sea-blite were found.

Area 5.1 – Structure of unknown function
In this area high anomalies were detected by geomagnetic prospection. A test trench showed a darkish grey soil layer, which seemed to be rich in charcoal. However, the fine matrix is very fine grained and probably consists of powdered charcoal mixed with clay formed into small dark pieces which look like charcoal. No charcoal or other plant remains are present in the samples.

Area 4.1 – Temple
This area occupies the top of the hill with the temple of Amhida. Only a few samples had been taken from seemingly undisturbed layers, rich in charred material. They probably date from an earlier period than the Roman one. Only charred macro remains are present. They are different from other areas as they contain high numbers of spikelet forks and rachis fragments of emmer wheat. There are only a few remains of free-threshing wheat. Barley is dominant and the finds comprise hundreds of rachises, but rarely grains. In addition to the cultivated species recovered in area 2.1, safflower, sesame, and cotton, but also some more weeds occur: mallow, milk vetch, purselane. Acacia, tamarisk and camel thorn belong to the woody species likely to have been used as fuel.

Area 1.3 House
In this area ashy matrix samples were taken mainly from levels immediately below or on the top of the floor. About 50% of the collected soil samples were analysed. Generally, the samples contain a high diversity of plant species but no species is dominant. Both the charred and the desiccated remains are much better preserved here than in all other areas of Amhida. Nevertheless, the preservation of desiccated material is generally bad and even the thick-walled olive pits are no

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3 At the Institute of Botany, Vienna University, a device was developed which meets the needs of the archaeobotanist working in arid regions: a) no water is necessary; b) large amounts of soil can be processed in comparatively short time; c) most importantly, the recovery rate is higher than by picking out plant remains from the sediment by hand (Thanheiser 1995).
longer hard but, like wood, are soft and easily disintegrate. Figure 10.2 shows charred and desiccated olive stones.

As usual, free-threshing wheat and barley are common. In this area several species which are otherwise rare in Amhida occur: pomegranate, pine, Egyptian plum (sebesten), garden rocket, water melon, cucumber or sugar melon, and the spices basil, black cumin, coriander, and dill.

High concentrations of desiccated rodent droppings were found in the building indicating a place of high rodent activity. They probably invaded this building when there was just reduced human presence or when the building was no longer occupied. The high number of gnawed date and olive pits in most samples from all areas may reflect the high frequency of rodents in the settlement and may point to the problems for protecting stored food. Figure 10.3 shows heavily gnawed charred and desiccated date pits.

Field Crops

Cereals

Among the cereals barley and free-threshing wheat usually dominate. Both bread wheat and hard wheat occur. Emmer wheat belongs to the glume wheats and is almost missing at the site except in the temple area. As was the case in 2004, pearl millet is very rare.

Pulses

Pulses are represented by lentil seeds only.

Fibre plants

Both seeds of flax and cotton occur in Amhida.

Oil plants

Olive pits are very frequent. Furthermore flax seeds and rare remains of Egyptian plum, garden rocket, sesame, and safflower occur. The latter one may also have been used as a dye plant.

Condiments

So far dill, black cumin, rosemary, basil, and coriander were recovered. Probably the weedy mustards were also used as condiments.

Fruit plants and nuts

The most common woody garden plants are olive tree, date palm, grape vine, and more rarely pomegranate, Egyptian plum and pine. Additionally, herbal plants, such as water melon, sugar melon or cucumber had been planted.

Fuel

Twigs and wood can be easily collected from the trees and bushes of acacia, tamarisk, and camelthorn, which are very common in Dakhleh and which have been recovered in small quantities. Figure 10.4 shows a charred fruit fragment of Nile acacia.

Other wild plants

Several wild growing members of the pea family and the cabbage family constitute valuable fodder. Many of them are not only field weeds but can also be found in fallows. In common they have a high feeding value: medick, clover, vetch, mustard but also grasses, such as Canary-grass and rye-grass.
Asphodill occurs at the edges of fields and on fallows and sometimes it grows in high quantities because it is neglected by domestic stock. The plant produces seeds of good dietetic value and it might have been collected as a medicine or condiment.

The sea club-rush, nettle-leaved goosefoot, and in particular sea-blites reflect some salinity in the soil which obviously also existed in Roman times. The salty soil probably caused problems when salt increased due to irrigation as it can often be seen today in the oasis. It would be fascinating to obtain more information concerning varying levels of soil salinity.

Summary
In the second season botanical remains from different areas were analysed. In contrast to the first season, when no well preserved desiccated material was recovered, area 1.3 yielded a high number of such desiccated remains. This might demonstrate differences in taphonomic processes, particularly in the proximity of moisture, in various areas of the site.
By and large the results match the ones from last year although some new taxa have been recovered. The most striking difference in the composition of plant remains was found in the temple area (4.1) where emmer wheat is dominating. In earlier periods, emmer wheat was a staple crop, but all archaeobotanical evidence from Egypt points to a replacement in the Greco-Roman Period. In contemporaneous Kellis it is very rare.

11. Textual Finds (Roger S. Bagnall)

The 2005 season yielded 63 ostraka and 5 inscriptions, not including the hieratic stelae described in section 2. Of the ostraka, 2 were written in Hieratic and 5 in Demotic (some of these with Greek as well, generally on the other side). Egyptian-language texts were found in both Area 1.3 and Area 4.1. The remainder of the ostraka were in Greek.

The inscriptions were varied in type and content. At one end of the spectrum was a small sandstone fragment with parts of five lines of a date by the emperor Trajan; almost nothing except imperial titulature and a date to Tybi 5 survives. This inscription was a surface find in Area 4 near what is thought to be the temenos wall. At the opposite end of the spectrum were three fragmentary lines with Greek letters on the bottom of a small moulded bowl in dark-gray clay, also a surface find, in Area 5. Another surface find from a building north of Area 2 was a thick fragment of wall-plaster with a heading in large letters and four lines of Greek poetry. This piece probably comes from the same source as the poetic fragments published by Guy Wagner in *BIFAO* 76 (1976). A pedestal block from the temple area had a number of graffiti, one of them referring to ‘Great Ammon.’ And another block of sandstone from the temple area had a name and patronymic, Horigenes son of Ioannes, evidently Christian and presumably a graffito.

The Greek ostraka, as far as read so far, are predominantly more of the ‘well chits’ of which a number were found in 2004, with little information except the name of a well, the name of an individual, and a year number. The combination of the new evidence with that from 2004 is now sufficient to guarantee that these last are in fact regnal year numbers, yielding important (but so far ambiguous) evidence for a more precise dating for the occupation layers of the house in Area 2.1, where most of them were found. A few, however, come from areas of the site, particularly Area 4, indicating that this type of text was not unique to the household of Area 2.1. There are also a number of short accounts in the 2005 finds and some briefer tags (with only names, usually). Of particular importance is two accounts with amounts of money, both in the thousands of talents, pointing to a date after 351. One of them provides an equivalence to the gold solidus which confirms a date in the 350s.
CONSERVATION WORKS

The 2005 activities of the Qasr Dakhleh Project (QDP)

The interrelated activities of the 2005 season of the QDP, which took place in the period from 15 January till 16 March, were subdivided into the following parts:

1. Continuation of the restoration of Bayt al-Qadi.
2. Continuation of the clearing out of Bayt al-Qurashi.
3. Restoration and reconstruction of Bayt al-Qurashi.
4. Clearing out of the collapsed Bayt Al `Uthman.

1. Continuation of the restoration of Bayt al-Qadi

The restoration of Bayt al-Qadi continued with the replastering which was begun in the 2004 season. All rooms on all floors and the stairwell have been replastered with the exception of the first room on the ground floor. It is expected that this, together with the work on the outside parts of the northern walls, will be completed during next season.

2. Continuation of the clearing out of Bayt al-Qurashi (BQur)

Last season the parts adjacent to Bayt al-Qadi were cleared of mud bricks and rubble. The clearing process was continued in this season. Nearly the whole of Bayt al-Qurashi was cleared in the 2004 season. The last three rooms were cleared during this season.

Like the previous season, objects and pieces of paper with writing on it were found. The objects again were mostly household goods. Especially in room BQur 11 and a small elevation above it yielded the surprising number of more than a hundred documents from the 16th, 17th and 18th centuries, most of them legal documents. Especially noteworthy is a legal document in very good condition of 1,4 m long of the year 987 AH/1579 AD, which is the oldest document found so far.

Interesting and important as they were, these finds and especially the paper documents, considerably delayed the restoration and reconstruction activities.

3. Restoration and reconstruction of Bayt al-Qurashi

The reconstruction of the ground floor of Bayt al-Qurashi was continued with the reconstruction and roofing of rooms BQur 2b, BQur 3 and BQur 4. The first floor rooms BQur 2a and 2b, BQur 5, BQur 7a and BQur 7b were also completed. In the southern wall of BQur 5 two large windows in the traditional style were built. The southern wall of the open courtyard of BQur 6 had to be entirely reconstructed. This courtyard was partly covered by the reconstructed stairwell which goes up from this courtyard to the first floor and by a balcony adjacent to room BQur 7a. The roofs of rooms BQur 2a, BQur 2b and BQur 5 are the completion of that part of the building. The second floor of BQur 7a has also been completed. A beginning was made with the reconstruction of rooms BQur 1 and BQur 7b on the second floor.
4. Clearing out of the collapsed Bayt Al `Uthman

The collapsed part of the Bayt Al `Uthman was cleared out as well as the parts of the collapsed houses to the north of Bayt al-Qadi. During the clearing process no archaeological relevant material was found. This is as expected, since even the earliest parts of the buildings which had collapsed were still standing in 1979. A beginning was made with the reconstruction of Bayt Al `Uthman.

`Ain Birbiyeh, Temple of Amun-Nakht

Work at this site proceeded for two months. During this time, further depth to 3 metres was reached in the Sanctuary, some two metres of the Contra-temple wall and its decoration were revealed, and a new Gateway structure was uncovered to the east of the temple.

The conservation techniques have been described in previous reports and will not be repeated here, except to reiterate that we use no synthetic materials, as these are not tested through time in the situation of a monument.

In the doorway between the Pronaos and the Sanctuary a steel-and-wood structure was inserted to support the lintel which was cracked and deemed unsafe. Once this was in place, work could proceed in the Sanctuary. We have now cleared to a depth of 3 metres, and have treated all the
walls with their relief decoration in a process of hardening. This room has been left with a temporary roof covering to protect it from weather and from entry by people during the off-season.

The Contra-temple wall has been treated by the same techniques as the Sanctuary walls. This wall has been excavated to a depth of 2 metres, to act as a counter-balance to the emptying Sanctuary. It has been covered with a vertical wooden structure, for security and safety.

Finally, a new Gateway has been uncovered some 35 metres east of the temple. This lies some 2 metres below the surface and we have seen about 1.5 metres of its height. It is undecorated, but is surprisingly different from the rest of the temple. The structure is considerably larger than the Augustus gateway, it is more massive in appearance and we begin to think it belongs to a different (?earlier) temple on the site. This has been fenced with wire to prevent accidents.

Ismant el-Kharab

Prof. Olaf Kaper reports:
A conservation programme was carried out at Ismant el-Kharab aimed at reconstructing the wall paintings from the mammisi (also designated Shrine I) of the temple of Tutu. The team comprised three conservators, a photographer and an epigrapher. This team worked for six weeks.

The wall paintings concerned are stored on site in about one thousand wooden trays. All of these paintings survive in fragments only. The work consisted of taking off the fragments from their original mud brick support and providing them with a new backing of gauze. One larger piece was conserved together with its mud brick support, which was consolidated and the edges of the painted plaster were strengthened. In addition, about 130 trays of plaster were dealt with, in which the plaster was consolidated with resin (paraloid and primal), partly reconstructed, and assembled using paraloid.

The work is planned to be continued during the coming three field seasons.

PHYSICAL ANTHROPOLOGY

This season’s field group consisted of seven anthropologists led by Dr. J. E. Molto. The season was primarily designed as a study season, with a short excavation to increase the number of infant burials.

The purposes of this season’s activities were:

A. To process subadult burials excavated in 2003 that were not analyzed
B. To recover additional subadult burials from Kellis 2 mapped in 2003 but not excavated
C. To process burials recovered by Dr. Colin Hope’s team from the North Tomb area 5,6,7 and 16 inside the Kellis Village Site.

A. Analysis of Subadult Burials
In the previous field season the bioarchaeological research focused on recovering and analyzing adolescent and adult burials from the southeast sector of Kellis 2. Many subadult burials were recovered and still more were mapped but left unexcavated due to time constraints. A total of 46 subadult burials were cleaned, sorted and analyzed in this field season. Demographically they correspond to previous Kellis 2 data in that half were neonates (died at or around the time of birth) or died in the first few months after birth, 14 were children between 1 and 6 years of age, 6 were late children between 6 and 12 years and at least three (563, 566, 611) were foetuses. While, as expected, none of the neonates or foetuses showed signs of anaemia (manifested by a condition called porotic hyperostosis = porous bones) one neonate showed a systemic (widespread) pathology of unknown cause, although in some respects the osseous changes mimic those associated with porotic hyperostosis. This skeleton requires further detailed analysis in order to determine the underlying disease. The most noteworthy pathology in the youngest cohort was the probable presence of anencephaly in burial 563 a foetus that was likely aborted spontaneously at 30–32 gestational weeks. Anencephaly essentially means this individual had a malformed and or absent brain with the concomitant lack of cranial development (no parietals or frontal and occipital squama). This condition is often associated with a multitude of other skeletal disorders including major neural tube defects like myomeningocele. This is one of the earliest cases of anencephaly in antiquity, another being reported in an Egyptian mummy from the catacombs of Hermopolis.

As expected the child (1 to 12 years) skeletons had considerable (65%) evidence of porotic hyperostosis which represents evidence of iron deficiency anaemia. Though this condition is non-specific in terms of cause, in the Kellis 2 sample population gastroenteritis is thought to be a major contributing factor. One child skeleton did however, show evidence of another common problem of childhood namely a middle ear infection (otitis media). In most cases otitis media will self heal but often the condition can be chronic or lead to septicaemia and death. In burial 505 the latter is a possibility because the infection was extensive resulting in severe mastoiditis and the destruction of the cortical bone as the infection drained exteriorly. These data on the subadult pathologies will be added to the large database now accumulating for the Kellis 2 population sample and will result in a better understanding of subadult morbidity and mortality in Roman Period Egypt.

In addition to the pathologies a number of subadult burials have evidence of genetic traits that support the view that Kellis 2 was organized along familial lines. For example, burials 576 and 577, both neonates, have supratrochlear spurs on their respective humeri suggesting they may be related. Also each of these burials is placed next to Tomb 3 one of the many superstructures located in Kellis. To date all five individuals that have this rare genetic skeletal trait are located in this part of the cemetery. Like the pathology the data being accumulated on the subadult burials will assist in defining who is related to whom in the Kellis 2 cemetery.

B. Recovery of the Subadult Burials mapped in 2003

Five field days (December 9, 11,12,13 and 14) were allotted to recover the subadult remains mapped in 2003. A total of 49 burials were recovered (see attached map – burials excavated in red) and these will be analyzed in 2005, plus the recovery of an additional 40 subadult burials. Two subadults (burials 583a and b) were buried together in a wooden coffin which is the first example of this mortuary practice at Kellis 2.

C. Burials Recovered from the Village of Kellis Rooms 5, 6, 7 and 16.
In the January 2004 excavation of burials close to the town site (North Tomb{NT} area) was carried out by Dr. Colin Hope’s team. They recovered remains from 4 rooms designated 5, 6, 7 and 16. Invariably the remains were badly disturbed, at least 10 of which had been intentionally burned. Only two complete skeletons were recovered, one from Room 16 and the other designated G10-1/6 Room 3/6. The burned remains likely represent early occupants of Kellis who were exhumed (see unknown association below) and burned to make room for later deceased individuals. Because of the commingled nature of the bones our first task was to determine the minimum number of individuals (MNI) present. The MNI results are shown in the following table.

<table>
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<th>NT</th>
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<th>Females</th>
<th>Males</th>
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<td>29</td>
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<tr>
<td>TOTAL</td>
<td>20</td>
<td>13</td>
<td>11</td>
<td>14</td>
<td>58</td>
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</table>

These remains were not subject to detailed investigation due to time constraints. In order to obtain a provisional understanding of the nature of this group a detailed study of the non-burned crania from NT 6 was conducted as well as the two complete burials.

Of the 13 crania recovered and analyzed from NT6 seven were male, five were female and one was a child aged 6–7 years. The morphological and paleopathological data from these skulls will be compared to Kellis 2 data to try and determine their similarities and differences. From a cursory viewpoint they are very similar as expected from previous comparisons of The Town Site and Kellis 2 burials. Radiocarbon dates from two previously excavated town site burials showed that the Town Site and Kellis 2 were in use simultaneously.

The two complete burials were noteworthy for different reasons. Burial 6, a female 50–60 years old, from room 1 of NT16, had major fractures of her second cervical vertebrae, her 5th thoracic vertebrae and a left rib. The latter shows considerable but incomplete healing while the vertebrae are essentially unhealed. Perhaps the rib and vertebrae fractures represent separate events. This unfortunate individual likely had a major fall on her head that essentially caused her death following a short period of time after the event.

Burial G10-1/6 from Room 3 is a young female (mid 20s) with no evidence for cause of death. She however shows a number of characteristics that suggest she was of Negroid ancestry including kinky black hair (unlike the wavy black/brown hair from the Kellis 2 population), considerable facial prognathism and a wide nose. This hypothesis will be tested using stable isotopes to determine where she might have originated and mtDNA to determine her direct ancestry.
In addition to the above, the North Tombs also yielded 19 bodies preserved in whole or in part by desiccated soft tissue. Eleven are adults and 8 are subadults. Some appear to be ‘natural mummies’ (preserved by dry conditions of burial) and others had been deliberately desiccated with a layer of a salt-like substance, possibly natron. Most bodies have intact abdominal contents and may be suitable for autopsy. These were kept in storage and will be studied by a team of experts lead by Dr. Arthur Aufderheide.

CONCLUSION

This 2004/2005 season has been as fruitful as past seasons. It was accomplished with much help of colleagues from the Supreme Council of Antiquities. Dr. Zahi Hawas, President of the SCA, and Dr. Magdi Gandour were most helpful in organizing the season. Local colleagues included Mr. Maher Bashendi and Mr. Sayed Yamani, and Hag Ahmed Salem of the Dakhleh Oasis inspectorates were all most willingly helpful in the oasis. The various representatives – Mr. Ahmed Goma, Mrs. Hannan Hassan Mutwali, and Mr. Ahmed Shezli of the Dakhleh Oasis and Mr.********** from Assiut were most helpful with their daily presence on site. Conservation expertise was provided by Mr. Baha’ Goma and by Mr. Rizk Abdelhay. All of these various colleagues have made the season run smoothly and we thank them very much. We are also grateful to Mr. Saad B. Mohammed, who takes care of our Cairo administration in and out of the season.