ANTHROPOLOGIE • LVII/1 • pp. 3–51 • 2019

JAN NOVÁČEK, KRISTINA SCHEELEN-NOVÁČEK, MARIOLA HEPA,
MICHAEL SCHULTZ, CORNELIUS VON PILGRIM, WOLFGANG MÜLLER

ROMAN AND LATE ANTIQUE BURIALS FROM THE OLD TOWN OF ASWAN (EGYPT)

ABSTRACT: The southern Egyptian city of Aswan is located directly north of the first cataract of the Nile which since Pharaonic time represented the border of the empire. During archaeological rescue excavations, tombs and burials from the Roman and Late Antique period were discovered in different areas of the modern city centre. The state of preservation and documentation of these structures allows establishment of a new typology and chronology of the burial architecture of Late Antique southern Egypt. The anthropological investigation identified 30 individuals, approximately half of them subadult. On average, adult individuals had died at an age of 36 years. Male individuals had an average stature of 164 cm, female individuals of 151–152 cm. The skeletal remains of five individuals, all subadults, showed probable vestiges of scurvy. Anaemia was suspected in ten individuals, both children and females. The diagnosis of a severe otitis media seems possible in nine individuals, five subadults and four adults. Nine individuals, four subadults and five adults, showed vestiges of a chronic sinusitis. Additionally, all the subadults demonstrating vestiges of a severe otitis media either showed typical bone changes induced by scurvy or by anaemia. Vestiges of a possibly healed pleurisy were found in three individuals. Dental pathologies were not very common in this population, only 13 teeth displayed carious lesions. Periapical processes were found in 10 cases. Furthermore, gingival pockets, ante-mortem tooth loss, dental calculus and periodontal disease were observed. Osteoarthritis was common among the adults, as well as various injuries, mostly fractures. One interesting diagnosis is a metastasising neoplasm, possibly breast cancer, in the skeleton of an elderly female, which had produced osteoplastic-osteoclastic metastases in the ribs and vertebrae.

KEY WORDS: Southern Egypt – Aswan – Roman burials – Late Antique burials – Tomb – Typology – Anthropology – Malnutrition – Dental pathology – Trauma – Metastasising cancer

Received 13 August 2018; accepted 10 December 2018.

DOI: https://doi.org/10.26720/anthro.19.02.14.2

INTRODUCTION

During rescue excavations conducted by the joint Swiss-Egyptian mission in spring 2014 and 2016, two small areas east of the main street of the modern suq of the old town of Aswan were investigated. Both represent some of the northernmost excavations in the area of the old town of the antique city of Syene performed by the mission up to now, and, very probably, almost correlate with the northern edge of the antique settlement area. In addition to structures, which were archaeologically identified as workshops and bakeries from Pharaonic times, several Roman pit-burials and chamber tombs from the late Antique period were discovered. The anthropological and palaeopathological investigation of the human remains from these graves provides an insight into the living conditions of the inhabitants of the garrison town of Syene, on the southernmost edge of the Roman Empire.

ARCHAEOLOGY OF SYENE/ASWAN

Investigating an ancient necropolis covered over by a modern town

The Swiss Institute for Archaeological and Architectural Research on Ancient Egypt and the Egyptian Ministry of Antiquities have been conducting a joint urban archaeological project in Aswan since 2000. Since then more than 90 areas have been investigated within the old city centre. (The mission is directed by Cornelius von Pilgrim, in close cooperation with Abd el-moneim Said Mahmoud, head of the Aswan Inspectorate). In several of these excavations, the extensive necropolis to the north of Roman Syene was encountered. In 18 areas, burials dating to the Graeco-Roman Period were found. All these areas were investigated during rescue excavations (*Figure 1*). That meant that the work had to be conducted under difficult circumstances, time pressure being the worst among them. The areas, already small, were further restricted in size by security concerns that arose due to the poor state of preservation of neighbouring houses or the immediate vicinity of well populated streets (*Figure 2*). These limitations only allowed the observation of random samples of the burial practices over differing periods. A coherent picture has still to be developed.

The necropolis extends along the shore of the Nile from the northern limit of the ancient town that can be assumed with high probability to be at the modern police headquarters, 330 m towards the north (Müller 2014: 62). Area 89 marks the northern limit and Area 82 marks, together with Area 55 (von Pilgrim, Müller 2010: 6), the eastern edge of the Late Antique cemetery while its western limit was defined by the ancient bank of the River Nile that was located approximately beneath the modern Suq-Street (Müller, De Dapper 2018: 27–28). Thus, the width of the cemetery was approximately 190 m.

Further to the east, some rock-cut tombs of Ptolemaic and Early-Roman dates were discovered (Areas 12 and 22). These tombs were cut into the rocky hill to the east of the modern town-quarter of Shona. As very few excavations were conducted in this part of the town, it is difficult to state whether these were single isolated tombs or another part of the cemetery. A preliminary investigation of finds from Area 12 have shown that the sarcophagi found in a rock-cut tomb were of a Late Ptolemaic date (personal communication by Sabine Ladstätter). A rock-cut tomb in Area 51 most probably dates to the Early Roman Imperial Period (von Pilgrim, Müller 2009: 19–20).

The tombs in the northern cemetery were chamber-tombs made of mud-bricks and simple pit-graves. As the layers of anthropogenic and natural sediment on top of the bedrock were up to 10m high, no rock-cut tombs were encountered in this area.

In several areas at the northern limit of the town, the cemetery was used from the Ptolemaic or at the latest Early Roman Period well until the end of Roman rule and beyond (von Pilgrim et al. 2008: 341–344, von Pilgrim, Müller 2009: 5–6, 2010: 8–9). The density of burials and the size of the cemetery increased over time. This is probably due to the historically evidenced growth in population and importance of Syene (Dijkstra, Worp 2006).

A preliminary typology of Late Antique tombs found in Aswan

Previously, a preliminary typology and chronology was attempted based on epigraphic and numismatic evidence. In this paper, an absolute chronology of tombs will be suggested based on a study of the pottery. The preliminary typology sketched below will be tested against the findings of this study.

Most of the evidence for this first stratigraphical and chronological model were derived from Area 45. The latest tombs found there and in the neighbouring Area 24 (Type 1) were chamber tombs with vaults and

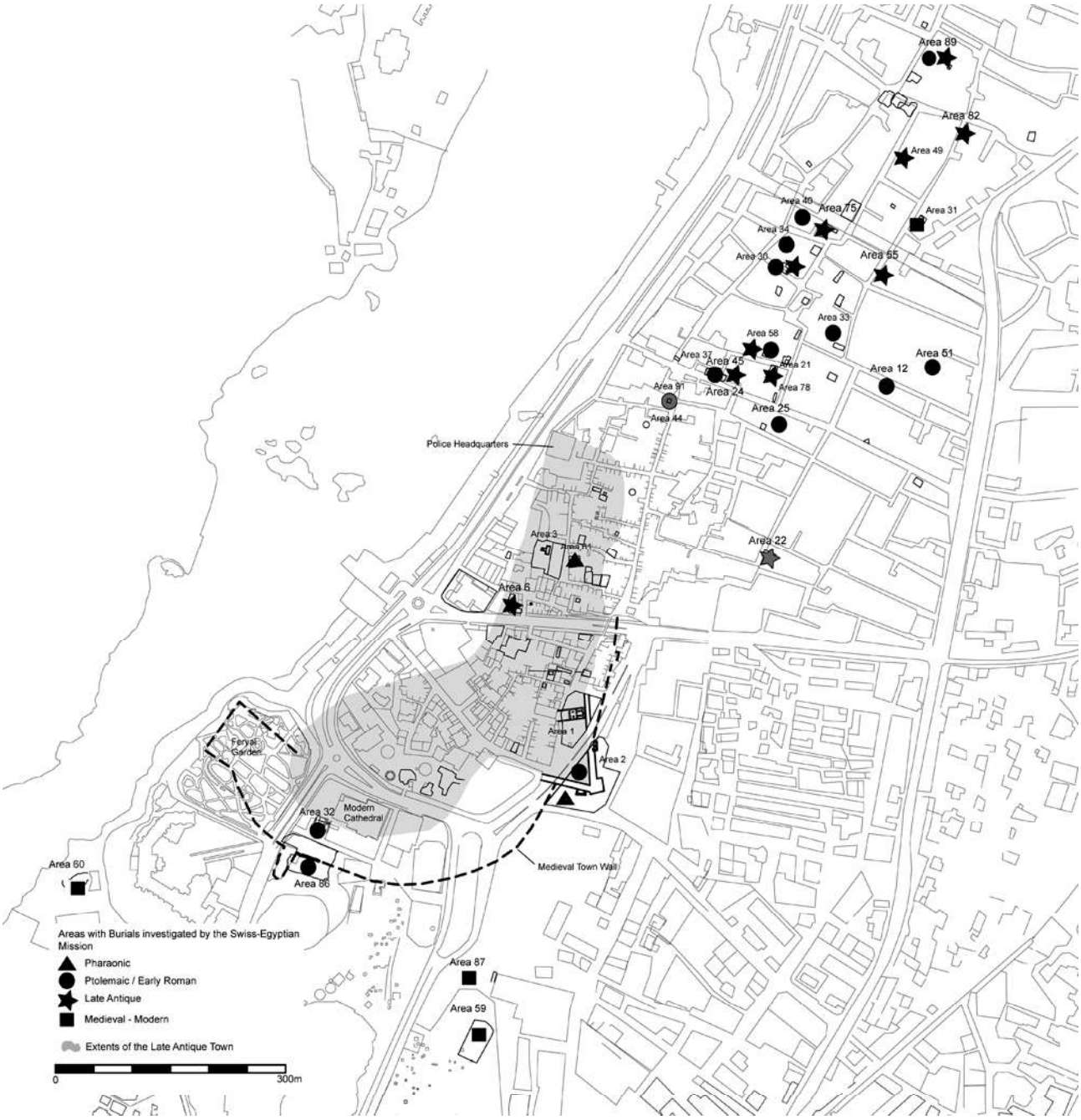


FIGURE 1: Map of Aswan with excavated areas. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

superstructures partly made of fired bricks (von Pilgrim et al. 2008: 340–341, von Pilgrim, Müller 2009: 4, 5). Often the superstructures, simple rectangular constructions (*mastabas*) and sometimes the walls of the chamber were covered with white lime-plaster. In a cemetery at Kellis, similar superstructures were encountered. However there, white plaster but no fired bricks were used (Bowen 2003: 167). In the cemetery of the monastery of St. Paulos in Western Thebes dating from the early 7th–10th century CE, rectangular

FIGURE 2: Area 82: Overview with modern surroundings. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

superstructures have been documented (Eichner 2018: 229–232). They rarely used fired bricks, but one example shows a coating in white lime-plaster (Eichner 2018: 235).

A good example of this type is the vault found next to the baptismal font in Area 6 (von Pilgrim et al. 2006: 260–262, Müller 2014: 66–67). A study of the pottery and other material associated with the construction of this possible *martyrium* produced a date in the 7th century CE (Martin-Kilcher, Wininger 2018: 200–202). Crypts inside intramural churches were very rare in Egypt (Grossmann 2014: 106–107). While the combination of crypt and baptismal font has been recorded for churches in necropoleis (Grossmann 2014: 93–94 and 109–111) the example from Aswan is the only one inside an urban area.

As this tomb was situated inside a building, its orientation differs from all other Late Antique tombs yet encountered in Aswan as it is oriented north-south with the entrance shaft in the north.

In Area 45, a Late Antique stela that has been dated to the 6th–7th century CE was found reused in the construction of the superstructure of a tomb of Type 1 (Dijkstra 2015: 25–26).

The earliest types of Islamic tombs attested from Aswan are clearly derived from Late Antique tombs of Type 1 (von Pilgrim *et al*. 2010: 184). They resemble the "Simple Tombs" of the "Fatimid Cemetery" at Aswan (Speiser 2013: 219).

Type 2 chamber tombs are very similar to Type 1 but without the use of fired bricks or lime plaster. As with Type 1, those tombs often have a shaft at the western end of the east-west oriented chamber. Both Type 1 and Type 2 tombs were family vaults with a high number of individuals buried in them (von Pilgrim, Müller 2009: 4–6).

As is the case with all other Late Antique burials in Aswan, the bodies were deposited in a supine position with the head in the west. This was common in "Christian" Late Antique cemeteries all over Egypt (Bowen 2003: 168).

The superstructures of these tombs have rarely been preserved. The few examples observed show a simple rectangular mastaba-like construction on top of the chamber.

In Area 75, two coins dating to the 2nd half of the 4th–5th century were found in a layer beneath a tomb of Type 2.

Type 3 comprises simple pit burials. Here the interred remains were put in a shallow pit in a supine position. Orientation and positioning of the body are the same as they were with Types 1 and 2. In Area 45, a coin found in the infill of one of the burial pits was dated to the time of Constantius II (337–361 CE). It gives a *terminus post quem* for the infill of the burials (Dijkstra 2015: 26). The later tombs of Type 2 should date to the 5th and 6th centuries. In pit graves in the Bagawat necropolis in Khargeh Oasis, coins of the same date-range were found (Bowen 2003: 170, Hauser 1932: 40).

There are several other types of tombs in Aswan but all of them predate Late Antiquity.

Area 82

Area 82 was situated at the eastern limit of the Late Antique cemetery (*Figure 1*). Regretfully, archaeological intervention in the construction site only started after a significant part of the foundation pit had already been excavated (von Pilgrim, Müller 2014: 21).

Two tombs were encountered in the small area. Tomb 1, the southern one, was a typical chamber tomb of Type 2. The vault had been completely destroyed by modern construction work when the archaeological investigation started. The chamber was approximately square with a side-length of 2.10 m. The walls of the chamber were made of unfired mud-bricks and 1 brick wide. Only one course of bricks was preserved. In the eastern section of the area, a 0.5 m deep grave pit was found. Vault and chamber were thus completely subterranean. As the northern wall of the tomb was protruding approximately 0.25 m from the western wall of the chamber, an entrance shaft or similar construction might have existed to the west of the tomb.

During excavation, 10 individuals were discerned inside the chamber. Several of the earlier burials were in disarray due to later secondary burials. All articulated skeletons were oriented in the typical way described above (*Figures 3* and *4*). There was an accumulation of individuals in the northern part of the chamber with burials 4 (14-82-1-2/4), 5 (14-82-1-2/5), 6 (14-82-1-2/6), 7 (14-82-1-2/7), 8 (14-82-1-2/8), 9 (14-82-1-2/9) and 10 (14-82-1-2/10) clustered together. While Burial 4 constituted the latest burial of the whole tomb and was still well articulated, the earlier burials in this area showed different stages of disarray. Burials 8 and 10 were displaced towards the north by Burial 4 with Burial 8 lying on top of Burial 10. Burial 4 was situated immediately on top of Burial 5 that was on top of Burial 6. Only a probably displaced leg was visible for Burial 3. The stratigraphical order of burials is thus such: Burials 8 and 5 were interred immediately before Burial 4, Burials 6 and 10 were slightly earlier and the fragmented Burials 6 and 3 were the earliest burials in the northern part of the chamber. Between the lower legs of Burial 4, a heavily corroded iron-knife was found (14-82-1-3/1). This knife represents the only grave good found in either Area 82 or 89.

In the southern part of the chamber, only one well-articulated burial was found. Burial 1 (14-82-1-2/1) was deposited on top of two clay-pipes (14-82-1-3/2 and 14-82-1-3/3). The pipes were orientated north-south and found under the head and the (lost) pelvis of the skeleton. Such pipes most probably were put in the burial chamber prior to the interment of the body in order to facilitate moving the body that was most presumably put on a board into the chamber. Evidence of burials with bodies deposited on wooden planks, boards or mats are known from Saqqara (Bowen 2003: 171, Martin 1974: 21). In Aswan, no wooden remains could be found due to the very humid environment. A tomb of Type 2 with clay-pipes used in a similar fashion was found in Area 25. There clay-pipes were found under the head, the pelvis and the feet of the original burial. A single pipe was deposited under one of the numerous secondary burials (von Pilgrim *et al.* 2008: 341).

Tomb 2 was situated to the west of Tomb 1 (*Figures 3 and 5*). The southern walls of the tombs were aligned to each other. Tomb 2 showed a variation of Type 1 as it comprised two separate chambers within one tomb-construction. Each chamber had its own vault. The mud-brick construction measured 2.80 m (north-south extension) by 2.10 m (east-west extension). Both vaults were damaged in antiquity as their remains were found covered by a layer of untouched wind-blown sand prior to excavation. The chambers were of different sizes. The

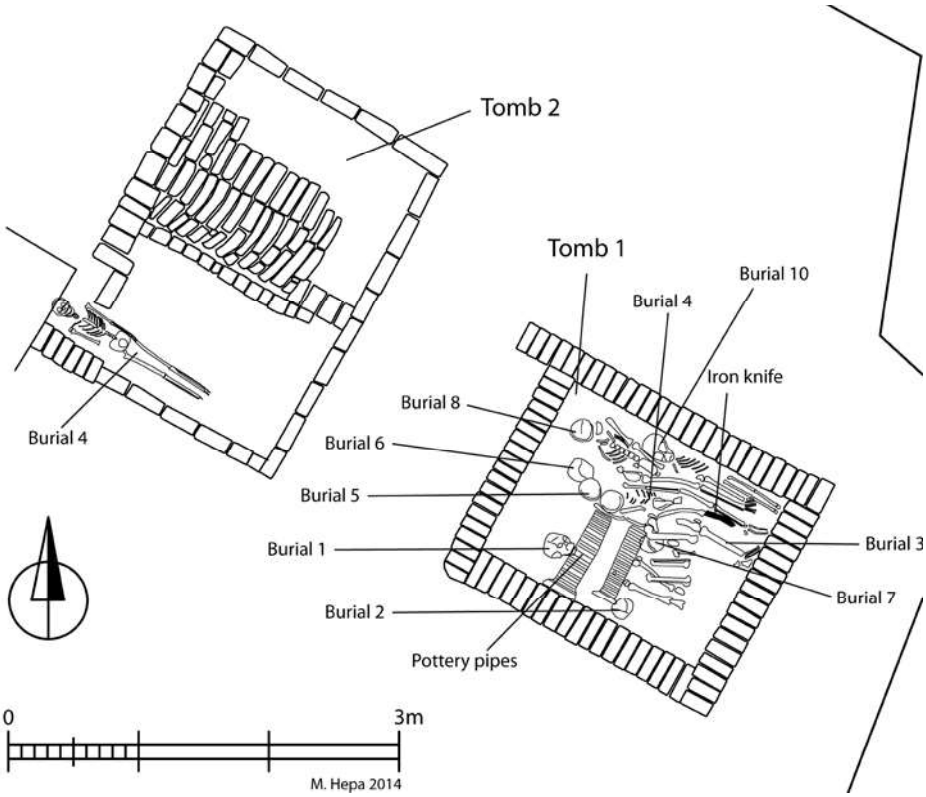


FIGURE 3: Plan of Area 82. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

FIGURE 4: Area 82: Overview of Tomb 1. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

FIGURE 5: Area 82: Overview of Tomb 2. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

FIGURE 6: Area 82: Detail of Tomb 2/Burial 4. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

FIGURE 7: Area 82: Detail of Tomb 2/Burials 2 and 3. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

FIGURE 8. Area 82: Detail of Tomb 2/Burial 1. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

northern chamber was 1.50 m wide, the southern one 1.10 m (in both cases the inner width was measured). Both the southern and the northern chamber showed partly walled up entrances (approximately 0.70 m wide).

Whereas no burials took place in the more spacious northern chamber, the southern chamber contained four well-articulated skeletons. The earliest burial (14-82-4-6/1= Burial 4) was deposited in the centre of the chamber and later covered by loose sandy material (*Figure 6*). On top of this material, two small children were buried, both put against the southern wall of the chamber (14-82-4-4/1 = Burial 2 in the west and 14-82-4-4/2 = Burial 3 in the east) (*Figure 7*). The two bodies were again covered by loose sandy material before the last individual was deposited in the chamber (14-82-4-3/1 = Burial 1) (*Figure 8*). The fact that the skeletons were much better preserved than those found in Tomb 1 may be due to the lower number of burials or the fact that more time had elapsed between the various interments. Only the two small children were buried at the same time. The heads of Burials 2 and 4 were lying in the entrance area or possibly the entrance shaft of the chamber. The head of Burial 1 was situated just within the chamber. Possibly, the earlier burials were moved in the course of the final interment in the vault. With the two adult burials preceding and succeeding the interment of two small children, a family relationship between the interred seems possible.

Area 89

Like Area 82, Area 89 was a rescue excavation. (The work was carried out by Aliyaa Abdel Monsef Hassan, Mohamed Abdel Raziq Mohamed Ali, Omnia Mohamed Abdallah and Said Ahmed Ali El-Rawi, all of them inspectors of the Aswan Inspectorate, together with members of the Swiss Institute). The side was to the north-west of Area 82 and contained 11 tombs from three major burial phases (*Figure 1*). Area 89 is the northernmost area with burials encountered to date in Aswan (von Pilgrim *et al.* 2016: 19–20).

Stratum C/2

Grave 11 was a pit-grave that contained a terracotta coffin with a child buried in it (skeleton = 16-89-40-8/2, coffin = 16-89-40-8/1, von Pilgrim *et al.* 2016: 19). The body was deposited in a supine position with the head in the south (*Figures 9 and 10*). The coffin showed

FIGURE 9: Area 89: Detail of Grave 11. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

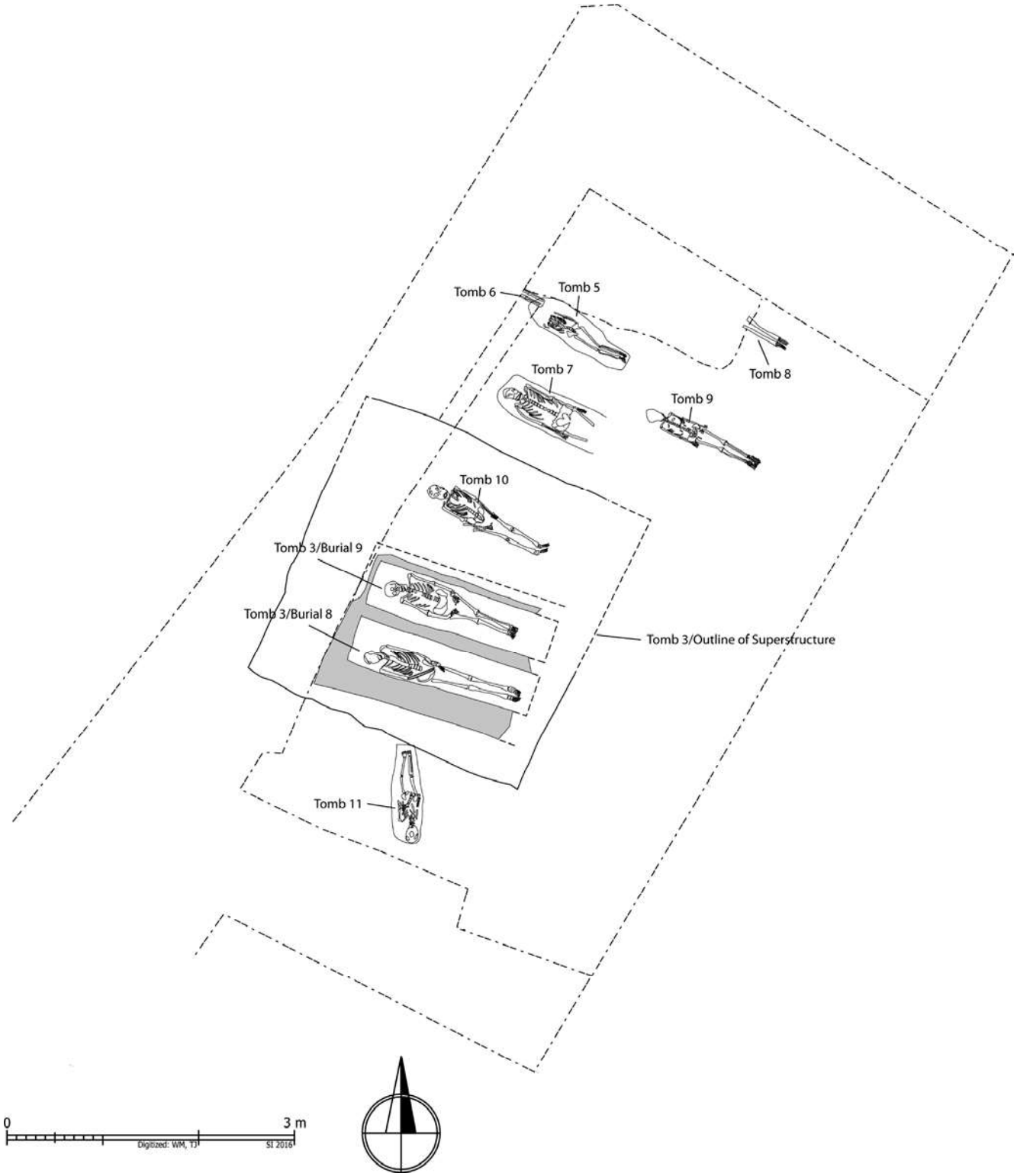


FIGURE 10: Plan of Area 89 during Strata C and B/3. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

a maximum width of 0.33 m, a length of 1.10 m and was 0.29 m high). It was a coffin of Type III-B1, with lid and modelled face without paint (Cotelle-Michel 2004: 271–280). The lid most probably had two parts. The upper part was damaged from the upper lip of the mask downwards, probably when the burial was robbed (*Figure 11*). This type of coffin was very common from the New Kingdom until the Roman Period. The facts that the coffin was found in a simple pit and that its orientation differed completely from all other burials in the area give reason to question whether its location was *in situ*. While all other terracotta coffins from Aswan were found either in rock-cut tomb chambers or mud-brick constructions (von Pilgrim *et al.* 2008: 343 plate 58c, 2011: 133), it must be noted that all of them belonged to adults. The orientation, on the other hand, closely resembles the orientation of the earliest burial phase in Area 45 with the sole difference that there the head was in the north (von Pilgrim, Müller 2009: 6) and no remains of terracotta coffins were found.

If the coffin was *in situ,* the grave was of significantly earlier date than all other burials, probably dating to the Ptolemaic or Early Roman Imperial Period.

Stratum C/1

During Stratum C/1, the deceased were buried in simple pit-graves (von Pilgrim et al. 2016: 19). These graves of Type 3 contained only single burials (*Figure 10*). All of them showed the same orientation. The skeletons in Grave 9 (16-89-31-1/1, *Figure 12*) and Grave 10 (16-89-32-3/1, *Figure 13*) were more or less complete. Those in Graves 5 (16-89-26-5/2) and 7 (16-89-26-5/3) had been damaged in antiquity. Most of Grave 8 (lower legs of the skeleton = 16-89-31-1/2) was outside the investigated area (*Figure 12*). The pits were rather shallow. No superstructures of any kind were

FIGURE 11: Area 89: Detail of terracotta coffin. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

FIGURE 12: Area 89: Detail of Graves 9 and 8. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

preserved. Only on top of the infill of Tomb 10, was a heap of granite-rubble deposited, either as a marker or as a means of protection.

Stratum B/3

Of the four tombs of Stratum B, only Tombs 2 and 3 were excavated. Tomb 1 at the very south of the site was completely robbed and Tomb 4 was too close to the northern limit of the site for any investigation of its contents (*Figure 14*). The well preserved mud-brick mastaba made it, as was the case with Tomb 3, a typical tomb of Type 2.

Stratum B/3 marks the first phase of Tomb 3. The vaulted burial chamber was constructed of unfired mud bricks. The western end of the chamber was mostly outside of the excavated area. The chamber was circa 2.40 m long and circa 1.50 m wide. As the eastern wall of the tomb was mostly preserved and showed no entrance of any kind, the entrance into the chambers was most probably from the west, outside of the investigated area (*Figures 10 and 14*). The chamber itself was divided by an intermediary wall into two subsidiary chambers of equal size. With a height of 0.45m, this wall did not reach the ceiling of the vault. The chamber had a maximum height of 0.90 m. The approximately square superstructure had a side-length of circa 3.20 m and was only preserved to a height of two courses of mudbricks. The original tomb chamber was situated beneath the southern half of the superstructure with its southern wall built on top of the

FIGURE 13: Area 89: Detail of Grave 10. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

FIGURE 14: Overview of Area 89 during Stratum B from the east. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

vault. The construction on top of Tomb 3 resembles Enclosures 1 and 2 in the Kellis 2 cemetery (Bowen 2003: 167, Birrell 1999: 38–40, fig. 3, *Figure 14*).

Burial 9 (skeleton = 16-89-14-2/1) was deposited in the northern chamber, Burial 8 in the southern one (skeleton = 16-89-13-1/1). Burial 9 was slightly earlier, as the interment in the southern chamber was carried out only after some sandy material had accumulated on top of its base (*Figure 15*).

As Grave 10 was situated exactly under the mastaba that formed the northern limit of the superstructure/enclosure, a connection between the earlier burial and Tomb 3 is feasible.

Looking at the orientation of the grave, a distinct difference to Tomb 3 becomes apparent. As Grave 10 is oriented like the graves of Stratum C/1, a direct relationship does not seem too probable.

The slight difference in orientation has also been observed elsewhere (Bowen 2003: 171, Jeffreys, Strouhal 1980: 28–29, fig. 2) but seems in Syene to be chronologically determined as all graves/tombs of a given Stratum share the same orientation.

Stratum B/2

During this Stratum, several secondary burials were carried out in the restricted space left on top of the crown of the intermediary wall and below the roof of the chamber. The earlier skeletons of Burials 8 and 9 had then been completely covered with sandy material up to the top of the intermediary wall (*Figures 16–17*).

The seven secondary burials were performed in short chronological sequence that could be stratigraphically established. Burial 1 (skeleton = 16-89-12-4/1) was the latest one. The skeleton is well articulated, the head in the entrance area of the tomb. Burial 4 (skeleton = 16-89-12-4/4) was slightly earlier and had been pushed deeper into the cramped chamber. Burials 3 (skeleton = 16-89-12-4/3) and 2

FIGURE 15: Area 89: Detail of Tomb 3 with Burials 8 and 9. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

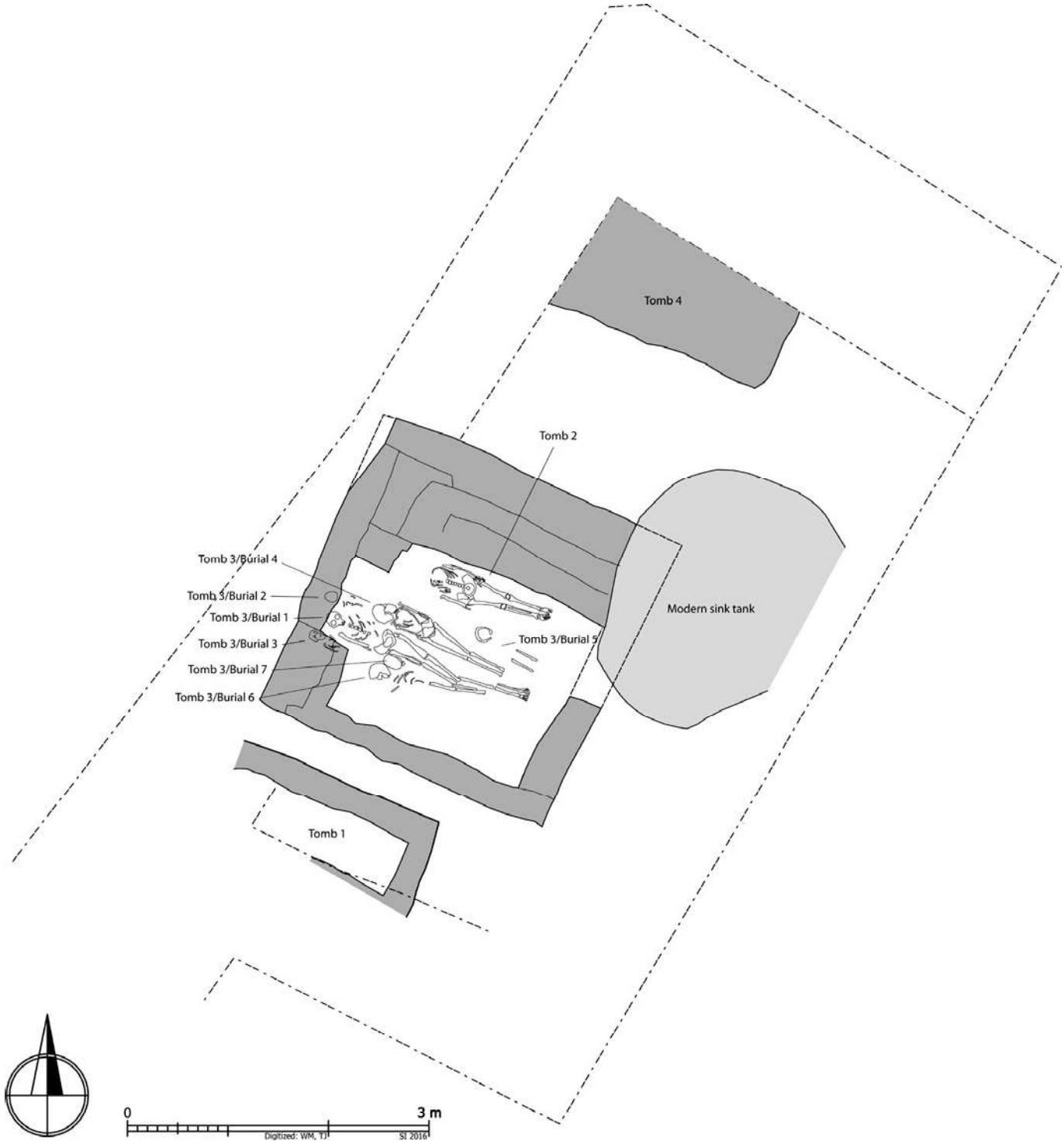


FIGURE 16: Area 89: Plan of Tomb 3 during Stratum B/2. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

FIGURE 17: Area 89: Detail of Tomb 3 with Burials 1–7. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

(skeleton = 16-89-12-4/2) were clearly earlier than Burial 1 but had to be deposited in the extreme west of the chamber due to the already very restricted space. Burials 5 (skeleton = 16-89-12-4/5), 6 (skeleton = 16-89-12-4/6) and 7 (skeleton = 16-89-12-4/7) were covered and damaged by the later burials and were thus the earliest burials in the chamber.

Stratum B/1

Now, a single narrow mud-brick chamber was constructed between the vault of Tomb 3 and the *mastaba* at the northern end of the superstructure/enclosure (*Figures 16 and 18*). Tomb 2 showed its own narrow vault and was partly decorated with white lime-plaster. It contained a single burial (skeleton = 16-89-9-2/2). The skull of the skeleton was not preserved and the vault severely damaged in antiquity.

This latest addition to the ensemble of Tomb 3 already shows features of Type 1 (white lime plaster).

Pottery and finds from Areas 82 and 89

Although only a small number of diagnostic sherds (listed are 19 fragments in area 89) were recorded from the tombs and graves, the stratigraphic position of this material is crucial for the date of construction refilling and abandonment of a burial site. In Area 89, little material was found in the refill of the grave pits or the chambers of the tombs. Pottery positioned stratigraphically below or above the graves and tombs, especially from a solid filling layer covering the graves of Stratum C and predating the construction of the chamber tombs of Stratum B, was examined (*Table 1*).

From the infill of the pit-graves of Stratum C, no diagnostic material was found. Small wall fragments of ripped Amphorae made of Nile silt and fragments of Aswan Pink Clay vessels with Red and White Slip, only allow a rough date in the Roman period. The deposit material, which covered Stratum C and predated

FIGURE 18: Area 89: Detail of Tomb 2. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

Stratum B contained some fragments dating to the 5th century CE, mixed with residual material of Pharaonic date (Von Pilgrim *et al.* 2015/2016: 17–18). Late Antiquity is represented by two dishes of Egyptian Red Slip Ware 'A' (***Figure 19*, 1–2** (16-89-26-1.K1 and 16-89-26-2.K2)), one fragment of a dish with White Slip (***Figure 19*, 3** (16-89-32-1.K2)) and a small bowl with slightly stepped rim and Red Slip (***Figure 19*, 5** (16-89-26-4.K2)). The tableware is typical for the beginning of the 5th century CE and gives a *terminus ante quem* for the pit-burials. Together with the Red Slip Ware a fragment of a drainpipe made of Aswan marl clay with numerous body sherds was found (***Figure 19*, 6** (16-89-26-1. K2)). The drainpipe has an in turned rim and a slightly globular body. The fragment corresponds to the examples found in Nag el-Tawil (Steskal, Rose 2012: 325, pl. 23, 149, 300–301).

Another fragment of an Egyptian Red Slip Ware 'A' base shows a huge stand ring (***Figure 19*, 4** (16-89-26-4. K1)), which is typical of deep bowls with a high and slightly conical stand ring and corresponds with the Gempeler (1992: 103) type T349. In the centre inside of its base, parts of a cross motif were visible. The characteristics of double outlines and splayed arms are comparable to Hayes' (1972: 276, Fig. 56, e) motif 311e, dating to the end of the 5th and beginning of the 6th century CE. Thus, the latest diagnostic sherds from the deposit material after the abandonment of the burials of Stratum C date to the end of 5th century CE.

The pottery from the earliest phase of Tomb 3 (Stratum B/3) comes from the filling of the two burial chambers. It comprises three dishes of Egyptian Red Slip Ware 'A' (***Figure 20*, 1–3** (16-89-13-1.K1, 16-89-13-2.K1, 16-89-14-1.K1)), one white slipped bowl with sloping edge (***Figure 20*, 4** (16-89-13-2.K2)) and a fragment of a cooking bowl with a knobbed rim and ripped wall (***Figure 20*, 5** (16-89-14-2.K1)), all of them dating to the end of the 5th century CE. Residual types from the chambers like the storage vessel (***Figure 20*, 6** (16-89-22-2.K1)) date to the 4th century CE. Matching

TABLE 1: Overview of archaeological data of burials in the area 89.

Tomb/ Grave Nr.	Burial Nr.	Object Numbers	Stratum	Stratigraphical units	Description of material	Pottery	Dating
1		robbed					
			B/1-A	16-89-10-1 16-89-11-1/1	Deposit material above tombs 2 and 3	Dish, bowl	End of 4th century CE– 6th century CE
2		16-89-9-2/2	B/1	Without diagnostic material			
3	1–7	16-89-12-4/1 – 4/7	B/2	16-89-12-4	Filling material inside the tomb 3	Bowl	Beginning-mid. of 4th century CE
			B/2-C/1	16-89-12-5	Material below burials Stratum B/2	Dish, bowl	End of 5th century CE
3	8	16-89-13-1/1	B/3	16-89-13-1	Filling material found with Burial 8	Dish	5th century CE or later
3			B/3	16-89-13-2	Material below Burial 8, inside Tomb 3	Dish, bowl	End of 5th century CE
3			B/3	16-89-14-1	Filling material on top of Burial 9	Dish	End of 5th century CE
3	9	16-89-14-2/1	B/3	16-89-14-2	Filling Material on top of Burial 9	Cooking bowl	End of 5th century CE
			B/1-A	16-89-22-2	Filling material on top of Tomb 4,	Storage vessel	4th century CE or later
4		Not excavated	B/2				
			B/3-C	16-89-26-1 16-89-26-2 16-89-26-4		Dishes, bowl, drainpipe	5th century CE
5		16-89-26-5/2	B/3-C	16-89-26-5		Some wall shards of Aswan Pink Clay with Red slip and Nile silt Amphora	Late Antiquity
6		16-89-26-3/4	B/3-C	16-89-26-3	Filling layer between Strata B and C		
7		16-89-26-5/3	C/1	16-89-26-5			
8		16-89-31-1/2	C/1				
9		16-89-31-1/1	C/1				
				16-89-32-1	Deposit material on top of Grave 10	Dish	5th century CE
10		16-89-32-3/1	C/1	Without diagnostic material			
				16-89-40-2 16-89-40-5	Material below Tomb 1	Dish, bowl	Beginning of 6th century CE
11		16-89-40-8/2	C/2	Without diagnostic material			

fragments from the southern and northern chambers of Tomb 3, Stratum B/3 indicate a roughly simultaneous interment of the bodies.

From the filling material of the chamber of the second phase of Tomb 3 (Stratum B/2) three diagnostic types could be registered: a dish of Egyptian Red Slip Ware 'A' (***Figure 21*, 1** (16-89-12-5.K2)), a white slipped bowl with ripped wall (***Figure 21*, 2** (16-89-12-5.K1)), which can be dated to the end of 5th century CE or later and a fragment of a little red slipped bowl (***Figure 21*, 3** (16-89-12-4.K1)) with parallels dating to the 4th century CE.

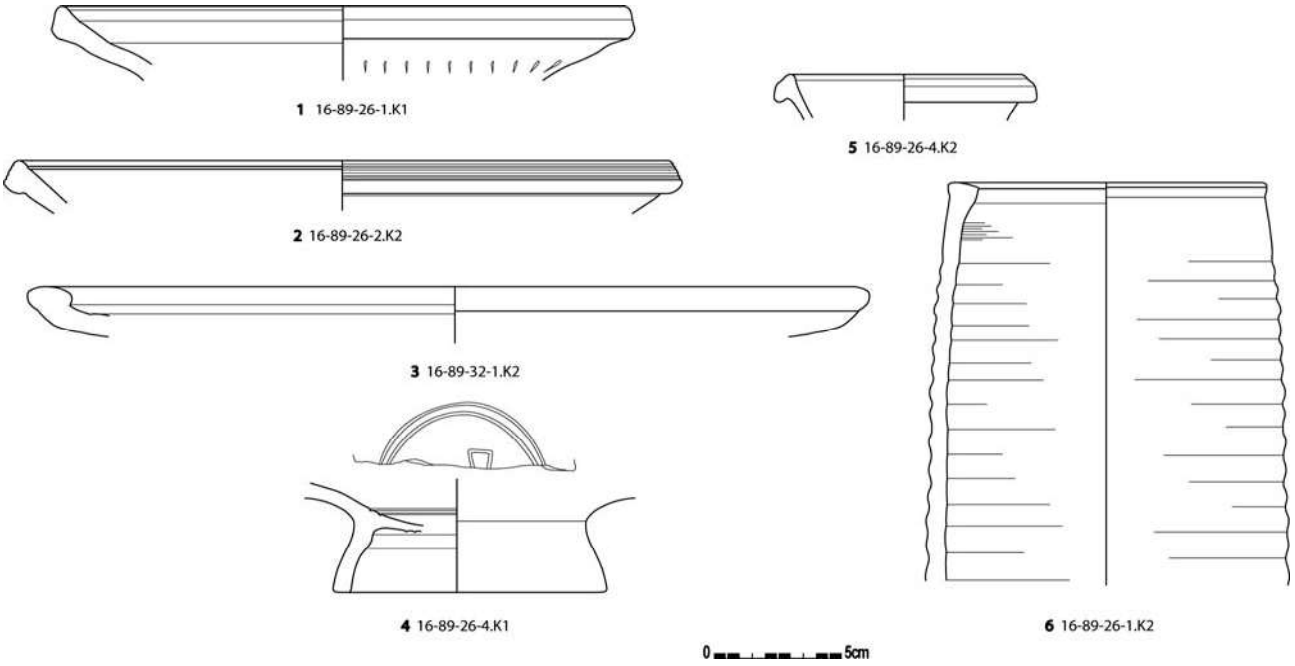


FIGURE 19: Pottery from the filling layer between Strata B and C. Scale 1:3. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

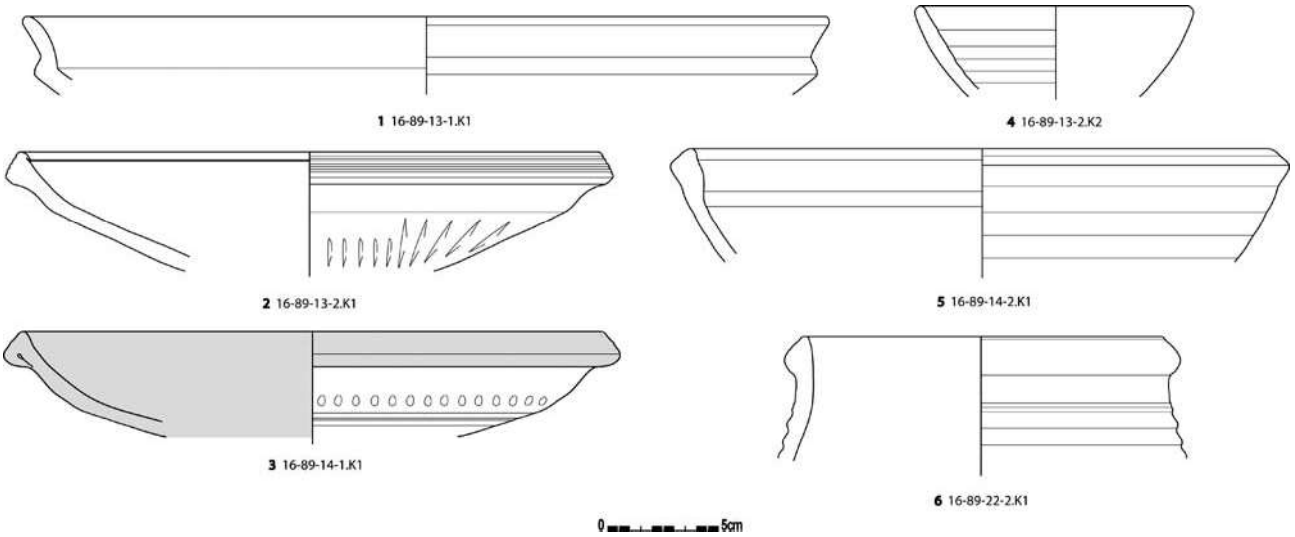


FIGURE 20: Pottery from the infill of the burial chambers of Tomb 3 during Stratum B/3. Scale 1:3. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

The material found immediately on top of the last burial phase in Area 89 gives a *terminus ante quem* for the abandonment of this part of the cemetery. The deposit material includes an almost completely preserved dish of Egyptian Red Slip Ware 'A' (***Figure 22*, 1** (16-89-11-1/1. K1)), which is decorated with a strongly abraded *Chi-Rho* motif. The motif is made up of fine dots set in outlines and situated inside a central circle. It compares well with Hayes (1972) motif 289B dating to the end of the 5th and beginning of the 6th century CE. In Syene decorations with Christian motives like the types mentioned are documented from the early 6th century CE onwards until they were replaced by transformed decorations in the middle of the 7th century CE (Martin-Kilcher, Wininger: 2017, 304). A fragment of a ring stand of Egyptian Red Slip Ware (***Figure 22*, 2** (16-89-40-5. K1)) bears similarity to dishes of the 6th century CE but is too small for a more detailed attribution. A white slipped bowl with a decoration of rouletting on the outside (***Figure 22*, 3** (16-89-10-1. K2)) is verified for Syene from the end of 6th to the beginning of the 7th century CE (Martin-Kilcher, Wininger 2017: 227, Abb. 6.22, 129, GT 339a-b). A large bowl (***Figure 22*, 4** (16-89-40-2. K1)) which comes from a layer directly above Tomb 1, is of the same date. The bowl is red slipped and shows traces of white painting on the outer and inner surface. Comparable types from Syene have been dated to the 7th (Martin-Kilcher, Wininger 2017: 186, Abb. 5.57, 507, GK 233/513) and 8th century CE. The same is true for similar pieces from Elephantine (Katzjäger 2017: 219–220, Schüssel 77, 245).

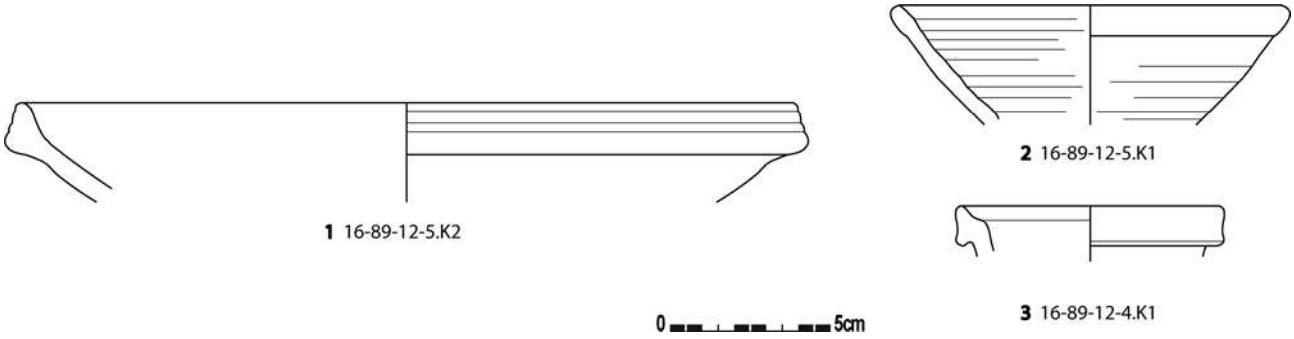


FIGURE 21: Pottery from the infill of Tomb 3 during Stratum B/2. Scale 1:3. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

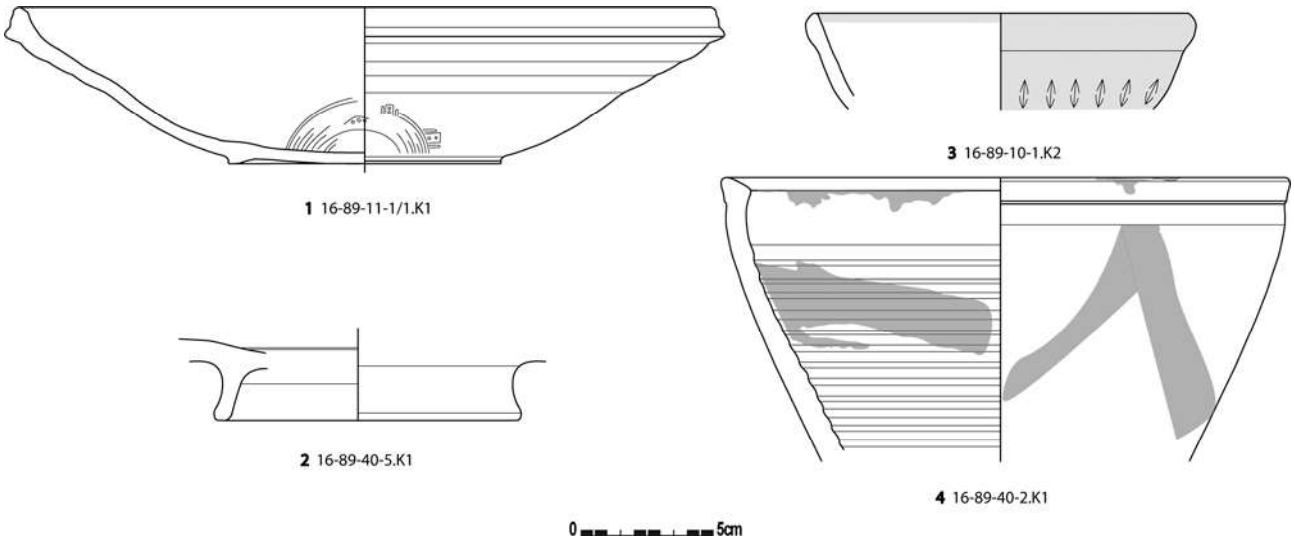


FIGURE 22: Pottery from the layers covering Tombs 1–3. Strata B/1-A. Scale 1:3. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

In Area 82, surprisingly no diagnostic pottery was found, except for two fragmented drainpipes, made of clay found under Tomb 1/Burial 1 (***Figure 25*** and ***Figure 23*, 1–2** (14-82-1-1/3 and 1/4.K1, 14-82-1-3/2.K1, Bailey 1998: pl. 103, Q 77-8, Lecuyout, Pierrat-Bonnefois 2004: 204, Fig. 3) and heavily corroded remains of an iron knife, which belonged to Tomb 1/Burial 4 (***Figure 24*, 1** (14-82-1-3/1)).

The two drainpipes made of Aswan marl clay were fragmented but nearly completely preserved. In contrast to the above-mentioned example from area 89, the pipes show a flanged rim and a slightly splayed body with regular, rectangular ribs. Comparable pieces with an identical rim shape were found in contexts dating to Late Antiquity or later, as, for example, inside the necropolis of Alexandria (Tréglia 2003: 461, 116) and in Luxor (Pierrat 1991: 161, Fig. 23, f, Beckh 2013: Taf. 64, Typ 198b). A piece with an identically flanged rim was found in Area 1 at Syene, together with an *in-situ* ensemble of completely preserved pottery that was dated to the middle of the 7th century CE (Martin-Kilcher, Wininger 2017: 191, Abb. 5.62, 538). There the pipe was probably reused as a stand for another vessel. Further examples with a similarly flanged rim, but of short square shape were found in a setting from the 2nd century CE in Area 13A also in Syene (Martin-Kilcher, Wininger 2017: 63, Abb. 3.20, 119). This piece may represent an earlier type of the same pipe which was common from the Early Roman Imperial Period onwards.

The aforementioned fragment of an iron knife most probably represents the handle of a pocket knife (***Figure 24*, 1** (14-82-1-3/1)). The object is fragmented and corroded. Its preserved length is 12 cm, the thickness 0.8cm. The width varies between 1.8 and 2.5cm. On one site, two round headed nails are visible 8.3cm apart. The blade seems still to be present inside the handle. The object thus most probably represents a folding knife (Vass 2012: 296). The pivot for the iron blade is clearly visible. Normally, the handle of such a knife was made of bone or ivory (Schenk 2008: 43). In the case of the knife from Area 82, what remains of the handle is made of iron, which is rather uncommon (Von Mercklin 1940: 340). It cannot be excluded, though, that the completely lost original surface was coated with leather or textile. Most known examples of pocket knives, date to the pre-Roman Period (Riha 1986: 30). Late Antique examples are known until the 3th century CE (Riha 1986: 30). The special construction of the handle could thus represent a later development of Roman pocket-knives.

The religious affiliation of the investigated tombs is difficult in the absence of epigraphic material like the stelae from Area 45 mentioned above and of finds bearing Christian symbols. Still, even considering the longevity of pagan cults in the Cataract Region, it seems feasible to assume that the huge majority of burials in the Late Antique necropolis of an urban centre like Syene were Christian.

The extreme scarcity of finds is a phenomenon well documented from other Late Antique necropoleis in Egypt. Whether this is due to rules concerning grave goods passed by the Christian authorities is a matter of dispute. Often pagan customs survived or were mixed with symbols of the new faith. While numerous grave goods were found with the burials of the necropolis of Qarara in Middle Egypt (Huber 2018: 212–213), such items were mostly missing in the nearby necropolis of Sharuna (Huber 2018: 221–223). Both cemeteries were in use from the 4th–6th century CE. The situation at Aswan thus resembles the observations at Sharuna, a cemetery organised around a funerary church. Probably, the necropolis of an important town like Syene, seat of a bishop at least since the first half of the 4th century CE, implied a stricter observation of Christian rules, as was the case at Sharuna.

As the finds presented in this paper are mostly fragments of pottery, it must be stressed that no complete vessels or parts of vessels were found *in situ.* As has been observed elsewhere, the pagan custom of depositing food on or in pottery as nourishment for the dead or to accompany the diseased, with vessels symbolising stored food, did not survive into Late Antiquity (Huber 2018: 223). The pottery presented constitutes settlement debris that was dumped at the outskirts of the town and dislodged when new grave pits were excavated or refilled.

The pocket knife from Area 82 is a rare example of an item of daily use buried together with the deceased. The terracotta pipes from the same area are an exception as they were found *in situ* but not as grave goods but rather as technical evidence of the actual process of burying.

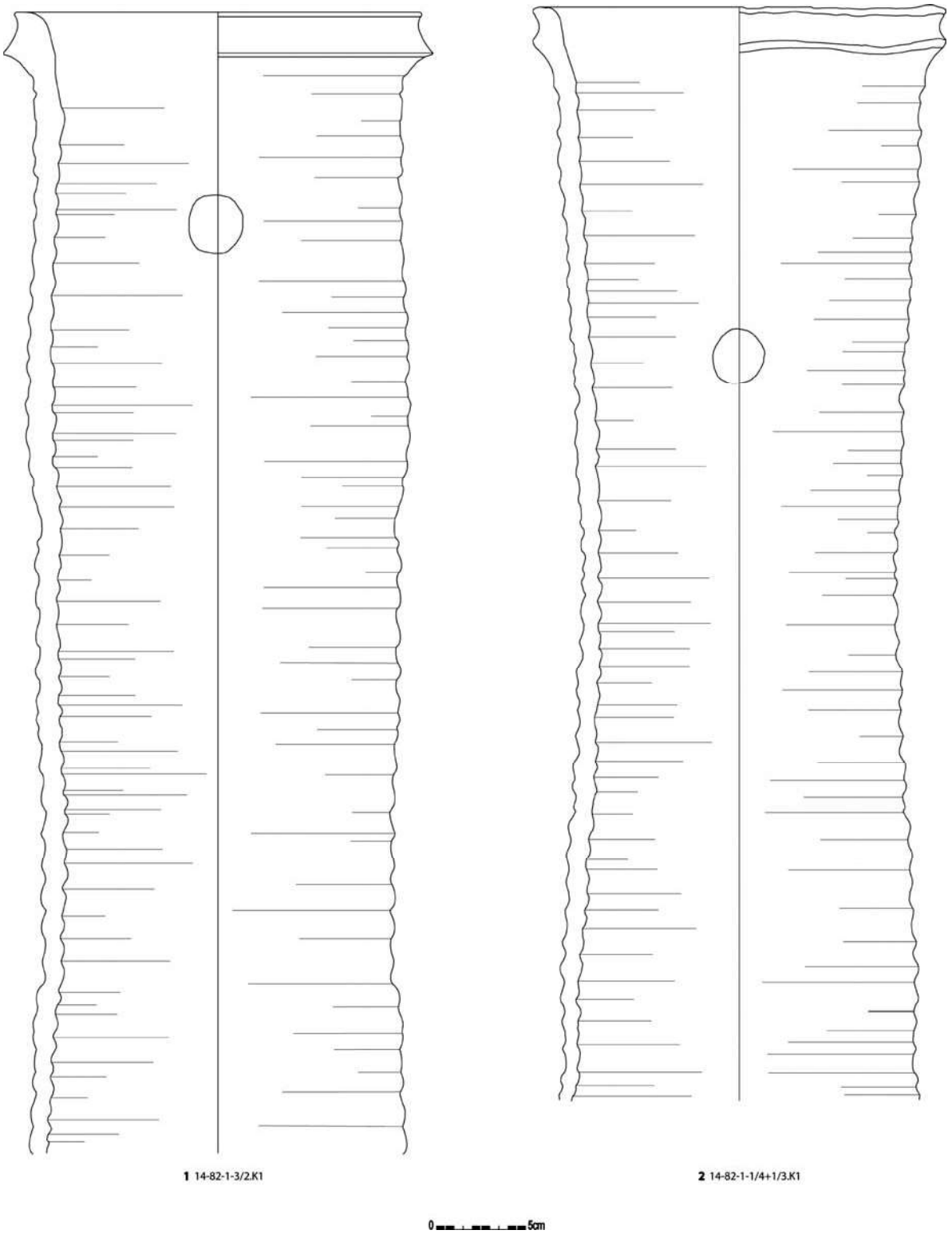


FIGURE 23: Drainpipes from Area 82/Tomb 1. Scale 1:3. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

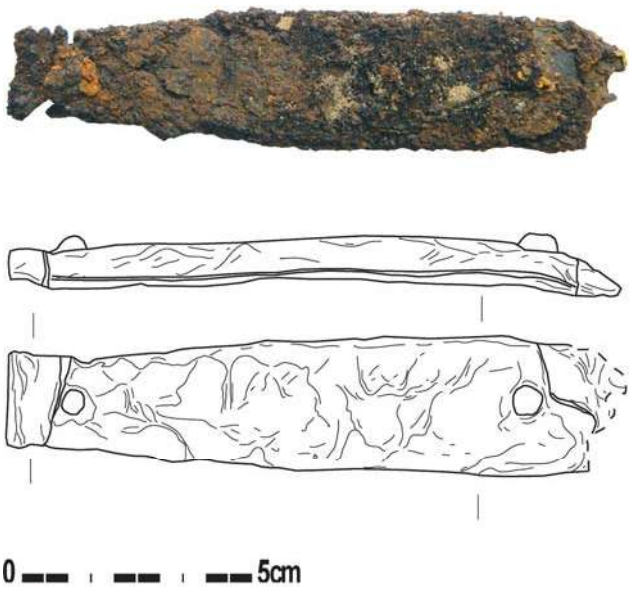


FIGURE 24: Handle of a pocket knife from Area 82/Tomb 1. Scale 1:2. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

Catalogue

***Figure 19*, 1** (16-89-26-1.K1)
Dish, ERSW 'A' Ø (Ø = Diameter) outside: 30 cm.
Aswan Pink Clay (Munsell 10R7/6), Red Slip (Munsell 10R6/8).
Band of rouletting on the exterior.
Parallels: *cf.* Gempeler 1992: Abb. 23, 4, GT 248Var.; similar Bailey 1998: pl. 8, C175, 6th–7th century CE; Martin-Kilcher, Wininger 2017: 173, Abb. 5.44, 278, GT 248Var., beginning 5th century CE; similar Katzjäger 2017: 126, Teller 43.3, T204, mid. 5th–end 7th century CE or later.

***Figure 19*, 2** (16-89-26-2.K2)
Dish, ERSW 'A' Ø outside: 32 cm.
Aswan Pink Clay (Munsell 10R7/8), Red Slip (Munsell 10R6/8).
Parallels: *cf.* Hayes 1972: 130, Fig. 23, form 83; Gempeler 1992: Abb. 13, 1, GT 218b, beginning 7th century CE; Martin-Kilcher, Wininger 2017: 170, Abb. 5.41, 199, GT 218b, beginning 5th beginning 6th century CE; Katzjäger 2017: 97, plate 24.1, T120, mid./end 5th–mid. 7th century CE or later.

***Figure 19*, 3** (16-89-32-1.K2)
Dish, WSL Ø outside: 38 cm.
Aswan Pink Clay (Munsell 2.5YR5/4), WSL (Munsell 10YR8/4).
Parallels: *c.f.* similar Hayes 1972: 162, Fig. 30, form 104; similar Gempeler 1992: Abb. 16, 14, GT 226b, second quarter 6th–mid. 7th century CE?; Bailey 1998: pl. 61, N34, 5th–6th century CE; Martin-Kilcher, Wininger 2017: 226, Abb. 6.21, GT 252, end 6th–first half 7th century CE; Katzjäger 2017: 131, Teller 47, T213, mid. 6th–beginning 8th century CE.

***Figure 19*, 4** (16-89-26-4.K1)
Dish or bowl, ERSW 'A' Ø outside: 10 cm.
Aswan Pink Clay (Munsell 10R8/4), Red Slip (Munsell 10R6/6).
Stamp decoration: Cross – motif? inside central circle, inside base of dish (Parallels: after Hayes motif 311e, Style E, Hayes 1972: 276, Fig. 56, e, end 5th–beginning 6th century CE; motif 79 after Gempeler 1992: Taf. 23, 5).
Parallels: *cf.* Gempeler 1992: Abb. 45, 2, GT 349, first half 6th century CE; similar Martin-Kilcher, Wininger 2017: 225, Abb. 6.20, 86, GT 349, end 6th–beginning 7th century CE.

***Figure 19*, 5** (16-89-26-4.K2)
Bowl, ERSW Ø outside: 12 cm.
Aswan Pink Clay (Munsell 10R7/4), Red Slip (Munsell 10R6/6).
Parallels: *cf.* similar Hayes 1972: 154, Fig. 28, 1; similar Gempeler 1992: Abb. 40, 3, GT 324c or GT 325, first half 6th–end 6th/begining 7th century CE; Martin-Kilcher, Wininger 2017: 174, Abb. 5.45, 296, GT 325, beginning 5th–beginning 7th century CE; Katzjäger 2017: 208–209, Schale 66.1, S213, end 5th–8th century CE.

***Figure 19*, 6** (16-89-26-1.K2)
Drainpipe Ø outside: 12 cm.
Marl Clay (Munsell 2.5YR6/6), uncoated.
Parallels: *cf.* similar Lecuyot, Pierrat-Bonnefois 2004: pl. 7, 94; Steskal, Rose 2012: 325, pl. 23, 149; similar Beckh 2013: Taf. 64, Typ 198c.

***Figure 20*, 1** (16-89-13-1.K1)
Dish, ERSW Ø outside: 26 cm.
Aswan Pink Clay (Munsell 2.5YR5/6), Red Slip (Munsell 10R6/6).
Parallels: *cf.* similar Gempeler 1992: Abb. 9, 9, GT 206a, after 4th century CE; similar Katzjäger 2017: 127–128, Teller 44, T206, 5th–7th century CE.

***Figure 20*, 2** (16-89-13-2.K1)
Dish, ERSW 'A' Ø outside: 30 cm.

Aswan Pink Clay (Munsell 10R7/6), Red Slip (Munsell 10R6/8).
Band of rouletting on the exterior.
Parallels: *cf.* Gempeler 1992: Abb. 43, 5–6, GT 344a, 6th/7th century CE; Martin-Kilcher, Wininger 2017: 180, Abb. 5.51, 404, GT 218a/c end 6th–beginning 7th century CE; Katzjäger 2017: 97–98, Teller 24.1, T120, end 5th–mid. 7th century CE.

***Figure 20*, 3** (16-89-14-1.K1)
Dish, ERSW 'A' Ø outside: 32 cm.
Aswan Pink Clay (Munsell 10R7/8), Red Slip (Munsell 10R6/8).
Band of rouletting on the exterior.
Parallels: *cf.* Hayes 1972: 92, Fig. 14, 19, form 58var.; Bailey 1998: pl. 8, C173, 5th–8th century CE; Gempeler 1992: Abb. 14, 11–12, GT 221b, second quarter 5th–second quarter 6th century CE; Martin-Kilcher, Wininger 2017: 176, Abb. 5.47, 333, GT 218b/c or 221b, beginning 6th century CE; Katzjäger 2017: 74, Teller 8.1, T33, end 5th–beginning 7th century CE.

***Figure 20*, 4** (16-89-13-2.K2)
Dish, WSL Ø outside: 14 cm.
Aswan Pink Clay (Munsell 10R8/2), White Slip (Munsell 5YR7/3).
Parallels: *cf.* Gempeler 1992: Abb. 35, 13, GT 316b, mid. 4th–6th century CE; Martin-Kilcher, Wininger 2017: 120, Abb. 4.36, 591, GT 316b, beginning 5th–end 6th century CE; Katzjäger 2017: 167–168, Typ 24.2, first half 5th–second half 5th century CE.

***Figure 20*, 5** (16-89-14-2.K1)
Cooking bowl, Ø outside: 26 cm.
Marl Clay (Munsell 2.5YR7/6), uncoated.
Parallels: *cf.* Egloff 1977: pl. 43, 13, end 6th century CE; similar Gempeler 1992: Abb. 83, 8, GK 117, after 5th century CE; Le Bomin 2016: 68, Fig. 11, 8, end 6th–beginning 7th century CE.

***Figure 20*, 6** (16-89-22-2.K1)
Quadûs or storage vessel, Ø outside: 16 cm.
Marl Clay (Munsell 2.5YR7/6), uncoated.
Parallels: *cf.* Gempeler 1992: Abb. 106, 7, GK 438, 2; Beckh 2013: Taf. 60, Typ 194b, general after 6th century CE; Martin-Kilcher, Wininger 2017: 167, Abb. 5.38, 177, 4th century CE.

***Figure 21*, 1** (16-89-12-5.K2)
Dish, ERSW 'A' Ø outside: 22 cm.
Aswan Pink Clay (Munsell 2.5YR6/6), Red Slip (Munsell 10R5/8).
Parallels: *cf.* Gempeler 1992: Abb. 13, 4–5, GT 218/219, second quarter 5th–end 6th century CE; Martin-Kilcher, Wininger 2017: 122, Abb. 4.38, 629, GT 218, mid. 5th–end 6th century CE; similar Katzjäger 2017: 97, Teller 24.1, T111, mid./end 5th–mid. 7th century CE or later.

***Figure 21*, 2** (16-89-12-5.K1)
Bowl, WSL Ø outside: 14 cm.
Aswan Pink Clay (Munsell 2.5YR7/4), White Slip (Munsell 10R8/4).
Parallels: *cf.* Gempeler 1992: Abb. 40, 12, GT 326, end 5th–beginning 6th century CE; Martin-Kilcher, Wininger 2017: 170, Abb. 5.41, 223, GT 326, first half 5th–end 6th century CE; Katzjäger 2017: 206–207, Schale 64.1, S198, second half 5th–beginning 8th century CE.

***Figure 21*, 3** (16-89-12-4.K1)
Bowl, ERSW Ø outside: 8 cm.
Aswan Pink Clay (Munsell 2.5YR8/4), Red Slip (Munsell 10R6/6).
Parallels: *cf.* similar Gempeler 1992: Abb. 41, 24, GT 341a, 6th century CE; Faiers 2005: 140, fig. 2.46, 305, 5th–6th century CE; Martin-Kilcher, Wininger 2017: 162, Abb. 5.33, 74, GT 341, beginning/mid. 4th century CE.

***Figure 22*, 1** (16-89-11-1/1.K1)
Dish, ERSW 'A' Ø outside: 26 cm.
Aswan Pink Clay (Munsell 2.5YR7/6), Red Slip (Munsell 2.5YR6/8).
Stamp decoration: Chi-Rho motif outside central circle, in simple outline, with decoration of fine dots, inside base of dish (Parallels: after Hayes motif 289B, Hayes 1972, 272, Fig. 54, b–c; motif 55 after Gempeler 1992, Taf. 18, 7, end 5th–beginning 6th century CE; Martin-Kilcher, Wininger 2017: 178, Abb. 5.49, 354, beginning of 6th century CE).
Parallels: *cf.* Hayes 1972: 390, Fig. 85a; Gempeler 1992, Abb. 14, 3, GT 220a, second quarter 5th-beginning 7th century CE; Martin-Kilcher, Wininger 2017: 173, Abb. 5.44, 280, GT 220/221Var.? End 4th–beginning 5th century CE; Katzjäger 2017: 95–96, Typ 23.1, T101, mid./end 4th–end 7th century CE.

***Figure 22*, 2** (16-89-40-5.K1)
Dish or bowl?, ERSW 'A' Ø outside: 12 cm.
Aswan Pink Clay (Munsell 10R7/6), Red Slip (Munsell 10R6/6).

Parallels: *cf.* similar Gempeler 1992: Abb. 20, 14–17, GT 236, 6th–first half 7th century CE.

***Figure 22*, 3** (16-89-10-1.K2)
Bowl, WSL Ø outside: 14 cm.
Aswan Pink Clay (Munsell 2.5YR7/6), White Slip (Munsell 10YR8/6).
Parallels: *cf.* Hayes 1972: 126, Fig. 22, Form 81, A1; Gempeler 1992: Abb. 50, 8–9, GT 356a, general 6th century CE; Martin-Kilcher, Wininger 2017: 227, Abb. 6.22, 129, GT 339a–b. 6th–beginning 7th century CE.

***Figure 22*, 4** (16-89-40-2.K1)
Bowl ERSW Ø outside: 22 cm.
Aswan Pink Clay (Munsell 10R7/4), Red Slip (Munsell 10R6/6).
Parallels: *cf.* similar Pierrat 1991: 166, Fig. 28, b–c; end 7th century CE; Gempeler 1992: Abb. 115, 5, GK 513c, end 5th–7th century CE; Martin-Kilcher, Wininger 2017: 186, Abb. 5.57, 507, GK 233/513, 7th century CE; similar Katzjäger 2017: 219–220, Schüssel 77, S245, first half 6th–mid. 8th century CE.

***Figure 23*, 1** (14-82-1-3/2.K1)
Drainpipe Ø outside: 23 cm
Marl Clay (Munsell 2.5YR6/6), uncoated
Parallels: *cf.* Pierrat 1991: 161, Fig. 23, f, from 7th century CE; Tréglia 2003: 461, 116, end 5th century CE; Beckh 2013: Taf. 64, Typ 198b; Martin-Kilcher, Wininger 2017: 191, Abb. 5.62, 538, mid. 7th century CE.

***Figure 23*, 2** (14-82-1-1/4+1/3.K1)
Drainpipe Ø outside: 23 cm
Marl Clay (Munsell 2.5YR6/6), uncoated
Parallels: *cf.* Pierrat 1991: 161, Fig. 23, f, from 7th century CE; Tréglia 2003: 461, 116, end 5th century CE; Beckh 2013: Taf. 64, Typ 198b. Martin-Kilcher, Wininger 2017: 191, Abb. 5.62, 538, mid. 7th century CE.

***Figure 24*, 1** (14-82-1-3/1)
Iron knife, handle of a pocketknife
Fragmented and corroded, length: 11.5 cm, width: 2–2.5 cm; thickness: 0.8 cm.
Two round nails (Ø 0.5 cm) on the surface.
Parallels: *cf.* Riha 1986: 112, Taf. 11, 90; Kozubová 2012: 65, obr. 5, 3a–b.

ANTHROPOLOGY

Materials and Methods

The investigation of the skeletons was performed in front of the temporary magazine of the Swiss Archaeological Mission in the Temple of Isis in Aswan. Altogether, from Area 82, 14 partially disturbed skeletons were identified. Furthermore, the skeletal remains of another 16 individuals from Area 89 were investigated.

In Area 82, chamber tomb 1 was partially disturbed by two drainpipes (see chapter Archaeology of Syene/Aswan), and the skeletons of earlier buried individuals were commonly disturbed by younger burials. Therefore, not all bones could be assigned to individuals, and some were severely incomplete. Among the, at least, ten individuals from the tomb, one was a collection of scattered children's bones, which did not fit to any other identified, incomplete individual. Tomb 2 comprised four individuals: two "main burials" of adults and another two child burials.

In Area 89, chamber tomb 1 was empty and chamber tomb 2 contained the skeletal remains of one individual. Nine individuals were recovered from the late Antique chamber tomb 3. Chamber tomb 4 has not been opened, as only a small part of this structure was uncovered within Area 89, and the close proximity of the surrounding buildings prevented any expansion of the excavation space. The remaining six individuals were found in Roman pit-burials; in one case (grave 11) buried inside a clay coffin. The feet of a further individual (tomb 6) were visible in the north-western profile but could not be recovered for static reasons. Therefore, this individual was not counted as part of this investigation (cf. von Pilgrim *et al.* 2017).

The preservation of skeletons was recorded according to the standards by Scheelen et al. (2015). The estimation of age-at-death and sex was conducted using standard methods compiled e.g. in (Brothwell 1981, Ferembach et al. 1980, Rösing *et al.* 2007, Stloukal *et al.* 1999, Ubelaker 1989). For the estimation of age-at-death, the standard groups were used (e.g. Stloukal *et al.* 1999), thus, the group infans I was separated into the subclasses infans Ia (0–1.99 years) and infans Ib (2–5.99 years) according to the recommendations of Schultz (1988). The stature was estimated using the methods of Pearson (1899) and Trotter and Gleser (1952, 1977, dataset for "Negroes"). The possible ancestry was estimated by means of morphological examination (Ballard 1999, Gilbert,

Gill 1990, Hefner 2009, L'Abbé *et al.* 2011, Van Gerven *et al.* 1977, Williams *et al.* 2005, Zakrzewski 2003), as well as by using the software AncesTrees (AncesTrees 2018). The software AncesTrees provides a correct estimation of ancestry of individuals of European and African origin up to about 90%, as has been tested on known samples (Navega *et al.* 2015). Therefore, it was applied as a reasonable alternative to biochemical methods, which it was not possible to conduct due to sampling restrictions in Southern Egypt.

The palaeopathological changes were recorded by macroscopic means and by using a hand lens (5× and 10× magnification) according to the standardization by Schultz (1988), particularly the classification of degenerative joint disease and dental pathologies. The degree of joint degeneration according to the morphological condition was evaluated on a scale from I (a healthy joint) to VI (a destroyed joint); the edges and articular surfaces were evaluated separately (cf. Schultz 1988.). The degree of periodontal disease was evaluated on a five-stage scale, from I (light) to V (severe; cf. Schultz 1988). Scurvy and anaemia were diagnosed according to the recommendations by common standards (Armelagos *et al.* 2014, Brickley 2018, Brickley, Ives 2006, Maat 1986, Mays 2014, 2018, Ortner, Eriksen 1997, Ortner *et al.* 2001, Schultz 1993, 2001, Snoddy et al. 2018, Stuart-Macadam 1989, 1992, Van der Merwe et al. 2010, Walker et al. 2009, Zuckerman et al. 2014). Further literature on palaeopathology and forensics was consulted for diagnostic (e.g. Adler 2005, Aufderheide, Rodríguez-Martín 1998, Blau, Ubelaker 2011, Brickley, Ives 2008, İşcan, Steyn 2013, Larsen 2015, Lewis 2007, Ortner 2003, Roberts, Manchester 2010, Teegen, Schultz 2017) or comparative reasons within the region (e.g. Armelagos, Van Gerven 2017, von Pilgrim *et al.* 2010). The results on palaeopathology were counted on "crude" (minimal) and "true", "corrected" (maximal) frequency (cf. Waldron 1994). The minimal frequency is the part of affected individuals within the whole population or whole group of subadults or adults. The maximal frequency is corrected to only those individuals within the respective group, which provided sufficiently well-preserved bones to diagnose the respective aspect. As the total number of individuals is rather low, any further statistical apportionment of adults to categories of sex and age-at-death would be futile.

RESULTS

The preservation of the skeletons from area 82 was, in most cases, highly incomplete (only four individuals were assessed as "complete" A1, or "almost complete" A2, cf. Scheelen et al. 2015), and the surfaces were well preserved. However, as they were commonly covered with hard, tightly attached sintering (*Figure 26a*), in some cases it was not possible to investigate the surfaces (mostly B2: well preserved, 70–90%; cf. Scheelen *et al.* 2015). The bone tissue was mostly rather solid, in some cases slightly brittle (from C2: solid, does not fall into pieces even under strong pressure, to C4: brittle, falls into bigger pieces under strong pressure, cf. Scheelen *et al.* 2015).

FIGURE 25: Photograph of drainpipes from Area 82/Tomb 1. © Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo.

The modern sink tank situated directly above tomb 3, 9 and 10 (*Figure 14*) led to a generally poor preservation of the skeletons from area 89. The skeletons were mostly incomplete (only six individuals were assessed as "complete" A1, or "almost complete" A2, cf. Scheelen et al. 2015). The bones were very brittle (C5: very brittle/friable, falls into small pieces under light pressure, cf. Scheelen *et al.* 2015). However, the bone surfaces were mostly preserved and only partially weathered (B3: satisfactory preserved, 50–70%; cf. Scheelen *et al.* 2015) and, therefore, it was easily possible to conduct the palaeopathological investigation. Some skeletons were covered with hard, tightly attached sintering (*Figure 26b, c*).

The overview of all individuals from the two areas is presented in Table 2. Altogether, 30 individuals were identified, 14 from Area 82 and 16 from Area 89. With

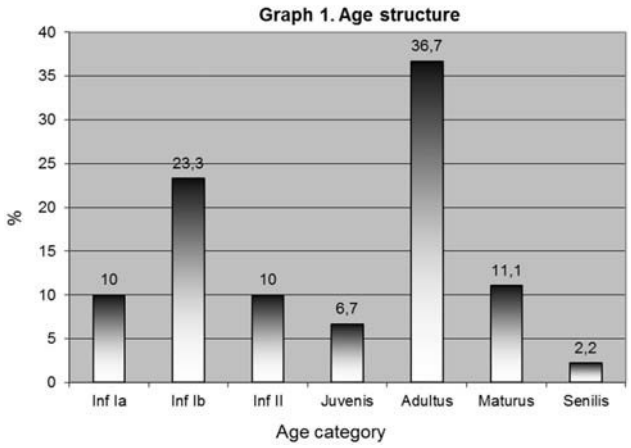
TABLE 2: Overview of the individuals from Areas 82 and 89. In some few cases, the numbering does not fit to the archaeological definition, as some partly disturbed bone elements were recovered and allocated because of bilateral symmetry, or age estimation. A–C: skeleton preservation according to Scheelen *et al.* 2015.

No	Signature	Tomb/burial	Sex	Age	A	B	C
1	14-82-1-2/3	tomb 1/ (ind. I)	?	1-2 y.	5	2	4
2	14-82-1-2/3 and 2/7	tomb 1/ (ind. II)	?	2-2.5 y.	5	2	4
3	14-82-1-2/10	tomb 1/ (ind. III)	male?	5-6 y.	2	1 (4 due to sintering)	2
4	14-82-1-2/5	tomb 1/ (ind. IV)	female?	11-12 y.	2	2	3
5	14-82-1-2/9, 2/10 and 2/5	tomb 1/ (ind. V)	male	18-20 y.	3	2 (3 due to sintering)	3
6	14-82-1-2/1 and 2/3	tomb 1/ (ind. VI)	female	22-25 y.	4	2	3
7	14-82-1-2/5	tomb 1/ (ind. VII)	male	35-50 y.	3	2	3
8	14-82-1-2/6	tomb 1/(ind. VIII)	male	25-40 y.	5	2 (4 due to sintering)	4
9	14-82-1-2/9	tomb 1/ (ind. IX)	female	25-40 y.	5	3	3
10	14-82-1-scattered bones	tomb 1/ (ind. X)	?	4-7 y.	6	2	2
11	14-82-4-4/1	tomb 2/ (ind. I)	female?	2.5-3.5 y.	3	2	3
12	14-82-4-4/2	tomb 2/ (ind. II)	?	2-2.5 y.	4	3	3
13	14-82-4-3/2	tomb 2/main burial A	male	30-40 y.	2	2	4
14	14-82-4-6/1	tomb 2/main burial B	female	21-23 y.	1	2 (3 due to sintering)	2
15	16-89-9-2/2	tomb 2	female	20-30 y.	5	4	5
16	16-89-12-4/1	tomb 3/burial 1	female	25-35 y.	4	3	4
17	16-89-12-4/2	tomb 3/burial 2	?	neonate	2	1	3
18	16-89-12-4/3	tomb 3/burial 3	?	1.5-2 y.	4	2	3
19	16-89-12-4/4	tomb 3/burial 4	female	55-70 y.	4	2	5
20	16-89-12-4/5	tomb 3/burial 5	?	2.5-3.5 y.	5	5	6
21	16-89-12-4/6	tomb 3/burial 6	male	40-55 y.	4	2	5
22	16-89-12-4/7	tomb 3/burial 7	male	25-40 y.	4	4	5
23	16-89-13-1/1	tomb 3/burial 8	male	20-24 y.	1	3	5
24	16-89-14-2/1	tomb 3/burial 9	female	30-45 y.	2	3	5
25	16-89-26-5/2	grave 5	?	8-10 y.	5	3	4
26	16-89-26-5/3	grave 7	male	35-50 y.	3	3	5
27	16-89-31-1/1	grave 9	?	9-10 y.	2	2 (5 due to sintering)	4
28	16-89-31-1/2	grave 8	male	25-45 y.	5	5	5
29	16-89-32-3/1	grave 10	female?	15-18 y.	1	4	4
30	16-89-40-8/2	grave 11	?	4-5 y.	2	1 (5 due to sintering)	4

FIGURE 26: Sintering on the surface of skeletons, commonly preventing any investigation of the bone surface, and effectively gluing the bones together. A – forearm of the individual 14-82-1-2/10, Tomb 1, Ind. III; B – left foot of the individual 16-89-26-5/2 grave 5; C – right ribs and shoulder blade of the individual 16-89-31-1/1 grave 9. © Kristina Scheelen-Nováček and Jan Nováček.

seven children, one juvenile and six adults from Area 82, and six children, one juvenile and nine adults from Area 89, both population samples are representatively compounded. Subadult (children and juveniles) and adult parts represent 50% (n=15/30) each. Young children below two years of age-at-death were present only in three cases (10%). With seven individuals (23.3%), children between two and seven years were the most frequent group of subadults for this investigation. With three individuals, older children between seven and 14 years represented another 10% of the investigated group. Two individuals (6.7%) were juveniles (14–20 years), among them one male and one probable female individual. Hence, the subadult individuals below 20 years of age-at-death represent exactly 50% of the skeletons from these two Areas. Among the adult individuals, the age category adultus (20–40 years) was most common, nine individuals, among them four males and five females, and another four (three males and one female) belonged to some extent in both categories adultus and maturus. These individuals belong in appropriate proportions to both categories, resulting in a total of 11 individuals in the category adultus (36.7%). The age category maturus (40–60 years) consisted of one individual (male) within the limits, another four overlapping with the age category adultus (three males and one female) and one senilis (female), making in total 3.33 individuals (11.1%). The age category senilis (>60 years) was represented only by one female individual, overlapping with the age category maturus, making the total number 0.67 (2.2%).

The average age-at-death of all individuals, including the children, was 21.4 years. The adults from 20 years onwards, on average died at an age-at-death of 36.2 years. The structure of the population is presented in Graph 1. In total, among the 17 juveniles and adults, nine individuals were males and eight females. Among the 15 adults, eight were men and seven women. The average age-at-death of adult males was 35 years, adult females died on average at 35.7 years.



In all cases except for one, the rather gracile morphology of the facial bones, as well as the non-metric traits (Ballard 1999, Gilbert, Gill 1990, Hefner 2009, L'Abbé *et al.* 2011), fit well to the local, Nubian and southern Egyptian population (cf. Van Gerven *et al.* 1977, Williams *et al.* 2005, Zakrzewski 2003). However, the individual from the main burial A from tomb 2 from Area 82 showed a more robust facial morphology and shovel-shaped incisors. In three skulls, a sufficient number of cranial measurements could be taken. In all cases, the results provided by the software AncesTrees (AncesTrees 2018) point to northeast Africa as the probable origin (values p: 0.7602041, 0.8741007 and 0.8792049).

In five male and three female individuals, the estimation of stature was possible. The average stature of the males was 164.4±3.5 cm according to the method of Pearson (1899), which corroborates with 164.4±4.5 cm according to the method of Trotter and Gleser (1952, 1977). The female individuals had an average stature of 152.3±3.5 cm (Pearson 1899), which is 151.4±3.7 cm according to the equation of Trotter and Gleser (1952, 1977).

In five individuals, all of them subadults, skeletal changes induced by scurvy were diagnosed (*Figure 27*). This means that at least 16.7% of the whole population and 33.3% of the subadults were obviously suffering from chronic vitamin C deficiency.

Vestiges of anaemia were frequently observed (*Figures 28 and 29*). Ten individuals, both children and adults, probably suffered from anaemia, accounting for 33.3% of the skeletal sample. Among the subadults, eight cases were recorded, which correlates with 53.3% as the minimum frequency in this group. Among the adult individuals, both cases were recorded in females,

FIGURE 27: Porotic filling of the alveoles, hint of scurvy, 14-82-1-2/3 tomb 1/ind. I. © Kristina Scheelen-Nováček and Jan Nováček.

therefore, 13.3% of all adults and 28.6% of adult females were probably suffering from severe anaemia.

As all child skeletons except for one and all adult skeletons were sufficiently well preserved for the diagnostics of scurvy and anaemia, the difference between maximal and minimal frequency is irrelevant in adults. In subadults, the maximal frequency reaches 35.7% (n=5/14) in scurvy and 57.1% (n=8/14) in anaemia.

The affected children most commonly showed vestiges of both scurvy and anaemia. This situation was observed in four individuals, thus, 80% of all subadults showing vestiges of scurvy and 50% of all subadults showing vestiges of anaemia probably also showed vestiges of the second disease at the same time.

Chronic otitis media was another commonly observed disease amongst the investigated individuals from Aswan (*Figure 30*). Nine individuals, five subadults and four adults, showed vestiges of severe, long-term inflammations of the middle-ear cavity, i.e., 30% of all individuals, 33.3% of the subadults and 26.7% of the adults. Among the adult individuals, three females and one male were affected. Since four skulls from subadults and three from adults were not at all or not sufficiently well preserved for the assessment of the middle ear cavities, the maximal prevalence is 39.1%

FIGURE 28: Cribra orbitalia, probably due to anaemia, 14-82-1-2/3 tomb 1/ind. I. © Kristina Scheelen-Nováček and Jan Nováček.

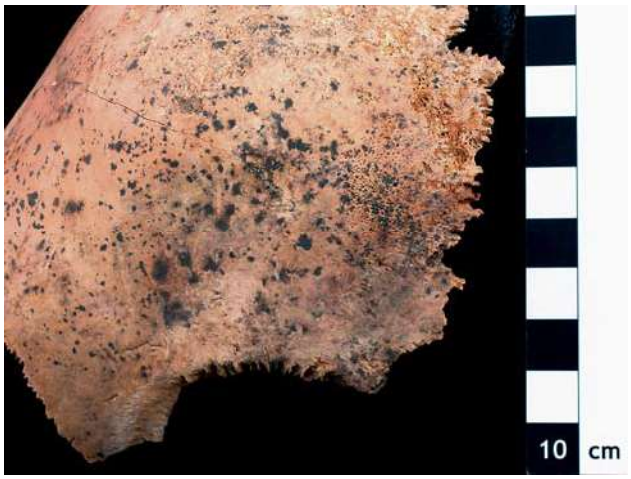


FIGURE 29: Parietal cribra, probably due to anaemia, 14-82-1-2/3+2/7 tomb 1/ind. II. © Kristina Scheelen-Nováček and Jan Nováček.

(n=9/23) of the whole population, 45.5% (n=5/11) of subadults and 33.3% (n=4/12) of adults.

Vestiges of long-term inflammations of the upper respiratory system and paranasal sinuses (e.g. rhinitis, sinusitis maxillaris, frontalis, sphenoidalis, ethmoidalis, dacryocystitis) were diagnosed in nine individuals (30% of the whole population), four subadults (26.7%) and five adults (33.3%). Five skulls of subadults and four of adults were not sufficiently well preserved, hence, the maximal prevalence was 42.9% (n=9/21) in the whole population, 40% (n=4/10) in subadults and 45.5% (n=5/11) in adults. Among the adults, three were females and two were males.

The skeletons of four subadults which demonstrated vestiges of chronic, paranasal infections, also showed those of a severe otitis media. In the case of the fifth subadult individual suffering from otitis media, a juvenile male, it was not possible to assess the bony upper respiratory tract due to the poor preservation of the skull. Furthermore, all five subadults with severe otitis media additionally showed vestiges of skeletal changes either due to scurvy or to anaemia. Three adult individuals showed vestiges of otitis media, and, simultaneously, sinusitis, one of them additionally had signs of anaemia.

Healed pleurisy (*Figure 31*) was observed in three individuals (10% of the whole population). All three

FIGURE 30: Strongly scarred promontorium with newly built spiculae in the left middle ear cavity, 14-82-1-2/10 tomb 1/ind. III. © Kristina Scheelen-Nováček and Jan Nováček.

FIGURE 31: Scarred, stringy surface of one of the left ribs due to pleurisy, 14-82-1-2/5+2/9+2/10 tomb 1/ind. V. © Kristina Scheelen-Nováček and Jan Nováček.

individuals were males, one juvenile and two adults. Therefore, the frequency reaches 6.7% in subadults, 13.3% of adults and 33.3% of all male individuals. In one adult male, the pleurisy correlates with several rib fractures (see below). Furthermore, in two cases, the pleurisy correlates with severe sinusitis. Neither women nor children showed any vestiges of severe pleurisy. However, in six cases, the rib cages were not preserved. Therefore, the maximal prevalence in the whole population was as high as 12.5%.

Dental pathologies were also observed in this population. In six subadult and three adult individuals, the jaws and teeth were not preserved, therefore, the minimal and maximal frequencies are presented in the following. In total, 260 teeth were recovered, among them 74 deciduous teeth and 83 permanent teeth from subadults, as well as 103 permanent teeth from adults. Of these, 13 displayed carious lesions, seven in subadults (frequency 7/157, 4.5%, one deciduous, 1/74, 1.4%, and six permanent teeth, 6/83, 7.2%) and six in adults (frequency 6/103, 5.8%). These 13 lesions were observed in six individuals (minimal 6/30, 20%, maximal 6/21, 28.6%), two of these were subadults (minimal 2/15, 13.3%, maximal 2/9, 22.2%) and four were adults (minimal 4/15, 26.7%, maximal 4/12, 33.3%). Most common were carious lesions in molars (12/13). In the adult individuals, they were more frequently observed in males (three individuals and four lesions). Dental abscesses were found in 10 cases in three adult individuals (minimal 3/15, 20%, maximal 3/12, 25%), two males and one female. Gingival pockets were found in five adult individuals (minimal 5/15, 33.3%, maximal 5/12, 41.7%), three males and two females. Ante-mortem tooth loss was observed in five adult individuals (minimal 5/15, 33.3%, maximal 5/12, 41.7%), four males and one female. Dental calculus (*Figure 32*) was observed in nine individuals (minimal 9/30, 30%, maximal 9/21, 42.9%), one subadult (minimal 1/15, 6.7%, maximal 1/9, 11.1%) and eight adults (minimal 8/15, 53.3%, maximal 8/12, 66.7%), among them six males and two females. Periodontal disease was common, 18 individuals (minimal 18/30, 60%, maximal 18/21, 85.7%) showed vestiges, corresponding to the five degrees scale according to Schultz (1988). Among these, were seven subadults (minimal 7/15, 46.7%, maximal 7/9, 77.8%) and 11 adults (minimal 11/15, 73.3%, maximal 11/12, 91.7%), six males and five females.

One individual, a child of about 1.5–2 years (16-89-12-4/3), showed an irregular dental development (*Figure 33*). Despite the determined age-at-death of under two years, the crowns of two first permanent molars were already completely developed and extremely fissured by enamel defects. Furthermore, two of the second permanent molar crowns were about half developed. However, their enamel was thin and partly missing, showing only spike-like dentin structures.

FIGURE 32: Pronounced dental calculus, 14-82-4-3/2, tomb 27 main burial A. © Kristina Scheelen-Nováček and Jan Nováček.

FIGURE 33: Irregularly developing molars, 16-89-12-4/3 tomb 3/burial 3. © Kristina Scheelen-Nováček and Jan Nováček.

Osteoarthritis (six degrees scale according to Schultz 1988) was common among the adult individuals from both burial areas. The only affected subadult was a juvenile female, whose hip was dysplastic (see below), and the joint was affected by osteoarthritis. Six individuals (minimal 6/15, 40%, maximal 6/9, 66.7%), four males and two females, showed vestiges of severe osteoarthritis of the spine. In all cases, the cervical spine was affected (once with a traumatic component, see below, *Figure 34*), in two individuals the thoracic and in three cases the lumbar spine was affected. In one individual, an adult or mature male from area 82 (see below), all preserved parts of the spine were affected by osteoarthritis. Four adults and one juvenile showed vestiges of osteoarthritis of the hip joint (minimal 4/15, 26.7%, maximal 4/13, 30.8%), amongst them three males and one female. Four individuals (minimal 4/15, 26.7%, maximal 4//13, 30.8%) showed vestiges of osteoarthritis of the knee joint, two of them males and two females. Two males and one female showed vestiges of osteoarthritis of the costovertebral joints (minimal 3/15, 20%, maximal 3/10, 30%) and elbow joint (minimal 3/15, 20%, maximal 3/13, 23.1%). Two males showed vestiges of osteoarthritis of the sternoclavicular (minimal 2/15, 13.3%, maximal 2/7, 28.6%), and shoulder joints (minimal 2/15, 13.3%, maximal 2/9, 22.2%). One male individual showed osteoarthritic changes in the joints of the hands, feet and ankles, resulting in the minimal frequency of 1/15, 6.7%, and the maximal frequency of 1/13, 7.7%. All of the individuals who displayed osteoarthritis of the spine were affected by osteoarthritis of at least one other joint. In three cases, two adult or mature males and a mature or senile female, at least five joints besides the spine were affected.

FIGURE 34: Ankylosed C6 and C7 due to compression fracture, 14-82-1-2/5 tomb 1/ind. VII. © Kristina Scheelen-Nováček and Jan Nováček.

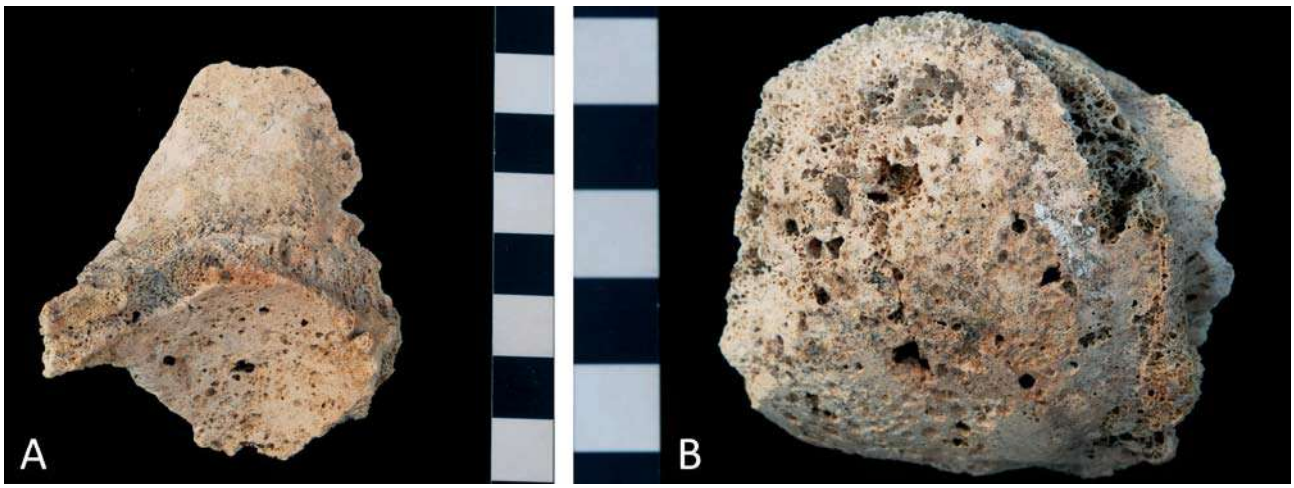


FIGURE 35: Dysplastic hip joint, 16-89-12-4/6 tomb 3/burial 6. A– flattened, eburnised acetabulum; B – deformed, flattened, porotic femoral head. © Kristina Scheelen-Nováček and Jan Nováček.

FIGURE 36: Dysplastic hip joint, 16-89-32-3/1 grave 10. A – ventral view of both femora with deformed femoral heads and necks; B – ventral view of femoral heads, necks and both pelvic bones with flattened, only slightly concave acetabula; C – dorsal view of the femora. © Kristina Scheelen-Nováček and Jan Nováček.

One late juvenile male from Area 82 (tomb 1, ind. V), showed a malposition of the hip. The right centrum – collum – diaphyseal angle (CCD) is 130°, and the left one 128°. However, the joints were not osteoarthritic. The hips of two individuals from Area 89, a mature male (tomb 3, burial 6, *Figure 35*) and a juvenile female (tomb 10, *Figure 36*) were dysplastic. The femora of the male were unfortunately poorly preserved, but both femoral heads were flattened and enlarged, with the femoral necks rotated inwards and the CCD angles probably reduced. The acetabula were poorly preserved. The fragments showed flattened, strongly osteoarthritic surfaces. The juvenile female femora were well preserved. The femoral heads were flattened and enlarged, the femoral necks shortened and hardly existent, and the CCD angles were only about 95°. The acetabula were not properly developed as joint sockets, but rather as slightly concave, rough ridges.

FIGURE 37: Small depression/defect at the edge of tibia plateau, possibly Osteochondritis dissecans, 14-82-1-2/5 tomb 1/ind. IV. © Kristina Scheelen-Nováček and Jan Nováček.

The skeleton of an 11–12-year-old child from Area 82 (tomb 1, ind. IV) showed irregular, bulgy, porotic changes on the right tibia plateau, corresponding to the position of the attachments of the lateral meniscus. On the lateral edge of the plateau, a large, almost *circular* defect of 8.5×7 mm size and up to 3 mm depth was detected (*Figure 37*). The bottom of the defect was smooth, the spongy bone not open, and the edges rounded. Furthermore, irregular holes were detected on the right clavicle, at the attachment point of the costoclavicular ligament, and on the crest of the greater tubercles of both humeri, corresponding to the attachment marks of the great pectoral muscles. The same individual showed a slightly arcuated groove on the right parietal, from behind the coronal suture close

to the temporal line almost up to the lambdoid suture (length 95 mm, width about 4–5mm on the whole length), with regular, smooth edges and a slightly rough bottom of the groove (*Figure 38*).

In the middle of the left ulna of an adult or mature male from Area 82 (tomb 1, ind. VII) a very well-integrated, hardly elevated callus of a straight or possibly oblique fracture was observed. The bone was not shortened. The same individual demonstrated a compression fracture of the medial condyles of the right tibia (*Figure 39*). The joint surface was strayed in and dropped off towards medio-dorsal. In the spongy bone, remnants of the growth plate were preserved, and the tibia shortened (T1b right 31.0 cm, left about 34.0 cm). On the ventromedial and dorsoproximal surface, a very well healed and integrated, flat groove separated the damaged part of the bone. Apparently, it was fractured incompletely and obliquely. In the middle of the ventromedial surface, two thin fracture lines ran longitudinally, with healed and rounded edges, but still open. The muscle marks of the right triceps surae muscle were particularly strong, and not proportional to all other muscle marks of this individual. The cervical and lumbar spine, as well as the costovertebral, sternoclavicular, shoulder, elbow, hip and knee joints partly showed vestiges of severe osteoarthritis. Another possible fracture caused ankylosed sixth and seventh cervical vertebra (*Figure 34*). The same individual demonstrated a well healed green-stick fracture of one of the left ribs, probably between the 7th and the 9th rib.

An adult male from Area 82 (tomb 2, main burial A) demonstrated another compilation of injuries. The atlantooccipital, as well as atlantoaxial joints were apparently overloaded. Both occipital condyles and the dental fovea of the atlas (*Figure 40*) show osteophytes and healed bone formations due to haemorrhages and ligament strain. The right clavicle was fractured and well healed a long time before death (*Figure 41*). In the middle of the bone, a well remodelled callus was visible. With a length of 12.2 cm, the right clavicle was more than 1 cm shorter than the left one with a length of 13.5 cm. Furthermore, several ribs had been fractured and well healed long before death. Due to the rather poor state of preservation, their precise location could not be exactly identified: one on the right from the 4th to 6th, and three on the left 6th to 9th. Surrounding these healed fractures, the internal surface of the ribs was scarred and bulgy, indicating healed pleurisy.

Three individuals from Area 89 showed vestiges of fractures. A young male individual from Area 89 (tomb

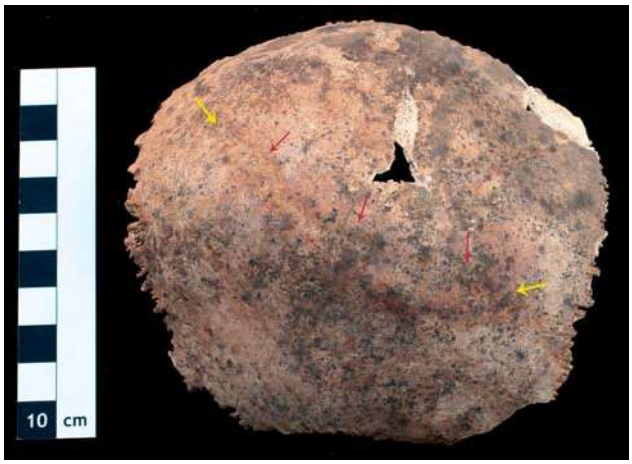


FIGURE 38: Long, thin groove in the right parietal, probably due to an injury. Yellow arrows: edges of the groove, red arrows: course of the groove, 14-82-1-2/5 tomb 1/ind. IV. © Kristina Scheelen-Nováček and Jan Nováček.

FIGURE 39: Right tibia with deformed proximal plateau, 14-82-1-2/5 tomb 1/ind. VII. A –dorsal view; B – medial view; C– ventral view. © Kristina Scheelen-Nováček and Jan Nováček.

FIGURE 40: Atlas vertebra with pronounced lipping around the fovea dentis, 14-82-4-3/2 tomb 2/main burial A. © Kristina Scheelen-Nováček and Jan Nováček.

FIGURE 41: Left (upper) and right (lower) clavicle with well healed fracture, 14-82-4-3/2 tomb 2/main burial A. © Kristina Scheelen-Nováček and Jan Nováček.

3, burial 8) had obviously suffered a green stick fracture of his right tibia (*Figure 42*). The distal quarter of the bone is ventromedially thickened, while the ventrolateral and dorsal surfaces are without any changes. The fracture was obviously well healed when the individual died.

Another individual, a mature male from Area 89 (tomb 7), had sustained a fracture of the mandible (*Figure 43*). The right side was visibly deformed. At the position of teeth 43 and 44, a fracture line separated the mandible, and the lateral part of it was shifted towards rostral and mesial and deformed. The fracture was well healed during the time of the death of the individual.

A further mature or senile, female individual from Area 89 (tomb 3, burial 4) had suffered a fracture of one of the ribs (*Figure 44A*). As the ribs were severely weathered and, in this case, additionally damaged (see below), the precise position of the rib could not be determined. By the time of the individual's death, the callus of the fracture was already partly remodelled, but still porotic.

Additionally, this skeleton displayed several lesions, which all had a similar morphology, with porotic,

FIGURE 42: Thickened distal part of the right tibia, probably a well healed green stick fracture, 16-89-13-1/1 tomb 3/burial 8. © Kristina Scheelen-Nováček and Jan Nováček.

lacerated edges of defects, which were filled with fine, new built spongy bone. The spongy bone surrounding the defects was commonly densified, radiating spicula-like from the defects (*Figure 45*). Two such defects were observed in rib fragments (*Figure 44*), another five in cervical and thoracic vertebrae (*Figures 45-47*). Exactly in one of these lesions, the rib was broken. The callus partially overlapped the spiculae of the lesion (*Figure 44A*). In one case, probably Th6, the vertebral body was apparently mostly dissolved, as the peduncle of the vertebral arch ended near a lesion of completely changed spongy bone directly at the edge of the body (*Figure 46*). The largest preserved lesion was in a vertebral arch and about 21×12 mm. Including the surrounding periostal reaction, the lesion itself was about 12×8 mm (*Figure 47*). The skull showed no such lesions, and the sternum, the pelvic bones and the shoulder blades were not sufficiently well preserved for the investigation.

DISCUSSION

With the comparatively high proportion of 50% of subadult individuals (seven children and one juvenile from Area 82 and six children and one juvenile from Area 89), the demographic structure within both skeletal samples corresponds to the commonly observed high infant and child mortality in preindustrial populations in anthropological investigations (cf. Acsádi, Nemeskéri 1970, Larsen 2015). The other half of the individuals were adults, eight of them males and seven females. It seems plausible to interpret this sample as a representative composition of individuals. Without a supporting DNA investigation, it is not possible to determine, whether the burials did belong to a biological family,

FIGURE 43: Well healed fracture of the mandible, 16-89-26-5/3 grave 7. A – medial (lingual) view; B – frontal view; C – lateral (buccal) view. © Kristina Scheelen-Nováček and Jan Nováček.

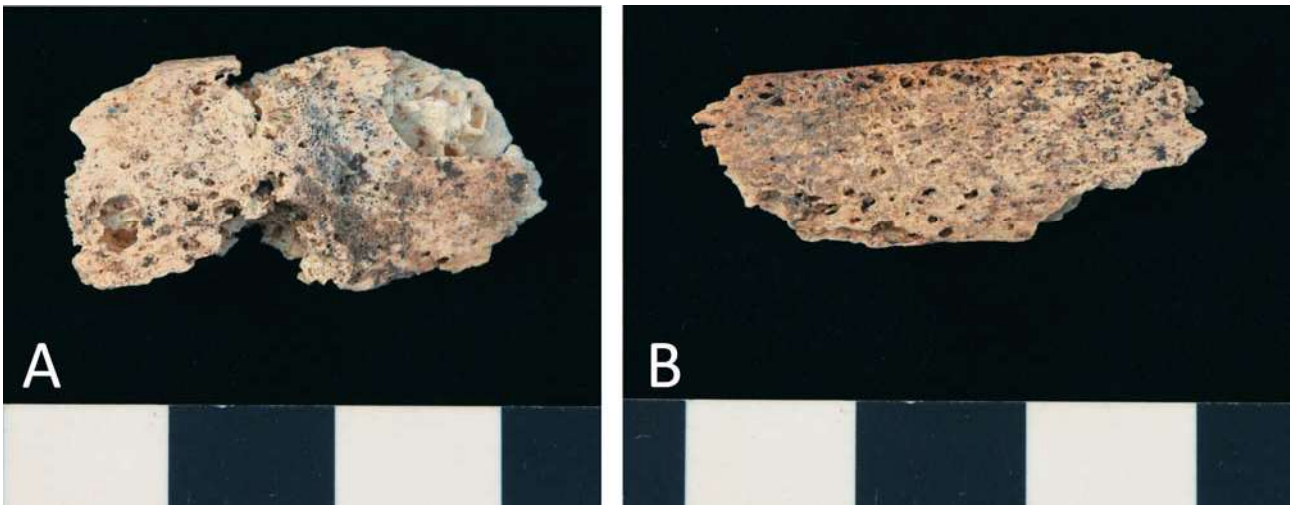


FIGURE 44: Deformed, porotic, "eaten away" rib fragments, 16-89-12-4/4 tomb 3/burial 4. A – remnants of callus over the osteolythic lesion; B – "eaten away" bone with tiny new built elements protruding spicula- or foam-like from the original cortical bone. © Kristina Scheelen-Nováček and Jan Nováček.

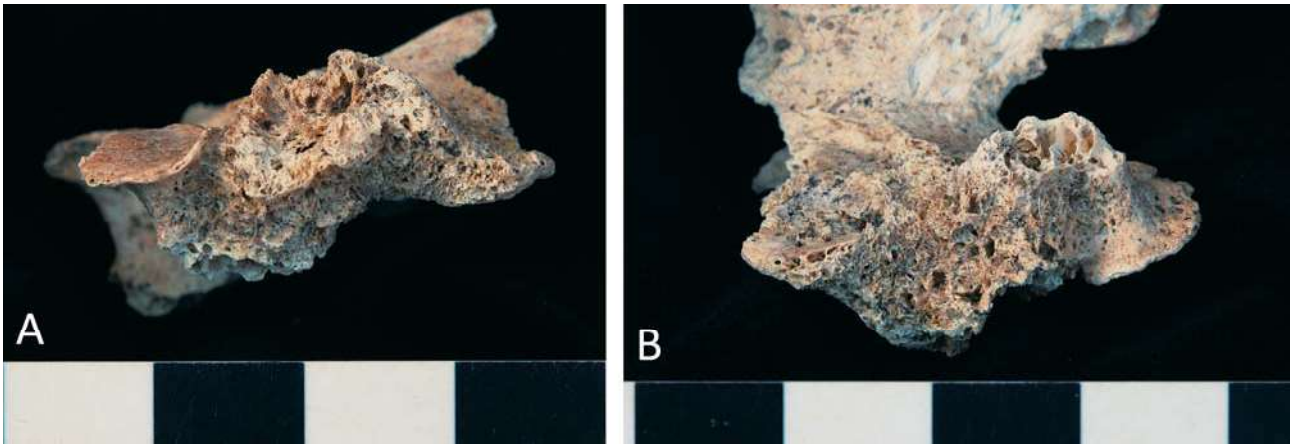


FIGURE 45: Tumorous changes to the thoracic vertebra, Th 4-8, 16-89-12-4/4 tomb 3/burial 4. A – spiculae and foam-like bone formations radiating from the original place of the metastasis in the transverse process; B – defects and reticular bone formations on the ventral side opposite to A. © Kristina Scheelen-Nováček and Jan Nováček.

as suggested by the archaeological situation at least in case of some burials from Area 82 (see Chapter Archaeology of Syene/Aswan). Currently, such continuative investigation is not possible due to restrictions within Southern Egypt. Concerning the results of the morphological investigation, it can be assumed that the individuals fit well to a complete, representative population, without any selection by age-at-death, or sex. The same situation was observed in the only other population of comparable dating published up to now, from Aswan, comprising 48 individuals (25 subadult, 23 adults) from Area 25 (cf. von Pilgrim *et al.* 2010), which can be dated to the 2nd century CE and later (von Pilgrim *et al.* 2008).

The average age-at-death of the adult individuals from Areas 82 and Area 89 was 36.2 years, which is

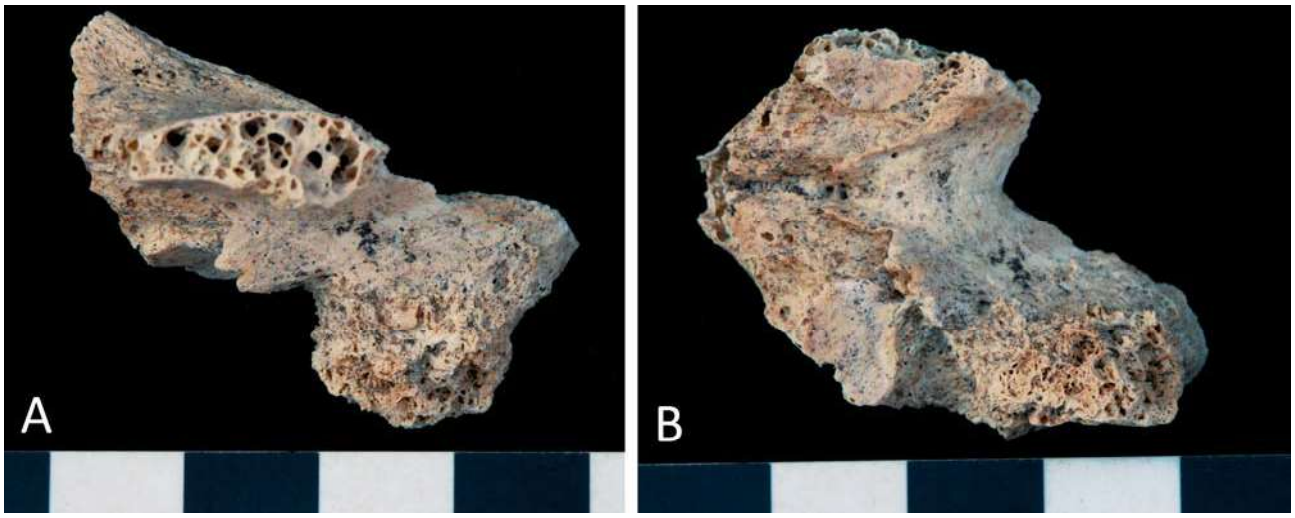


FIGURE 46: Tumorous changes to the thoracic vertebra, probably Th6, 16-89-12-4/4 tomb 3/burial 4. A – tumorous periostosis on the medial surface of the peduncle (towards dura mater spinalis); B – ventral view shows the destruction of the peduncle due to foam-like bone formation. © Kristina Scheelen-Nováček and Jan Nováček.

FIGURE 47: Tumorous changes to the thoracic vertebra, Th 4-8, foam-like and reticular bone formations due to a lesion, which was situated in immediate proximity, either under these structures inside the vertebral arch, or in the transverse process, 16-89-12-4/4 tomb 3/burial 4. A – dorsal view, tumorous periostosis spreads up to the lower articular process; B – ventral view, the left lower joint was affected; C – ventrolateral view, very strong affection of the place of former transverse process indicates the possible origin of the metastasis there. © Kristina Scheelen-Nováček and Jan Nováček.

more than eight years less than in the published skeletal sample from Area 25, with an average age-at-death of the adults (n=23) of 44.8 years (von Pilgrim *et al.* 2010) As both samples were rather small (15 adults from Areas 82 and 89, compared with 23 adults from Area 25), this result should not be overestimated. However, the difference of eight years, about 20% of the whole average life span of adults from the population from the Areas 25, 82 and 89, seems striking and too pronounced, even in consideration of the sample size, since there are no reasons not to consider any of the samples as a non-representative population. Therefore, it could be speculated as one possible explanation aside a statistical aberration: a possible decline in living conditions between the 2nd century CE and later (Area 25, von Pilgrim *et al.* 2008) and the 4th to 6th century

CE represented by the individuals from Area 82 and Area 89 (see Chapter Archaeology of Syene/Aswan). This difference, though, would affect only the adults, as the child mortality in the skeletal sample from Area 25 was comparably high, as in the Areas 82 and 89 (52.1%, cf. von Pilgrim *et al.* 2010). Contradictory to this hypothesis, however, the average stature (s. above) became slightly higher, as the individuals from the younger period of Areas 82 and 89 were on average about 164 cm (males) and 152 cm (females) tall, compared to an average of 161 cm (males) and 151 cm (females) in the sample from Area 25 formula Pearson 1899, cf. von Pilgrim *et al.* 2010). This difference, however, cannot be used as a basis for statistical comparison, because the number of individuals in the two cases is far too low.

The morphology of the skeletons, mainly their gracile facial bones, indicate that most of the individuals probably belonged to the local Nubian and/or southern Egyptian population (cf. e.g. Armelagos, Van Gerven 2017, Scheelen-Nováček *et al.* 2018a, b). Three individuals were identified as northeastern Africans, using the software AncesTrees (AncesTrees 2018). However, the individual, or his ancestors, from the main burial A from tomb 2 of Area 82 possibly had another origin. As an important trade and military site on the border of ancient Egypt, every origin from within or even outside the borders of the Roman Empire is possible. Because it is currently not possible to conduct biochemical tests such as DNA and isotope analysis in southern Egypt, it can only be assumed that this person, or his ancestors, possibly originated from some faraway place. However, the burial in the presumably family tomb indicates that this man was a part of the local social structure.

Metabolic diseases arising from malnutrition were common in this population. Scurvy (*Figure 27*) was diagnosed in one third of all subadults, anaemia (*Figures 28, 29*) even in more than the half of them. Of course, in the case of anaemia, other reasons, such as any type of long-term blood loss, genetic conditions, and not only malnutrition have to be taken in consideration (cf. Larsen 2015, Wapler *et al.* 2004, Walker *et al.* 2009). Especially different kinds of parasites, feeding on human blood, were probably common in late Antique southern Egypt. This assumption can be supported by the comorbidity of scurvy and anaemia. Four of five individuals showing the characteristic skeletal changes due to scurvy probably also suffered from anaemia. In the only individual who demonstrated vestiges of scurvy, but not simultaneously typical characteristic of anaemia, the skull was missing. Therefore, especially for the diagnostics of anaemia, the material was probably only suitable to a limited degree (cf. Stuart-Macadam 1989, 1992, Ortner 2003, Brickley 2018, Brickley, Ives 2008, Zuckerman *et al.* 2014). On the other hand, only half of the subadults showing vestiges of anaemia also demonstrated characteristic changes due to scurvy (c.f. Armelagos *et al.* 2014, Brickley, Ives 2006, Maat 1986, Ortner, Eriksen 1997, Ortner *et al.* 2001, Snoddy *et al.* 2018, Van der Merwe *et al.* 2010). It is tempting to consider the interpretation that this other half might have suffered from anaemia for reasons other than malnutrition. It is possible that these children did indeed have enough vitamin C but suffered from a lack of iron and/or proteins, whether or not this scenario might be plausible. Furthermore, about a quarter of the female individuals suffered from anaemia, while none of the male individuals displayed such changes. This frequency fits well with the present-day common prevalence of anaemia among women postpartum, which can reach up to about 30% even in modern developed countries (Medina Garrido *et al.* 2018), or even more in developing countries (Bentley, Griffiths 2003, Borges *et al.* 2016, Haidar *et al.* 1999). These frequencies are higher, than in the other skeletal sample from Imperial times in Aswan. In the population represented by Area 25, the frequency of scurvy amongst children reached 24%, and that of anaemia 12%. In adult individuals from this skeletal sample, neither scurvy nor anaemia were diagnosed (von Pilgrim *et al.* 2010). Whether this is another hint towards the decline of living conditions during the few centuries, or just a result of a statistical error due to the small sample, cannot yet be satisfyingly answered. For further interpretation, the number of investigated skeletons of comparable dating from Aswan needs to be enlarged.

The frequencies of inflammations of the middle ear cavity (*Figure 30*), the nasal cavity and the paranasal sinuses were comparably high. In most cases, the individuals suffering from one also suffered from the other. In children and adults, the frequencies lay between one quarter and one third of the population. Most children suffering from these conditions, also showed probable vestiges of scurvy and/or anaemia (80–100%). Presumably, this coincidence is not accidental, but results from a weakened immune system due to anaemia or scurvy (cf. Larsen 2015, Mays 2018, Stuart-Macadam 1992, Zuckerman *et al.* 2014). Reasons for such inflammations can be climatic

conditions, or exposure to other exogenous irritations, such as smoke from fireplaces in closed rooms (cf. Gresky, Schultz 2011, Schulte, Spranger 1985). Also, the danger of spread and repeat of an infection within a dense population plays a substantial role (Grupe *et al.* 2004), which can be assumed in the important border settlement of ancient Syene. Compared with the skeletal sample from Area 25, the frequency of various paranasal inflammations did not change, but, surprisingly, the frequency of otitis media was more than twice as high in the individuals from Area 82 and 89. In Area 25, the frequency of paranasal inflammations was about one third, and that of severe otitis media 12–13% in both children and adults (von Pilgrim *et al.* 2010). Possibly, this could indicate that the exogenous conditions, such as climate, did not change, but perhaps the living conditions, such as population density or housing.

Among the adult individuals, females were slightly more often affected by severe otitis media or paranasal inflammations than males. However, as the sample size is too small, these results should not be overinterpreted, especially, as the vestiges of healed pleurisies (*Figure 31*) were only detected in young male individuals (one juvenile and two adultus). Possibly, this could result from the generally poor preservation of ribs, which were commonly strongly weathered, especially those of gracile or subadult individuals. The vestiges of pleurisy on the internal surface of the ribs can often be associated with a TBC infection (cf. Roberts 1999). However, as in the presented cases from late Antique Syene, no other indications supporting this diagnosis were identified, probably, it was rather connected to a complicated, but non-specific inflammation (cf. Mays *et al.* 2002, Nováček *et al.* 2017, Schultz 2010, Schultz *et al.* 2001, 2003, Thomas 2010). In the case of the adult male from the main burial of tomb 2, Area 82, a connection between the diagnosed, healed pleurisy to the earlier fractured ribs seems likely. In any case, also such non-specific pleurisy was a serious, probably life-threatening condition in a population without antibiotics (cf. Fauci *et al.* 2008). Presumably, it often resulted from long-term pneumonia with a spread to the pleura (cf. Thomas 2010). With 20% in the adult individuals from Area 82 and 89, compared to 21.3% in the adult individuals from Area 25 (cf. von Pilgrim *et al.* 2010), the frequency of healed pleurisies in adults was almost the same in both skeletal samples. However, in Area 25, also two subadult individuals suffered from pleurisy, therefore, the frequency in the whole skeletal sample was higher.

The frequency of caries and apical abscesses was rather low in the individuals from Area 82 and 89. Only six individuals, two of them subadults, were affected by caries (20% of the whole population), and only three adults showed vestiges of abscesses (20% of adults). In Area 25, more than 30% of the adults suffered from caries or abscesses (cf. von Pilgrim *et al.* 2010). One third of adults suffered from gingival pockets, this is almost the same frequency as in the population sample from Area 25 (about 35%, cf. Nováček, Schultz 2012). The frequency of periodontal disease (60%) and dental calculus (30%, *Figure 32*) was higher in the individuals from Area 82 and 89, compared to those from Area 25 (39.1% periodontal disease and 21.7% dental calculus, cf. von Pilgrim *et al.* 2010). In none of the samples, enamel chipping was observed chipping observed. Given the rather small sample sizes in both investigations, it is questionable whether one can speak of differences in diet, such as a lower proportion of carbohydrates in the diet of the later population samples, and the same amount of meat. Nevertheless, such, in some respects, huge differences do indicate differences or changes in the living conditions from Roman Imperial time to late Antiquity, which obviously had an influence on the people´s diet, alimentation habits and/or oral hygiene. However, for an improved reliability of the results, the sample size of the investigated Roman and late Antique individuals from Aswan has to be enlarged.

In the case of the irregular development of the permanent teeth of an individual 16-89-12-4/3 (*Figure 33*), the most probable explanation seems to be a disturbance in the enamel growth, leading to a premature development of the teeth, combined with a disordered composition of the enamel itself. It seems probable, that, if the child would have lived longer, the teeth would have erupted and grown further with extreme hypoplastic changes to the crowns.

The assessment of severity of osteoarthritis is difficult in macerated skeletons, as it is clinically not possible to say what kind or size of pathological changes (proliferative and/or degenerative changes to the joint), caused any clinically relevant complaints and which did not. Some newly built bone formations, which appear to be extreme in radiologic investigations, do not cause any problems such as pain or a limitation of mobility. Conversely, some joints provoke pain with only light changes to the cartilage of the joint and no changes to the bone at all (cf. Adler 2005, Resnick, Kransdorf 2004). The main advantage of the system according to the standards set by Schultz (1988),

which also was adapted in a simplified version for the Codebook of the Global History of Health Project (cf. Steckel *et al.* 2006), is that the valuation digits from IV to VI represent changes to the joint usually including an inflammatory component. With this inflammatory aspect, it is probable that the joint was affected in a way, which caused no noticeable (or worse) discomfort to the individual. However, it is still not possible to exclude the possibility that the joints of lower valuation digits (II or III) of severity of proliferative – degenerative changes did or did not cause any clinical complaints, resulting in a wide "grey area". On the other hand, all the individuals with joint disease of higher stages (IV to VI) probably did feel some limitation of mobility or even suffer from pain.

Such osteoarthritis was, in general, common among the adult individuals from the Areas 82 and 89. About 40% of the adults suffered from osteoarthritis, usually the spine and some joint or joints of the extremities were affected. This has a lower frequency than in the in average older population from Area 25, where more than 60% of the adults suffered from severe osteoarthritis (cf. von Pilgrim *et al.* 2010). However, as both populations were rather small, it is not possible to give any reliable interpretation of the differences between the stress patterns of the two skeletal population samples. It can only be postulated that the late Antique individuals found in the graves from the Areas 82 and 89 were subjected to lower physical strain, such as daily (working) activity. As the frequency and severity of the osteoarthritis in this population grew with the age-at-death and given the eight years difference in the average life span of adults between the individuals from Area 25 and the Areas 82 and 89, it is a non-surprising situation. Therefore, it is highly possible that there was no difference in work or other "every day" physical strain, just that the people from the late Antique period died a bit younger, before they developed more severe osteoarthritis. The only one affected subadult individual was a juvenile female, whose hip was dysplastic and, therefore, developed a premature osteoarthritis (see below). More commonly, males were affected by osteoarthritis, in about a 2:1 ratio. Among the non-spinal postcranial joints, each with four affected individuals, most commonly the hip and the knee were affected. This fits well with present-day clinics, as both these joints are the most common source of complaints and endoprosthesis surgery in modern populations, no matter which genetic, cultural or climatic background and conditions (e.g. Cho *et al.* 2015, Ganz *et al.* 2007, Iidaka *et al.* 2016, Pal *et al.* 2016) the patients come from. In three cases, the costovertebral joints showed severe osteoarthritis, which probably caused suffering, simulating thoracic visceral diseases (similar, for example, to angina pectoris, cf. Benhamou *et al.* 1993). Furthermore, in three individuals, the elbow joint was affected, in two males the shoulder and sternoclavicular joints, and in one male the joints of the hands and feet showed vestiges of osteoarthritis. As in no cases were any hints of any kind of rheumatoid or other polyarthritis identified (such as in Adler 2005, Aufderheide, Rodríguez-Martín 1998, cf. Hartl 1992), the probable explanation of a severe, premature osteoarthritis could have been the physical strain due to manual work, such as in agriculture (cf. e.g. Davatchi *et al.* 2009, Larsen 2015). Osteoarthritic changes of the sternoclavicular joint could possibly be associated with carrying heavy loads, as is known from injuries of the costoclavicular ligament (see below).

The dysplastic hip joints of two individuals from Area 89 (burial 3 from tomb 2, *Figure 35*, and burial 10 from atop of this tomb, *Figure 36*) represent an uncommonly high frequency among16 individuals from this Area. The morphology of the femoral heads was similar in both cases, but the skeletal remains from the male individual were too poorly preserved to establish a possible morphological similarity between the two dysplasias to be able to judge possible genetic relationships between these individuals and their inherited hip malformations. However, the hypothesis of a familial connection and inheritance, seems to be probable.

One individual (infans II) showed an injury of the right lateral meniscus which might indicate an overload or possibly knee trauma, e.g. due to an accident. The same knee was also affected by probable osteochondrosis dissecans (*Figure 37*), which most commonly appears in the knee joint (Wells 1974). The reason for this condition has not yet been completely deciphered, however, traumas in childhood or adolescence belong to the most frequent reasons (Shea *et al.* 2013). However, as a possible differential diagnosis, also a cyst-like structure could have left similar traces (cf. Adler 2005). Severe ruptures on the arms indicate heavy physical work, as such ruptures in costoclavicular ligaments are known from individuals, who were habitual walkers with heavy loads on their shoulders (e.g. known from Napoleonic soldiers, cf. von Grumbkow 2013, Scheelen-Nováček *et al.* 2018b), also the ruptures of the tendons of both great pectoral muscles indicate physical overload (cf. Gresky *et al.* 2016). An uncommon finding is the groove on the

parietal of the same individual (*Figure 38*). The most plausible interpretation might be a healed cranial injury, resulting from a blow with a blunt, longish object, like a thin bar (pole or baton, stick), which hit the head from above (cf. Lovell 1997). The location far above the hat brim indicates interpersonal violence (cf. Kremer *et al.* 2008). This could be interpreted as a harsh punishment or some other sort of interpersonal violence, although, accidents cannot be completely excluded.

A number of other different injuries was observed in an adult or mature male. The fracture of the right tibia (*Figure 39*) apparently happened a long time prior to the individual's death, probably during his childhood, as is indicated by the remains of the growth plate, which otherwise would have been re-modelled after growth had ended, as well as the missing three centimetres of length, compared to the left side. Apparently, this injury was comprised of fractures of the proximal joint, an oblique fracture of the proximal shaft and longitudinal fractures in the diaphysis, which *never completely closed* and healed. Due to these, the otherwise possible differential diagnoses of this pathological change as an injury of the proximal growth plate, or other bone deformation (e.g. congenital, or due to rickets, or osteomalacia) can be excluded. As there were no inflammatory changes, this fracture apparently remained closed and never developed an osteomyelitic process, which would have disfigured the morphology of the bone (cf. Aufderheide, Rodríguez-Martín 1998, Ortner 2003). Still, it must have caused a severe limitation in mobility and resilience of the leg, possibly resulting in the observed severe osteoarthritis of the spine and joints of the extremities. As a possible interpretation, it cannot be excluded that the extraordinary strong muscle attachments of the right triceps brachii muscle could have originated from a helping tool, such as a crutch, which he needed to walk. The other fractures, cervical vertebra (*Figure 34*) as well as the rib fracture, were not necessarily connected to the injury of the leg. The fracture of the ulna could be interpreted as a "parry fracture" (cf. Lovell 1997, İşcan, Steyn 2013), although it is not possible to say whether it was caused by interpersonal violence, or by an accident.

The injury of the atlanto-occipital and atlanto-axial joint of the male individual from the main burial A from tomb 2, Area 82 (*Figure 40*), witnesses an unusual load on this joint. Such an injury could arise from different causes, for example, carrying heavy loads on the head, or perhaps pulling heavy objects with a belt bound around the forehead (cf. Lovell 1994). Another possible interpretation could be an injury during a fist fight, for example, from overstretching the neck in a grappling hold (such as "double Nelson", cf. Nováček *et al.* 2017). Also, the other injuries of this individual indicate a high physical strain. However, it is impossible to judge, what kind of situation could have led to such a compilation of injuries. Both types of accidents, such as falls, as well as unarmed interpersonal violence are easily possible in this case (cf. Brickley 2006, İşcan, Steyn 2013).

Both fractures in male individuals from Area 89 can be interpreted as well healed. Whether they resulted from accidents or injuries, cannot be defined. Especially the fracture of the mandible (*Figure 43*) could either have been caused by a blow, or during such a situation as a traffic accident (nowadays, such injuries most commonly happen as a result of bicycle accidents, Niethard et al. 2009). The rib fracture of the older female (*Figure 44A*) probably resulted from the tumour-induced damage to the bone structure (see below), as is often observed these days in the clinical setting (up to 30% of all spontaneous rib fractures in women result from metastases of breast cancer, Harris 2016).

Among the 14 individuals from Area 82, three showed severe injuries, with a total of one severe injury of a knee and one injury of the atlanto-occipital and atlanto-axial joints without any fractures and ten fractures from all over the skeleton. All of these injuries could have been caused accidentally, or, in some cases, possibly by interpersonal violence. In comparison, from the 16 individuals from Area 89, also three were affected by fracture. Thus, the frequency in both samples is almost the same, although in Area 89 a maximum of one fracture per individual was observed, one of them possibly not even connected to an accident or traumatic event, but to cancer (see below). In comparison, either the affected individuals buried in Area 82 were extremely unlucky people, or, possibly, they were involved in activities or had living conditions, which were much harsher than those of any other individual buried in Area 89. With five affected individuals and a total of six fractures, the individuals from the older, Imperial time burials from Area 25 (cf. von Pilgrim *et al.* 2010) demonstrated a similarly high frequency of fractures and other severe injuries to those from Area 82, including, for example, a nasal fracture probably straightened by a skilled surgeon).

An extraordinary diagnosis is the osteoplastic-osteoclastic process in the ribs and vertebrae of an

elderly woman (*Figures 44–47*). The most probable interpretation of such findings is a metastasising carcinoma (Molnár *et al.* 2009, Strouhal *et al.* 1996, Strouhal, Němečková 2008, cf. Aufderheide, Rodríguez-Martín 1998, Ortner 2003). Unfortunately, it was not possible to conduct any further, radiologic, microscopic, biochemical or molecular biological investigation. Therefore, a more precise, or even assured diagnosis of the primary carcinoma, as would be possible e.g. by proteomics (cf. Schultz *et al.* 2007) or DNA analysis (cf. Schlott *et al.* 2007), cannot be achieved in this case. Furthermore, without the destruction of the bone tissue, it was not possible to check the intact bones, which commonly serve as locations of metastatic growth, for further lesions (cf. Aufderheide, Rodríguez-Martín 1998, Ortner 2003). Other bones, which commonly show metastatic lesions, such as pelvis and sternum, were not at all or too poorly preserved. Therefore, it is very probable that only a minority of all lesions was detected, either the ones, which were located close to the surface of the bone and had already perforated it, or, in some cases, the bone fractured directly at the location of the lesion. This happened either *intra vitam*, as documented by healing (callus in some ribs broken in the primarily tumorous lesion, see above), or post mortem due to the weakened structure of the bone at the location of the tumorous tissue. The largest preserved lesion was 12×8 mm. In another case, possibly a larger part of the vertebral body was destroyed, but as only the peduncle was preserved, this cannot be stated with certainty. Most lesions were rather small and, therefore, either the process spread rather slowly, which could well be possible in an elderly female, or, possibly, the metastasising process was still more in an early stage at the time of the individual's death. Due to the lack of opportunity of further analysis we have to speculate that any cancer, producing combined osteoclastic and at the same time osteoplastic metastases in the bones, especially in ribs and vertebrae, seems aetiologically possible. As the sex of the individual excludes the possibility of prostate cancer, breast cancer could well be possible, which causes bone metastases in 57–73% of cases (cf. Resnick, Niwayama 1988, Waldron 1996). However, other cancers are also possible. Especially, bronchial carcinomas produce mixed osteoplastic-osteoclastic metastases in the bone (Strouhal, Němečková 2008). Also, other cancers spread to the bone, with varying intensities (cf. Resnick, Niwayama 1988, Waldron 1996). However, none of them has been known so far to produce mixed metastases, but rather osteoclastic metastases only (Strouhal, Němečková 2008). In the case of a possible bronchial carcinoma, the question would be whether the common concomitant of this carcinoma, the so called Pierre-Marie-Bamberger syndrome (osteoarthropathia hypertrophicans, Abu-el-Auf, Meyer 2001, or pulmonary hypertrophic osteoarthropathy, Nicolazzo *et al.* 1990, also known in older publications as periostosis ossificans, Moroz, Gorlov 1958), either did not develop in this individual or, possibly, had not yet developed at the time of death, as the cancerous illness possibly had not yet advanced very far. Not every case of pulmonary or bronchial carcinoma is accompanied by Pierre-Marie-Bamberger syndrome, it develops in only about 10% of all non-small-cell bronchial carcinomas, while in 90% of the cases of Pierre-Marie-Bamberger syndrome, neoplasms of lungs or bronchi were the trigger (cf. Fietz *et al.* 1998). Because the individual possibly died at an age of over 60 years, it is highly feasible that the bone growth ratio was too slow to produce any visible hypertrophic changes to the postcranial skeleton at the time of death. Therefore, bronchial carcinoma cannot be excluded only because of the missing symptoms of a Pierre-Marie-Bamberger syndrome. Anyway, whether the primary cancer illness was breast or bronchial carcinoma, either the cancer itself or, more probably, the associated weakening of the organism and resulting diseases, such as, for example, an acute pneumonia due to broken ribs (see above), could well have been the reason for this individual's death.

CONCLUSIONS

The two Areas from the far north of the Late Antique cemetery of Syene allow a small glimpse into the development and nature of Late Antique burial practices in the very south of the Roman Empire during the 4th–6th century CE. Crucial questions such as the spatial organization of the cemetery, its relationship to other cemeteries in Aswan or questions of ethnicity or religion cannot be answered for the time being due to complete lack of evidence or to the fact that further research is necessary. Thus, the archaeological focus of this paper lies in the chronology.

The preliminary chronology sketched at the beginning of the paper was clearly confirmed by the study of the pottery and other diagnostic material. While simple pit-graves were the predominant type of

burial during the 4th and first half of the 5th century CE, from the middle of the 5th century onwards, elaborate chamber tombs with multiple burials and superstructures became common. These chamber tombs remained typical until the end of Roman rule in Aswan. The last phase in the development of this kind of burial was marked by the use of new building materials (fired bricks and lime-plaster).

This paper focuses on just a small part of the long history of Aswan. As the time range of burials in Aswan is enormous – from the Old Kingdom until the medieval period – the great potential of further anthropological and archaeological research is beyond any question. Stratigraphical and archaeological studies are currently being conducted in order to establish a chronology and better overall knowledge of the burial practices of the population of an important Egyptian town for approximately the last 3500 years.

The anthropological investigation of skeletal human remains from late Antique burials from the Areas 82 and 89 produced 30 individuals, representing a typical preindustrial population with high child mortality and a rather low average age-at-death of the adults, with a slight majority of males and slightly higher average age-at-death of females. Compared to another Roman Imperial time skeletal sample from the same city, the average age-at-death of the adults is distinctly lower, although the child mortality, and several vestiges of pathological conditions did not change much. Apparently, metabolic diseases such as scurvy and anaemia were more common in the late Antique individuals, while the frequency of severe inflammations of the upper and lower respiratory tract was either comparably high, or even higher in the individuals from Area 25, dating to Roman Imperial time. Dental pathologies possibly indicate changes in diet, as at least some of the frequencies of the different dental pathologies seem to have changed from the Roman to the late Antique period. The individuals from Roman Imperial times either were subjected to a higher amount of physical strain and, therefore, more frequently developed osteoarthritis, or, simply, they lived on average a few years longer and, therefore, developed more osteoarthritis. The only differences between the two late Antique population samples from the Areas 82 and 89 were observed in cases of severe traumata and, especially, fractures. Indeed, the number of affected individuals was the same, but the affected persons from the burials in Area 82 suffered many more injuries per person than those buried in Area 89. Whether these individuals were just accident-prone, carried out dangerous work, or, possibly, were the subject of harsh punishment, is beyond credible interpretation. An extraordinary find was a probable metastasising carcinoma in an elderly female. This illness, possibly resulting from either breast or bronchial cancer, could have been the cause of death of this individual. From its origin, the tumour had metastasised into at least several ribs and vertebrae, even causing spontaneous fractures of some of the ribs. This interesting, unusual case has expanded the collection of pathologies, which was at the very centre of Professor Eugen Strouhal's work.

ACKNOWLEDGEMENTS

We gratefully acknowledge the Ministry of State for Antiquities and the members of the Permanent Committee for granting us permission to undertake the Joint Mission in Aswan. We very much appreciate the fruitful cooperation with our colleagues of the Aswan Inspectorate in this joint mission.

Many thanks go to Katharina Stötzel, Göttingen, for her help with the preparation of figures, and to Cyrilla Maelicke, Göttingen, for proof-reading the manuscript.

Last, but not least, we would like to thank the two anonymous peer-reviewers for their helpful comments on an earlier draft of this paper.

REFERENCES

ABU-EL-AUF E., MEYER E., 2001: "Rheumatoide" Beschwerden. Osteoarthropathia hypertrophicans (Morbus Pierre-Marie-Bamberger). *Der Radiologe* 41: 457–458.

ACSÁDI G., NEMESKÉRI J., 1970: *History of human life span and mortality*. Budapest.

ADLER C.-P., 2005: *Knochenkrankheiten*. Berlin, Heidelberg, New York.

ANCESTREES. http://lfa.uc.pt/ancestrees/. (last access on July 26th, 2018)

ARMELAGOS G. J., SIRAK K., WERKEMA T., TURNER B. L., 2014: Analysis of nutritional disease in prehistory. The search for scurvy in antiquity and today. *International Journal of Paleopathology* 5: 9–17. doi: 10.1016/j.ijpp.2013.09.007

ARMELAGOS G. J., VAN GERVEN D. P., 2017: *Life and Death on the Nile. A Bioethnography of Three Ancient Nubian Communities*. Gainsville/Florida.

AUFDERHEIDE A. C., RODRÍGUEZ-MARTÍN C., 1998: *The Cambridge Encyclopedia of Human Paleopathology*. Cambridge, UK.

BAILEY D. M., 1998: *Excavations at el-Ashmunein V. Pottery, lamps and glass of the Late Roman and Early Arab Periods,* British Museum Press, London.

BALLARD M. E., 1999: Anterior femoral curvature revisited: race assessment from the femur. Erratum in Journal of Forensic Sciences 44: 1108. Trudell MB [corrected to Ballard ME]. *Journal of Forensic Sciences* 44: 700–707.

BENHAMOU C. L., ROUX C., TOULIERE D., GERVAIS T., VIALA J. F., AMOR B., 1993: Pseudovisceral pain referred from costovertebral arthropathies. Twenty-eight cases. *Spine* 18: 790–795.

BENTLEY M. E., GRIFFITHS P. L., 2003: The burden of anemia among women in India. *European Journal of Clinical Nutrition* 57: 52–60.

BIRRELL M., 1999: Excavations in the Cemeteries of Ismant el-Kharab. In: C. A. Hope, A. J. Mills (Eds.), *Dakleh Oasis Project: Preliminary Reports on the 1992–1993 and 1993–1994 Field Seasons.* Pp. 29–41. Dakleh Oasis Project: Monograph 8. Oxbow Books, Oxford.

BLAU S., UBELAKER D. H. eds., 2011: *Handbook of Forensic Anthropology and Archaeology* (World Archaeological Congress Research Handbooks in Archaeology). Walnut Creek/CA.

BORGES M. C., BUFFARINI R., SANTOS R. V., CARDOSO A. M., WELCH J. R., GARNELO L., COIMBRA C. E. JR., HORTA B. L., 2016: Anemia among indigenous women in Brazil. Findings from the first national survey of indigenous people's health and nutrition. *BMC Women's Health* 2015: 16. doi: 10.1186/s12905-016-0287-5

BOWEN G. E., 2003: Some Observations on Christian Burial Practices at Kellis. In: G. E. Bowen, C. A. Hope (Eds.): *The Oasis Papers 3. Proceedings of the Third International Conference of the Dakhleh Oasis Project.* Pp. 167–182. Dakleh Oasis Project: Monograph 14. Oxbow Books, Oxford.

BRICKLEY M., 2006: Rib fractures in the archaeological record. A useful source of sociocultural information? *International Journal of Osteoarchaeology* 16: 61–75. doi: 10.1002/oa.809

BRICKLEY M., 2018: Cribra orbitalia and porotic hyperostosis: A biological approach to diagnosis. *American Journal of Physical Anthropology* 167, 4: 896–902. doi: 10.1002/ajpa.23701

BRICKLEY M., IVES R., 2006: Skeletal manifestations of infantile scurvy. *American Journal of Physical Anthropology* 129: 163–172.

BRICKLEY M., IVES R., 2008: *The Bioarchaeology of Metabolic Bone Disease*. London.

BROTHWELL D. R., 1981: *Digging up bones. The excavation, treatment, and study of human skeletal remains*. Ithaca, N.Y, [London].

CHO H. J., MOREY V., KANG J. Y., KIM K. W., KIM T. K., 2015: Prevalence and risk factors of spine, shoulder, hand, hip, and knee osteoarthritis in community-dwelling Koreans older than age 65 years. *Clinical Orthopaedics and Related Research* 473: 3307–3314. doi: 10.1007/s11999-015-4450-3

COTELLE-MICHEL L., 2004: *Les sarcophages en terre cuite en Égypte et en Nubie de l'époque prédynastique à l'époque romaine.* Éditions Faton, Dijon.

DAVATCHI F., TEHRANI BANIHASHEMI A., GHOLAMI J., FAEZI S. T., FOROUZANFAR M. H., SALESI M., KARIMIFAR M., ESSALATMANESH K., BARGHAMDI M., NOOROLAHZADEH E., DAHAGHIN S., RASKER J. J., 2009: The prevalence of musculoskeletal complaints in a rural area in Iran: a WHO-ILAR COPCORD study (stage 1, rural study) in Iran. *Clinical Rheumatology* 28: 1267–1274.

DIJKSTRA J. H. F., 2015: Three Christian Funerary Stelae from Aswan. In: A. J. S. Jiménez-Serrano, C. von Pilgrim (Eds.): *From the Delta to the Cataract. Studies Dedicated to Mohamed el-Bialy.* Pp. 24–35. CHAN 76. Brill, Leiden/ Boston.

DIJKSTRA J. H. F., WORP K. A., 2006: The administrative position of Omboi and Syene in Late Antiquity. *ZPE* 155: 183–187.

EGLOFF M., 1977: *Kellia: la poterie copte. Quatre siècles d'artisanat et d'échanges en Basse-Égypte.* Recherches suisses d'archéologie copte 3. Librairie de l'Université, Georg et C^ie^, Genève.

EICHNER I., 2018: Death and burial in the monastery of St. Paulos at Western Thebes, Upper Egypt. In: C. Eger, M. Mackensen (Eds.): *Death and Burial in the Near East from Roman to Islamic Times. Research in Syria, Lebanon, Jordan and Egypt.* Münchner Beiträge zur Provinzialrömischen Archäologie 7. Pp. 227–241. Reichert Verlag, Wiesbaden.

FAUCI A. S., BRAUNWALD E., KASPER D. L., HAUSER S. L., LONGO D. L., JAMESON J. L., LOSCALZO J., 2008: *Harrison's principles of internal medicine*. New York.

FEREMBACH D., SCHWIDETZKY I., STLOUKAL M., 1980: Recommendations for age and sex diagnosis of skeletons. *Journal of Human Evolution* 9: 517–549.

FIETZ T., SCHNEIDER P., KNAUF W. U., THIEL E., 1998: Trommelschlegelfinger und Arthralgien als reversibles paraneoplastisches Syndrom (Pierre-Marie-Bamberger-Syndrom) beim nicht-kleinzelligen Bronchialkarzinom. *Deutsche medizinische Wochenschrift (1946)* 123: 1507–1511.

GANZ R., LEUNIG M., LEUNIG GANZ K., HARRIS W. H., 2007: Reflections on the cause of osteoarthritis of the hip. *The Orthopedic Journal of Harvard Medical School Online*: 76–79.

GEMPELER R. D., 1992: *Elephantine X, Die Keramik römischer und früharabischer Zeit.* Archäologische Veröffentlichungen 43. Verlag Philipp von Zabern, Mainz am Rhein.

VAN GERVEN D. P., ARMELAGOS G. J., ROHR A., 1977: Continuity and Change in Cranial Morphology of Three Nubian Archaeological Populations. *MAN New Series* 12: 270–277.

GILBERT R., GILL G. W., 1990: A metric technique for identifying American Indian femora. In: G. W. Gill, S. Rhine (Eds.): *Skeletal Attribution of Race*. Pp. 97–99. Albuquerque/NM.

GRESKY J., SCHULTZ M., 2011: Einflüsse von Klima- und Wohnbedingungen auf Erkrankungen der Nasennebenhöhlen am Beispiel der Population des bajuwarischen Gräberfeldes von Harting (Oberpfalz). *Beiträge zur Archäozoologie und Prähistorischen Anthropologie* VIII. Beier & Beran, Langenweißbach: 83–94.

GRESKY J., WAGNER M., SCHMIDT-SCHULTZ T. H., SCHWARZ L., WU X., AISHA A., TARASOV P. E., SCHULTZ M., 2016: 'You must keep going'. Musculoskeletal system stress indicators of prehistoric mobile pastoralists in Western China. *Quaternary International* 405 B: 186–199. doi: 10.1016/j.quaint.2015.04.035

GROSSMANN P., 2014: Churches and Meeting Halls in Necropoleis and Crypts in Intramural Churches. In: E. R. O'Connell (Ed.): *Egypt in the First Millennium AD. Perspectives from new fieldwork*. Pp. 93–113. BMPES 2. Peeters, Leuven.

VON GRUMBKOW P., 2013: *Das Leben in der napoleonischen Armee. Interdisziplinäre Untersuchung eines Massengrabs aus Kassel, Hessen*. Diss. rer. nat. Göttingen.

GRUPE G., CHRISTIANSEN K., SCHRÖDER I., WITTWER-BACKOFEN U., 2004: *Anthropologie. Ein einführendes Lehrbuch*. Berlin.

HAIDAR J., NEKATIBEB H., URGA K., 1999: Iron deficiency anemia in pregnant and lactating mothers in rural Ethiopia. *East African Medical Journal* 76: 618–622.

HARRIS S. R., 2016: Differentiating the Causes of Spontaneous Rib Fracture After Breast Cancer. *Clinical Breast Cancer* 16: 431–436. doi: 10.1016/j.clbc.2016.07.001

HARTL P. W., 1992: Erkrankungen des rheumatischen Formenkreises. In: W. Siegenthaler, W. Kaufmann, H. Hornbostel, H. D. Waller (eds.): *Lehrbuch der inneren Medizin*. Pp. 598–660. Stuttgart, New York.

HAUSER W., 1932: The Christian Necropolis in Khargeh Oasis. *BMMA* 32/3/Section 2: pp. 38–50. (https://www.metmuseum.org/pubs/bulletins/1/pdf/3255361.pdf.bannered.pdf)

HAYES J. W., 1972: *Late Roman pottery*. The British School at Rome. W. Heffer and SonsLtd Cambridge, London.

HEFNER J. T., 2009: Cranial nonmetric variation and estimating ancestry. *Journal of Forensic Sciences* 54: 985–995.

HUBER B., 2018: The early Christian cemeteries of Qarara and Sharuna, Middle Egypt. In: C. Eger, M. Mackensen (Eds.): *Death and Burial in the Near East from Roman to Islamic Times. Research in Syria, Lebanon, Jordan and Egypt.* Münchner Beiträge zur Provinzialrömischen Archäologie 7. Pp. 207–225. Reichert Verlag, Wiesbaden.

IIDAKA T., MURAKI S., AKUNE T., OKA H., KODAMA R., TANAKA S., KAWAGUCHI H., NAKAMURA K., YOSHIMURA N., 2016: Prevalence of radiographic hip osteoarthritis and its association with hip pain in Japanese men and women: the ROAD study. *Osteoarthritis and Cartilage* 24: 117–123.

İŞCAN M. Y., STEYN M., 2013: *The Human Skeleton in Forensic Medicine*. Springfield, IL.

JEFFREYS D. G., STROUHAL E., 1980: North Saqqara 1978–9: The Coptic Cemetery Site at the Sacred Animal Necropolis. Preliminary Report. *JEA* 66: pp. 28–35.

KATZJÄGER D., 2017: *Spätantike Alltagskultur auf Elephantine, Oberägypten. Typochronologie, Funktion und kulturelle Diversität der keramischen Funde aus den Wohnhäusern um den Chnumtempel.* Unpublished Dissertation, University of Salzburg.

KOZUBOVÁ A., 2012: Vreckový nožík alebo britva? K interpretácii niektorých predmetov z kosti a parohoviny z pohrebísk vekerzugskej kultúry (na základe nálezov z chotínskych pohrebísk). *Zbornik SNM Archeológia 22, ročník C VI*: 59–77.

KREMER C., RACETTE S., DIONNE C. A., SAUVAGEAU A., 2008: Discrimination of falls and blows in blunt head trauma: systematic study of the hat brim line rule in relation to skull fractures. *Journal of Forensic Sciences* 53: 716–719.

L'ABBÉ E. N., VAN ROOYEN C., NAWROCKI S. P., BECKER P. J., 2011: An evaluation of non-metrical cranial traits used to estimate ancestry in a South African sample. *Forensic Science International* 209, 1–3: 195.e 1–7. doi: 10.1016/j.forsciint.2011.04.002.

LARSEN C. S., 2015: *Bioarchaeology. Interpreting behavior from the human skeleton*. 2nd edition (Cambridge studies in biological and evolutionary anthropology). Cambridge.

LE BOMIN J., 2016: Les thermes byzantins de Taposiris Magna. La céramique d´un dépotoir de la fin du VIe et du début du VIIe s. apr. J.-C. *Bulletin de liaison de la céramique égyptienne* 26: 39–71.

LECUYOT G., PIERRAT-BONNEFOIS G., 2004: Corpus de la céramique de Tôd, Fouilles 1980–1983 et 1990. *Cahiers de la céramique égyptienne* 7: 145–209.

LEWIS M. E., 2007: *The bioarchaeology of children. Perspectives from biological and forensic anthropology* (Cambridge studies in biological and evolutionary anthropology 50). Cambridge, UK, New York.

LOVELL N. C., 1994: Spinal arthritis and physical stress at Bronze Age Harappa. *American Journal of Physical Anthropology* 93: 149–164.

LOVELL N. C., 1997: Trauma Analysis in Paleopathology. *Yearbook of Physical Anthropology* 40: 139–170.

MAAT G. J. R., 1986: Features of malnutrition, their significance and epidemiology in prehistoric anthropology. In: Herrmann, B. (Ed.): Innovative Trends in der Prähistorischen Anthropologie. Mitteilungen der Berliner Gesellschaft für Anthropologie, Ethnologie und Urgeschichte 7: 157–164.

MARTIN G. T., 1974: Excavations at North Saqqara, 1972–73. *JEA* 60: pp. 15–29.

MARTIN-KILCHER S., WININGER J., 2017: *Syene III. Untersuchungen zur römischen Keramik und weiteren Funden aus Syene / Assuan (1.–7. Jahrhundert AD). Grabungen 2001–2004.* Beiträge Bf 20. Pewe-Verlag, Gladbeck.

MAYS S. A., 2014: The paleopathology of scurvy in Europe. *International Journal of Paleopathology* 5: 55–62. doi: 10.1016/j.ijpp.2013.09.001

MAYS S., 2018: Micronutrient deficiency diseases: Anaemia, scurvy and rickets. In W. Trevathan (Ed.): The international encyclopedia of biological anthropology. Chichester.

MAYS S. A., FYSH S., TAYLOR G. M., 2002: Investigation of the link between visceral surface rib lesions and tuberculosis in a Medieval skeletal series from England using ancient DNA. *American Journal of Physical Anthropology* 119: 27–36.

MEDINA GARRIDO C., LEÓN J., ROMANÍ VIDAL A., 2018: Maternal anaemia after delivery: prevalence and risk factors. *Journal of Obstetrics and Gynaecology: The Journal*

of the Institute of Obstetrics and Gynaecology 38: 55–59. doi: 10.1080/01443615.2017.1328669

VON MERCKLIN E., 1940: Römische Klappmesser. *Serta Hoffilleriana, Vjesnika Hrvatskoga Archaeologskoga Drustva* 18–21. Pp. 339–352. Zaklada tiskare narodnih novena, Zagreb.

MOLNÁR E., MARCSIK A., BERECZKY Z., SCHMIDT-SCHULTZ T. H., SCHULTZ M., PÁLFI G., 2009: Malignant tumours in osteoarchaeological samples from Hungary. *Acta Biologica Szegediensis* 53: 117–124.

MOROZ R. I., GORLOV A. P., 1958: Sistemnyi ossifitsiruiushchii periostoz (bolezn' P'er-Mari-Bambergera) [Systemic periostosis ossificans (Pierre-Marie-Bamberger disease)]. *Klinicheskaia meditsina* 36: 121–125.

MÜLLER W., 2014: Syene (ancient Aswan) in the First Millennium AD. In: E. R. O'Connell (Ed.), *Egypt in the First Millennium AD. Perspectives from new fieldwork.* Pp. 59–69. BMPES 2. Peeters, Leuven.

MÜLLER W., DE DAPPER M., 2018: The Urban Landscape of Aswan (Egypt) Since the Predynastic Period: a Geoarchaeological Approach. In: Y. Tristant, M. Gilardi (Eds.): *Landscape Archaeology. Egypt and the Mediterranean World.* Pp. 19–42. BiEtud 169. IFAO, Cairo.

NAVEGA D., COELHO C., VINCENTE R., FERREIRA M. T., WASTERLAIN S., CUNHA E., 2015: AncesTrees: ancestry estimation with randomized decision trees. *International Journal of Legal Medicine* 129, 5: 1145–1153. doi: 10.1007/s00414-014-1050-9

NICOLAZZO F., SALVINI S., SEBASTIANI G. D., CIAVATTI M., SERRA A., BARZELOTTI P. D., GRASSO C., DI LASCIO G., 1990: Osteoartropatia ipertrofizzante pneumica di Pierre-Marie-Bamberger. Discussione su cinque casi e revisione della letteratura [Pulmonary hypertrophic osteoarthropathy of Pierre-Marie-Bamberger. Discussion of 5 cases and review of the literature]. *La Clinica terapeutica* 132: 117–123.

NIETHARD F. U., PFEIL J., BIBERTHALER P., 2009: *Orthopädie und Unfallchirurgie.* Duale Reihe. Stuttgart.

NOVÁČEK J., SCHEELEN K., SCHULTZ M., 2017: The wrestler from Ephesus. Osteobiography of a man from the Roman period based on his anthropological and palaeopathological record. In: J. R. Brandt, E. Hagelberg, G. Bjørnstad, S. Ahrends (Eds.): *Life and death in Asia Minor in Hellenistic, Roman and Byzantine times* (Studies in Funerary Archaeology). Pp. 318–338. Oxford, Philadelphia.

ORTNER D. J., ERIKSEN M. F., 1997: Bone changes in the human skull probably resulting from scurvy in infancy and childhood. *International Journal of Osteoarchaeology* 7: 212–220.

ORTNER D. J.; KIMMERLE E. H., DIEZ M., 2001: Evidence of probable scurvy in subadults from archaeological sites in North America. *American Journal of Physical Anthropology* 114: 343–351.

ORTNER D. J., 2003: *Identification of Pathological Conditions in Human Skeletal Remains*. London.

PAL C. P., SINGH P., CHATURVEDI S., PRUTHI K. K., VIJ A., 2016: Epidemiology of knee osteoarthritis in India and related factors. *Indian Journal of Orthopaedics* 50: 518–522. doi: 10.4103/0019-5413.189608

PIERRAT G., 1991: Essai de classification de la céramique de Tôd de la fin du VII^{e} siècle au début du XIII^{e} siécle ap. J.-C. *Cahiers de la céramique égyptienne* 2: 145–204.

VON PILGRIM C., BRUHN K.-C., DIJKSTRA J. H. F., WININGER J., 2006: The Town of Syene. Report on the 4th and 5th Season in Aswan. *MDAIK* 62: 215–277.

VON PILGRIM C., COLMAN R., MÜLLER W., NOVÁČEK J., DE PONTBRIAND A., SCHULTZ M., 2010: Report on the 7th Season in Aswan. *MDAIK* 66: 179–224.

VON PILGRIM C., KELLER D., MARTIN-KILCHER S., MAHMOUD EL-AMIN F., MÜLLER W., 2008: The Town of Syene. Report on the 5th and 6th Season in Aswan. *MDAIK* 64: 305–356.

VON PILGRIM C., HEPA M., MÜLLER W., PFEIFFER S., 2016: Report on the 16th Season of the Joint Swiss-Egyptian Mission in Syene/Old Aswan (2015/2016). *ASAE* forthcoming. (http://swissinst.ch/downloads/Report 16th season 2015_16.pdf) (last access on July 26th, 2018)

VON PILGRIM C., HEPA M., MÜLLER W., NOVÁČEK J., SCHEELEN-NOVÁČEK K., 2017: Report on the 17th Season of the Joint Swiss-Egyptian Mission in Syene / Old Aswan (2016/2017). *ASAE* forthcoming. (http:// swissinst.ch/downloads/Report Swiss_Egyptian Mission ASWAN 2017.pdf) (last access on July 26th, 2018)

VON PILGRIM C., MÜLLER W., WERLEN L., 2011: The Town of Syene. Report on the 8th Season in Aswan. *MDAIK* 67: 125–161.

VON PILGRIM C., MÜLLER W., SCHWAIGER H., 2012: Report on the Twelfth Season of the Joint Swiss-Egyptian Mission in Syene/Old Aswan (2011/2012). *ASAE* forthcoming. (http://www.swissinst.ch/downloads/Swiss Inst_Report Aswan 2012.pdf) (last access on July 26th, 2018)

VON PILGRIM C., MÜLLER W., 2009: Report on the 9th Season of the Joint Swiss-Egyptian Mission in Syene/Old Aswan (2008/2009). *ASAE* forthcoming. (http://www. swissinst.ch/downloads/Report 9th Season_2008-2009.pdf) (last access on July 26th, 2018)

VON PILGRIM C., MÜLLER W., 2010: Report on the Tenth Season of the Joint Swiss-Egyptian Mission in Syene/Old Aswan (2009/2010). *ASAE* forthcoming. (http:// swissinst.ch/downloads/Report on the Tenth Season of the Joint Swiss_ Egyptian Mission in Syene_Old Aswan (2009_2010).pdf) (last access on July 26th, 2018)

VON PILGRIM C., MÜLLER W., 2014: Report on the 14th Season of the Joint Swiss-Egyptian Mission in Syene/Old Aswan (2013/2014). *ASAE* forthcoming. (http://swissinst. ch/downloads/Report 2014th Season 2013_2014.pdf) (last access on July 26th, 2018)

RESNICK D., KRANSDORF M., 2004: *Bone and Joint Imaging*. Philadelphia.

RESNICK D., NIWAYAMA G., 1988: *Diagnosis of Bone and Joint Disorders*. Philadelphia.

RIHA E., 1986: Römisches Toilettgerät und medizinische Instrumente aus Augst und Kaiseraugst. *Forschungen in Augst* 6. Römermuseum Augst, Augst.

ROBERTS C. A., 1999: Rib lesions and tuberculosis. the current state of play. In: G. Pálfi et al. (eds.): *Tuberculosis. Past and Present*, pp. 311–316. Budapest, Szeged.

ROBERTS C. A., MANCHESTER K., 2010: *The archaeology of disease*. Brimscombe Port Stround.

RÖSING F. W., GRAW M., MARRÉ B., RITZ-TIMME S., ROTHSCHILD M. A., RÖTZSCHER K., SCHMELING A., SCHRÖDER I., GESERICK G., 2007: Recommendations for the forensic diagnosis of sex and age from skeletons. *HOMO - Journal of Comparative Human Biology* 58: 75–89.

SCHEELEN K., NOVÁČEK J., SCHULTZ M., 2015: Anthropologische und paläopathologische Untersuchung menschlicher Skeletüberreste aus dem Friedhof um die Türbe. In: S. Ladstätter (ed.): *Die Türbe im Artemision. Ein frühosmanischer Grabbau in Ayasuluk/Selçuk und sein kulturhistorisches Umfeld* (Sonderschriften des Österreichischen Archäologischen Instituts). Pp. 377–487. Vienna.

SCHEELEN-NOVÁČEK K., NOVÁČEK J., ROSE, P. J., 2018a: A case of a death in the fortress Hisn al Bab, on the first cataract of the Nile. *International Journal of Osteoarchaeology* 28: 264–273. doi:10.1002/oa.2651

SCHEELEN-NOVÁČEK K., NOVÁČEK J., SCHULTZ M., ROSE P. J., 2018b: Im Kampf gefallen – ein besonderer Skeletfund aus der spätantiken Festung Hisn al-Bab (Provinz Assuan) am ersten Nilkatarakt. *Beiträge zur Archäozoologie und prähistorischen Anthropologie* XI. Beier & Beran, Langenweißbach: 93–103.

SCHENK A., 2008: *Regard sur la tabletterie antique. Les objets en os, bois de cerf et ivoire du Musée Romain d'Avenches*. Documents du Musee Romain d'Avenches 15. Association Pro Aventico, Avenches.

SCHLOTT T., EIFFERT H., SCHMIDT-SCHULTZ T., GEBHARDT M., PARZINGER H., SCHULTZ M., 2007: Detection and analysis of cancer genes amplified from bone material of a Scythian royal burial in Arzhan near Tuva, Siberia. *Anticancer research* 27: 4117–4119.

SCHULTE F. J., SPRANGER J., 1985: *Lehrbuch der Kinderheilkunde*. Stuttgart.

SCHULTZ M., 1988: Paläopathologische Diagnostik. In: R. Knußmann (ed.): *Anthropologie. Handbuch der vergleichenden Biologie des Menschen*. Pp. 480–496. Stuttgart, New York.

SCHULTZ M., 1993: Initial Stages of Systemic Bone Disease. In: G. Grupe, N. Garland (eds.): *Histology of ancient human bone. Methods and Diagnosis* (Proceedings of the Paleohistology Workshop from 3–5 October 1990 at Goettingen). Pp. 185–203. Berlin, New York, Tokyo.

SCHULTZ M., 2001: Paleohistopathology of bone: A new approach to the study of ancient diseases. *Yearbook Am. J. Phys. Anthropol. (American Journal of Physical Anthropology)* 116: 106–147.

SCHULTZ M., 2010: The biography of the wife of Kahai. A biological reconstruction. In: A. Woods, A. McFarlane; S. Binder (Eds.): *Egyptian culture and society. Studies in honour of Naguib Kanawati* (Supplément aux Annales du Service des Antiquités de l'Égypte). Pp. 163–179. Cairo.

SCHULTZ M., WALKER R., STROUHAL E., SCHMIDT-SCHULTZ T. H., 2001: Skeletal remains. II Merinebti, Hefi and Iries. In: N. Kanawati, M. Abder-Raziq (Eds.): *The Teti cemetery at Saqqara, Volume VII. The tombs of Shepsipuptah, Meriri (Merinebti), Hefi and others* (The Australian Centre for Egyptology: Reports). Pp. 65–74. Warminster.

SCHULTZ M., WALKER R., STROUHAL E., SCHMIDT-SCHULTZ T. H., 2003: Report on the skeleton of Jj-nfrt from his mastaba in the North Cemetery of Unis's Pyramid (5th Dynasty). In: N. Kanawati, M. Adber-Raziq (Eds.): *The Unis Cemetery at Saqqara. Volume II. The tombs of Iynefert and Ihy (reused by Idut)* (Reports). Pp. 755–786. Oxford.

SHEAK G., JACOBS J. C., CAREY J. L., ANDERSON A. F., OXFORD J. T., 2013: Osteochondritis Dissecans Knee Histology Studies Have Variable Findings and Theories of Etiology. *Clinical Orthopaedics and Related Research* 471: 1127–1136. doi: 10.1007/s11999-012-2619-6

SPEISER P., 2013: Umayyad, Tulunid and Fatimid Tombs at Aswan. In: D. Raue, S. J. Seidlmayer, P. Speiser (Eds.): *The First Cataract of the Nile*. SDAIK 36. Pp. 211–222. Walter de Gruyter, Berlin/Boston.

STECKEL R. H., LARSEN C. S., SCIULLI P. W., WALKER P. L., 2006: *Data collection codebook*. The global history of health project. Columbus.

STESKAL M., ROSE P., 2012: Research on Roman Nag el-Tawil in Upper Egypt. Field-work 2011/2012. *Jahreshefte des Österreichischen Archäologischen Institutes in Wien* 81: 277–330.

STLOUKAL M., DOBISÍKOVÁ M., KUŽELKA V., STRÁNSKÁ P., VELEMÍNSKÝ P., VYHNÁNEK L., ZVÁRA K., 1999: *Antropologie. Příručka pro studium kostry*. Prague.

STROUHAL E., VYHNÁNEK L., HORÁČKOVÁ L., BENEŠOVÁ L., NĚMEČKOVÁ A., 1996: Malignant tumours affecting the people from the ossuary at Krtiny (Czech Republic). *Journal of Paleopathology* 8: 5–24.

STROUHAL E., NĚMEČKOVÁ A., 2008: *Trpěli i dávní lidé nádory?* Prague.

SNODDY A. M. E., BUCKLEY H. R., ELLIOTT G. E., STANDEN V. G., ARRIAZA B. T., HALCROW S. E., 2018: Macroscopic features of scurvy in human skeletal remains: A literature synthesis and diagnostic guide. *American Journal of Physical Anthropology* 2018: 1–20.

STUART-MACADAM P. L., 1989: Nutritional Deficiency Disease. A Survey on Scurvy, Rickets and Iron-Deficiency Anemia. In: M. Y. İşcan, K. A. R. Kennedy (eds.): *Reconstruction of Life from the Skeleton*. Pp. 201–222. New York.

STUART-MACADAM P. L., 1992: Anemia in Past Human Populations. In: P. L. Stuart-Macadam, S. Kent (Hrsg.), Diet Demography and Disease. Changing Perspectives on Anemia. Pp. 151–170. New York.

TEEGEN W.-R., SCHULTZ M., 2017: *Starigard/Oldenburg - Hauptburg der Slawen in Wagrien VII. Die menschlichen Skeletreste*. (Offa-Bücher 86). Kiel.

THOMAS C., 2010: *Atlas der Infektionskrankheiten*. Stuttgart.

TRÉGLIA J.-C., 2003: La céramique impériale et romaine tardive. Secteur 5 de la fouille du pont de Gabbari. In: J.-Y.

Empereur, M.-D. Nenna (Eds.): *Nécropolis 2.* Pp. 407–465. Études alexandrines 7. IFAO, Cairo.
TROTTER M., GLESER G. C., 1952: Estimation of stature from long bones of American Whites and Negroes. *American Journal of Physical Anthropology* 10: 463–514.
TROTTER M., GLESER G. C., 1977: Corrigenda to "Estimation of Stature from Long Bones of American Whites and Negroes". *American Journal of Physical Anthropology* 47: 355–356.
UBELAKER D. H., 1989: *Human skeletal remains. Excavation, analysis, interpretation* (Manuals on archeology 2). Washington.
VAN DER MERWE A. E., STEYN M., MAAT G. J. R. 2010: Adult scurvy in skeletal remains of 19th century mine workers in Kimberly, South Africa. *International Journal of Osteoarchaeology* 20: 307–316.
VASS L., 2011: A Roman bone pocket knife handle depicting Eros riding a dolphin from Porolissum (Moigrad, Sălaj county, Romania). In: C. Cosma (Ed.): *Studii De Arheologie Şi Istorie. Omagiu Profesorului Nicolae Gudea La 70 De Ani / Studies In Archaeology And History. An Anniversary Volume To Professor Nicolae Gudea On His 70th Birthday.* Pp. 295–305. Editura Mega, Cluj.
WALDRON T., 1994: *Counting the dead. The epidemiology of skeletal populations*. Chichester, New York.
WALDRON T., 1996: What was the prevalence of malignant disease in the past? *International Journal of Osteoarchaeology* 6: 463–470.
WALKER P. L., BATHURST R. R., RICHMAN R., GJERDRUM, T., ANDRUSHKO V. A., 2009: The causes of porotic hyperostosis and cribra orbitalia: A reappraisal of the iron-deficiency-anemia hypothesis. *American Journal of Physical Anthropology* 139: 109–125.
WAPLER U., CRUBÉZY E., SCHULTZ M., 2004: Is Cribra Orbitalia synonymous with Anemia? Analyzes and Interpretation of Cranial Pathology in Sudan. *American Journal of Physical Anthropology* 123: 333–339.
WELLS C., 1974: Osteochondritis dissecans in ancient British skeletal material. *Medical History* 18: 365–369.
WILLIAMS F. L., BELCHER R. L., ARMELAGOS G. J., 2005: Forensic misclassification of ancient Nubian crania. Implications for assumptions about human variation. *Current Anthropology* 46: 340–346.
ZAKRZEWSKI S. R., 2003: Variation in ancient Egyptian stature and body proportions. *American Journal of Physical Anthropology* 121: 219–229.
ZUCKERMAN M. K., GAROFALO E. M., FROHLICH B., ORTNER D. J., 2014: Anemia or scurvy: A pilote study on differential diagnosis of porous and hyperostotic lesions using differential cranial vault thickness in subadult humans. *International Journal of Paleopathology* 5: 27–33. doi: 10.1016/j.ijpp.2014.02.001

Jan Nováček*
Thuringia State Service
for Cultural Heritage and Archaeology
Humboldtstr. 11
Weimar
Institute of Anatomy and Cell Biology
University Medical Centre
Göttingen
Germany
E-mail: jan.novacek@tlda.thueringen.de
http://orcid.org/0000-0003-2707-5347

Kristina Scheelen-Nováček
Michael Schultz
Institute of Anatomy and Embryology
University Medical Centre
Kreuzbergring 36
Göttingen
Department of Biology
University of Hildesheim
Germany
E-mail: scheelen@uni-hildesheim.de
E-mail: mschult1@gwdg.de

Mariola Hepa
Institute of Archaeology,
Ludwig-Maximilians-University Munich,
Germany

Cornelius von Pilgrim
Wolfgang Müller
Swiss Institute for Archaeological
and Architectural Research
on Ancient Egypt in Cairo 11/13
Sh. el-Shaer Aziz Abaza
Cairo 11211 (Zamalek)
E-mail: mariolahepa@lmu.de
E-mail: cvpilgrim@swissinst.ch
E-mail: wmueller@swissinst.ch

*Corresponding author.