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Michałowice, Czarnocin commune, site 1. The urn from grave 80 (photo Jan Bulas)

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The emergence and development of architecture on the casemate foundation platforms in the Nile Delta

Abstract: Foundation platforms with casemate construction appeared in Egypt in the middle of the second millennium BC, but the most complete development of them is related to the first millennium BC. At this time, casemate technique became widespread and extremely influential in the urban landscape. Given the area where most casemate platforms have been identified, the diversity of structures which were erected on such foundation or the range of chronology of these layouts, the complexity of the discussed issue should be mentioned here. This highlights the necessity of recognizing why this form of foundation came into being and how it developed. The factors which are to be included in this analysis are: construction quality of casemate platforms, natural conditions and political circumstances in which they could be raised and, moreover, religious beliefs or social and demographic changes. This multifaceted subject allows us to realize how complex cultural phenomenon Egyptian civilization was and what information could be obtained thanks to an analysis of its urban architecture.

Keywords: ancient Egypt, the Nile Delta, town, architecture, foundation methods

1. Introduction

The main issue related to the urban architecture in ancient Egypt was its adaptation to natural conditions. Annual floods and significant environmental humidity, especially in the Nile Delta, forced Egyptians to develop unique skills connected with planning and construction. The most important element of every building was its appropriate footing on the ground. The Egyptians knew the role of foundations as the main factor in supporting the entire structure, affecting the stability of the building and defining its solidity. According to the results of the latest research, some very well developed techniques of building foundations existed in Egypt. Foundation platforms with a casemate construction were one of the most unique forms and it seems that this architectural solution should be strictly linked with the area of the Nile Delta.

Foundation platforms with a casemate construction appeared in Egypt in the

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middle of the second millennium BC, but the most advanced type is dated to the first millennium BC. At this time the casemate technique became widespread and highly influential in the urban landscape. The considerable complexity of the issue which is the subject of this paper can derive from the specific region for the creation of casemate platforms, the diversity of structures erected on such foundations and the chronological extent of these layouts. Such a statement brings out the necessity of recognizing the reason for the creation of this form of foundation and the manner of its development. Factors which need to be included in this analysis are: the construction quality of casemate platforms, the natural conditions and political circumstances in which they could be raised and, moreover, religious beliefs or social and demographic changes.

2. The main features of platforms with a casemate construction

Casemate construction was made of brick or stone walls, forming a framework with free spaces called casemate chambers between them. Such chambers were often filled with sand, earth, brick or stone rubble. The factors mentioned above helped to create a solid structure and make the building process faster. The term "casemate" is derived from storages or dungeons existing in old castles (for example in the Medieval Europe). In Egypt, casemate construction was used especially to build foundation platforms (Spencer 1979a, 116–118; Clarke, Engelbach 1990, 76–77; Arnold 1991, 109–114), but other uses are also known (cf. Oren 1984). In various publications we can also find another name for this kind of construction technique – cellular (German zellenartige Konstruktion, Fundamentzellen). In this paper, the term "casemate" was adopted, since it appears to reflect better the characteristic of the discussed structures.

Most ancient Egyptian casemate platforms known today were discovered in the Nile Delta (Fig. 1). The sites with remains of such kind of architecture are: Awaris, Buto, Daphne, Diospolis Inferior, Heracleopolis Parva, Memphis, Mendes, Naukratis and Tanis[2]. Similar structures are also known from the Valley, but they are later constructs and far less numerous. Moreover, only in the Delta were casemate platforms used as foundations for various groups of buildings. At this point we can define a few types of structures with different functions: cultic, defensive or residential. Structures defined as cultic are the so-called "peripteral temples" (Spencer 1979b, 132–137) or Egyptian šn' '3 w'b, which means "pure storehouses" (Traunecker 1987). Those were places within temenos where sacrifices for the gods were stored, made and distributed. The large platform from Tanis (Fig. 2) (Fougerousse 1933) and the south platform from Heracleopolis Parva (Spencer 2006, 358–359) can be included in this category. Both large platforms from Awaris (Fig. 3) (Bietak 2005, 13–17; Bietak, Forstner-Müller 2006, 63–79) as well as the smaller and more formalized forts discovered in Daphne (Petrie *et al.* 1888, 53–58), Diospolis Inferior (Spencer 1996, 51–62), Memphis (Petrie 1909b) and Naukratis (Petrie 1886) (Fig. 4) belong to the category of defensive structures. Residential buildings are represented by the defensive palaces from Awaris and Memphis and, most of all, by the "tower" buildings from Buto (Fig. 5) (Hartung 2003, 212–215; Kreibig 2009, 117), Memphis (Petrie 1909a, 1) and Mendes

[2] In order to standardize the nomenclature adopted, the ancient names of the sites given by classic authors (except Awaris) are used. After: Leclére 2008

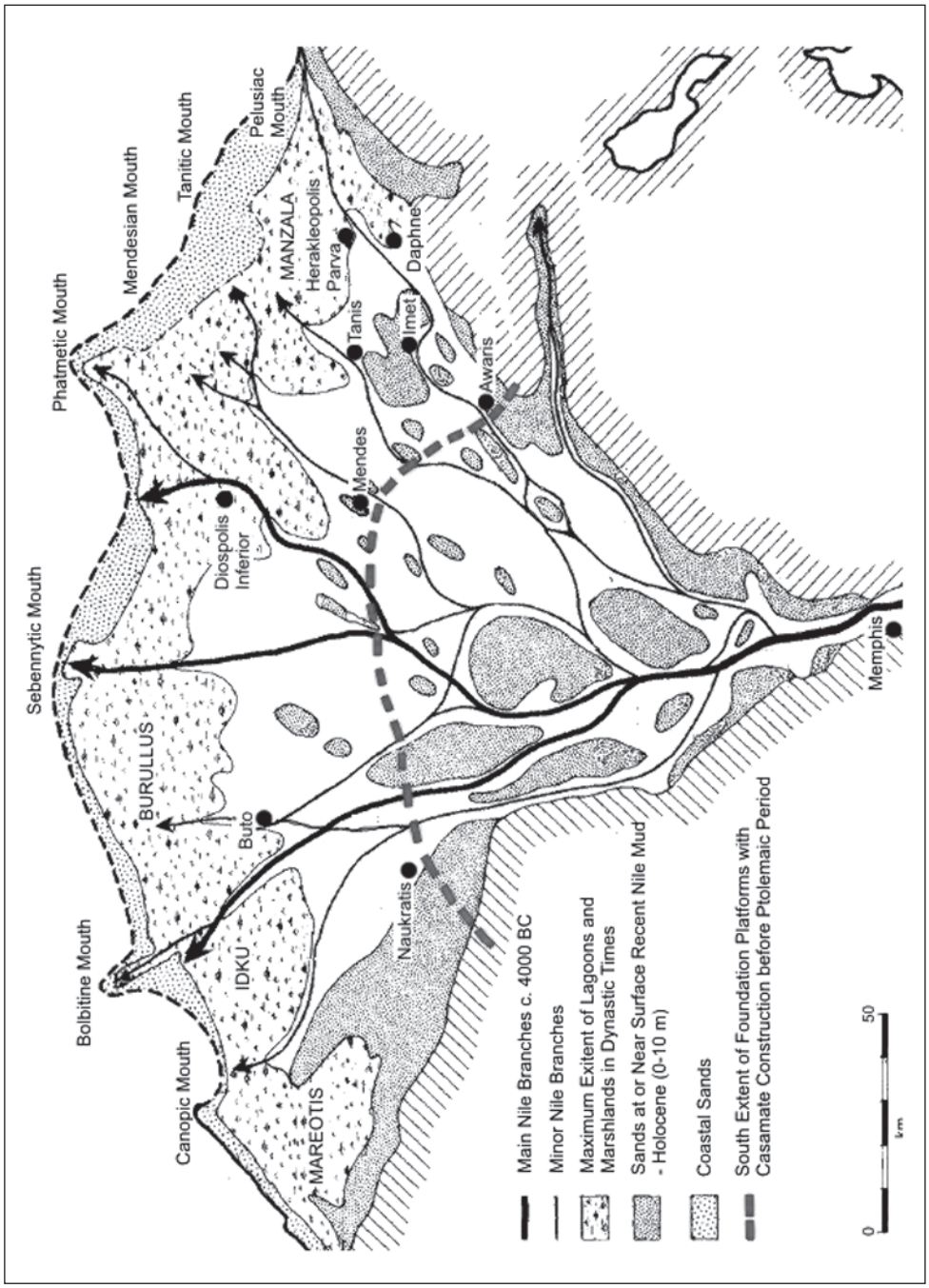

Fig. 1. The Nile Delta. Extent of sites with remains of casemate platforms in Dynastic Times. Reproduced after Butzer 1976, fig. 4

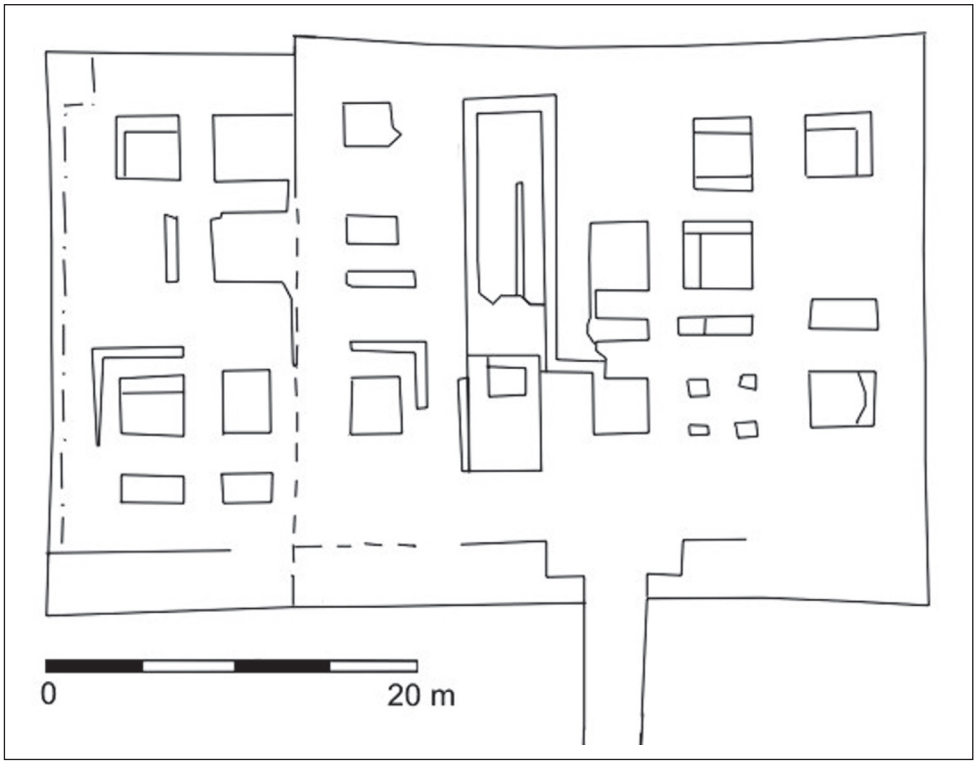

Fig. 2. Šn' '3 w'b of Psametik I in Tanis. Reproduced after Brissaud, Zivie-Coche 1998, pl. I

(Wilson 1982, 5–11). Besides this there is a group of casemate platforms whose correct interpretation is difficult. For example: the north platform from Heracleoplis Parva (Spencer 2006, 359) is supposed to be a defensive structure. What is more, some of the discussed platforms may have a secondary use as burials, as was the case in Buto (Kreibig 2009, 115–119). There are also examples of constructions used as graves from the very beginning. Such structures were discovered at Tell Tebilla (Mumford 2000; 2001) or Imet (Petrie *et al.* 1888), but will not be taken into account in this paper.

While discussing foundation platforms with a casemate construction, it is necessary to determine the primary features of this type of architecture. Material and building technique are elements that connect all of the above-mentioned structures. The basic material used to raise casemate platforms (like most buildings in Egypt) was brick.

McHenry (after: Kemp 2000, 80) determined the four basic elements necessary to occur in the soil in order to make bricks. These are: coarse sand or aggregate, fine sand, silt and clay. All of these elements have different features. Coarse sand (aggregate) makes brick strong and fine sand fill the spaces between bigger grains. Silt and clay are necessary for the cohesion and ductility of building material. The content of those ingredients in brick can vary and even the absence of one of them still allows to make a brick with satisfactory features.

Additionally, Hughes (after: Kemp 2000, 80) highlights one more component, independent of those above: the minerals present

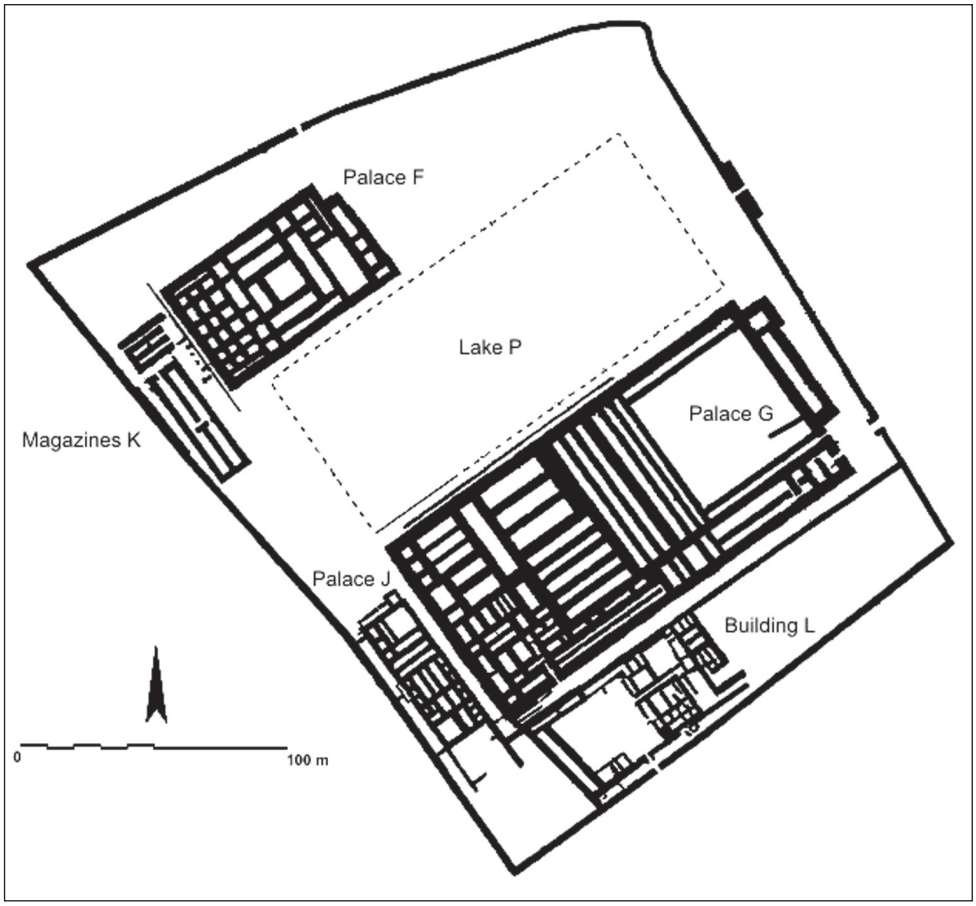

Fig. 3. Palaces in Area H, Awaris. Simplified plan. Reproduced after Bietak 2010, fig.28

in most soils. Their role is to cement the particles of silt and sand. Straw was not, instead of the common opinion, necessary in all cases. If brick did not have enough clay but had more than enough organic material, straw was a useful element. In such cases, straw gave the brick more strength and allowed it to dry faster. If sand and alluvial soil were of good quality, the presence of straw was unnecessary (Clarke, Engelbach 1990, 208). We can distinguish two types of bricks, because of the manner of the connection of their components. The first type, with a high content of sand, was very strong in a dry environment but susceptible to erosion by water. The second type, mud-brick, contained more clay and therefore had less strength, but was more resistant to moisture (Kemp 2000, 80).

As additions to the bricks, some other materials were used as well, including stone and wood. Stone, mostly limestone, was primarily applied in the finishing of works. It could line the lower parts of brick walls or the level of the floor just above the foundation. Since most of the known casemate platforms were built in a land lacking in stone, it can be stated with a high degree

of probability that most of this material came from the Memphite region (Aston *et al*. 2000, 12). Limestone, besides aesthetic advantages, had some construction importance too. Apart from reinforcing a structure, the stone slabs protected brick walls against erosion.

There were also different kinds of wood used by ancient Egyptians with most of them imported from the Levant, ancient Syria. When it comes to the casemate platforms, wood was used to reinforce the construction of brick walls. It formed an inner skeleton which resembled the so-called "post-and-beam" construction. Moreover, wooden floors and doors existed within the constructions.

Platforms with a casemate construction were built in a specific way and the building technique was developed across the centuries. First of all, a trench had to be dug with its size similar to that of the platform itself or slightly larger. The next step was to fill the trench with sand or earth and it seems that sand was used more willingly, because of its features: it was not a subject of deformation caused by the weight of structure and it did not change its degree of shear and compression under the influence of moisture (Pisarczyk 2001, 16). What is more, its role as a stabilizer during earthquakes (Arnold 1991, 114) and connection with the mythic primeval mound (Ricke 1935) were not without significance.

On such prepared ground, the brick walls of foundation platform were erected. The main building material was mud-brick, because of its resistance to the moisture which could infiltrate into foundation. The presence of moisture increased the mud degree of shear and compression (Pisarczyk 2001, 16). The minerals present in the soil toughened the structure (Spencer 1979a, 116–117), especially important in an area threatened by annual flooding. Sometimes a combination of mud and sand-brick was used and, in such cases, sand-bricks reinforced the foundation and were used as walls lining inner chambers (Bietak, Forstner-Müller 2006, 68) or corners of outer walls (Spencer 1996, 55) (Fig. 5). The other way to consolidate the structure was by the usage of a specific construction process of the walls. It consisted of laying successive layers of bricks in such a way that they were bent upwards towards the corners, and the lowest point was always in the middle of wall (Fig. 6:1). This was associated with the creation of the concave face of the walls, clearly visible in the plans (Fig. 5, Fig. 6:2). Such an arrangement was used, for example, in Mendes (Wilson 1982, 7–8) or Diospolis Inferior (Spencer 1996, 54). In one case – šn' '3 w'b in Tanis – the outer walls became additionally inclined to the center (Fig. 6:3) (Fourgousse 1933, 82–83). It seems that a similar technique of construction was applied only for outer walls from the Late Period onward and it was not noticed in earlier structures from the second millennium BC. The next manner of constructing and reinforcing foundation platforms' brick walls was making use of the wooden skeleton mentioned above. Beams were lying along and perpendicularly to the face of the wall, sometimes diagonally to the corners too, as it is noticeable in Building D at Mendes (Wilson 1982, 7–8). Mats of organic materials were often laid between the layers of bricks and beams. In some cases, the outer walls of casemate platforms were linked with other structures, for example an enclosure's walls, like in Diospolis Inferior (Fig. 7) (Spencer 1996, 27).

One of the most characteristic feature of casemate platforms is the presence of inner chambers. These chambers varied in size and shape, but had one common feature. In almost all cases their layout reflected the plan of building on the level of utility (cf. Figs 4:2,3). Chambers could be filled with sand, earth or brick-rubble, but

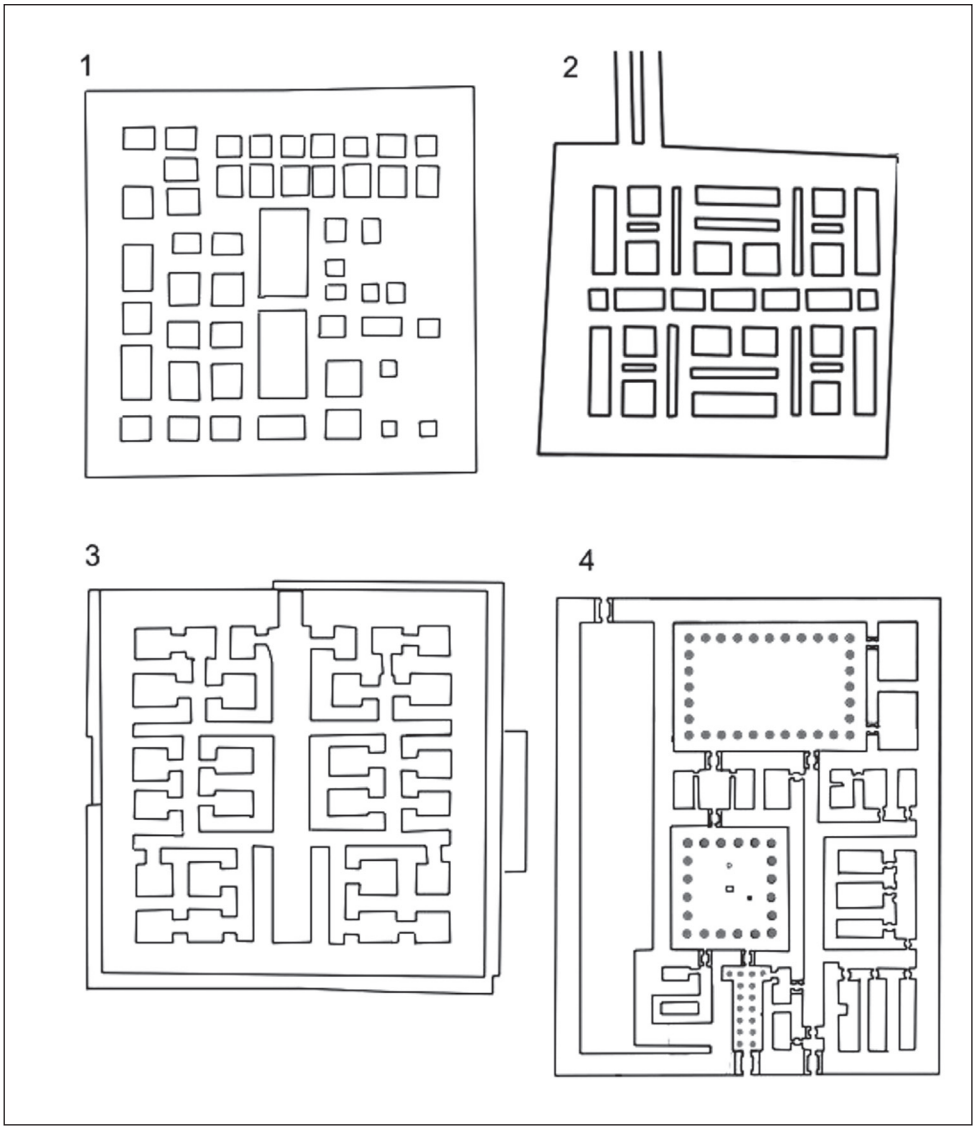

Fig. 4. Forts of XXVI dynasty. Simplified plans. 1 – Daphne. Reproduced after Petrie, Murray, Griffith 1888, pl. XLIV; 2 – Diospolis Inderior. Reproduced after Spencer 1996, pl. 6; 3 – Naukratis, floor level. Reproduced after Petrie 1886, pl. XLIII; 4 – Memphis, Palace of Apries, floor level. Reproduced after Kaiser 1987, Abb. 2

were also used as storage or even for burials. The roofing of such chambers could be twofold: vaulted (Kemp 1977a, 103–105; Wilson 1982, 8) or flat (Petrie 1909b, 2). They could be approached from the level of a ground or from their top. The arrangement of rooms depends on the layout and manner of construction of the chambers. Considering the height of certain platforms (even to 8 m), they were accessible

by stairs or ramps – the latter with a casemate construction as well (Jánosi 1996, 96–98).

3. Development of the casemate platforms

What can be seen at first glance is the considerable resemblance between the foundation platform with casemate construction and specific Egyptian type of tomb – the mastaba. An association between them can be seen in the manner of construction: peripheral walls enclosing a space divided into chambers by inner walls. In mastabas and casemate platforms as well, some chambers were filled with sand or earth to reinforce the whole structure. Since the earliest mastaba tomb was discovered at Tell el-Farkha (Chłodnicki, Ciałowicz 2008) we can assume that the origin of those structures was in the Nile Delta. What needs to be emphasized is that there is no archaeological evidence leading us to derive casemate platforms from mastabas of the Early Dynastic and the Old Kingdom. It appears, however, that technical knowledge gained through building mastabas could be helpful during the construction of the first casemate platforms. The possibility of a common origin of both types of architecture is an issue that requires further studies.

The first archaeologically confirmed foundation platform with a casemate construction appeared in Egypt at the turn of seventeenth and sixteenth centuries BC. The palace from F/II area in Awaris (Bietak, Forstner-Müller 2009), connected with the Hyksos king named Chairan is the earliest example of this type of foundation (Fig. 8). Next, at the end of the Hyksos rule in Egypt, a citadel on the H area was erected (Jánosi 1996; Bietak *et al.* 2001, 32–34). Similar structures originated from the Early XVIII dynasty: in Deir Ballas in Upper Egypt (Fig. 9) (Smith 1958, 158–159; Lacovara 1981, 120–124; 1990; 1996; 2006) and a new palace district in the H area in Awaris, with three casemate platforms (Fig. 3): Palace F (Jánosi 1994; 1996; Bietak *et al.* 2001; Bietak 2005), Palace G (Bietak *et al.* 2001; Bietak, Forstner-Müller 2003, 39–50; 2005, 71–95) and Palace J (Bietak *et al*. 2001, 85). The relationship between the first confirmed casemate platform in Egypt and Asian rulers persuaded M. Bietak (1996, 68–70) to link the genesis of such structures with the ancient Levant, especially with the defense system of Hazor and Ebla. A different theory was presented by P. Lacovara (2006, 192–193). The researcher claims that the predecessor of the casemate platforms from the Second Intermediate Period in Egypt was the Great Tumulus (K) in Kerma, Nubia. An argument for such statement is supposed to be the long and narrow compartments of this structure that evolved into similarly long and narrow chambers filled with earth inside the platform of the North Palace in Deir el-Ballas (Lacovara 1981, 121; 1996, 144; 2006, 188). A definitive recognition of the form of architectural starting point for later casemate platforms is still far from in sight. What is sure is that, thanks to palaces in Awaris, Deir el-Ballas and other buildings from the New Kingdom, there is a chance to reconstruct the initial evolution of such foundations.

The oldest layout where the platforms have appeared is early phase of Hyksos palace in the F/II area in Awaris. In this case, not all of the features of casemate foundation can be found, so it may be more appropriate to call it a cellular construction. Inner chambers were not filled with earth, sand or brick rubble, but were used as storage. It seems that at this time only compartments inside the ramps were filled. Some similar, long chambers were not filled to reinforce the whole structure until the later phase of the XV dynasty palace and the case of the North Palace from Deir el-Ballas. With the expanded form of casemate platforms – block foundation under the palaces from Awaris' area H and South

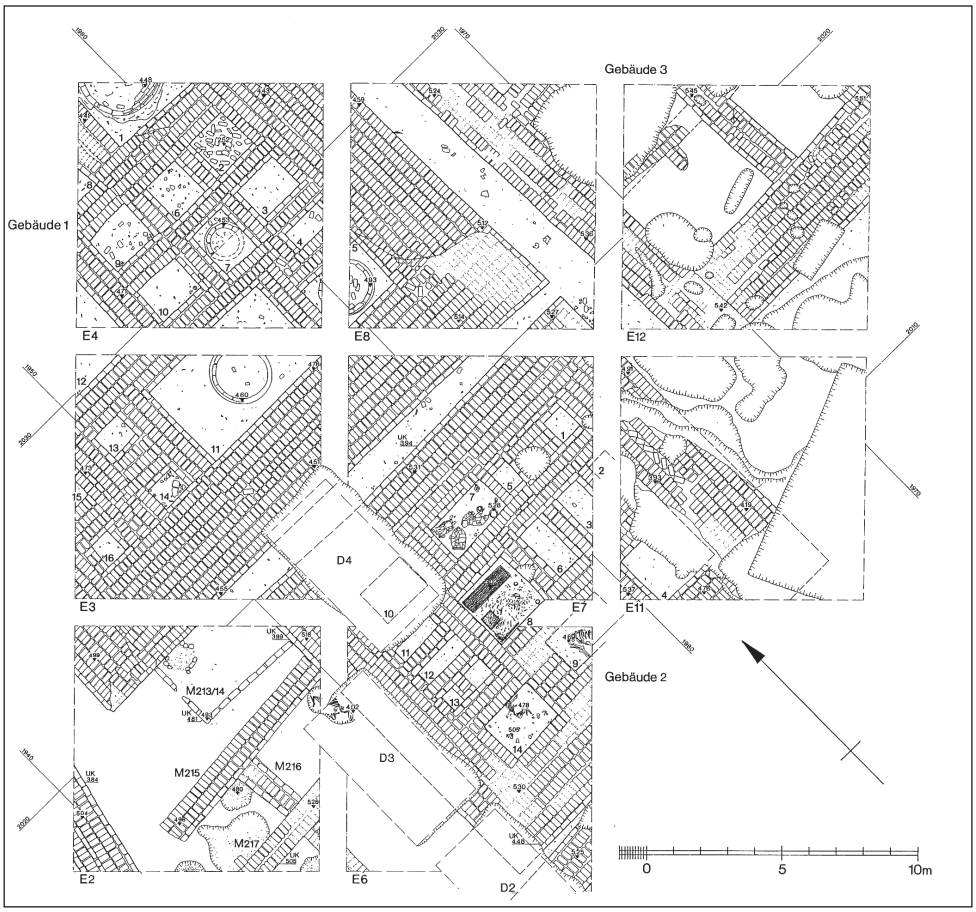

Fig. 5. Buildings from Buto. Saite Period. Reproduced after Hartung *et al.* 2003, Abb. 5

Palace in Deir el-Ballas – there has been a diversification in the shape and arrangement of inner chambers. Almost in all cases the inner compartments were filled with additional material (earth, sand or brick rubble). The only exception was a strip of chambers (magazines and bathrooms) along the western side of platform under the Palace G (Bietak, Forstner-Müller 2005, 73–90). Moreover, an example of Amenhotep III's building from Kôm el-'Abd (Kemp 1977b) shows a case of intentional filling of all previously used chambers (the north-west corner of platform). What is worth noting is that the custom of using inner compartments as storages was continued throughout the whole period of building ancient casemate foundations. The way of entering such places – from the ground level in the second millennium BC or from the top in the Late Period (cf. Wilson 1982, 8; Kreibig 2009, 117) – was what differentiated them.

The diversity of the structures raised on casemate foundation platforms occurred very quickly. The earliest smaller layout, different than that of a palace, can be seen in the chapel of Queen Tetisheri in Abydos (Fig. 10) from the time of Ahmose, first king of XVIII dynasty (Curelly 1904, 35–36). It was the first example of an entirely

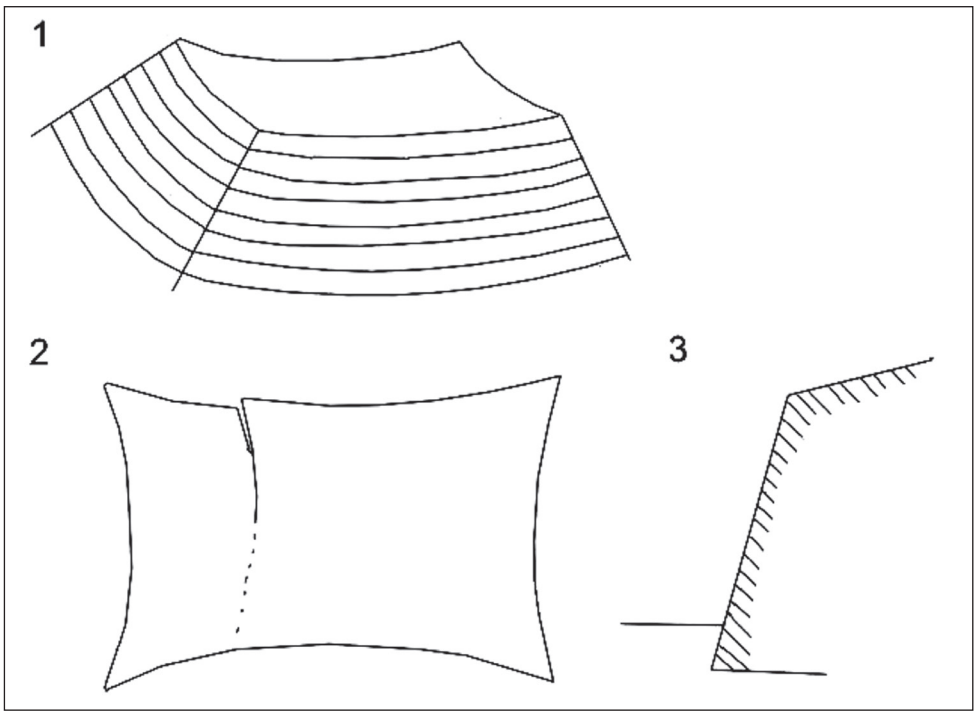

Fig. 6. Plan and façade from šn' '3 w'b in Tanis. Reproduced after Fougerousse 1933, figs. 5, 6, 7

symmetrical arrangement of casemate chambers, which became characteristic for šn' '3 w'b and some forts in the Late Period (cf. Smoláriková 2008). There we can also find a combination of chambers filled with earth and a chapel that could be approached from the ground level. In the later period some similarities can be found at the so called South Altar in Tell el-Amarna (Frankfort, Pedlebury 1933, 101). In Amarna, ramps leading perpendicularly to the top of platform were observed for the first time.

There is a lack of big casemate platforms in Egypt from the Ramesside period – we do not know what the palaces of Seti I and Ramses II in Piramses looked like exactly. On the other hand – new type of fort on casemate platform can be observed in Deir el-Balah, south Canaan, dating to the end of XIX and XX dynasties (Killebrew *et al.* 2006, 115). The first millennium BC has to be assumed as the next period of development of this kind of foundation. Around the middle of the VII century BC, various types of buildings on casemate foundations seemed to occur. There are: šn' '3 w'b, forts and houses. Most of them were usually built on a square plan (cf. Figs. 2,4,5), and had inner chambers arranged symmetrically (cf. Petrie 1886, 24–26; Spencer 1996, 52–54) or in rows (cf. Hartung 2003, 212–215). Undoubtedly several reasons for these changes exist, especially related to the functions of buildings. As the architecture of Egypt was influenced by constant development, one of them would be the possibility of the evolution of varied types of buildings raised on other foundations. It could also be platforms, as in the case of temples known from the Old Kingdom (Arnold 1991, 110; Redford 2010, 38–40).

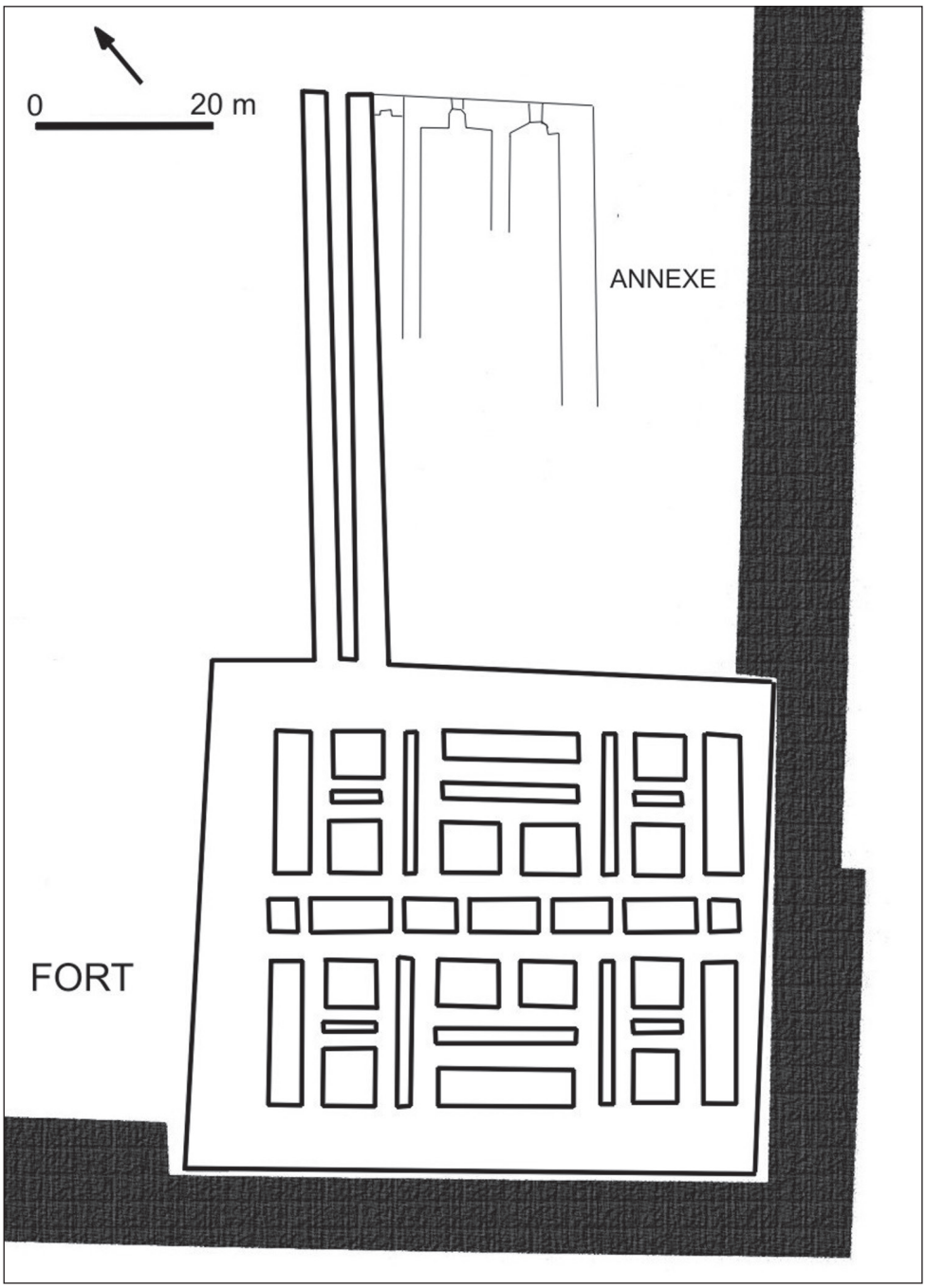

Fig. 7. Fort in Diospolis Inferior. The walls of the casemate platform are connected with the temenos wall. Reproduced after Spencer 1996, pl. 6

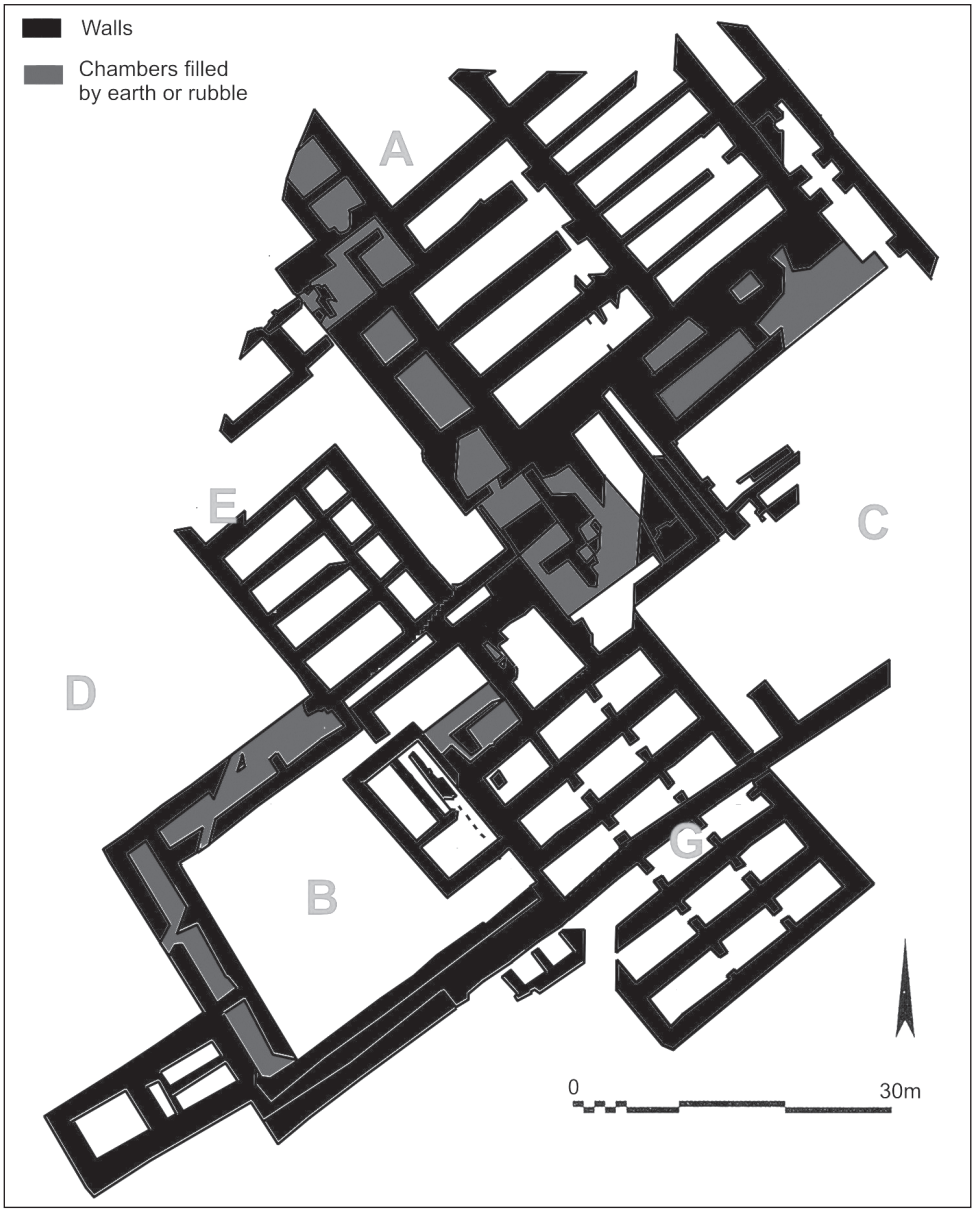

Fig. 8. Palace in area F/II, Awaris. Simplified plan. Reproduced after Bietak 2010, fig. 21. A, E. G – magazines and casemates, B, C, D – courtyards

Other factors were precisely determined by the environmental, political and social conditions which supposedly emerged at this time.

4. The impact of the environment

The oldest casemate platforms were discovered in the Nile Delta, which could indicate

this region as the place of its origin. In this case the question is: why did the necessity of developing a new type of construction appear in this part of Egypt? One of the most popular answers for such a question is the linking this kind of architecture with protecting buildings against the Nile floods (Szafrański 2003, 208–215) and moisture in the Delta in general.

The Delta was created by the Nile and its direct predecessors, spreading sediments from the Miocene (six million years ago) onwards (Said 1993, 38). The most important for the historic and present landscape's features were the units of stratification descending from Pleistocene and Holocene (i.e. the last two millions years). Those are the Early and the Middle Pleistocene coarse sands and gravels, projecting in some places in the Delta as so called geziras or turtle backs. On them lie the Late Pleistocene fine sands and Holocene alluvium, found directly on the surface (Butzer 1975, 1044; 1976, 22–25).

There were several primary Nile branches (classical: Canopic, Bolbitine, Sebennytic, Phatmetic, Mendesian, Tanitic, Pelusiac) and many more smaller ones in the historical period in the Delta. As early as then, some investments related to the river were undertaken, for example creating canals connecting river branches or regulating natural streams. Year by year the Nile flooded the ground between branches and only geziras and turtle backs, islands possible to settle on, were left above the water. Some flood basins in the Delta water could remain for the most part of the year or create perennial marshes (Butzer 1976, 17–18). It should be remembered that some part of the Delta were constantly covered by marshes, lagoons or lakes, especially in the north (Butzer 1975, 1043–1045; Redford 1996, 682). Apart from that, on the large area of the south and central Delta, small amounts of water prevented the development of full-scale agriculture and there was no danger of flooding for the buildings there. What is worth noticing is that almost all of the sites[3] with the remains of casemate foundation platforms are situated in the northern parts of the Nile Delta – close to lakes or marshes (cf. Fig. 1).

The moisture level, usually higher than in the rest of Egypt's land, had to be intensified by annual floods – particularly during years with a very high level of water. In spite of that, even such high floods did not necessarily have to cause the submersion of the buildings (but, evidently, it happened relatively often). The record of flood level is known for a town lying the farthest to the north in the Pharaonic Delta – Diospolis Inferior. It comes from the times of Senwseret I and reached 3.4 m above the level of flood basin (Bell 1975, 226), thus is too low to threaten Tell el-Balamun. The present height of the annual flood is 17.95m above field level (Spencer 1996, 11). It was obviously lower in the Middle Kingdom, but even then the direct risk of flooding the highest parts of a tell was very doubtful.

There are several periods of increased river activity in Egyptian history. In such cases, a great mass of water of annual flood could be disastrous for some brick building raised on too low levees or geziras. If we compare the period of this increased activity of the Nile with the use of casemate construction in Egyptian architecture, some correctness can be seen. For the first time, a situation like this is noticed at the turn of the fourth and the third millennium BC (Butzer 1976, 28; Said 1993, 134–138), when mastabas in the Delta in all likelihood probably emerged. The next period is the end of the Middle Kingdom and the Second Intermediate Period (Bell 1975; Said 1993, 143–149).

[3] The only exception is Memphis, but it is not exactly part of the Delta.

It can be connected with appearance of foundation platforms with a casemate construction (Szafrański 2003, 211–217). Finally, the building boom of the Late Period can be easily related with the period of high Nile floods, lasting from the Third Intermediate Period to – with some fluctuations – around 500 BC, or even to the Ptolemaic Period (Butzer 1976, 30; Said 1993, 152). Here appears the question – could it be an over-simplification of the problem? It is worth noting some details that may help us to better understand the interrelations mentioned above.

In the First Intermediate Period and at the beginning of the Middle Kingdom (XI dynasty) the flood level was reduced in a catastrophic way (Bell 1971). After that, during the rule of the kings of XII Dynasty, there was a period of the conspicuous rising of the water level. This upward trend continued during subsequent decades and the peak can be dated to the times of Amenemhat III and his successors. In such cases, steps preventing catastrophic perennial floods had to be taken. In the times of Amenemhat III's rule, drainage works at the Fayum Oasis were carried out (Bell 1975, 226–247), which seemed to fulfill the task at hand.

There is no proof of taking up efforts to construct buildings on casemate foundation platforms. There can be two explanations for this process. First – as Z. Szafrański (2003) claimed – the relatively late emergence of casemate platforms could be the result of decades of attempts and experiences with high water, even if no architectural remains of such experiments have survived. Nevertheless, if a similar technique was known to Egyptian architects from the time of first mastabas, why was it not used at the beginning of the high floods? On the other hand – it was not necessary to construct high foundations platforms, because the other preventing actions were successful enough. Although the first explanation cannot be declined completely, one interesting fact should be noted. In the earliest palace with casemate platforms from the F/II area in Awaris (Fig. 8) storage was located inside such a platform, on the level theoretically threatened by the flood. A similar solution is known from the later periods. Palace of the F/II area was built after the last known catastrophic Nile flood in times of Sobekhotep VIII. In this case, no knowledge exists if the solid construction of casemate chambers within walls and ramps - enclosed storages, provided enough protection, or if it was no longer necessary. If the second statement is true, the development of more and more foursquare casemate platforms in the times of floods' stabilization on lower level was related to factors others than the Nile regime.

The Nile floods became exceptionally high again in the first millennium BC. Once again, the architectural response to this environmental conditions was surprisingly delayed. There is only a little evidence of archaeologically confirmed step of evolution between casemate platforms of the type known from the second millennium BC and the mass raising of Late Period structures[4]. The earliest layout of the second kind is the west part of the great platform from Tanis – dating to the Third Intermediate Period. But also in that case, there is developed form of šn' '3 w'b foundation there. A possible explanation is a shift of settlement to higher areas, also observed in the New Kingdom as an adaptation to the Nile floods, in the Middle Kingdom and the Second Intermediate Period (Szafrański 2003, 217). It could be the reason for the lack of a large-scale building project right at the beginning of the next high flood period. Only population growth could force Egyptians to descend to the areas threatened by the Nile.

[4] There are: chapel from Abydos, building at Kôm el-'Abd, altar from Achetaton or the fort from Deir el-Balah, but none of them comes from the Nile Delta.

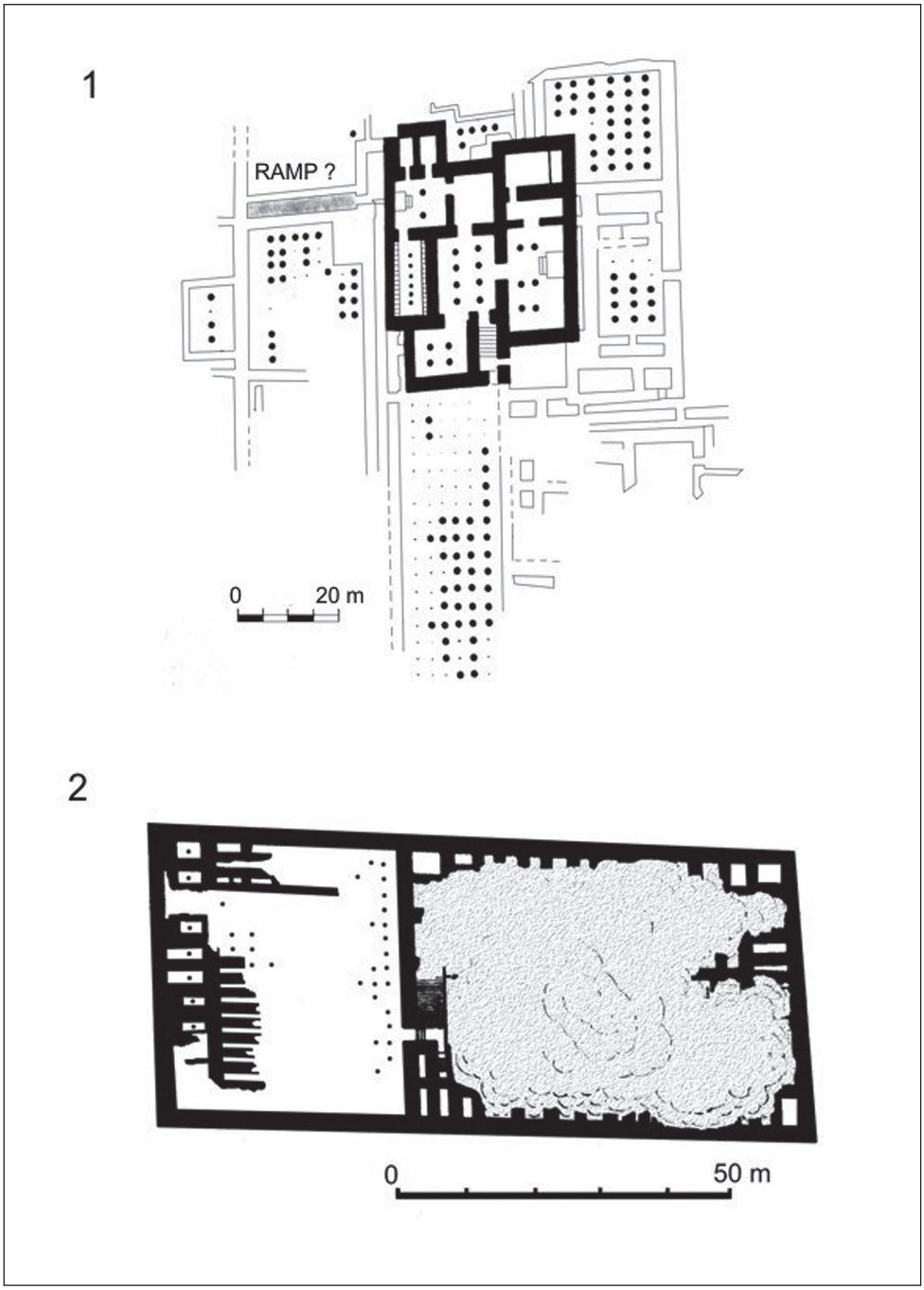

Fig. 9. Deir el-Ballas. 1 – North Palace. Floor level – simplified plan. Reproduced after Lacovara 1996, fig. 6; 2 – South Palace. Reproduced after Smith 1958, fig. 51

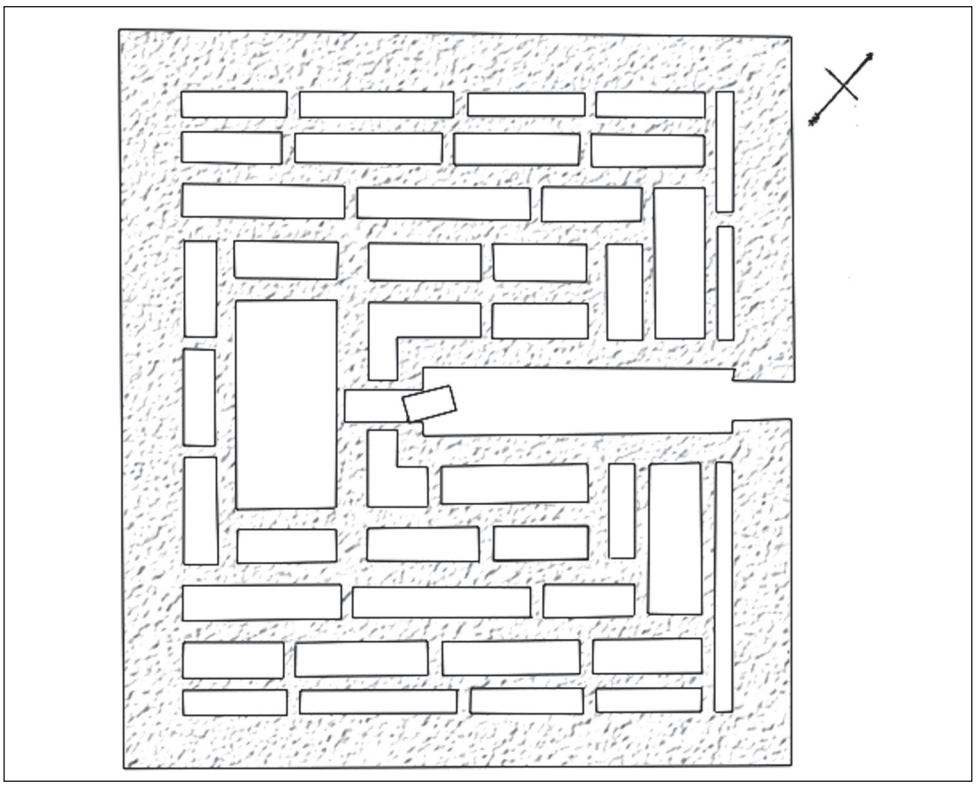

Fig. 10. Chapel of Queen Tetisheri, Abydos. Reproduced after Curelly 1904, pl. LI

5. The impact of political situation

The environmental conditions were very important, but not the only factor responsible for the emergence of casemate foundation platforms. The political situation played one of the main roles in the development of this process. The Second and Third Intermediate Periods alike were times of political disunity in Egypt. Royal power was weak and numerous wars were waged and in both cases similar schemes can be seen.

As mentioned, there is a distinct delay between the appearance and greatest intensity of the Nile flooding, and the development of the building of casemate platforms. In the first case there is the reasoning in the form of taking other preventive activities (e.g. in the Fayum) and the necessity of developing appropriate forms in architecture. It seems that knowledge of mastaba construction at the beginning of Egyptian monarchy was not enough. However, such an explanation does not fit to the first millennium BC. There existed some types of buildings which could be used at the beginning of the period of high floods and then have been modified. The most convenient explanation as to why this did not happen is the political situation in the country and the weakness of royal power. The obvious clue can be the fact that the function of the oldest structures on casemate foundations was as royal palaces. It is also meaningful that the first layout of this kind was connected with one of the most powerful Hyksos rulers, Chairan, and not with the

defeated kings of Thebes. In later times such buildings enjoyed a strong relationship with the pharaoh. Examples are: palaces from Deir el-Ballas and Awaris, chapel of queen Tetisheri in Abydos or fort at Deir el-Balah, but also: šn' '3 w'b and forts founded by Psametik I and his successors in the Late Period (Fougerousse 1933, 76–88; Traunecker 1987, 147–158; Spencer 2006, 358–359; Smoláriková 2008, 110–113).

Such facts are arguments for another factor affecting casemate foundation development. The state of threat and repeated military clashes had an influence on king-commander residence. It is evident in the case of the end of the Second Intermediate Period and the early New Kingdom palaces, when military interventions taken by pharaohs of the XVII and XVIII dynasties escalated. Of further importance, P. Lacovara (2006, 192) defined structures from Deir el-Ballas as a fortified camp. Again, the history of the first millennium BC is full of wars – both civil and against invaders. The first kings of the XXVI dynasty freed the country from Assyrian occupation and united it after decades of disintegration. They had enough power to establish defensive buildings to protect peace in Egypt (Smoláriková 2008). In both cases, the characteristics of palace-forts are a strategic location and a high level of defense – the last is evident in the high of foundation platforms e.g. Daphne (Petrie *et al.* 1888, 54) or Naukratis (Petrie 1886, 25).

In spite of all the similarities between the situation in Egypt in the second and the first millennium BC, there are some differences too. In the Second Intermediate Period and in the New Kingdom, all buildings on casemates were founded by the king, i.e. the state. On the other hand, in the Late Period after the first period of royal activities (šn' '3 w'b or forts) private houses with the same construction of foundations appeared very quickly. As early as the beginning of the Saite times, whole cities became built up by structures raised on casemate platforms like Imet (Petrie *et al.* 1888) or Buto (Fig. 11) (Herbich 2003, 263–266; 2007, 160–163; 2009, 170–172). One of the explanations of such a phenomenon could be state of threat which was related to the defensive features of casemates in the second millennium BC and times of Psametik I and Apries. Nevertheless, such a statement seems to be illogical in the only longer time of peace and prosperity in Egypt during the first millennium BC. Because of that, other explanations should be taken under consideration.

6. Social and religious transformation

One more possible explanation for the so widespread appeal of buildings on casemate platforms in the Late Period (and next – in the Ptolemaic Period) are changes in Egyptian society. There are visible religious changes (or in individual devotion) and related to them changes in state ideology as well as demographic changes and the enlargement of oecumene.

As early as in the New Kingdom, casemate platforms were adapted to sacral structures. The first example is the chapel of Tetisheri in Abydos from the beginning of XVIII dynasty and the chapel in the Tuthmoside Palace G in Awaris (Bietak *et al.* 2001, 78–79; Bietak, Forstner-Müller 2005, 86–89). Later, in the period of increased importance of solar cults during the reign of Amenhotep III and IV (Wilkinson 2011, 295–334), a casemate technique was adopted for altars, where offerings to the solar disc – Aton – were made (Frankfort, Pedlebury 1935, 101). Because of that, such a platform was supposed to be related to the primeval mound and Heliopolitan theology (cf: Ricke 1935; Spencer 1979b).

The Amarna revolution allowed them to turn to the more personal contact between man and god (Grimal 2005, 341–342). The

Fig. 11. 1 – Geophysical map of Tell el-Fara'in; 2 – close to the south-western part of Kom A. Reproduced after http://www.dainst.org/en/project/buto?ft=all (status as of Oct. 26th, 2012)

complete uncertainty of the political situation, royal power continuity and possibility to keep Maat made such relations deeper and deeper during difficult years of the Third Intermediate Period. People looked to strengthening traditional values, through the religion of the ancestors or personal contact with god, more often due to established oracles. Such behavior gave people feelings of safety, defined their ethnicity and culture and were more understandable in the face of numerous invasions. Besides private initiatives, growing devotion to religion can be noticed in the acts of public institutions. The increasing mythologization of temple architecture (Spencer 1979b; Arnold 1999, 308) like referring to the primeval mound, was one of the manifestations of such a state.

The connections between temple architecture and Heliopolitan myths were known as early as in the Old Kingdom. In the New Kingdom it was emphasized by raising the floor level of the entrance to the temple sanctuary (Spencer 1979a, 133). Examples of smaller chapels erected on a higher ground level than surrounding areas are known from the White Chapel of Senwseret I or the Red Chapel of Hatshepsut in Karnak. This idea gained a unique framework in the Late Period in form of high foundation platforms for sacral buildings as peripteral temples or šn' '3 w'b, but also huge foundations of naos' court of Amasis in temple of Banebjed in Mendes (Hansen 1965, 31–38; Hansen *et al.* 1967, 5–64; Redford 2009, 15–160).

The appropriate arrangement of the Palace of Apries in Memphis could be another example of archaism and referring to the happier times of ancestors in order to legitimate present actions, in this case related to the cultic domain too. The earlier mentioned palace-fort was surrounded by its own enclosure and it was supposed to refer to the enclosure of the Step Pyramid in Sakkara – by the architecture and location against tomb of Djoser as well (Krol 2007, 285).

In spite of all of this, intentional archaism or relations with religion cannot be assigned to every structure raised on a foundation platform. Such an explanation is unconvincing – particularly because of the fashion to develop whole cities on casemate structures. It seems to be impossible to assume that practical Egyptian people transferred such ideas to civil architecture, even in the period of the highest peak of interest in traditional religion. A more rational explanation certainly exists.

7. Demographical changes

What needs to be noticed is that one of the advantages of using foundations in the form of a casemate platform was the possibility of raising structures which were more massive and, first of all, higher than previously. However, there is no chance to decisively define casemate buildings from the Nile Delta as houses before the Greco-Roman Period. Some important reasons for doing so appear.

Models of houses (Badawy 1966, 17) and wall paintings from Theban tombs (Badawy 1968, 15–22) can be evidence of the ability to build tower houses as early as the Middle and the New Kingdom. In the case of casemate platforms from the Late Period, there are examples of structures from Buto (Hartung 2003; Kreibig 2009), Diospolis Inferior (Herbich, Spencer 2006; 2007; 2009; 2010) or Mendes (Wilson 1982). What is worth emphasizing (especially in the case of Buto and Diospolis Inferior), is that most of the casemate structures from those sites were recognized by geophysical method. Because of that, it is more difficult to assign them to definite functions. In the case of Buto, researchers (Hartung 2003, 215) determined bigger platforms as foundations under probably public buildings and smaller ones – as houses. However, thanks to recognizing the

wall construction, we can classify buildings from Buto as structures functioning from later times as town houses. Models of similar ones from the Ptolemaic Period confirm that buildings erected using such techniques could even have several floors. The sizes of platform remains indicate that they were rather tight and staircases occupied a lot of space. Architects were forced by the scarcity of space, also inside the town area, to erect high buildings. It is not known if a single building was occupied by one or more families. The consequences of putting this issue in the broader sense require consideration.

The attitude towards the perception of the Nile Delta as a one, big marsh throughout most of the history of Ancient Egypt is now rejected. However, it has to be admitted that the natural conditions of the most of its territory at first made it very difficult to establish more intense settlement. In the Old Kingdom, the south and central parts of the Delta were the most densely settled areas. Most of those areas were occupied by the royal domains, an argument for the existence of wastelands on the broad territories of the Delta available to take over by the state. In the First Intermediate Period many of the swamps had been drained, making colonization on a larger scale possible. An example of that can be an appeal to King Merikare (X dynasty) – "built cities in the Delta". The continuation of such activity is confirmed in the Middle Kingdom (settlement in 'Ezbet Rushdi or Abu Ghalib) and more intense development of the Nile Delta followed in subsequent periods. The intensification of settlement on the Deltas' borders in the New Kingdom was related to the foreign policy of pharaohs. In the north areas of the Delta, population growth did not take place until the Saite and Ptolemaic Periods (Butzer 1976, 93–96).

The development of settlement in the Nile Delta was not only related to the changes in environment. The north part of the region was settled in the time of Lower Egyptian culture (van den Brink 1993; van der Way 1988), but it was not on the scale known from subsequent ages. What changed over the centuries was the amount of people in Egypt in general, and particularly in the Nile Delta (Table 1). Clearly there is noticeable growth of population from the New Kingdom to the Greco-Roman Period. In these times, the population of Egypt doubled and, in the Nile Delta, this index tripled. One of the reasons was obviously the political and cultural situation in this part of Egypt. The rising importance of the Nile Delta at this time, the presence of royal residences and (later) Greek trading posts, could attract settlers from the Valley and other parts of Egypt. In that case, there is no surprise at the appearance of 35 new cities at this area between 600 BC – AD 950 (Butzer 1976, 100). Besides, the development of earlier existing centers can also be seen. One example is Buto, where settlement expanded

Table 1. Hypothetical population in Egypt through the ages. Reproduced after Butzer 1976, table 4

Region	4000 BC	3000 BC	2500 BC	1800 BC	1250 BC	150 BC
	Hypothetical population (in thousands)					
Valley	240	600	1.040	1.120	1.620	2.400
Fayum	3	6	9	61	72	312
Delta	80	210	540	750	1.170	2.160
Desert	25	25	25	25	25	50
Total (millions)	0.35	0.87	1.6	2.0	2.9	4.9

to earlier unoccupied areas between koms not before the Saite period. Here we can assume the necessity to provide enough space to settle, which was very difficult because of the limits of such places in the north Nile Delta. It is related to the issues mentioned above, i.e. adaptation of architecture to environmental conditions. In spite of the process of the natural rising of alluvium caused by periods of increased river accumulation, the area between koms in Buto – annually flooded until then – had to be characterized by higher moisture. Therefore, even if using of casemate platforms was not necessary for building security, it certainly gave better effects in the case of need to erect buildings with several floors.

8. Summary

Despite pretenses of invariability, a constant evolution in Egyptian architecture is noticeable. Solutions developed for other elements of constructions and types of foundation were used to erect casemate platforms. Foundations platforms with casemate constructions were built with bricks, sand and rubble, stone and organic materials. The discussed structures are an ideal example of the harmonic combination of varied materials and the appropriate use of their features.

The emergence and development of such varied types of layouts raised on casemate platforms were driven by many factors. One of the most popular explanations related such a form of architecture with the environmental conditions and protection for the buildings against the Nile floods. Another was connected to religious beliefs and Heliopolitan theology. However, it seems that the explanation of origin and diffusing of casemate foundations is more complex and a few variants have to be considered which, besides floods or religion, include the political situation and demographic changes.

One explanation cannot be taken apart from the others. Although the natural conditions are an important element affecting such types of architecture (once again, the construction of the mastaba should be noticed), they could not, and were not, the only one present. The influence of religion, especially Heliopolitan[5], was no justification for the unusual trend of building casemate structures in Egypt in some point of its history. Erecting of casemate platfors was the result of a few factors. What has to be underlined is that when only one such element was present (high floods, political threat or religious beliefs), it did not contribute to the emergence of new kinds of structures. More important was the slow evolution of construction techniques connected to social development and demographic changes. It caused a need to create more complicated solutions in architecture, including more solid foundation methods.

The introduction of large-scale buildings on casemate platforms changed the image of Egyptian towns. Despite a long history of multi-storey houses in Egypt, they have never been widespread before the Saite period. Until now, most casemate structures were discovered in Lower Egypt, especially in the Nile Delta. These are the earliest and most varied in function layouts: sacral buildings, defensive palaces, houses and even examples of using platforms for burial places. In the south of the country and in the deserts, casemate construction was used occasionally in Pharaonic times. First of all peripteral temples or šn' '3 w'b are located there. Only in the Delta is the discussed form of architecture spread among the whole society. Until now, there have been no archaeological remains of towns built

[5] It has to be emphasized that the origins of Heliopolitan theology were a result of the observation of the environment, the Nile floods and the Egyptian landscape.

with tower houses on casemate foundation platforms in Upper Egypt.

The analysis of different aspects of casemate buildings brings some conclusions. Because of the importance of the construction of such foundations, the materials used, various factors (environmental, political, religious and demographic) affecting their emergence and development, location in Egypt and chronology of individual structures, casemate platforms originated from the Nile Delta, and they developed there as well. They were a kind of adaptation to some determined conditions. Casemate buildings were spread throughout the whole country from the Delta. In the Greco-Roman period, when Egypt was visited and inhabited by Greeks, the Nile Delta architecture was the first that affected foreigners. The popularity of this type of building in Ptolemaic times and the use of casemate techniques in other environmental conditions are possible as well.

Powstanie i rozwój architektury na platformach fundamentowych o konstrukcji kazamatowej w delcie Nilu

W świetle najnowszych badań, w Egipcie istniały dobrze rozwinięte i opracowane metody fundamentowania budowli, a jedną z najbardziej specyficznych ich form były platformy o konstrukcji kazamatowej. Wydaje się, że takie rozwiązanie architektoniczne może być ściśle związane z terenami Delty Nilu. Stanowiska, na których zostały odnalezione ślady podobnych konstrukcji to przede wszystkim: Awaris, Buto, Dafne, Diospolis Inferior, Herakleopolis Parva, Memfis, Mendes, Naukratis oraz Tanis.

Platformy fundamentowe o konstrukcji kazamatowej pojawiły się na terenie Egiptu w połowie II tysiąclecia p.n.e., lecz ich najpełniejszy rozwój przypada na okres I tysiąclecia p.n.e. W tym czasie zostały one przyjęte na szeroką skalę, w wyjątkowy sposób wpływając na zmianę krajobrazu miejskiego. Biorąc pod uwagę obszar, na którym rozpoznano większość platform kazamatowych, różnorodność struktur, jakie były wznoszone na takim fundamencie czy zakres chronologiczny rozpoznanych budowli, można stwierdzić dużą złożoność omawianego zagadnienia. Z tego względu istotna wydaje się próba rozpoznanie przyczyn powstania oraz rozwoju tej formy architektonicznej. Czynnikami, które należy wziąć pod uwagę są: właściwości konstrukcyjne platform kazamatowych, warunki naturalne i polityczne, w jakich doszło do ich powstania, a także wierzenia religijne, przemiany społeczne i demograficzne.

W warunkach egipskich podstawowym budulcem używanym przy konstrukcji platform kazamatowych była cegła wykonywana z syltu i gliny z większą lub mniejszą zawartością piasku oraz czasami materiału organicznego w postaci słomy. Duża zawartość gliny wzmacniała odporność tego rodzaju budulca na erozję poprzez wodę. Jednocześnie cegły o dużej zawartości piasku wzmacniały całą konstrukcję, co – w połączeniu ze specyficzną metodą wznoszenia murów – zapewniało wytrzymałość niezbędną dla budowli o wielu piętrach. Ceglane mury oraz komory kazamatowe wypełnione piaskiem lub ziemią dawały odpowiednią ochronę w czasie wysokich wylewów Nilu.

Kwestia pochodzenia konstrukcji kazamatowej jest wciąż dyskusyjna. Jej podobieństwo do technik budowy mastab okresu wczesnodynastycznego oraz Starego Państwa, może wskazywać na rodzimy rozwój. Jednocześnie podnoszone są głosy wskazujące na import podobnych rozwiązań z terenów Lewantu lub Nubii. Jednocześnie, dla wskazania genezy stosowania fundamentów w postaci platform

kazamatowych, niezbędne jest powiązanie czasu powstania tych struktur z zachodzącymi wówczas w Egipcie zmianami środowiskowymi. Czas wznoszenia budowli na platformach kazamatowych łączy się wyraźnie z okresami wzmożonej aktywności Nilu oraz wyjątkowo wysokimi wylewami rzeki, przed którymi omawiana konstrukcja mogła być skuteczną ochroną.

Pierwsze budowle wznoszone na platformach kazamatowych były związane z władcami hyksoskimi oraz królami rodzimej XVIII dynastii. Były to przede wszystkim pałace, obronne fortece. Dość szybko do repertuaru obiektów konstruowanych za pomocą techniki kazamatowej dołączyły obiekty o znaczeniu kultowym – kaplice oraz ołtarze. W okresie największego rozwoju budownictwa wykorzystującego fundament kazamatowy, wznoszone były w ten sposób zarówno pałace-forty władców, jak i tzw. šn' '3 w'b oraz najzwyklejsze domy mieszkalne. Rozprzestrzenienie się omawianej techniki budowlanej wśród szerokich kręgów egipskiego społeczeństwa mogło być spowodowane zarówno zmianami w nim zachodzącymi, jak i wzrostem liczby ludności (zwłaszcza na terenie Delty Nilu) oraz związanymi z tym względami praktycznymi.

Wieloaspektowość tej tematyki pozwala dostrzec, jak bardzo złożonym zjawiskiem kulturowym była cywilizacja egipska oraz jakie informacje można uzyskać, analizując architekturę miejską tego kraju w starożytności.

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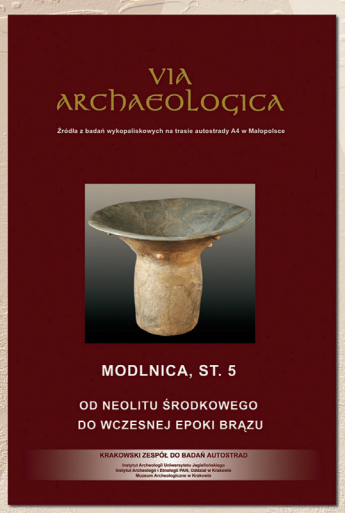

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