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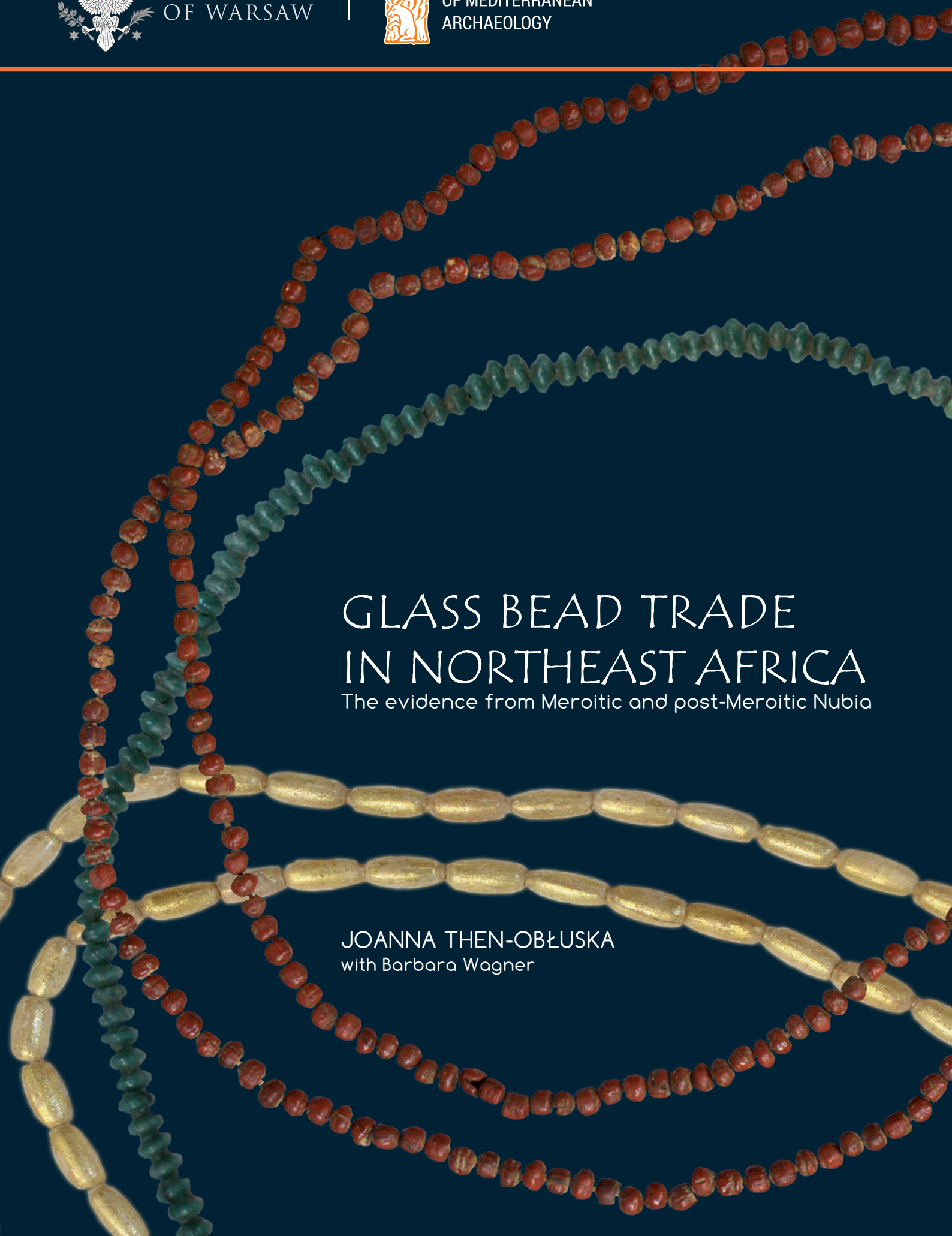

GLASS BEAD TRADE IN NORTHEAST AFRICA

The evidence from Meroitic and post-Meroitic Nubia

JOANNA THEN-OBŁUSKA
with Barbara Wagner

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Polish Centre of Mediterranean Archaeology, University of Warsaw
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Contents

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INTRODUCTION

This book presents a fascinating but little known body of evidence that is vital for the reconstruction of trade contacts in Roman and late antique Northeast Africa, the time of intensive maritime trade contacts in the Indian Ocean region. Beads, next to pottery, are the most abundant archaeological material in Nubia, often constituting the only evidence for direct and indirect trade contacts in archaeological records. The Nubian part of the Nile Valley has always been one of the most developed African regions and its link with the Mediterranean world is well recognized. The link of Nubia with Asian cultures is less recognized (e.g., Haaland 2014).

The aim of this research is to facilitate an understanding of the importance of beads by highlighting the various techniques and groups of raw materials used to make personal adornments, namely glass beads and pendants found in Meroitic and post-Meroitic Nubia. Combining a morphological approach and chemical compositional analysis, this work examines the contribution which beads and pendants can make to trade studies, and puts this body of data within the wider context of the overseas trade contacts of Northeast Africa in both the Roman and Late Antique period.

A short history of Meroitic and post-Meroitic Nubia is given in Chapter 1. Additionally, an iconographical and contextual overview of how the beads were displayed and deposited is provided in Chapter 2 to emphasize their exceptional role in Meroitic and post-Meroitic cultures in the Middle Nile region. Chapter 3 presents the collections used in this research and the burial sites at which large groups of beads have been found in the main regions of Nubia (Lower Nubia, Dal Cataract region, Fourth and Fifth Cataract regions). The database, comprising almost 200 beads and pendants was used in a morphological and chemical compositional study. For each site, a brief description is outlined and the information on the find contexts of given objects is assembled from the excavation reports and archival material. Chapter 4 presents a morphological description of the beads. It examines techniques of production, which are often vital for their provenance studies. Analogies drawn from literature and museum collections, as well as distributions are given for every type. Many of the presented beads are illustrated for the first time.

In Chapter 5, beads and pendants are examined through the results of their chemical compositional studies, using the laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS) method. Major, minor and trace elements in ancient glass can be diagnostic of their geographic origin and period of manufacture. The elemental analysis of glass beads from Nubia, involving 41 elements, gives us our first insight into the sources of the glass used to manufacture the beads from Nubia between the 1st and 6th centuries AD. It provides the first scientific evidence for the presence of Egyptian and Levantine glass in Nubia and also the first evidence for the presence of Sri Lankan/South Indian glass beads in Nubia. The combination of the glass groups and the beads produced is given in Chapter 6.

The work introduces a new technique to enhance cultural analysis in the study of long-distance trade contacts in Northeast Africa. The results confirm strong links between Nubia—that is, sites north of the confluence of the Blue and White Nile—and the East Mediterranean in the Meroitic and post-Meroitic periods. Furthermore, the results provide evidence for the circulation of both Egyptian and

Levantine glass in Northeast Africa. One of the outcomes of the combined macroscopic and laboratory studies used in this research is the discovery of the large-scale import of ready-made Sri Lankan/South Indian objects into Northeast Africa in late antiquity. Their source had never been identified in Nubia until the present study. Their presence in Nubian graves stimulates reflection on the extensive trade between Nubia and the Red Sea coast. Finally, the results provide the first evidence of the direct or indirect involvement of Nubia in the Asian maritime trade.

A list of museums and site collections (with abbreviations) consulted for the purpose of this study is given here for the reader's convenience.

• The British Museum, London (www.britishmuseum.org)	**BM**
• Brooklyn Museum, New York (www.brooklynmuseum.org and personal observation)	**Brooklyn Museum**
• Berber bead finds (personal observation)	**BMC**
• Berenike bead finds (personal observation)	**BE**
• Gdańsk Archaeological Museum (personal observation)	**GAM**
• The Egyptian Museum in Cairo (personal observation)	**JE**
• Museo Arqueológico Nacional, Spain (personal observation)	**MAN**
• Museum of Archaeology in Poznań (personal observation)	**MAP**
• Museum of Archaeology University of Stavanger (personal observation)	**MAUS**
• Metropolitan Museum of Fine Arts, New York (www.met.org)	**MET**
• Museum of Fine Arts, Boston (www.mfa. org and personal observation)	**MFA**
• National Museum in Warsaw (personal observation)	**MNW**
• Oriental Institute Museum University of Chicago (personal observation)	**OIM**
• Peabody Museum of Archaeology and Ethnology at Harvard University, Cambridge (www.peabody.harvard.edu)	**Peabody**
• University of Pennsylvania Museum of Archaeology and Anthropology (www.penn.museum.org)	**PENN**
• Scandinavian Joint Expedition in Museum of Archaeology University of Stavanger (personal observation)	**SJE**
• Section française de la Direction des antiquités du Soudan, Khartoum (personal observation)	**SFDAS**
• Sudan National Museum, Khartoum (personal observation)	**SNM**
• Petrie Museum, University College, London (www.petrie.ucl.ac.uk)	**UC**
• University of California Santa Barbara and Arizona State University excavations at El-Ginefab School bead finds (personal observation)	**UCSB/ASU**
• el-Detti bead finds (personal observation)	**D**
• el-Zuma bead finds (personal observation)	**Z**

CHAPTER 1

NUBIA IN THE MEROITIC AND POST-MEROITIC PERIODS

Nubia is a geographic region located in the northeast corner of Africa [***Figs 1–1, 3–1, 4–1, 7–1***]. It encompasses the southern end of Egypt and northern Sudan, where it is divided into Lower Nubia in the north and Upper Nubia in the south. Different regions within Nubia are separated by a series of cataracts, with the First Cataract being south of Aswan and the Sixth Cataract north of modern Khartoum. The Classical historians often called the area south of Egypt 'Ethiopia', incorporating not only the modern country of Ethiopia, but Lower and Upper Nubia and the lands beyond. The ancient Egyptian word for gold, *nub*, might be the origin for the name since Nubia had the ancient world's richest supply of gold (Fisher 2012).

From the 3rd century BC until the 3rd century AD, Meroë with its great stone pyramid tombs and their chapels became a center of the royal and elite mortuary cult and a centre of the Nubian Kingdom of Meroë (Dunham 1957; 1963). The Kingdom of Meroë probably extended as far south as the confluence of the Blue and White Nile and beyond, and in the north, Lower Nubia became the intermediary with Egypt. The location of Meroë also made it the nodal point for travels east to the Red Sea, south to Ethiopia, and farther into sub-Saharan Africa (Fisher 2012: 37–40). While the Ptolemies and Kushites interacted in Lower Nubia, trade was renewed in the Ptolemaic Red Sea ports of Berenike Trogodytica and Ptolemais Theron. The Meroitic people from the south eventually settled along the Nile in Lower Nubia. Different tribal groups lived in the area west and east of the Nile, and near the Red Sea. Lower Nubia, for a time ruled by Rome in the north and Meroë in the south, became very prosperous in the 1st to 4th centuries AD. Despite heavy plundering, the finds in the cemeteries show that the populations outside the centers were not without certain means and that some luxury objects and other revenue from this trade benefited these groups (Säve-Söderbergh 1981: 3). The pyramids at Meroë, and some of the largest sites to the north, like Faras (Griffith 1924: 1925), Karanog (Woolley and Randall McIver 1910), Qustul and Ballaña (Williams 1991ab), and Abri (Vila 1982) demonstrate the common practice of extended burials in chambers accessed by sloping steps or ramps, or in vertical shafts. The graves were marked by brick structures, mastabas or small pyramids with 'chapels' or offering niches, and were accompanied by inscribed or painted stele, offering-tables and distinctive sculptures referred to as 'ba-bird statues'. In the Meroitic heartlands, at sites like Kadada and Gabati, grave superstructures were rare and there were no offering tables or inscriptions (Edwards 2004: 175). Meroitic graves in Upper Nubia were covered with tumuli or not marked in any particular way (El Tayeb 2012). In general, the deceased were accompanied by grave goods ranging from richly furnished royal burials to the simplest forms, accompanied only by pottery jars and cups (Adams 1977: 374–375; Edwards 2004: 174). The Kingdom of Aksum conquered the Meroitic kingdom in the early 4th century AD. Pyramid and mastaba superstructures then disappeared, to be replaced by the widespread use of tumuli. Further changes have been noted in material culture (Edwards 2004).

Three entities emerged between the 4th and 6th centuries AD after the fall of Meroë: Nobadia in Lower Nubia, Early Makuria in Upper Nubia, and Alwa (Alodia) in the region up from the Fifth Cataract. Once the Romans had withdrawn from Lower Nubia around AD 298, the Nobadians,

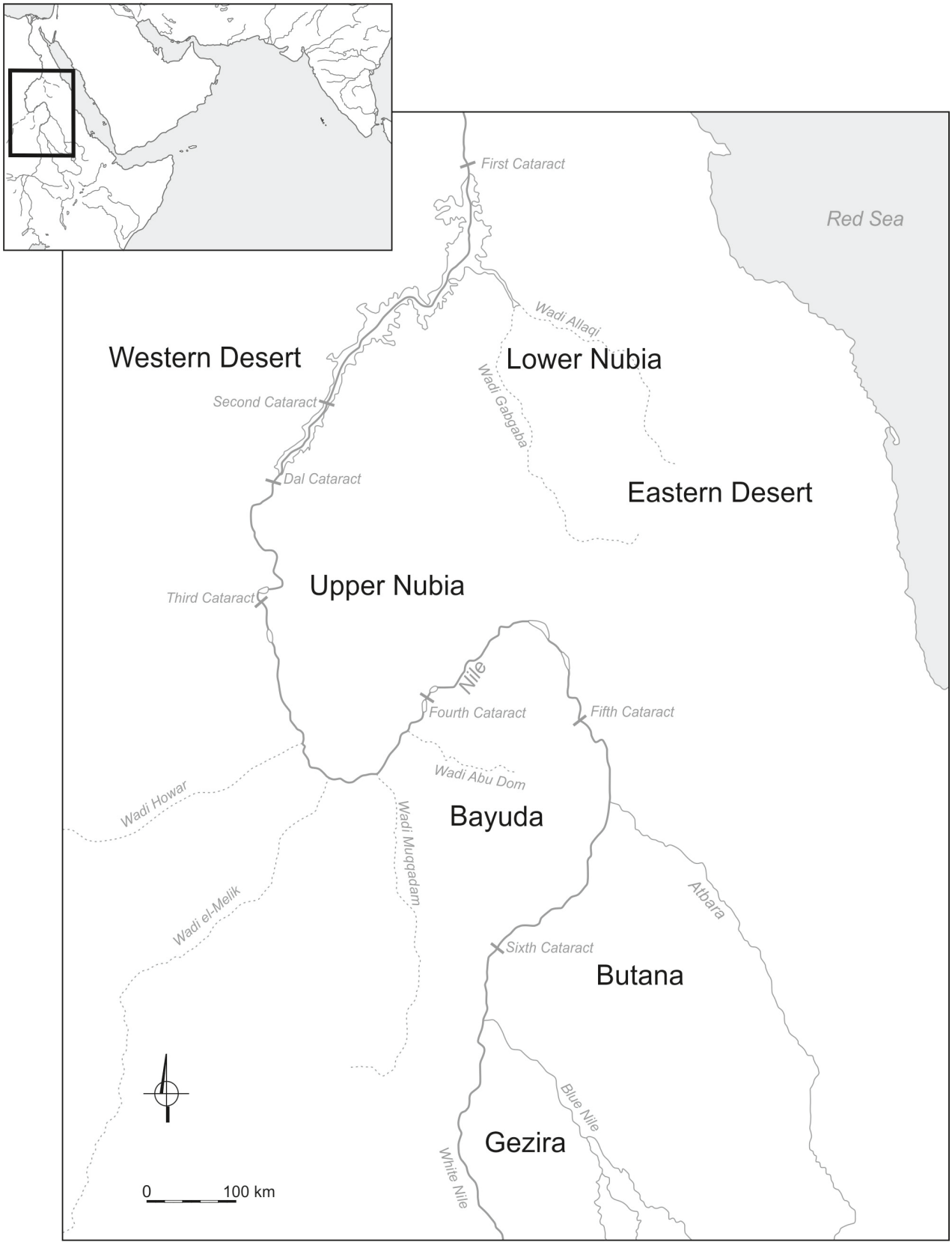

Fig. 1–1. Map of Nubia

possibly from the Western Desert, and the Blemmyes from the Eastern Desert encroached on the area (Strouhal 1984; Ricke 1967). The Blemmyes are well attested in the written sources, and they and other groups occupied the region of the emerald and beryl mines at *Mons Smaragdus* in the Eastern Desert (e.g., Dijkstra 2012). However, the ethnic term "Blemmye" needs to be used with care since it probably included a wide variety of people living between the Red Sea and the Nile Valley (Dijkstra 2012). The presence of these Eastern Desert dwellers in the Nile Valley is marked by Eastern Desert Ware, which is found in the Eastern Desert as far as the Egyptian Red Sea ports of Berenike, Marsa Nakari, and Quseir to the northeast, and the Fifth Cataract region in Sudan to the south (Barnard 2006; 2008; Barnard and Magid 2006). Additionally, their tumulus graves are found on the west and east banks of the Lower Nubian Nile Valley at Kalabsha and Wadi Qitna, where they date to the mid-4th century AD, i.e., about AD 330/340–370/380 (Ricke 1967; Strouhal 1984; Williams 1991b:12).

The Nobadian king Silko conquered the Blemmyes in the mid-5th century AD and the early Nobadian royal and elite cemetery at Qustul is dated to around AD 370–380, while that at Ballaña dates to around AD 420 (Emery and Kirwan 1938; Farid 1963). The largest of the great tumuli was nearly 80 m in diameter and 12 m high. Several had multi-chambered substructures to contain the burial and its abundant grave goods. The kings were buried with their regalia, including silver crowns, and spears and other military equipment. Imported materials including metal vessels, items of furniture, horse harnesses, wooden boxes with ivory inlays, game boards and gaming pieces, toilet articles, and a large quantity of pottery, not the least Mediterranean amphorae, were probably used in the funerary rituals. A great deal of beadwork and jewellery was also buried with them.

Following excavations in the south, at Tanqasi, Hammur, and El-Hobagi (e.g., Shinnie 1954; Żurawski 2000; Lenoble et al. 1994; Lenoble 2004b), it was assumed that these tumulus cemeteries were counterparts to the Nobadian cemeteries at Qustul and Ballaña. Royal burials in the Early Makurian region have not been identified until recently. Nevertheless, the recent finds of ornaments and

Table 1–1. *General chronology of Egypt, Lower Nubia, Upper Nubia and Central Sudan (after Fisher et al. 2012; El-Tayeb 2013; Williams 1991; Welsby and Anderson 2004)*

Egypt	Lower Nubia	Upper Nubia	Abbreviation	Central Sudan	
Late Period (Dynasties 25–30)	Napatan	Napatan	N	Napatan	~722–332 BC
Ptolemaic Period	Early Meroitic	Early Meroitic	EM	Meroitic	~400–200 BC
Early Roman	Classic Meroitic	Classic Meroitic	M	Classic Meroitic	~100 BC–AD 200
Late Roman	Late Meroitic	Late Meroitic	LM	Late Meroitic	~AD 200–300
		Transitional Late Meroitic to Early Makuria	LM/PM	Post Meroitic	~AD 250–350
Byzantine (AD 395–640)	Early Nobadian/ Post–Meroitic	Early Makuria Phase I (Early Post–Meroitic)	EPM		~AD 350–450
		Early Makuria Phase II (Late Post–Meroitic)	LPM	Alwa	~AD 450–550
		Early Makuria (Terminal Phase)	TPM		~AD 550–600
Islamic Period	Christian Nobadia	Christian Makuria	Ch	Christian Alwa	AD 641–1400

adornments at el-Zuma has now provided evidence of the royal character of the decorated objects found in these tombs (Then-Obłuska 2017c).
The post-Meroitic period in Lower Nubia was previously called the X-Group (4th–6th centuries AD). But due to the state formation process occurring at that time, it is now called Early Nobadian in Lower Nubia (e.g., Obłuski 2014), and Early Makurian in Upper Nubia (El-Tayeb 2012). Christianized Nobadia and Makuria were united under a Makurian king by the early 7th century AD (Fisher 2012: 39). ***Table 1–1*** presents the general chronology of Egypt, Lower Nubia, Upper Nubia, and Central Sudan during the periods discussed here.

CHAPTER 2

BEADS IN MEROITIC AND POST-MEROITIC CULTURES: ICONOGRAPHIC AND CONTEXTUAL OVERVIEW

Rich bead and pendant adornments are one of the most characteristic features of ancient Nubian cultures, and the Meroitic and post-Meroitic periods are no exception. In the Meroitic period beads were found associated with royal, ritual and private spheres. The stela of Nastasen (335–315 BC), the last king buried at Napata, in the necropolis at Nuri (Nu 15), shows the king offering a necklace and pectoral to Amun, in both his Theban and Napatan forms (Wildung 1997: Pl. 265). A similar scene is shown on a stela of the Meroitic King Amenakhabale (first half of 1st century AD), in which he offers a three-strand necklace to Amun and Mut (Baud 2010: Pl. 223).

A cord necklace with three ram's head pendant amulets and a long string of large beads with a central amulet can be observed on a king's statue found on the island of Argo (e.g., Wildung 1997: Cat. 270, about 200 BC). A broad collar of beads, pendants and amulets lies in many rows over the shoulders and breasts of queens and kings in the reliefs from the Lion Temple at Naga (Wildung 1997: 326, Fig. 44). Along with a string of large globular beads, a collar like this belongs to the most characteristic royal and divine adornments of the Meroitic period. The royal reliefs from the 1st century AD at Naga, Meroë, and Musawwarat es-Sufra are characterized by depictions of royalty and gods wearing long strings of large globular beads and a central amulet (e.g., Török 2011: Pls 81, 82, 87, 155, 156, 159). The same motif is repeated on the gold jewelry found in the Tomb of Queen Amishakheto, where it is shown around the neck of a god. Above an enameled shield (*aegis*) in the form of a broad collar, a god's head is portrayed wearing an amuletic gold necklace of large beads (Priese 1992: Figs 39c, 47; Andrews 1991: 168–169, 199). A similar necklace appears on the necks of Mut (Priese 1992: Fig. 34; Wildung 1997: Pl. 333), Sebiumeker (Priese 1992: Fig. 41; Wildung 1997: Pl. 334), and Apademak (Wenig 1978: Fig. 74, Cat. 164; Priese 1992: Fig. 9; Wildung 1997: Pl. 335). Representations of similar necklaces are shown hanging beneath the heads of *criocephalus* gods and goddesses (Priese 1992: Figs 9, 29, 30, 32; Wildung 1997: Pls 328, 329, 331 and 332). Elaborate necklaces are depicted on the funerary Ba-bird statue of a prince or a viceroy found at Karanog (Woolley and Randall-MacIver 1910: Pl. 1; Török 1997: 492). A bronze bust found at el-Hassa, ascribed to a Meroitic queen and dated to the end of the 1st century AD, depicts a short necklace of large beads (Baud 2010: Pl. 308). A string of elongated beads is easily discernible on the queen's neck in a scene that decorates a bronze bowl from Karanog grave 187 (Woolley and Randall-MacIver 1910: Pl. 27). While strings of large globular beads with a central amulet belong to the royal and divine sphere, broad collars composed of multiple strings of small beads, pendants and amulets were also worn by non-royals (Wildung 1997: Cat. 365). Two broad collars were reconstructed from individual elements found with the treasure of Amanishakheto (Wildung 1997: Cat. 365, 366).

Meroitic funerary stelae depicted men, women and children wearing rich bead adornments (Woolley and Randall-MacIver 1910: Pls 11–13; Spaer 2001). On one such stela, the necks and arms of a girl are decorated with bead necklaces, bracelets and a possible circlet (Woolley and Randall-MacIver 1910: Pl. 13:7079 G.146). A clay figure of a doll from Karanog is adorned with a painting of a large red, green and black bead necklace (Woolley and Randall-MacIver 1910: 245, Pl. 109: 7466 G.286). Last but not least, the motif of a string of beads, pendants and amulets is found

painted around the necks and on the shoulders of Meroitic clay vessels (Williams 1991/I: 37, 40; Török 2011: 248). The association between pottery decoration and beadwork design, whether painted or real, can be traced back to Middle Nubian culture and continued into the post-Meroitic period (Then-Obłuska 2014; 2016).

The range of contexts in which beads were found is impressive for both the Meroitic and post-Meroitic periods. Beads found in Nubian temples could be part of foundation deposits (e.g., Then-Obłuska 2014a) and votive ornaments (Then-Obluska 2017a). Nevertheless, the overwhelming majority of beads found in Meroitic Nubia come from human burial sites, where all ages and both sexes presented bead adornments. Bead jewelry is also deposited as grave offerings next to the individual's body (e.g., Dunham 1963: 146–151). Beads placed in a basket, in which a wooden box containing beads was also included, were found on top of the coffin lid in a Meroitic grave of a woman in her late forties at Sedeinga (Francigny and David 2013: 107, 111, Figs 7, 9 and Color Fig. 3).

As in the Meroitic period, post-Meroitic beads and pendants were usually found adorning the human body in the form of necklaces, bracelets, earrings, armlets, anklets, belts, circlets and beaded pendants (e.g., Then-Obłuska 2014a; Żurawski 2010: 211, Fig. 42; Jacquet-Gordon and Bonnet 1971–1972: 81, Fig. 4 bead adornments from the intact tomb No. 72; Habachi 1967; Emery and Kirwan 1938: 206, Cat. No. 120). Moreover, a bead was found threaded into the individual's hair (MAN Inv. 1980/91/305.58 Argin, personal observation). They were also found sewn to textiles or leather headbands, wristbands, and garments (Williams 1991; Żurawski 2010: Fig. 40; Longa 2011: 503).

Strings of beads were used as decoration on leather scabbards (e.g., Emery and Kirwan 1938: Pl. 49; Lenoble 2004: Cat. 131). They were found placed in basketry boxes (Emery and Kirwan 1938: Pl. 107.D; Török 1987: 56, Cat. 164), wooden boxes (Williams 1991: 335, Fig. 161d, Pl. 83h), a wooden chest in a royal tomb (Emery and Kirwan 1938: 212, Cat. 159), a linen bag (Strouhal 1984: 223, Pl. 73, object P 3010), leather bags or wraps (Säve-Söderbergh 1981: 38, Object 19/1:15; Pellicer and Llongueras 1965: 61–62, Fig. 36:6, 17, Pl. XIX:3) or leather containers with metal fittings (Bates and Dunham 1927: 37–38, Nos 6, 15a–e, Pl. LXVII).

Together with bell pendants, beads also adorned animal harnesses and trappings in the Early Nobadian royal tombs of Qustul and Ballaña (Emery and Kirwan 1938). A string of beads was bound around a camel's tail in tomb A.11 at Firka (Kirwan 1939: 3, Object A.11/2, 4–5). Beads were also deposited in a cow's burial in the Fourth Cataract region (Welsby 2011).

Last but not least, strings of beads adorned pots and anthropomorphic figures deposited in subsidiary grave pits outside the burial chamber in the Fourth Cataract region (Then-Obłuska 2014a: Cat. 199–204, 210–212; 2014b; Żurawski 2005: 216; Fig. 22 Saffi 56; 2008: 159 Shemkhiya 5, Tomb 3).

CHAPTER 3

COLLECTIONS AND ARCHAEOLOGICAL CONTEXTS

3.1 Introduction

The objects for analysis were selected from the largest European and Sudanese collections of Nubian beads: the Scandinavian Joint Expedition (SJE) materials stored in the Museum of Archaeology at the University of Stavanger (MAUS) in Norway, the National Corporation of Antiquities and Museums (NCAM) materials stored at the Sudan National Museum in Khartoum (SNM), and those in the Museum of Archaeology in Poznań (MAP) and the National Museum in Warsaw (MNW). The sites are presented according to the museum collections from which the sample material originated. An overview of the collections, sites and the number of samples used in the study is given in ***Table 3–1***.

In general, the beads were excavated at burial sites in Lower Nubia, between the First and Second Nile Cataract (SJE), in Upper Nubia, between the Second and Third Cataract (SNM01–SNM34), in the Fourth Cataract region (MAP, MNW, SNM60–SNM74), and between the Fifth and Sixth Cataracts (SNM35–SNM57) [***Fig. 3–1***]. The graves were dated to the Meroitic and post-Meroitic periods, that is, from the 1st century BC to the 6th century AD.

3.2 SJE

The glass beads in this study come from one of the largest collections of Lower Nubian beads in Europe, which is now stored in the Museum of Archaeology at the University of Stavanger (MAUS). They were excavated by the Scandinavian Joint Expedition (SJE) to Sudanese Nubia in 1961–1964 (Säve-Söderbergh 1981), at sites which lie on the east bank of the Nile just to the north of the Second Cataract and encompassing a belt of about 50 km in length (Säve-Söderbergh 1981).

The objects in this study come from graves that were excavated at eight burial sites: Serra 25, Ashkeit 63, 332 and 349, Wadi Halfa 123, Abka 250 and 416, and Gamai 432. The items under discussion were found in 26 private graves attributed to the Meroitic or post-Meroitic Periods, or with unspecified dating. In general, the sites ranged from a few to a dozen or more tumuli superstructures of up to 12 m in diameter and containing either single or multiple grave units. **Site 25 in Serra East** is a large cemetery at which more than 300 units were investigated, most of which had been heavily plundered (Säve-Söderbergh 1981: 70). **Site 349 at Ashkeit** comprised only one grave which was situated on an outcrop of the mountain. The grave consisted of a mound and a simple circular shaft containing a child burial (Säve-Söderbergh 1981: 148). **Site 63 at Ashkeit** is a post-Meroitic cemetery with six disturbed mounds, varying in diameter from 3 m to 12 m and with heights from 1.50 m to 0.50 m, and containing 12 graves with shafts of different types and in states of varying preservation (Säve-Söderbergh 1981: 139). Similarly, **Site 332 at Ashkeit** is a cemetery with a few graves of Meroitic or post-Meroitic date (Säve-Söderbergh 1981: 146). **Wadi Halfa Site 123** is a small cemetery of about fifteen mounds (Säve-Söderbergh 1981: 152). **Site 432 at Gamai** is a burial ground of mainly Meroitic date comprising nine units, all of which had been disturbed (Säve-Söderbergh 1981: 174). **Abka 250** is again a large cemetery of Meroitic date. It measures 55 m by 25 m and consists of 75–100 units (Säve-Söderbergh 1981: 158); 45 tombs were examined. **Site 416 at Abka** is a cemetery of Meroitic and post-Meroitic date where 29 graves were found (Säve-Söderbergh 1981: 167).

Various artifacts were found in the graves: metal cups, tools, weapons, toilet utensils, fittings, and jewelry, bracelets, anklets, rings and

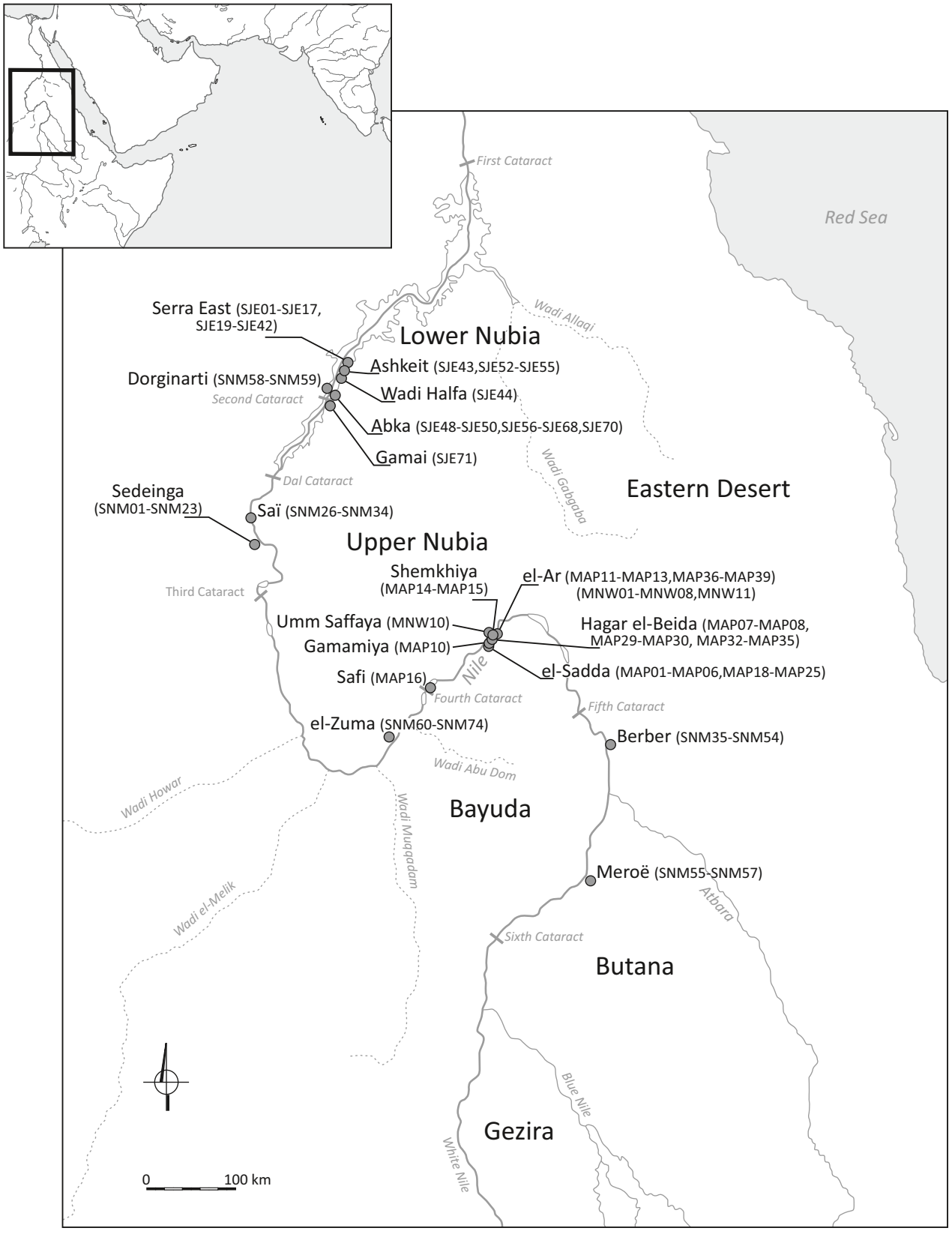

Fig. 3–1. Map of Nubia, marking the location of sites yielding the samples examined in this study

*Table 3–1. Overview of collections, sites and numbers of the samples in the study**

Collection	Site	Sample numbers
MAUS	Abka 250	SJE48–SJE50
	Abka 416	SJE56–SJE68, SJE70
	Ashkeit 332	SJE52
	Ashkeit 349	SJE53–SJE55
	Ashkeit 63	SJE43
	Gamai 432	SJE71
	Serra East 25	SJE01–SJE17, SJE19–SJE42
	Wadi Halfa 123	SJE44
	Not analyzed in the study	SJE18, SJE45–47, SJE51, SJE69
SNM	Berber	SNM35–SNM54
	Dorginarti	SNM58–SNM59
	Meroë	SNM55–SNM57
	Saï	SNM26–SNM34
	Sedeinga	SNM01–SNM23
	el-Zuma	SNM60–SNM74
	Not analyzed in the study	SNM24, SNM25
MAP	el-Ar 2	MAP11–MAP13, MAP36–MAP39
	Gamamiya 66	MAP10
	Hagar el-Beida 1	MAP29–MAP30
	Hagar el-Beida 2	MAP07–MAP08, MAP32–MAP35
	el-Sadda 1	MAP01–MAP06, MAP18–MAP25
	Safi 56	MAP16
	Shemkhiya 4	MAP14
	Shemkhiya 5	MAP15
	Not analyzed in the study	MAP09, MAP17, MAP26,–28, MAP31
MNW	el-Ar 1	MNW11
	el-Ar 2	MNW01–MNW08
	Umm Saffaya 14	MNW10
	Not analyzed in the study	MNW09

* Numbers missing from the above listing concern samples that could not be analyzed for different reasons.

bells, as well as stone, clay, wooden, bone and ivory objects, leather sandals, strings and cords, bags, quivers, saddles, and shroud covers, basketry, textiles, and glass vessels. Pottery and bead finds definitely dominated the grave assemblages. Bead adornments were found with child, female and male individuals, regardless of age and sex. The beads were mostly found loose, scattered or in heaps, but in certain cases they were found partly strung. Necklaces and bracelets are the main beadwork types (Säve-Söderbergh 1981: 41, 47–48). In one tomb, 315 beads and two lumps of glass were found in a compact mass of leather that may have been a bag (Säve-Söderbergh 1981: 38, Object 19/1:15). The beads found in graves were made of a variety of materials, including organics like Red Sea mollusk shells, ostrich eggshell, and stones (e.g., carnelian, quartz, agate), and inorganic materials like faience or glazed composites, glass and metal-in-glass (Säve-Söderbergh 1981: 39–48; Then-Obłuska 2018d).

3.3 SNM

The Sudan National Museum (SNM) collection of beads used in this study consists of material excavated by several missions working in Sudan: *Section Française de la Direction des Antiquités du Soudan* (SFDAS) at Sedeinga (SNM01–SNM25) and Saï (SNM26–SNM34), the National Corporation of Antiquities and Museums (NCAM) at Berber (SNM35–SNM54), the Harvard University and Museum of Fine Arts in Boston at Meroë (SNM 55–SNM57), the Oriental Institute Museum, University of Chicago at Dorginarti (SNM58–SNM59), and the Polish Centre of Mediterranean Archaeology University of Warsaw (PCMA UW) and NCAM at el-Zuma (SNM60–SNM74). Therefore, the collection encompasses archaeological sites covering almost the whole range of the Nubian Nile Valley, starting with the Meroitic graves at Dorginarti, between the First and Second Cataracts, continuing through Meroitic Saï and Sedeinga between the Second and Third Cataracts, then Late post-Meroitic el-Zuma between the Third and Fourth Cataracts, and finally, the Meroitic-period Berber and Meroë up the Nile between the Fifth and Sixth Cataracts. The sites mentioned above are presented below in a geographical sequence following from north to south.

Dorginarti is an island fortress at the foot of the Second Cataract of the Nile. It was excavated from January through June of 1964, after which the rising waters behind the new High Dam at Aswan made further work impossible. Excavations at Dorginarti were conducted by the Oriental Institute Nubian Expedition under the direction of James Knudstad and Richard H. Pierce (e.g., Knudstad 1966). The remains of the early fort were dated by Lisa A. Heidorn (1992; 2013; forthcoming) to the Third Intermediate Period, while the latest occupation dates to the Saite, or Napatan, period. The fortress was situated close to the steep northern banks of the island (Heidorn 2013). The beads were found in 10 intrusive Meroitic graves containing twelve individuals. While the majority of beads from the OINE excavations is stored in the Oriental Institute Museum, some specimens were left in the SNM. A group of beads from Meroitic child burial No. 3 were divided between the two museums. Two of the glass beads from this burial are samples in this study (SNM58–SNM59).

Saï Island is located between the Second and the Third Cataracts, south of the barren, rocky area known as the Batn al-Hagar. It is among the largest Nile islands, measuring 12 km north to south and 5.5 km east to west. From 1993 until 2005, the excavations of the Université de Lille 3 and the SFDAS operated at cemeteries 8–B-5.A, 8–B-32 and 8–B-52.B under the direction of Francis Geus (1995; 1998; 2002; 2006). At a later date, it was under the direction of Didier Devauchelle (e.g., Doyen and Devauchelle 2012), and at present it is under the supervision of Vincent Francigny (e.g., 2009; 2010; 2014). Between 1996 and 2010, more than 3400 beads were uncovered at sites 8–B-5.A, 8–B-32 and 8–B-52.B. They have been published in a separate paper (Then-Obłuska 2016c).

The bead sample used in this study comes from cemetery 8–B-5.A, season 2011. This was a cemetery of the elite at Saï, and was established around the 1st century AD, to be used through an estimated beginning of the 4th century AD. Dates for Meroitic Saï have already been verified through ceramic studies (David 2010). Tombs in cemetery 8–B-5.A, as in other Meroitic Nubian elite cemeteries, have small brick pyramids topped with lotus-shaped capstones. Small chapels on their eastern sides were equipped with stone steles, offering tables, and *ba*-bird statues. Funerary stelas indicate connections with the inhabitants of Karanog in Lower Nubia, the seat of the *peshto*-viceroy (Rilly 2008). The importance of Saï in the northern Meroitic state is further demonstrated by the Meroitic temple there with its column capitals bearing the names of Meroitic royalty, that is, Amanitore, Natakamani, and one of their sons, and its column drums decorated with motifs

of Nile gods and offerings, as in the Graeco-Roman temple at Dakka in Lower Nubia (Francigny 2015). This demonstrates the interconnection between these two areas during the 1st century AD.

The assemblage of Saï beads and pendants is characterized by a variety of materials, techniques, and shapes that contribute significantly to a comparative study of Meroitic bead collections (Then-Obłuska 2016c). Alongside objects already identified at other sites, richly imbued with visible Egyptian and Greek influences, the Saï assemblage contributes some new bead types. Moreover, the beads were on their original strings and confirm known bead patterns used over a long time between the 1st and 4th centuries AD when the cemeteries were in use (Then-Obłuska 2016c).

Sedeinga is located between the Second and Third Cataracts, on the left bank of the Nile, about 30 km south of Saï island. Sedeinga is a significant site in the Abri-Delgo Reach of the Nile, holding remains of a New Kingdom temple and town, and both Napatan and Meroitic settlement remains and cemeteries with pyramidal tombs (Labrousse 1994a; 1994b; Schiff Giorgini 1965). Sedeinga's location is close to an important trade route, today known as the "Forty Days Road". It takes the same route to Egypt as the ancient Meroitic road and passes right by the cemetery. Most graves at Sedeinga were looted in antiquity, but excavations have still yielded a number of artifacts, including a group of glass vessels. The most impressive were fluted vessels in blue glass with painted and gilded figures and Greek texts. They are similar in style and technique to other material from the Roman Empire and were undoubtedly a highly prized import (Morkot 2012: Fig. 149). Also found at the site were silver rings with bezels, one with a Silenus head and another set with a carved agate carrying a profile of the head of Serapis surrounded by seven stars or planets. The nature of the material from the cemeteries shows that local elites may have played an important role in trade (Morkot 2012: 328).

French archaeologists have exposed the remains of 35 small, eroded pyramids. The bead and pendant samples in this study were found at Sedeinga during the recent SFDAS excavations in 2009–2014, directed by Claude Rilly and Vincent Francigny (2010; 2011; 2012; 2013). The 3400 beads and pendants from Sector II of the cemetery (Then-Obłuska 2015a) came from 31 tombs with multiple burials and in 13 surface collections. The tombs have been ascribed to the Late Napatan and Meroitic periods, about 400 BC–AD 300 (Rilly and Francigny 2013). Many beads were found in disturbed contexts in looted tombs, although some beads were still preserved in their original position. The chronological, geographical, and political situation of the site made the bead assemblage exceptionally rich as regards usage of varied organic and inorganic materials, as well as evidence for technologies used to produce the objects. During a period dominated by faience and glass in bead assemblages, the use of organics and stones indicates strong links with the neighboring Nubian deserts, an overland connection with the Red Sea coast, and, surprisingly, an interest in the resources of the Nile River (Then-Obłuska 2015a).

El-Zuma lies between the Third and Fourth Cataracts in Upper Nubia. The Dongola Reach, as this zone is designated, occupies a strategic position controlling the north–south and east–west desert roads, as well as the riverine communication routes. Connections between the area and the hinterland to the southeast, south and west have always followed the *widyan* (sing. *wadi*) that facilitated desert crossings for trade caravans through the Bayuda Desert to the Shendi Reach via Wadi Abu Dom, or to the southwest steppes of Kordofan via Wadi el-Muqaddam and Wadi el-Malik, and to the west via Wadi Howar and on to Darfur (El-Tayeb 2012: 15). Excavations at el-Zuma are conducted by the Polish Centre of Mediterranean Archaeology (PCMA) and National Corporation for Antiquities and Museums (NCAM) under the direction of Mahmoud El-Tayeb (2012 and references therein; 2017 and references). The site was dated to the late post-Meroitic period, otherwise called the Late Phase of the Early Makuria period, about AD 450–550.

Between 2005 and 2017, more than 1500 objects of personal adornment were excavated from 21 heavily robbed tumuli (Then-Obłuska 2016d; 2017d). The remains of personal adornments (beads, pendants, earrings, chains, and a ring), royal regalia (cabochons and settings), and decorated items (metal sheets, ivory intarsia and gaming pieces) dominate the assemblages from three large, partly excavated tumuli, Z1, Z4, and Z7. Apart from beads made of a variety of materials (marine mollusk shell, coral, ostrich eggshell, faience, stone), all of which were probably locally produced, the remaining items were glass bead imports from both the Mediterranean and Sri Lanka/South India. Furthermore, many decorated objects and the techniques used to make them find parallels in the elite Nobadian cemeteries

of Qustul and Ballaña, suggesting the royal character of some of the Early Makuria tomb-owners at el-Zuma (Then-Obłuska 2017d).

Berber lies between the Fifth and Sixth Cataracts, some 150 km north of Meroë. Rescue work and regular excavations were carried out at the Meroitic cemetery there between 2009 and 2013 by the National Corporation for Antiquities and Museums (NCAM) with logistical support from the SFDAS (Bashir 2010; 2014; 2015; Bashir and David 2010; 2015). The period about 2000 years ago was when the Kushite Kingdom controlled a large amount of territory and exerted a great deal of power in the area. C^{14} dates and an important review of the ceramic material has revealed a development of the necropolis from probably about the 2nd century BC to about the 3rd century AD (Bashir and David 2015; Bashir 2015). Although the Kushites often built pyramids to bury their dead, these graves are entirely underground and contain impressive artifacts that are comparable with finds at Meroë. With the exception of three tombs with mud-brick pyramid foundations, the cemetery at Berber shows no traces of visible superstructures covering the graves. However, it is likely that some tombs were covered by low gravel mounds, a common feature in some Meroitic cemeteries such as Gabati (Bashir and David 2015).

The variety and diversity in terms of points of origin of the materials from Berber is directly related to trade and the exchange of prestigious items among elites, as a mechanism controlled by the royals to exercise power. The presence of such items, and the important geographical location of Berber at the north end of a corridor linking the Nile and the Red Sea to the southern part of the kingdom of Kush, shows that the region was a crossroad for trade caravans. This argument has been supported by the archaeological evidence, including the discovery of ancient routes passing by Berber and some way-stations located along the desert route to Berber (Bashir 2015). About 2630 beads and pendants, together with some fragments, were collected from 16 tombs excavated between 2009 and 2013. They were mostly made of faience, glass, and metal-in-glass, but also from ostrich eggshell, stone, silver and bone. Metal-in-glass beads constitute a quarter of the bead assemblage (Then-Obłuska 2018b). Some of them belong to one of the most characteristic metal-in-glass bead types and were decorated with an impressed lozenge motif on one side and a figurative motif of Harpocrates on the other (compare SNM54). The huge diversity of bead types makes the assemblage comparable to Meroitic assemblages from the royal cemeteries of Meroë.

Meroë lies between the Fifth and Sixth Cataracts of the Nile Valley, some 209 km north of Khartoum. Ancient Greek and Roman authors wrote knowledgeably about Meroë, which was once the center of a kingdom whose elites participated in the religious, political, and economic life of Egypt and the greater Mediterranean world (Dunham 1957; 1963; Yellin 2012: 258). The last pyramids in Africa were built for Meroitic elites and rulers buried in three cemeteries at Meroë, or modern Begrawwiya: the Western, Southern, and Northern Cemeteries. The Western and Southern Cemeteries also contained pit and mastaba burials for non-elite Nubians, and the Western Cemetery continued to be used for elite and non-elite burials until the end of the Meroitic period (mid-4th century AD).

Beads coming from excavations at Meroë have been published in the original excavation reports (Dunham 1957; 1963). Most of the objects are stored in the Museum of Fine Arts in Boston, while the remainder were left in Sudan and are now stored at the Sudan National Museum (e.g., Eisa 1999; Markowitz and Doxey 2014). Many objects were divided between the two museum collections and the beads have been partly published (e.g., Eisa 1999; Markowitz and Doxey 2014; Liu 2014; Then-Obłuska 2015c). A string of tabular face beads belongs to the most spectacular bead finds (e.g., Liu 2014). About 35 lozenge-shaped mosaic glass face beads and some fragments were excavated by the Boston Museum of Fine Arts and Harvard University at the beginning of the 20th century (Dunham 1963: 143, Fig. S:XVm and 108j, Object 23–1–310), found with the burial of an eight-year old male child in tomb W 308 (Dunham 1963: 143). To be more precise, they were found to the right of the skeleton, among other grave offerings, including hundreds of beads and amulets (Dunham 1963: 146–151, Objects 23–1–303 to 23–1–317, Fig. 105b).

The face beads were divided in 1927 between the Sudan National Museum and the Boston Museum of Fine Arts where they are registered as MFA 23.830 (Markowitz and Doxey 2014; Liu 2014). Ten of the face beads from that grave are in the Sudan National Museum, catalogued as SNM 2167 [see ***Pls 32a–h***]. The lozenge-shaped beads from Meroë are outstanding among the many face beads found in Roman contexts throughout the ancient world (Liu 2014). Sampling of three

fragments of two types of face beads from W 308 (SNM55–SNM57), kept in the Sudan National Museum in Sudan (Liu 2014: 44), was generously granted for this study.

3.4 MAP and MNW

In 2003, the Polish Centre of Mediterranean Archaeology University of Warsaw (PCMA), together with the Archaeological Museum in Poznań (MAP), joined the international Merowe Dam Archaeological Salvage Project, a salvage operation to investigate and record archaeological sites along the river from the proposed high dam in the Fourth Cataract region, which was planned to extend over 170 km upstream from modern-day Karima. For five years, Dr. Bogdan Żurawski from the Polish Academy of Sciences, Dr. Mahmoud El-Tayeb from the University of Warsaw and Dr. Marek Chłodnicki from the Poznań Archaeological Museum examined a 45–km-long belt on the left bank of the Nile in the easternmost part of the Fourth Cataract between Shemkhiya and Khor Umm Ghizlan, including the islands of Saffi and Uli, as well as the Christian stronghold of Dar el-Arab. The survey zone covered the river valley on the left bank and the adjacent desert extending between the said localities (Krzyżaniak et al. 2005; Chłodnicki 2007; Chłodnicki et al. 2007; Żurawski 2007a; 2007b; 2008; 2010).

The Polish were able to recreate settlement patterns and reconstruct the material history of this region from their examination of nearly 500 tombs representing a range of time periods and of many different settlement sites, including three strongholds. Altogether 1200 archaeological sites were described, photographed and otherwise documented. At the beginning of 2010 everything that had been excavated by these various missions was transferred to the museum in Karima and an official division of finds awarded half the finds to the Polish side. The MAP and MNW received pottery vessels, a decorated bronze cup, bronze arrowheads and spearheads, stone archers' rings, bronze and silver rings and bracelets, and finally many dozens of small beads made of ostrich eggshell, faience, glass, quartz, carnelian and other stones that had been restrung into various necklaces and bracelets. The Late Meroitic and post-Meroitic objects were excavated at el-Sadda, Saffi, Hagar el-Beida, Umm Saffaya, el-Gamamiya, el-Ar, Shemkhiya, Musa, Ashkot, and Dar el-Arab. Some of them are barely mentioned in the excavation reports, but the sites are presented below.

El-Sadda 1, the most important post-Meroitic tumulus cemetery in the PCMA concession, is located on a vast plain on the right side of Khor Umm Ghizlan, and was excavated between 2005 and 2007 (the PCMA and MAP were joined by the Patrimonium Foundation in the excavation effort) (Chłodnicki 2007: 207–208; Osypiński 2007). The site encompassed 74 superstructures clustered in six groups, as well as tombs with mounds that appeared to be completely destroyed or had never existed in the first place; of these, 26 tumuli and three flat-topped graves were examined. Tomb T.79 had a very deep, slightly trapezoidal shaft and a vast chamber with an entrance subdivided by a pillar in the middle. It had been plundered and all that remained of the skeleton and grave goods lay in the southern part of the chamber: animal bones, beads of faience, stone and glass, as well as a ring made either of bronze or of poor-quality silver. The human bones were greatly disturbed and deposited by the west wall of the chamber. In the sandy fill of the plundered shaft, large pottery sherds were recorded together with fragments of woolen cord, probably the remains of a cloth in which the body had been wrapped (Osypiński 2007; 2010). The present study sampled 14 beads from four of the Late Meroitic to post-Meroitic tumuli, including the one described above (T.18, T.33, T.69, T.79) (MAP01–MAP06, MAP18–MAP25).

Hagar el-Beida 1 cemetery, located in the vicinity of the houses of Hagar el-Beida village, consists of 14 large tumuli (10–20 m in diameter) of the Late Meroitic/post-Meroitic transition or post-Meroitic periods. Among them is a "royal tumulus", T.10, measuring 32 m in diameter and 6 m in height. All the graves had been plundered in ancient times, leaving behind a smattering of grave goods. The burial chamber was lined with bricks and furnished with a brick-lined shaft. A 2–m-high kerb surrounded the grave structure, which was subsequently covered with a mound reaching 5 m in height. The main chamber still contained three ceramic pots, three copper alloy bowls—two with a masterful lotus-flower ornament—a ladle-pot and a small cup, as well as a dozen iron arrowheads of different types. Scarce human skeletal remains were found. Other finds from the fill included copper-alloy rings and beads of faience, quartz, agate and glass. The grave could be attributed to post-Meroitic times, but at least part of the grave and equipment was of Meroitic date. The Hagar el-Beida tumulus was built in the Dar el-Manasir region, far from any known center

of power, and may have been constructed for a member of the ruling family during the 4th century AD (Lemiesz 2007; Chłodnicki 2007; 2014; 2015: 227; Chłodnicki et al. 2007; Chłodnicki and Stępnik 2013). Two beads of glass from this tumulus were samples for the present study (MAP29––MAP30).

Hagar el-Beida 2 lay in a vast wadi south of Hagar el-Beida 1. The cemetery consisted of 93 tumuli and two general types of graves: burials covered with mounds of silt and gravel with loose pebbles on top and graves encircled by stone rings. Most of them were 5–8 m in diameter. They were plundered, both in antiquity and in modern times. Graves from the eastern part of the site yielded many arrowheads, spearheads and two archer's rings; they are thought to be "warriors' graves, dated provisionally to the Late Meroitic (Chłodnicki 2007: 208–209). Warriors' graves were clearly prevalent in the excavated part of the site. A shared feature of all the burials was the variety of personal adornments, observed especially in the male burials. Excavations produced evidence of strings of beads, either singular or wrapped several times around, being used as necklaces. Beads also appeared as bracelets, but in this case the string was composed of just one kind of bead. Strings of beads could also be wrapped around the hips; in this case the beads were of ostrich eggshell exclusively. Finally, beads could also be attached to pieces of clothing (Longa 2011: 507; Chlodnicki 2015). Preliminary analysis of the ceramic material and tumulus structure has set the date for the Hagar el-Beida 2 burials in the Late and post-Meroitic periods (Longa 2011). Six beads from three tumuli (T.25, T.27, T.29) were sampled for the study (MAP32–MAP35).

Gamamiya 66 is said to be a Napatan cemetery in all likelihood. The stone structures there were destroyed, the pottery, bones and beads scattered (Chłodnicki et al. 2007). A surfce find of a bead fragment was studied (MAP10).

Shemkhiya 4 is a small cemetery complex of four to eight tumuli (Chłodnicki 2007; Żurawski 2008; 2010). One bead sample in the study (MAP14) comes from T.1 and belonged to an adult female (aged between 25–35 years). The bigger complex, **Shemkhiya 5,** counted more than 20 tumuli, many evidenty freshly plundered (Chłodnicki 2007). They are of about 5–8 m in diameter and 1.00–1.50 m in height. The overwhelming majority of burials are of women and children up to six years old with a fairly uniform set of grave goods for adults as well as children. The intact burial in T.14 yielded a black ware balsamarium/unguentarium, considered an example of Mediterranean cultural influence in Late Meroitic contexts (Żurawski 2008: 159). The necklaces wrapped around the neck of jars deposited outside the burial chamber in tomb T.3 are viewed as a post-Meroitic custom (Żurawski 2008: 159). The cemetery was dated to between the 2nd and 4th centuries AD (Żurawski 2008; 2010). One bead sample in the study (MAP15) comes from grave T.6 of an adult female (30–35 years old).

Safi 56 is a post-Meroitic tumulus cemetery that was excavated in 2004–2005 on Safi Island. The cemetery sits in a wadi bed. Despite earlier robbing at least once in the case of all of the mounds on Safi 56, excavations recorded vessels, arrowheads, basketry, beads and pendants; these have yet to be published in detail (Żurawski 2005; 2007b).

El-Ar 1 lay on the outskirts of Ab Naqaqir village, on the border between the *mantiqa* of el-Ar and **Umm Saffaya**, in the bed of a Nile palaeochannel branching out from the river near the village. All 31 graves at the site were excavated between 2007 and 2009 (Żurawski 2010: 197). Among the finds was a huge fragment of a leather shield from tomb T.8 (Żurawski 2010: 207). T.27 was the smallest double-shaft tomb in the cemetery, the only one not plundered in antiquity, hence it yielded an extremely rich collection of grave goods. All the double-shaft graves at el-Ar belonged to people of the highest social status. The ceramic collection suggests the late 4th/early 5th century as the most plausible period for the burials. One of the two etched carnelian beads known from Nubia comes from these excavations (Then-Obłuska 2013; 2018d).

Of the three tumuli from site **el-Ar 2** (T.6, T.15, T.32) (Chłodnicki 2007; 2015), the heavily plundered T.32 yielded one of the richest sets of finds. The tumulus, which was approximately 12 m in diameter and 1 m in height (Żurawski 2010: 210–211), covered a burial chamber which yielded two archer's rings, a figurine of Isis suckling Horus on her knees, a copper-alloy chain, a ring and bracelet from the same material, and a collection of ostrich eggshell, faience, and glass beads.

CHAPTER 4

MORPHOLOGICAL DESCRIPTION OF GLASS SAMPLES

4.1 Introduction

The morphological description of glass beads (centrally perforated objects) and pendants (objects with off-center perforation or with attached loop) follows the terminology of Maud Spaer (2001) and Peter Francis Jr (2002). However, Spaer's work primarily categorizes glass objects according to non-decorated and decorated categories (trail-decorated, mosaic, crumb and spot, and gold-in-glass). In the present study, the typology is based principally on technique of manufacture/perforation of the bead body and subsequently on decoration technique.

A bead body can be a section of a drawn glass tube. Otherwise, molten glass can be wound around a rotating mandrel to form a bead. Glass strips can be folded, or joined around a mandrel to form a bead. Glass can also be rod-pierced with a mandrel. Small drawn glass tubes were heated and then segmented by rolling them on open molds with grooved or crenellated surfaces (4.2.1). Segmented tubes were cut or snapped at intervals to produce single- or multiple-segment beads. Their ends were left sharp or hot-finished. As a result of segmenting on molds, the shape of the perforation is more or less oblate and the bead openings are contracted. Rather than being segmented on molds, some heated tubes seem to have been segmented by pinching the tube at regular intervals to form a bead. Drawn glass tubes, when cold, could also be cut into beads. This preserves the cylindrical shape of the perforation. Their ends can be left unworked (4.2.2) or they are hot-finished (4.2.3). Otherwise, beads were heat-rounded (4.2.4).

Drawn glass could be monochrome, compound (two layers or tubes of glass), composite (more than two layers of glass), metal-in-glass (two layers of transparent glass with metal foil in-between), and striped (with longitudinal stripes). Sections of mosaic glass cane with an eye pattern could be applied to drawn and segmented beads. Metal-in-glass beads could be additionally shaped into collared or tabular beads. The latter could have geometric and/or figurative motif pressed onto their surfaces.

Wound beads were made by winding molten glass around a mandrel into globular or oblate forms (4.2.5). They could be decorated with the application of mosaic or stratified eyes. Stratified eyes were made of a few glass layers. The wound beads could also be trail-decorated.

Beads that exhibit traces of a single seam were made of a glass strip that was folded around a rod (4.2.6). The strip could be made of monochrome or mosaic glass. Monochrome folded glass could have been decorated with mosaic eyes. Joining two or more strips around a mandrel results in two or more seams (4.2.7). Often three mosaic-glass strips were joined to form a bead.

For some beads the technique of manufacture remains uncertain (4.2.8). They were certainly made using a mandrel, so they are called mandrel-formed. Some of them were additionally marvered on a flat plate giving facets. Other beads were decorated with mosaic eyes.

Monochrome and mosaic glass could be perforated through piercing with a hot rod or a rod was used for heated glass (4.2.9). Monochrome rod-pierced beads could be decorated with mosaic eyes.

4.2 Techniques, provenance, parallels and dating

All bead samples in the study are presented below according to the techniques of production mentioned above. They are illustrated in a catalog

MIND MAP OF TECHNIQUES DISCUSSED IN THE CHAPTER

4.2.1 Drawn and segmented glass

- 4.2.1.1 MONOCHROME
  - 4.2.1.1.1 *Small*
  - 4.2.1.1.2 *Large*
  - 4.2.1.1.3 *Tapered cylinder*
  - 4.2.1.1.4 *Ellipsoid*
- 4.2.1.2 MONOCHROME WITH APPLIED MOSAIC DECORATION
- 4.2.1.3 STRIPED
- 4.2.1.4 COMPOUND
  - 4.2.1.4.1 *Small compound bichrome*
  - 4.2.1.4.2 *Large compound bichrome*
  - 4.2.1.4.3 *Large compound colorless*
- 4.2.1.5 METAL-IN-GLASS
  - 4.2.1.5.1 *Small*
  - 4.2.1.5.2 *Large*
  - 4.2.1.5.3 *Long collared*
  - 4.2.1.5.4 *Melon*
  - 4.2.1.5.5 *Collared melon*
  - 4.2.1.5.6 *Figurative*

4.2.2 Drawn and cut glass

4.2.3 Drawn and cut gold-in-glass with finished ends

- 4.2.3.1 TINY CYLINDER
- 4.2.3.2 LARGE GLOBULAR
- 4.2.3.3 SMALL ELLIPSOID

4.2.4 Drawn, cut and rounded glass

- 4.2.4.1 MONOCHROME
- 4.2.4.2 COMPOUND

4.2.5 Mandrel-wound glass

- 4.2.5.1 MONOCHROME
- 4.2.5.2 SEGMENTED
- 4.2.5.3 COILED
- 4.2.5.4 MONOCHROME WITH APPLIED DOTTED DECORATION
- 4.2.5.5 MONOCHROME WITH APPLIED TRAIL DECORATION
- 4.2.5.6 MONOCHROME WITH APPLIED STRATIFIED EYES
- 4.2.5.7 BICHROME

4.2.6 Folded glass

- 4.2.6.1 MONOCHROME WITH APPLIED MOSAIC DECORATION
- 4.2.6.2 MOSAIC

4.2.7 Joined glass

- 4.2.7.1 MONOCHROME AND MOSAIC
- 4.2.7.2 MOSAIC
  - 4.2.7.2.1 *Checkerboard*
  - 4.2.7.2.2 *Flower*

4.2.8 Mandrel-formed glass

- 4.2.8.1 MONOCHROME
- 4.2.8.2 MONOCHROME FACETED
  - 4.2.8.2.1 *Flattened bicone*
  - 4.2.8.2.2 *Circular bicone*
  - 4.2.8.2.3 *Long circular bicone*
  - 4.2.8.2.4 *Hexagonal bicone*
  - 4.2.8.2.5 *Small long cornerless cuboid*
  - 4.2.8.2.6 *Large long cornerless cuboids*
  - 4.2.8.2.7 *Small cornerless cubes*
  - 4.2.8.2.8 *Large cornerless cubes*
- 4.2.8.3 MONOCHROME WITH APPLIED MOSAIC DECORATION
- 4.2.8.4 MOSAIC

4.2.9 Rod-pierced glass

- 4.2.9.1 MONOCHROME
- 4.2.9.2 MONOCHROME WITH APPLIED MOSAIC DECORATION
- 4.2.9.3 MOSAIC
  - 4.2.9.3.1 *Round tabular*
  - 4.2.9.3.2 *Lozenge tabular*

that encompasses their context and morphological details (see below) and in synoptic plates (see Catalog below), where they are arranged according to the collections (SJE, SNM, MAP, MNW) and their sample number.

In spite of their apparent profusion in graves, no clear evidence for the production sites of glass beads has so far been found within the boundaries of the territory here considered. Archaeological evidence that enables the tracing of their external provenance is given whenever possible. The parallels come mainly from the collections studied at the MAUS/SJE, MAN, MNW, MAP, SNM/NCAM (see Abbreviations for the extended names of collections), and Naprstek Museum in Prague. Additionally, in the case of the drawn and rounded glass beads, the parallels also encompass the JE, GAM, MAN, MFA, MET, OIM, Peabody, and UCSB/ASU assemblages. The locations of the sites they were found at are shown in ***Fig. 4–1***. Parallels for some bead types are gathered in ***Tables 4–1*** to ***4–18***, which are arranged by site and given in geographical order from north to south, up the Nile. Some bead parallels are illustrated in ***Plates 1–32***.

4.2.1 Drawn and segmented glass

The molds with crenellated surface that were used in the production of segmented beads have been found in early and late Roman contexts at Alexandria in Egypt (Kucharczyk 2011: 63–64, Fig. 8:1, 2nd–3rd centuries AD; Rodziewicz 1984: 146–159, 241–242, Figs 265–266, Pl. 72, Nos 359–366, end of 5th–6th centuries AD). On the basis of the shape of the molds that were used for their manufacture, drawn and segmented collared gold-in-glass beads have also been associated with the Alexandrian bead workshops (Rodziewicz 1984; Spaer 2001: 133–134; Kucharczyk 2011). Gold-in-glass beads are thought to have been produced on Elephantine in the early Roman period in Egypt (Rodziewicz 2005: 34–35), and at Meroë, from where they were exported around the world (Markowitz 2012). However, no evidence has been provided to support these claims.

4.2.1.1 Monochrome

Monochrome globular beads could be small or large, either tapered cylinders or ellipsoids. The varieties are presented below.

4.2.1.1.1 Small

All but three beads are single-segments of a monochrome drawn and segmented tube. Three beads are double-segments (**SJE08**, **SJE09**, **SNM42**). They were found in the following colors: opaque red (**SJE08**, **SNM21**, **SNM50**, **SNM65**, **SNM66**, **SNM74?**, **MAP03**, **MNW02**), translucent dark blue (**SJE09**, **SJE49**, **SJE50**, **SJE61**, **SNM23**, **SNM42**, **SNM49**, **MAP02**, **MAP05**, **MNW04**), translucent dark green (**SJE01**, **SJE29**, **SJE60**, **SNM18**, **MAP04**, **MAP35**, **MNW03**, **MNW07**), turquoise (**SJE31**, **MAP12**, **MNW11**), yellow (**SJE07**), black (**SJE19**), opaque green (**SJE33**), translucent red (**SJE14**), amber (**MAP25**), dark purple which appears black (**SJE15**), and transparent colorless (**MNW08**). The beads usually measure less than 5 mm in diameter. They are found in Meroitic and post-Meroitic contexts in Nubia.

It is difficult to make a distinction between Meroitic and post-Meroitic drawn and segmented beads. In general, Meroitic/early Roman specimens are often tiny single- and multiple-segments (Then-Obłuska 2018a). For example, the samples **SJE60** and **SJE61** represent hundreds of tiny single- to multiple-segment drawn beads that formed two armlets and were found in a post-Meroitic grave (Säve-Söderbergh 1981: 169, SJE416/10:8a and 8b) [***Pls 1, 2***]. However, the armlets, and another object made of small faience beads and a single compound drawn glass bead (SJE416/10:8c) from the same grave, are Meroitic in date. Similar specimens are found in Meroitic and early Roman contexts, are less than 3.5 mm in diameter, and are often multiple-segments of regular short oblate shape, as mentioned above (e.g., Then-Obłuska 2015b: Fig. 4:9; 2018a). The post-Meroitic/late Roman specimens are often globular or irregular in shape [***Pls 3–6.2***] and, rarely, cylindrical [***Pl. 6.3***].

Drawn and segmented beads appeared in the Meroitic period in Nubia and they became the most common glass bead type in post-Meroitic collections. Whereas red beads (Barn Red 10.0R 3/8) dominate the Meroitic and post-Meroitic Nubian glass assemblages, dark blue is the second most common color and green is the third [***Tables 4–1*** to ***4–3***]. Yellow and black beads are less common finds [***Tables 4–4, 4–5***]. The beads were found both alternated with other bead types and in uniform strings. Drawn and segmented monochrome beads, in the above-mentioned colors, are the second most common glass type at the 4th–6th century AD Red Sea port of Berenike (Then-Obłuska 2015b; 2018a).

4.2.1.1.2 Large

Some single-segment drawn beads are larger than those mentioned above, measuring more than 5 mm

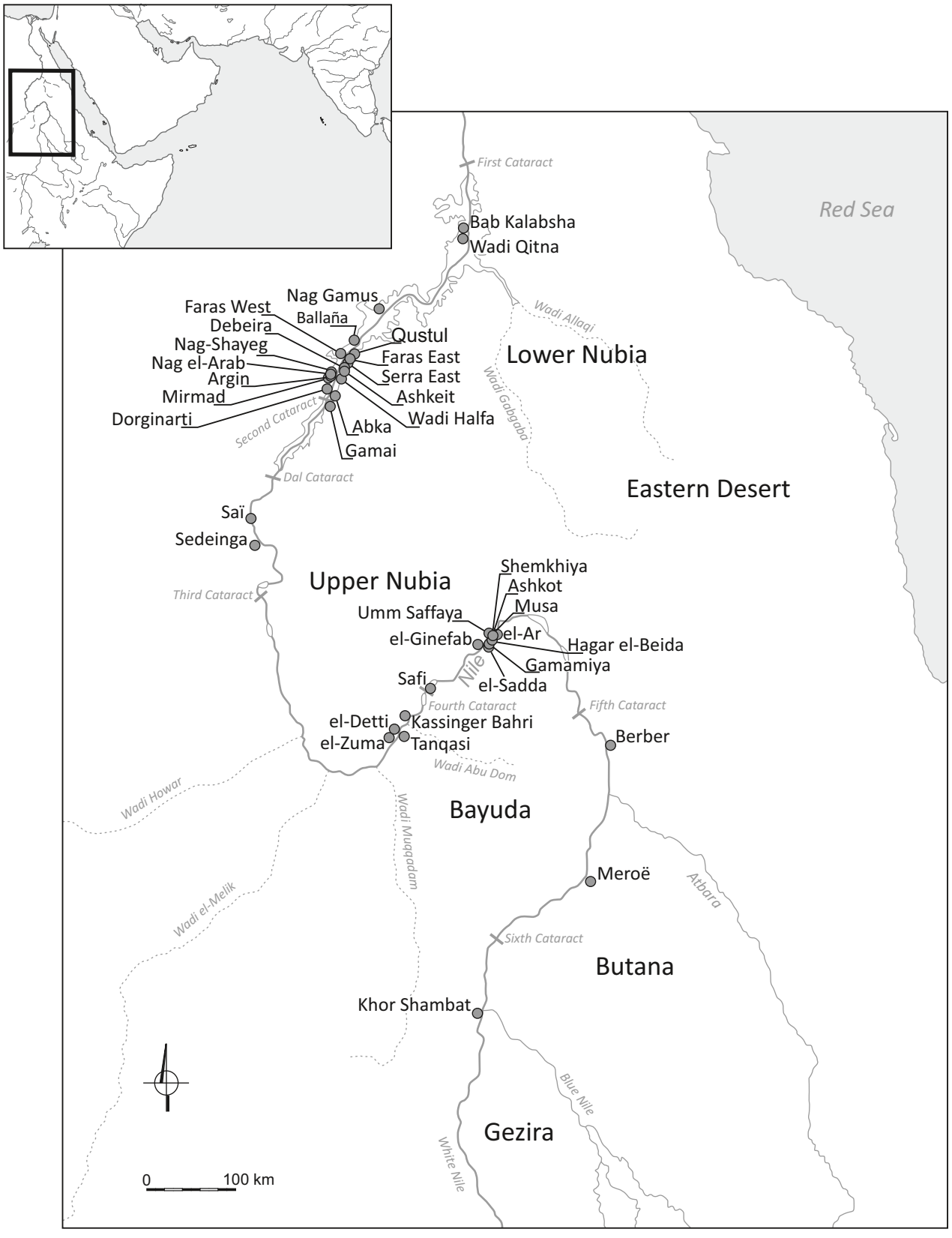

Fig. 4–1. Map of Nubia, showing the localities mentioned in the text

in diameter and 4 mm in length. Green beads have been found in Meroitic graves (**SNM29**, **SNM30**, **SNM40**), opaque red examples (**SJE30**) in post-Meroitic graves and there is a yellow one (**SJE44**) of most probably post-Meroitic date. Opaque red specimens are more common overall [***Table 4–6***] and are also recognized in contemporary contexts at Late Berenike (Then-Obłuska 2015b: Fig. 4:10–11).

4.2.1.1.3 Tapered cylinder

A small yellow bead took on the shape of a tapered cylinder (**SNM53**). It is represented by 36 beads found in a Meroitic Berber grave, BMC T31/258 [***Pl. 7.1***]. They are larger than the small drawn and segmented beads, and measure 5.1–6.3 mm in diameter and 5.8–9.8 mm in length. Similar beads can be observed among the finds from Karanog (Silverman 1997: 302–303 and PENN Inv. E7925) and Mirmad tomb T.75 (MAN 1980.96.422.160).

A large tapered cylinder translucent green bead (**SNM04**) from a Meroitic grave is as yet unparalleled.

4.2.1.1.4 Ellipsoid

Some beads seem to be pinched-off of drawn tubes rather than segmented in molds as in the case of a long ellipsoid black bead from a Meroitic grave at Sedeinga (**SNM03**) [***Pl. 7.2***].

An amber bead (**SJE65**) features elongated ends that might be evidence of pinching it from a tube. The sample was found in a Meroitic grave. Two similar beads were recorded from post-Meroitic grave T.21 at Mirmad (MAN 1980.96.176).

4.2.1.2 Monochrome with applied mosaic decoration

A white bead body was pinched off from a drawn tube and decorated with mosaic eyes in blue and white (**SNM38**). Another dark blue bead body was decorated with mosaic eyes in white, black, white, red (**SNM39**). These beads are rather large, measuring about 8 mm in diameter and 7 mm in length. They were found in a Meroitic grave at the Berber cemetery dated between the 1st century BC and the 3rd century AD [***Pl. 20.2***] (Bashir and David 2015).

4.2.1.3 Striped

A small globular bead was a segment of a drawn dark purple tube decorated with five white longitudinal stripes (**MAP23**). It comes from a grave dated to the late Meroitic to post-Meroitic period. Small drawn and segmented striped beads have been discovered in other Meroitic and early Roman contexts. They have been recorded from assemblages in tomb Q 427 at Qustul (Williams 1991a/I: 124; 1991a/II: 82–83, OIM E21544, personal observation) and tomb T.98 at Nag Shayeg (e.g., MAN 1980.93.160) [***Pl. 8.1***]. A small double-segment bead was found in an early Roman assemblage at Berenike (Zych 2011: 146, Cat. 71c, Fig. 12–68, late 1st to early 2nd century AD).

A large globular black bead, most likely drawn, exhibits six longitudinal white stripes (**SNM12**). Although it has rough ends, traces of the segmented portion are preserved there. It comes from a Meroitic grave at Sedeinga. No parallel could be traced so far.

4.2.1.4 Compound

Compound beads consist of two layers or two glass tubes. In the latter case, a smaller tube is set into the larger one. Examples from the studied collections are presented below.

4.2.1.4.1 Small compound bichrome

Small compound beads can be bichrome: translucent red-on-colorless (**SJE41**, **SNM50**) and opaque red-on-colorless (**SJE56**, **MAP08**, **SNM51**), colorless-on-red (**SJE71A**, **SJE71B**), yellow-on-colorless (**MAP15**), green-on-yellow (**SNM31**), green-on-white (**SNM05**). They are less than 5 mm in diameter. One of the samples above (**SJE56**) is said to have been found in a post-Meroitic grave. However, like two other samples (**SJE58**, **SJE59**), they are usually found in Meroitic contexts.

Red-on-colorless compound glass beads have been found in early Roman contexts at the Red Sea port site of Berenike (Zych 2011: Cat. 72, Fig. 12–69; Then-Obłuska 2015b: Fig. 4.18) and at 1st-to-3rd-century AD Meroitic burial sites (Then-Obłuska 2015a: Fig. 13: S041/l, Sedeinga; 2016c, Saï; MAN 1980.96.351.89, Mirmad; SJE416/10:8c, Abka; BMC T33–256 and BMC T32–255/8, Berber) [***Pl. 8.2***]. Yellow-on-colorless glass beads were found on the surface at the Meroitic site of Sedeinga (Then-Obłuska 2015a: Fig. 13: S024/a) and in early Roman contexts at Berenike (Then-Obłuska 2015b: Fig. 4.17). A green-on-white bead was found in an early Roman deposit at Berenike (Then-Obłuska 2015b: Fig. 4.16), while green-on-yellow examples were found in Meroitic tombs at Abka (SJE250/8:2) and Berber (BMC T23–268/2).

4.2.1.4.2 Large compound bichrome

Two large compound bichrome specimens are orange-on-red (**SNM06** and **SNM33**), and measure

about 7 mm in diameter. Examples were also found in Meroitic graves at Saï and Sedeinga (Then-Obłuska 2015a; 2016c).

4.2.1.4.3 Large compound colorless

Unlike examples above and below, some large specimens are made of two very thick transparent tubes, the inner one set into the outer one and then segmented (**MAP14**, **MAP22**, **MNW05**, **MNW06**, **MNW10**). The inner tube can be much smaller in diameter than the outer one, which results in a gap between them. The layers happen to be dark in color and this gives the impression of a metal-in-glass bead [***Pls 9–12***], but they usually lack a metal-foil layer. They measure about 10 mm in diameter. Large metal-in-glass beads or their imitations appear mainly in late Meroitic assemblages in Upper Nubia (Then-Obłuska 2014a: Pl. 2.154). Only a few specimens have been found in Lower Nubia [***Table 4–7***].

4.2.1.5 Metal-in-glass

Metal-in-glass beads were made of two colorless glass layers with gold or silver foil in between, so they are called gold- or silver-in-glass, or sandwich beads. They could be simple-bodied or additionally shaped (for all the varieties found in the sample collection. see below).

4.2.1.5.1 Small

Small single- (**SJE64**, **SNM45**) and double-segment beads exemplify the gold-in-glass type (**SJE42**, **SNM26**), featuring similar thicknesses of the outer and inner glass layers. Small single- and multiple-segment gold-in-glass beads are typical of Meroitic assemblages in Nubia [***Table 4–8***]. Although **SJE42** was found in a post-Meroitic grave, it belongs to a Meroitic type, as seen by the example in a Meroitic grave at Abka (SJE250/24:3). The beads measure less than 5 mm in diameter.

Small silver-in-glass single-segment beads also feature a similar thickness of the two glass layers (**SJE35**, **SJE57**). **SJE57** comes from a post-Meroitic grave, although the grave contained other reused Meroitic beads. Small silver-in-glass beads are typically found in Meroitic graves (SJE416/23:1c, Abka; BMC T17–253/6, 11 beads) [***Pl. 13.1–2***]. The beads measure less than 5 mm in diameter.

4.2.1.5.2 Large

Larger globular gold-in-glass beads (**SJE40**, **SNM36**, **SNM41**) feature a much thicker inner layer with a thinner outer one. They were very common in Meroitic graves at Berber (BMC T09–87/5, five beads, BMC T12–22/1, 18 beads, BMC T27–266/9, 36 beads and nine halves, BMC T31–259/4, 17 beads, BMC T31–259/5, 22 beads and two halves, BMC T33–256/2, three beads, BMC T01–12/1, 38 beads and eight halves, BMC T33–256/2, 199 beads and two halves) [***Pls 14–16***]. They measure about 7 mm to 10 mm in diameter.

A large silver-in-glass drawn and segmented bead (**MAP13**) partly lacks the metal foil. Silver-in-glass beads are found in late Meroitic, post Meroitic and late post-Meroitic sites in Lower Nubia, and to some extent in the Fourth Cataract region [***Table 4–9; Pl. 13.3***]. They measure between 4 and 7 mm in diameter.

4.2.1.5.3 Long collared

The same thick inner layer and thin outer one can be observed on a long bead with collars at both ends (**SNM52**). Long collared beads were found in graves at Berber (BMC T12–23p/4, five beads in fragments, BMC T31–260, 64 beads and three fragments, BMC T33–256, 57 beads and 17 fragments; BMC T33–256/3, one bead and three fragments, BMC T33–256/1, one bead) [***Pl. 17***]. They measure about 4 mm in diameter and about 17 mm in length.

4.2.1.5.4 Melon

Some gold-in-glass beads were additionally ribbed, resulting in a melon shape. Both a tiny melon bead (**SNM19**) and a large one (**SNM20**) were found in the collections. All were found in Meroitic graves. The larger example is similar to examples from the tomb of Queen Amanishakheto at Meroë (Spaer 2001: Fig. 59).

4.2.1.5.5 Collared melon

Another example presents a small gold-in-glass collared bead that was ribbed (**SJE34**). It was found in a Meroitic grave at Serra East in Lower Nubia.

4.2.1.5.6 Figurative

Gold-in-glass beads could be decorated with impressions of geometric or figurative motifs. The examples in the collection are long tabular gold-in-glass beads, having a lozenge net pattern on one side and a figurative motif on the other (**SNM54**). While many beads have dotted impressions on the side opposing the figurative surface, the beads from Berber had nothing but lozenge patterns.[1] The figure that can be observed on at least 12 complete specimens and their frag-

ments from a tomb at Berber [*Pl. 18*] presents the deity Harpokrates, a boy with a finger touching just below his mouth, accompanied by a horn of plenty at his side. Harpokrates wears a crown over the lunar disk on his skullcap. Elsewhere, beads decorated with figurative motifs were found in contexts dated between the second half of the 1st century BC and the middle of the 1st century AD (Spaer 1993: 20; Lankton 2003: 55, Fig. 6.2).

The luxurious gold-in-glass beads with figurative motifs are rare on the whole. However, they have been found primarily in Nubia (e.g., Shinnie and Bradley 1980: Item 2515, Fig. 68, Meroë and MET 10.130.2479_EGDP017279; Woolley and Randall-McIver 1910: 75, Karanog; Dunham 1957: 108, Fig. 73, Pl. 66F; Markowitz and Lacovara 1996: Fig. 8, although described as made of blue glass, Beg. N6 in Meroë; JE 40103, provenance not given; object 86.2.5/20, Qasr Ibrim, record at the BM, Dr. Pamela Rose, personal communication), but also in Egypt, southern Russia and Iran (Spaer 1993: 16 and references therein; Spaer 2001: Cat. 234–235 and references therein; Whitehouse and Brill 2005: Cat. 72).

4.2.2 Drawn and cut glass

Silver-in-glass long cylinders having simple cut ends are also found (**SNM35**). The sample represents a group of more than 24 beads and some fragments found at Berber in grave BMC T01 [*Pl. 19.1*]. They are rather large beads, measuring approximately 5.5 mm in diameter and 6.8–8.2 mm in length. No parallels have yet been traced.

4.2.3 Drawn and cut gold-in-glass with finished ends

Gold-in-glass beads, either short tubes or spheres, with hot-finished (fire-polished) ends were produced in Rhodes between the 3rd and the 2nd century BC (Weinberg 1969: Pl. 79d; Spaer 2001: 133–134). The drawn and cut glass beads with finished ends in this study are tiny cylinders, large globular beads or small ellipsoids.

4.2.3.1 Tiny cylinder

Sample **SJE63** represents 28 tiny drawn gold-in-glass beads that have hot-finished ends [*Pl. 19.2*]. They come from Meroitic grave 22 at site 416, Abka (SJE 416/22:3). Six similar beads have been ascribed to grave 23 at the same site (SJE 416/23:3). Additionally, this type has been observed in Meroitic graves at Qustul (e.g., OIM E20573=Williams 1991a/I: 117; 1991a/II: 34).

4.2.3.2 Large globular

Large gold-in-glass Meroitic beads with hot-finished ends and a cylindrical shape of their perforations are also represented in the study collection (**SJE62**, **SNM37**, **SNM44**). The large globular beads from a Meroitic grave at Berber measure between 12.4 mm and 15 mm in diameter and their hole diameters are from 5 mm to 7 mm (BMC T09–87/5) [*Pl. 20.1*].

4.2.3.3 Small ellipsoid

A similar treatment of the ends and the shape of the perforation have been noted for ellipsoid beads from a Meroitic grave at Berber, BMC T17–253/5 (**SNM47**) [*Pl. 20.2*]. The beads usually have large hole openings.

4.2.4 Drawn, cut and rounded glass

In contrast to the beads made by segmenting drawn tubes on open ribbed molds, as mentioned above, some beads are made by cutting drawn glass tubes, while cold, into sections. To smooth the sharp ends of the sections, they were mixed with ash and heated while stirring in a pan. Ash prevents the beads from sticking together and the holes do not close due to the action of heat. As a result beads have more or less rounded ends. This way of rounding drawn beads is considered as an indicator of South Asian technique and the beads are usually called South Asian or Indo-Pacific in the literature (Francis 2002). Peter Francis Jr (2002: 25, Fig. 3.3, sketch of "roundness" factor) distinguished four stages of drawn beads roundness.

4.2.4.1 Monochrome

Drawn and rounded beads in purple, which appears black to the eye (**SJE67**), and opaque yellow (**SJE68**) have been recognized in the Meroitic assemblages of Abka in Lower Nubia. Translucent amber (**SNM43**) and translucent dark blue beads

[1] Some drawn gold-in-glass tabular beads bear a pressed decoration in the form of a lozenge pattern on both sides. A lozenge pattern on one side and protruded dots on the other was observed on a bead from Mirmad tomb 75 (Presedo Velo, Blanco y Caro, and Pellicer Catalán 1970: Type 169; MAN T75.1980.96.431.169, personal observation).