

# GEOARCHAEOLOGICAL AND ENVIRONMENTAL WORK AT THE SACRED ANIMAL NECROPOLIS, NORTH SAQQARA, EGYPT

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## Abstract

This paper summarises work undertaken during the *Catacombs of Anubis* project which has examined the Dog Catacomb at North Saqqara. It examines the condition and natural decay of the monument as well as looking at the environs of the Lake of Abusir at the northern end of the site.

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**Key words:** Saqqara, Dog Catacomb, Ibis, Relative Humidity, Augering

## INTRODUCTION

The Catacombs of Anubis project is directed by Nicholson and has largely been funded by the *National Geographic Society*. The work presented here is the result of a team effort and Nicholson has summarised the work of his colleagues who will publish full reports of their work in the near future. Thanks are due not only to those whose work directly informs this paper but to all those who have taken part in the project.

The work at the Dog Catacomb, whose mummified inhabitants were sacred to the dog- or jackal-headed deity Anubis, has been undertaken in order to better understand the construction of the monument, its dating and the species, gender and age profiles of the animals it houses. An investigation of the associated temple was undertaken by Jeffreys and Smith (1988) during the late 1970s.

As part of the project it was decided to investigate the question of the ‘Lake of Abusir’ a now dry lake which is well attested until well into the 20<sup>th</sup> Century and which has sometimes been suggested as a possible breeding ground for Sacred Ibis (*Threskiornis aethiopicus*). These birds had their own catacomb on the Western side of the Saqqara plateau in the area investigated by Professor W.B. Emery (1903–1971).

Emery’s untimely death meant that the work was never fully published by him, but it has been conveniently summarised by Bacon (1971: 230–234) and in greater detail by Smith (1974). There are preliminary reports by Emery in the *Journal of Egyptian Archaeology* through the 1960s. The work at the site was subsequently continued by Professors

Harry Smith and Jeffrey Martin in the 1970s, and by Smith and Nicholson in the 1990s (on the bird catacombs see Martin 1981, Davies and Smith 2005, and more generally Nicholson 2005)

The presence of a substantial body of water in the vicinity of the catacombs may have implications not only for the bird populations at Saqqara but also for some of the other animals represented in the catacombs including, for example, cats and dogs. Figure 1 shows the location of the catacombs and the approximate position of the Lake of Abusir.

## THE DOG CATABOMB

One of the significant features of the archaeology of the Dog Catacomb is its apparent lack of documentation. Current research suggests that it is first attested in 1897 when it appears on De Morgan’s *Carte de la Nécropole de la Memphite* (De Morgan 1897) where it is presented without comment (Fig. 2). The key to the map ascribes it to the New Kingdom (1550–1069 B.C.) though the grounds for this are unknown.

The map actually shows two dog catacombs, a small one which is not currently accessible and which is thought to have partially collapsed and a larger one which has been the focus of the work reported on here. It is possible that De Morgan’s dating comes from finds made in the smaller of the two catacombs but at present this can only be speculated upon. It is likely that his *Carte* is a compilation of surveys and information provided by many workers and it is possible that the New Kingdom attribution comes from one of these although no other source has yet been identified. Since the smaller cat-

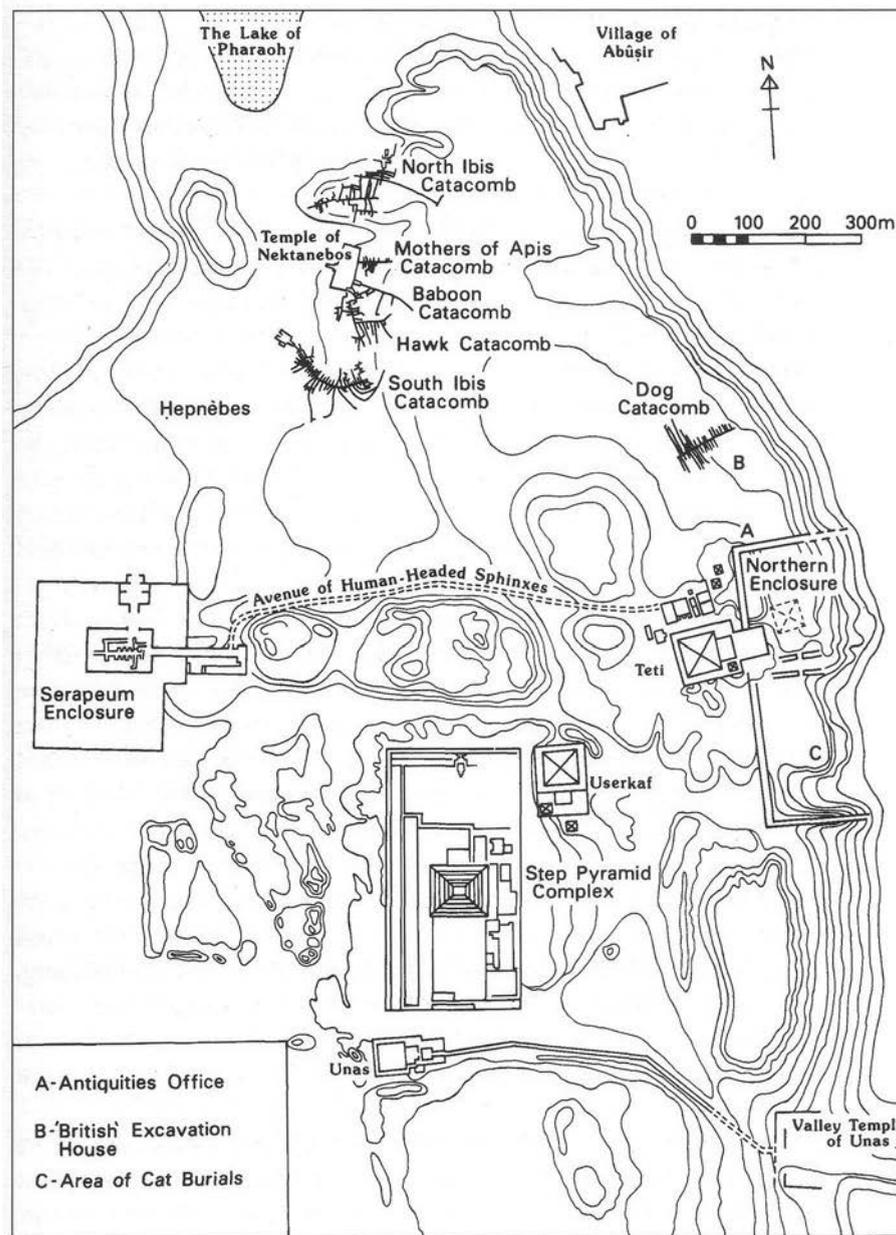


Fig. 1. Map of North Saqqara showing the location of the animal catacombs. (Drawn by J. Hodges).

acomb is currently inaccessible it may be that it belongs to the New Kingdom (1550–1069 B.C.) whilst the larger (hereafter referred to as the catacomb) is believed to belong to the Late Period (747–332 B.C.) perhaps extending through the Ptolemaic Period (332–30 B.C.) and into the early Roman (after 30 B.C.). Radiocarbon dates on samples of bone and other material are currently with the S.C.A./M.S.A. approved laboratory at the French Institute in Cairo. The current project has re-surveyed the catacomb and found inconsistencies in the De Morgan plan (Fig. 3).

The animal catacombs are cut into the upper calcareous beds of the Sakkara member of the Lower Eocene Maadi formation (Youssef *et al.*, 1984), which at this locality dip slightly to the West. This member forms the bulk of the Saqqara Abu Sir plateau, and consists of alternating light yellow, hard limestones and softer yellow marls (Fig. 4). These

rocks are thought to have formed in a lagoonal environment in a shallow sea sheltered by many islands (Gingerich, 1992; Peters *et al.*, 2009; Zalmout and Gingerich, 2012). The marl beds contain many late diagenetic gypsum veins (Peters *et al.*, 2009). The Sakkara member is overlain on the East side of the plateau by the early Pleistocene Idfu Gravels (Youssef *et al.*, 1984; Said 1981). The dog catacomb itself comprises an axial corridor approximately 173 m long from which open, on either side, a series of shorter tunnels the longest of which is about 65 m. It is into these tunnels that the mummified animals were placed. The catacomb has been excavated such that the roof/wall junction follows the same bedding plane throughout, giving a limestone roof and marl walls. As the roof follows the dip of the beds, the elevation of the catacomb reduces with distance from the entrance at 45.13 m to the end of the axial aisle at 41.03 m.

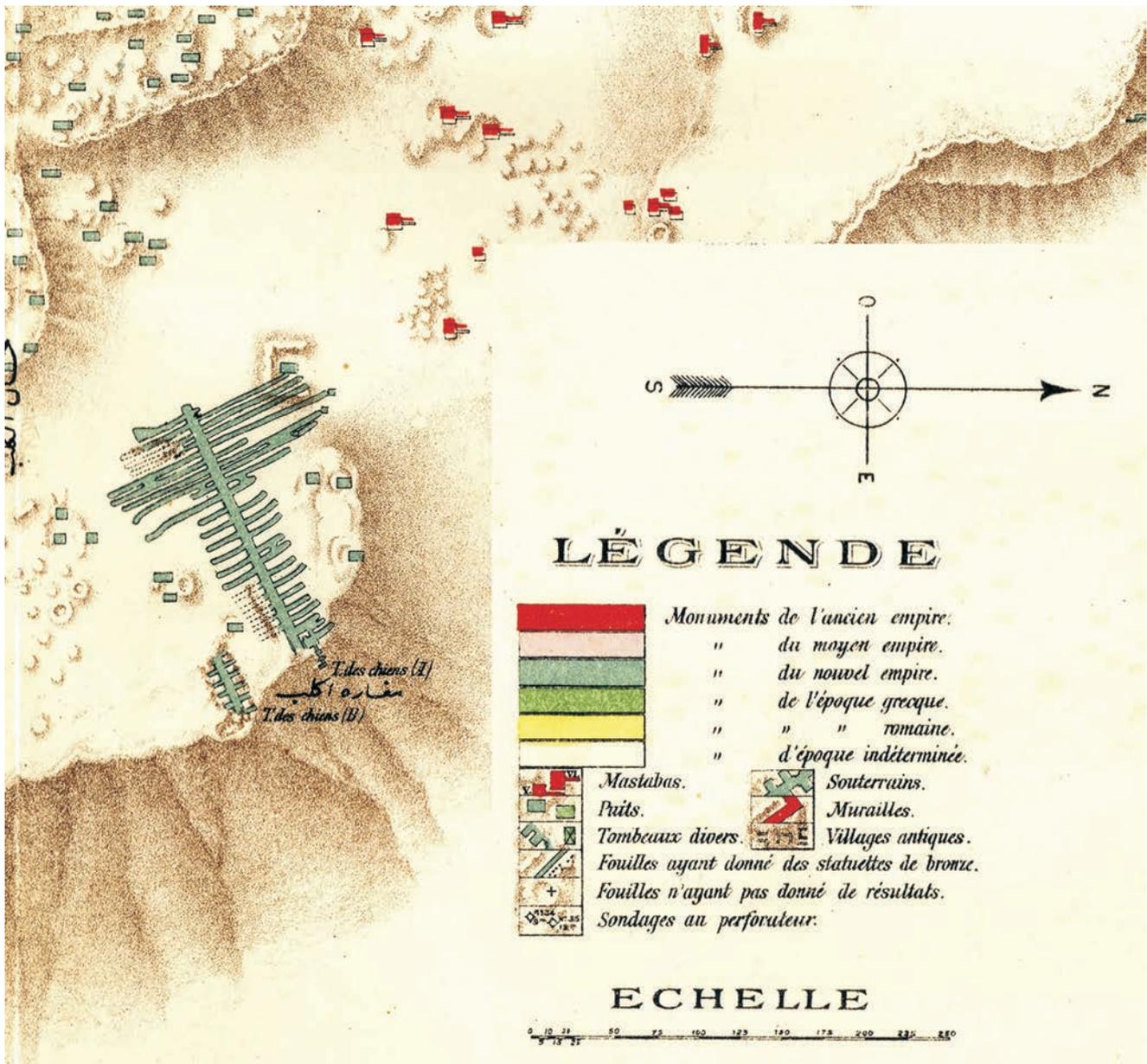


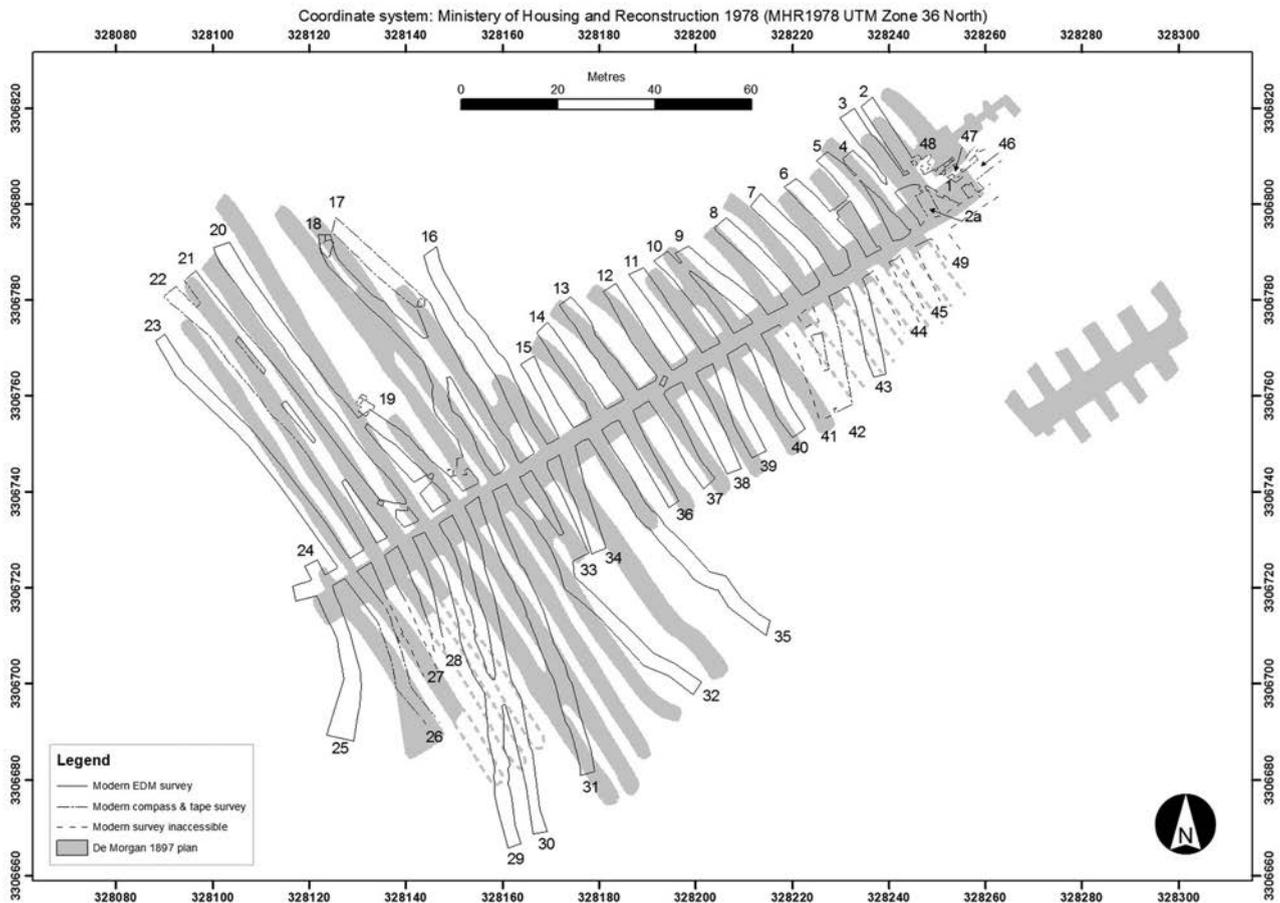
Fig. 2. Extract from De Morgan's (1897) *Carte de la Nécropole de la Memphite: Dahchour, Saqqarah, Abou-Sir* showing the dog catacombs.

Whilst working in the bird catacombs on the West of the plateau in the 1990s Nicholson noted that the humidity, particularly in the North Ibis Catacomb, appeared to increase over time. He was aware from ethnographic work in the clay mines of Deir el-Gharbi (Nicholson and Patterson 1985) that humidity could be a cause of collapse and in the interests of both safety and the better understanding of the ancient catacombs he consulted with Professor John Harrison. In 2009 geologist Ying Qin had identified that parts of the monument were subject to erosion and continual minor collapse but in the short time available could not do more than record its presence whilst undertaking other work for the project. Harrison, over two seasons in 2010 and 2012 was able to examine the deterioration of the monument in greater detail.

His work showed that the marl of the Maadi formation contains the swelling clay montmorillonite, and is indeed susceptible to changes in humidity. Similar instability has

also been noted at the nearby Idut tomb (Akarish and Shoeb, 2011). These changes operate throughout the year leading to the phenomenon known as 'scabbing' (Fig. 5) whereby, usually small, flakes of rock break away from the ceiling and walls of the catacomb. The evidence of this is particularly noticeable at the bottom of the walls of the axial corridor and, to a slightly lesser extent, in the emptied parts of the burial tunnels. That this is less obvious in the burial tunnels may well be because they do not appear to have been emptied until some time in the 19<sup>th</sup> or early 20<sup>th</sup> Century A.D. and so might be expected to have undergone less dramatic changes in humidity than those exposed for longer as the axial aisle appears to have been. It is not known whether or not the axial corridor would itself have been used to hold burials.

During the 2012 season *Omega OM-EL-USB-2-LCD*<sup>®</sup> relative humidity loggers were placed at intervals along the axial corridor to measure changes in humidity during the sea-



**Fig. 3.** Plan of the Dog Catacombs overlaid on that by De Morgan (1897) (shown in grey). The smaller catacomb is currently inaccessible and so shown only in De Morgan's version. (Plan by S. Mills, S. Williams and H. Nouwens).

son and beyond. It was found that humidity increased toward the rear (West) of the monument with recordings in excess of 90%RH being noted. It is not surprising to find that there were higher levels of humidity the further one went into the catacomb since the main source of fresh air was at the East where there is a modern, secondary, entrance to the site. Any other sources of fresh air are very minor and the result of incompletely blocked tomb shafts which were truncated when the dog catacomb tunnels were quarried.

It seems likely that the presence of the survey team has had an effect on the relative humidity but since they are present for only a few weeks per year and for only a few hours each day this effect is unlikely to be significant in terms of the overall deterioration of the site. However, the humidity loggers have been left in place and it is hoped that they can be removed and their data downloaded in 2013. This should allow us to see not only the effects working in the catacomb but also the annual cycle of humidity.

What is clear from the work is that any tomb or catacomb cut into the marls of the Maadi formation at Saqqara will have a finite lifespan. Over time the scabbing of the walls will lead to their weakening and eventual roof collapse. This was demonstrated in 2012 when our colleagues at the S.C.A. showed us an area of collapse immediately South of the Dog Catacomb and North of Professor Emery's house – and therefore in the general vicinity of the smaller, uninvestigated, Dog

Catacomb. The precise location of the catacombs on the De Morgan map is inaccurate. The new work has precisely determined the position of the larger catacomb but this cannot yet be done for the smaller as the entrance is not currently visible. What had happened in this area was that a hole about 2.0 m in diameter had appeared in the desert surface. Careful investigation revealed that the underlying rock had collapsed leaving a significant void roofed only by the concreted Idfu gravel. Such collapses are well documented at Saqqara and are monitored by our Egyptian colleagues. It seems that one cause of their occurrence is likely to be changes in humidity leading to the collapse of tombs and tunnels beneath the desert.

The De Morgan *Carte* (1897) shows a series of tunnels indicated only by dotted lines on the South side of the axial corridor of the large dog catacomb at its East end. Our investigation showed that these were in fact areas of massive rock collapse. What is unclear is whether they were caused by over-ambitious quarrying, earthquakes or changes in humidity. In the absence of data on humidity over time, and because our work is not yet finished, Professor Harrison has not yet formed a conclusion as to why the collapse occurred. However, the location of these galleries at the Eastern end of the catacomb where air circulation would always have been greatest might suggest that humidity was not the major cause here. Earthquakes occur infrequently in Egypt but can be sig-

nificant, the last sizeable one in the Saqqara area was that of 1992 but there have been numerous others including one of 1847 (Mekkwawi *et al.* 2007). The date of the major collapses in the Dog Catacomb cannot yet be ascertained with any certainty other than to say that they happened before 1897.

In passing it should be noted that the ancient quarrymen, whilst cutting the catacomb, dug through the remains of a large fossil vertebrate, possibly a whale. The fossil was first noted by Qin. Although the stratigraphy of the Saqqara area is not well understood, paleontological investigations suggest that the Maadi formation at Saqqara may be comparable to the Qasr el-Sagha formation at Fayum and the Maadi formation at Gebel Mokattam, and thus may be expected to contain cetaceans (e.g. *Basilosaurus isis*, *Prozeuglodon atrox*, *Saghatetus Osiris* or *Dorudon stromeri*) or sirinians (e.g. *Eotheroides* sp., *Protosiren* sp. or *Eosiren libyca*) (Gingrich, 1992; see also Underwood *et al.* 2011). The location of the fossil, at the base of a sandstone bed, accords with recent findings at Wadi el-Hitan (Peters *et al.*, 2009) It is hoped that it will be fully investigated by a palaeontologist during 2013. It is believed that no vertebrate fossils have hitherto been recorded in the Maadi formation at Saqqara, as these rocks have previously been recorded as being devoid of fossils (Youssef *et al.*, 1984).

### THE FAUNA OF THE CATACOMB

This is not the place to go into any detail regarding the species of animal interred in the Dog Catacomb as a summary publication is in press (Ikram *et al.* in press) and it is intended that the overall publication will take place in 2014.

However, the work by Professor Salima Ikram and her team of faunal specialists has demonstrated that a range of species are present in the catacomb and whilst the majority are indeed dogs or other canids there are also cats and birds. More surprising are the estimated numbers of animals in the catacomb. Our present estimates, based upon the number of individuals per 15 litre sampling container suggest that, if the axial corridor was also used for burials and these were stacked to a similar depth to the burial tunnels, some 8,000,000 animals would be present. These large numbers result from the practice of mummifying very young animals, often newly born and thus of very small size.

The animal mummies would be dedicated by pilgrims to the site of Saqqara who, by providing a fitting burial for one of the god's species, would hope that the animal would intercede with the deity on their behalf. During the Late Period such dedications of votive animals became a common feature of Egyptian popular religion but the numbers required necessitates a re-evaluation of the way the cult must have operated (see Ikram *et al.* in press; Dunand and Lichtenberg 2005).

It must be supposed that in the city of Memphis itself, and perhaps in its environs – possibly including the fringes of the Saqqara plateau, there were 'farms' for the production of puppies and dogs for the cult. It may well be that pilgrims to Saqqara were unaware of the existence of such establishments and believed that the animals for whose burial they were paying were large dogs such as those which they might have seen in the Anubieion temple itself, or that there was a wilful ignorance of such farms. As yet the relationship be-



**Fig. 4.** Entrance to the Dog Catacomb. Exposed rhythmic sequence of limestone (white) and marl (yellow) beds forming the Catacomb roof. Note white gypsum veins in the marl. The width of the doorway seen at bottom centre is c.0.75 m. (Photo: J.P. Harrison).

tween breeders, pilgrims and priests of Anubis is unknown but it certainly should not be regarded with 21<sup>st</sup> century sensitivities. Those who dedicated mummies believed that they were doing the best for the animal (and for themselves) by giving it a fitting burial for its eternal life.

The breeding establishments would have needed access to water. Those in Memphis would doubtless have had access to the Nile and to wells reaching its water table, but those further away may have needed other sources. For this reason investigation of the Lake of Abusir was carried out.

### The Lake of Abusir

The so-called 'Lake of Abusir' is well known to archaeologists working at Saqqara, but its nature and the time at which it dried up are not well known. For this reason geologist Erin Earl (a student of geology under the supervision of Dr. Judith Bunbury, Cambridge University) was asked to investigate evidence for the lake (Earl 2011).

That such a body of water existed in ancient times seems to be attested by a reference in demotic payri to the 'Lake of Pharaoh' (Ray 1978: 153) and is probably in the same place as the Birket Mukhtar Pasha known from recent times (Earl 2011: 13) though whether the same body of water had remained throughout is uncertain. It has been the subject of several recent papers referred to by Earl and which will be



**Fig. 5.** Looking along the axial aisle of the Dog Catacomb. The effects of scabbing can be seen at the foot of the walls. (Photo: P.T. Nicholson).

more fully discussed in her report (see for example Reader 2009, Cilek *et al.* 2012).

Earl's research was conducted in the now dry area to the North of the Saqqara plateau near the modern village of Abusir, which today extends to the North-Eastern slope of the plateau. The area in which she worked is overlooked by what was the main entrance to the North Ibis Catacomb and it is supposed that the lake might have served as a breeding ground for the sacred ibis birds (*Threskiornis aethiopicus*).

The work involved taking a series of hand-augered cores and attempting to date them by means of the small fragments of pottery which they contained as well as characterising the sediments which comprised the cores. This method has been pioneered by David Jeffreys at Saqqara (see Bunbury and Jeffreys 2009) Judith Bunbury and Angus Graham in the same region as well as elsewhere in Egypt. The results of Earl's work suggest that there was indeed a body of water present in the region of the presumed Lake during the Late Period (c.747–332 B.C.), the peak of the animal cults. The lake was probably seasonal and would dry up during the hot summer months, though it would probably have been sufficient to support the breeding of the species. Whether the birds were cared for in any way by the priests who oversaw the ibis cult is not yet known, though it is a possibility since they have a low breeding success rate (BBC 2012) and would have been required in very large numbers.

The same body of water may have served to supply the temples of the Saqqara plateau, including the Anubieion, as

well as some of the breeding centres for dogs required for the catacomb.

## CONCLUSION

The work at the Dog Catacomb is not yet complete. It is hoped that a season in 2013 will provide the necessary data on relative humidity, the fossil fauna and other aspects of the work reported on here so that a final publication can be produced during 2014.

What is clear is that the Dog Catacomb was just one part of an important and extremely large scale operation to breed and mummify animals for burial at North Saqqara. The geoarchaeological work is helping to shape the interpretation of the site, understand the means by which it is naturally deteriorating and suggest ways in which it might best be preserved for the long term.

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