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IN MUD FORGOTTEN: OLD KINGDOM PALAEOECOLOGICAL EVIDENCE FROM ABUSIR

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Abstract

The present study aims to summarise the major evidence on the climate development in the pyramid fields based on the Abusir data and dating to the Old Kingdom (2700–2200 BCE). The interpretation of the latest evidence presented in the article is based on the identification and evaluation of molluscs, beetles, Lake of Abusir sediments, small vertebrae and archaeological evidence documented during the research of several Old Kingdom tomb complexes and the seasonal Lake of Abusir. The study shows that this climate change was of a long-term nature and its origins may be dated to at least the latter half of the Fifth Dynasty.

Key words: Old Kingdom, pyramid fields, Abusir, climate change evidence, archaeology of the Lake of Abusir, molluscs, beetles, small vertebrae

INTRODUCTION

Abusir South excavations started in 1991 and since then they produced, among other important data, valuable records for studying environmental conditions that existed in the area of ancient Memphis, once the capital of the Old Kingdom state during the third millennium BC. The principal cemeteries of Abusir and Saqqara were located immediately to the west of ancient Memphis. Therefore to develop a picture of environmental conditions that existed in the area is one of primary issues of the Old Kingdom research concerning ancient Egyptian state and its centre (Fig. 1).

Previous research on the subject suggests rather strongly that the Nile, Nile flood and its migratory tendencies had always played a significant role for the ancient Egyptians (Bell 1970 and 1971; Butzer 1976; Jeffreys and Tavares 1994; Hassan 1997 and 2010; Seidlmayer 2001 and Jeffreys 2010, to name but a few). There is ample evidence to believe that the development was a very dynamic one. Based on earlier studies, Lutley and Bunbury (2008) have shown that the eastward movement of the Nile was exceeding 2 km per millennium in the area of Giza. The north-north development of the Nile Delta head exerted perhaps even stronger influence on the cultural topography of the ancient sites in the Memphite area. Fairbanks (1989) argued that the sea level was 121±5 m below present sea level during the last glacial maximum. Based on Fairbank's study, Bunbury and Jeffreys (2011) have suggested that the head of Delta probably reached as far as to Meidum area in the Fayum oasis during the Old Kingdom.

Abusir and Saqqara and their eastern edge dividing these sites with famous cemeteries of the Old Kingdom from the current floodplain remained to a large extent intact up to modern times. One of the basic questions is how much can we therefore reveal about the Old Kingdom landscape based on finds from the sediments preserved in the area and from the adjacent tombs and cemeteries. For this direction of research we may use old maps, evidence of beetles, mammals and molluscs from the cemeteries, geological studies and even administrative and iconographic sources.

MAPS

One of the first modern maps of the area produced by K. R. Lepsius expedition in the 1840s' shows Lake of Abusir, a body of water located to the north of the North Saqqara promontory (Bárta, Brůna 2006, 17 and foldout map). Another assistance in detailing the location of the lake was gained by using very detailed satellite imagery on the pyramid fields commissioning QuickBird satellite of the DigitalGlobe Corporation (Bárta, Brůna 2006, 40 and 42 and the foldout map) (Fig. 2).

Based on proxy evidence, it is likely that it was this lake which represented principal access to the cemetery during the third millennium BC (Bárta 1999 and below for details). From this point you could enter North Saqqara, the precinct of Djoser, South Abusir and many areas that started to develop later on, during the Fifth and Sixth Dynasties. Some tombs in the close distance from the lake still reflect this topographical determination. As a typical example may be used the late Third – early Fourth tomb of Hetepi at Abusir South which retained niching on the north façade thus reflecting on the incoming visitors proceeding to the cemetery from the lake (Bárta, Coppens, Vymazalová et al. 2010, pl. 8). In addition, satellite imagery analysis of Abusir South tombs shows that many principal tombs built in the area were furnished with independent communications, all starting on the western bank of the lake (Bárta, Brůna, Křivánek 2003, 22).

Fig. 1. General view of the Fifth Dynasty necropolis at Abusir, looking over the past Lake of Abusir to the northwest (M. Frouz, Archive of the Czech Institute of Egyptology).

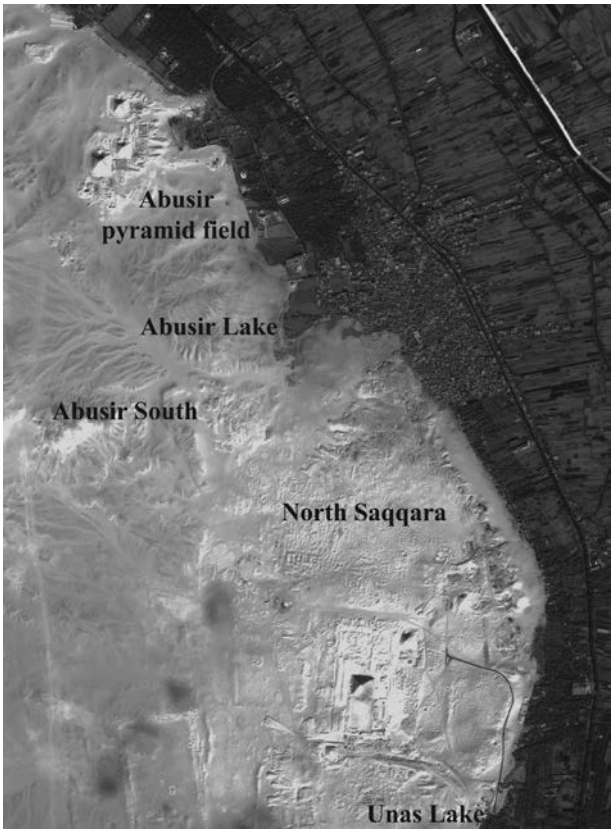

Fig. 2. Satellite image of Abusir and North Saqqara (Digital Globe Corp.)

This lake is today non-existent but according to the locals it existed prior to the construction of the Aswan Dam back in the 1960s'. Interestingly, they all have claimed that it was only a seasonal feature and that they (or their predecessors) used to catch fish in the lake. Nowadays the only indicator of its former existence is scarce vegetation and an area of cultivated land.

MOLLUSCS EVIDENCE

During sampling activities at the former Lake of Abusir in 2007, we were for the first time able to collect evidence for molluscs dated to the Old Kingdom (Cílek, Bárta, Lisá, Pokorná et al. 2012). The identified species belonged to aquatic molluscs such as *Bithynia tentaculata*, *Bulinus truncatus*, *Bellamya unicolor*, *Valvata nilotica*, *Gabbiella* cf. *senaariensis* and *Melanoides tuberculata*. These molluscs are diagnostic of slow flowing or stagnant waters.

Another contribution to the study of molluscs in Abusir South was provided by the research of tomb AS 57 and carried out by Z. Sůvová (2011, 159). She focused entirely on the molluscs contained in the mud bricks of the mastaba and was able to identify altogether three species: *Coelatura aegyptiaca*, *Anodonta cygnea* and *Bellamya unicolor*. All three of them are indicative of slow flowing, permanent fresh water.

Eventually, a very illustrative case on the broader study and use of molluscs was made by the recent survey of the Institute in 2011 when we concentrated on mapping and docu-

Fig. 3. *Poecilus pharaoh* species on the mummification bowl from the tomb complex of Inti (reign of Pepy I, M. Bárta, Archive of the Czech Institute of Egyptology).

menting tomb robbers activities all over the site. One of the specific activities was an analysis of environmental data for the general interpretative potential focusing on molluscs contained in mud bricks, mud plaster and excavated debris left behind by the tomb robbers (Odler, Dulíková, Juřičková 2013). The evidence for molluscs shows that many of them may be connected again with slow flowing or stagnant waters. The following species could be identified: *Bellamya unicolor*, *Gabbiella senaariensis*, *Bulinus truncatus*, *Corbicula consorbina* and *Unio elongates mancus*. In one single case, however, also *Etheria elliptica* could be identified which is associated with freshwater with a clear preference for fast flowing streams, lakes, rapids and waterfalls.

PALAEOENTOMOLOGICAL EVIDENCE

In 1995, the tomb complex of the vizier Qar and his sons started to be explored. This project lasted until 2002 when last of the tombs within the complex was documented (tomb of Inti) (Bárta et al. 2009). During the course of several excavation seasons, a number of beetle species were brought to light. They differed in their contexts and dated mostly to the Sixth Dynasty (24–23rd centuries BC) – reign of Teti and Pepy I (this dating is based on palaeographic evidence encountered in individual tombs of the complex of vizier Qar, see Bárta et al. 2009).

There are several advantages working with palaeoentomological finds from excavation. Beetles are in general very sensitive to their environment and are not able to travel large distances; thus they are environmentally and locally specific. Beetles also respond rapidly to environmental stress and tend to preserve well in dry environment (Bárta, Bezděk 2008). In specific Abusir contexts it is necessary to mention several species that provide quite important data to our question.

The majority of fragments were collected in vizier Qar's burial chamber from the burnt layer inside the limestone sarcophagus. One specimen found there belonged to Family Carabidae: *Scarites* (sbg. *Scallophorites)*. The genus *Scarites* (Fabricius 1775) is a species inhabiting sandy soils. It is common on seashores and the banks of salt lakes. An interesting specimen also belonged to family Tenebrionidae: *Prionotheca coronata coronata* (Olivier 1795). Very often are tenebrionids associated with semi-desert and desert habitats. Other species live on decaying wood, fungi, bird nests and similar biotopes with decaying plant litter. More than ten specimens of family Tenebrionidae: *Sclerum orientale* (Fabricius 1775) could be identified. This tenebrionid species is connected with the same habitat as the preceding one.

Fig. 4. Trench 1 at the Lake of Abusir showing a mudbrick platform of the late Third/early Fourth Dynasty date (its surface is at 18.00 m asl.). It is a trench of 5 × 5 m (M. Bárta, Archive of the Czech Institute of Egyptology).

Further on, we were fortunate to discover in Embalming shaft E within the tomb complex of Inti a set of red Meidum ware bowls which contained beetles that were caught in hot resin used during the mummification ritual. The beetles belonged to Family Carabidae: *Poecilus* (sbg. *Ancholeus*) *pharao* (Lutshnik 1916). This *Poecilus pharao* is an endemic species of Egypt. What is important in this context is the fact that the species is associated exclusively with saline habitats. It is interesting to observe that the evidence produced from the tomb of Qar and his sons indicates that some 300 m west of the Lake of Abusir probably existed a desert-like saline environment as early as at the beginning of the Sixth Dynasty (Teti – Pepy I) (Fig. 3).

The exclusive saline habitats of most of the above beetles favours the conclusion that a major climate decline started at least a century before the actual demise of the Old Kingdom around 2200 BC. At least three more independent sources seem to fully support the notion of a continuous worsening of the climate conditions well before the end of the Old Kingdom: the Nile flood heights recorded on the Palermo Stone (Wilkinson 2000), increasing evidence for desert motifs in tomb decoration appearing from the reign of Nyuserra onwards with two exceptions dating to the early Fourth Dynasty (Meidum cemetery) and one at the beginning of the Fifth Dynasty (pyramid complex of Sahura in Abusir) (in general see Butzer 1959 and Herb and Föster 2009; specifically on the Old Kingdom Bárta 2013) and the most recent sounding works at the Lake of Abusir (see below) which reveal an accumulation of sand layers over Early Dynastic structures thus indicating a slow regression of the lake during the latter half of the Old Kingdom.

LAKE OF ABUSIR EVIDENCE

It is due to pioneering work of D. Jeffreys that we start to understand the nature of the lakes along the edge of the Abusir and Saqqara cemeteries (Jeffreys 2001, 2006a and b). In 2007, four trenches were open and studied in significant detail by the Czech mission using sedimentological description, together with the micromorphological results of selected strata, molluscs and archaeobotanical findings (Cílek, Bárta, Lisá, Pokorná et al. 2012). The old Nile terrace deposits constituted the background for the mud brick pavement built during the Old Kingdom. This pavement was discovered at the bottom of Trench 1 and tentatively dated – by means of associated pottery – to the late Third/early Fourth Dynasty. The pavement was orientated in a northeast – southwest direction, i.e. in effect along the principal direction of incoming visitors to the cemeteries of North and Central Saqqara and South Abusir (Fig. 4, a square of 5 × 5 m). Later on, this pavement, perhaps a landing installation, was partly destroyed by heavy outwash, and the anthropogenic features were overlain by a layer of pure sand. Subsequent sedimentological development is characterized by increased desiccation interrupted by several phases of elevated moisture due to the activity of the local hydrological system. What seems to be

Fig. 5. Valley temple of Sahura in Abusir flooded during the rise of the water table caused by the filling of the irrigation channels (M. Bárta, Archive of the Czech Institute of Egyptology).

rather significant is observation that in the sedimentological record there were no black Nile loams rich in organic matter. The most likely explanation may be that the lake was fed by ground water collected in the bedrock during the Nile flood. The rising flood contributed to the rise of ground water and its penetration on the surface thus creating shallow lakes including the Abusir Lake. At the same time, this may explain other evidence favouring a slow flowing water in the vicinity of the cemeteries and the administrative evidence related to the goddess Heqet (see below). This principle of the water table rise may be observable even nowadays when irrigation channels get fully charged. As a direct consequence of this principle, the valley temple of Sahura gets seasonally flooded despite the fact that it is not any more connected with any surface water source (Fig. 5).

SMALL VERTEBRAE

As a consequence of the first step of an long-term analysis focusing at Abusir South on small vertebrae, 530 individuals of 24 animal species could be established (for details see Pokorný, Kočár, Sůvová a Bezděk 2009, 39-40 and 38, tab. 4.6). Bones of small vertebrae were found predominantly in taphocoe- noses of owl pellets. In many cases these bones formed thin layers of deposits at the bottom of Old Kingdom burial shafts which were robbed still during or at the end of the Old Kingdom and left open for some time. As a result, the owls could nest in the shaft walls and produce, by the way of their digestion, these layers. The following owls species may be considered based on their finds at the bottom of the shafts: *Tyto alba*, *Bubo ascalaphus* and *Asio otus* (P.c. Zd. Sůvová and her studies on animal bones from tomb AS 67 in preparation). Again, individual vertebrae species tell us a great detail about the environment they lived in at the end of the Old Kingdom. Most frequent among mammals were Spiny Mice (*Acomys* sp.) and African Grass Rat (*Arvicanthis niloticus*), followed by insectivores such as Pygmy White-toothed Shrew (*Suncus etruscus*), Asian House Shrew (*Suncus murinus*) and Lesser White-toothed Shrew (*Crocidura suaveloens*). In addition, five species of bats living in dry desert environment and tombs. The Pygmy White-toothed Shrew is typical of river banks. On the other hand, Asian House Shrew and Lesser White-toothed Shrew are typical of human activities such as houses or fields.

(Egyptian) Spiny Mice (*Acomys cahirinus*) and Lesser Egyptian Jerboa (*Jaculus jaculus*) occupy desert environment covered with sand or stones. Eventually, Short-tailed Bandicoot Rat (*Nesokia indica*) inhabits moist areas and areas along channels and rivers; African Grass Rat (*Arvicanthis niloticus*) requires a dense grass cover such as savannahs and grasslands, sub-desert or cultivated areas. Rock Rat (*Praomys fumatus*) is also typical of grassy environment.

It is not easy to interpret such a seemingly heterogenous evidence. Yet a closer look may communicate a rather clear and unbiased picture of an environment where cultivated and inundated areas were meeting sharply with approaching

Fig. 6. Lake of Abusir (upper left-hand part of the photo) and the landscape of Abusir and Saqqara about a century of ago (Courtesy of the Egyptian Ministry of Antiquities).

desert environment which we so much believe characterized the Sixth Dynasty and the end of the Old Kingdom.

ARCHAEOLOGICAL RESEARCH AND EVIDENCE FOR WATER CONDITIONS OF THE CEMETERY

Equally important and fruitful as environmental data may be the analysis of the textual and iconographic material from the cemeteries themselves. The distribution of the Old Kingdom holders of the title 'priests of (the frog goddess) Heqet' indicate that many of them used to be buried in a close distance to the Lake of Abusir (Bárta 1999). This may tell us also something about the nature of the lake and the way ancient Egyptians were building their sacred landscapes based on detailed observations of nature. First of all, the title itself is rather rare in the Old Kingdom. Second, the fact that most of its holders decided to be buried close to the Lake of Abusir is suspicious as well. In this particular local context it is important to mention that in Ancient Egypt the goddess Heqet was venerated in the form of a frog or a woman with a frog's head. Primarily, she was worshipped as a guarantor of life and resurrection. It may be of interest to recall that certain species of frogs are known to be able to hibernate in the mud for several years, waiting for sufficient water to be able to regenerate and breed. In this biological characteristics may lay the key to the understanding of Heqet's importance in the area. A connection between lake(s) and Heqet is referred to by a Leiden stela V 4, which mentions officials "of the first day" who built their tombs on the shore of Heqet "at the time of Geb," emphasizing the importance and role played by Heqet during the burial ceremonies (Obsomer 1995, 537). Therefore, it is not far-fetched to establish a close relationship between the Lake of Abusir, the goddess Heqet and the funerary processions implying the resurrection symbolism.

Undoubtedly, lakes in front of the Abusir and Saqqara cemeteries played a significant role in the traffic to, from and within these cemetries. First of all, they represented major entryways into the cemeteries. The Old Kingdom iconographic evidence is rich enough to show many funerary processions in which the transition of the deceased to the cemetery makes use of the watery way (Settgast 1963). According to L. Giddy, D. Jeffreys, and A. Tavares there existed two more lakes within the Saqqara-Abusir area, each providing principal approach to the cemeteries. The first lake was situated east of the Abusir royal mortuary complexes of Sahura and Nyuserra. Their valley temples were furnished with docking facilities. In the case of Sahura the landing installations were oriented not only to the east but also to the south. The second lake existed at the valley temple of Unas (Giddy 1994, 195; Jeffreys and Tavares 1994, 156 and 159).

CONCLUSION

From the presented evidence emerges a more complete and a far more vivid picture of environmental conditions which once existed in Abusir and Saqqara during the third millennium BC. We can see that the combination and synthesis of archaeological evidence, remains of beetles, molluscs and small verterbrae, geoinformatic (satellite imagery), geological, administrative and environmental data may refine our perspective on the landscape formation and its practical as well as symbolical use by the Egyptians. The evidence of molluscs, beetles and small rodents may be used for reconstructing slowly depredating climate at the end of the Old Kingdom. They also show that this change was not a sudden one but rather of a long-term nature thus opposing the concept of "quick collapse" propagated by Weiss and Bradley (Weiss, Bradley 2001). At the same time, the collected evidence helps us to understand the local water conditions when small (semi-) permanent lakes existed along the eastern edge of the Abusir-Saqqara cemeteries which were filled during the Nile flood season and yet most likely not connected directly with the river Nile by any of the side-branches. These lakes were perhaps drying for several months in the year. Last but not least, the evidence provided by the natural sciences reveals valuable details as to how the ancient Egyptian mind operated the process of creating sacred spaces from profane landscapes.

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