Barikot beads (13th century BCE – 15th century CE): Typology, Iconography, Technology and Chronological Variation

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Dedications

This thesis is dedicated to my parents: Malik Abid Rabbani and Uzma Khalid

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By

Mubariz Ahmed Rabbani

Abstract

This thesis examines around 1350 bead ornaments made from various types, which have been recovered from the excavations of the archaeological site of Barikot located in the Swat Valley of modern Pakistan to provide new perspectives on the prevailing typological features and technological methods of bead production, covering nearly the entire chronological sequence of the site (ca. 1300 BCE – 1500 CE). To shed light onto the typological features of the beads, the raw materials and shapes of the ornaments are identified and studied, which have provided new insight into the prevailing ornamental traditions as well as socio-economic and cultural aspects of the little explored protohistoric, Early Historic and Late Historic periods of the north-western subcontinent. To reconstruct the drilling technologies and manufacturing practises, silicone casts of the drill holes of 41 beads have been taken and studied through Scanning Electron Microscopic analysis, which have, likewise, provided, not only evidence of continuity but also transformations in the prevailing bead drilling traditions at various points in time.

Furthermore, to reconstruct adornment practices during the Kushana periods in the Gandharan region (1st – 3rd centuries CE), this thesis compares selected examples of archaeological beads from Barikot and other sites with the forms of beads carved into the regional iconography, mainly the sculptures of Bodhisattvas (Buddhist divine beings) deriving from the Gandharan world. Bead shape, size, and style are evaluated to determine whether the carved depictions represent actual ornaments or they are simply symbolic or imaginative. This analysis has provided new insight into how ornaments were worn in the Early Historic period of Gandhara and into the accuracy of iconographic depictions. The site of Barikot has been stratigraphically excavated by the ISMEO Italian Archaeological Mission in Pakistan and is one of the few sites from this time period that has a chronology supported with numerous radiocarbon dates.

Declaration of original authorship

‘Declaration: I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.’

MUBARIZ AHMED RABBANI

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Chapter 1: Introduction

As is common in contemporary times, items of jewellery including bead ornaments of various raw materials and forms were, for a variety of reasons, worn by men, women, children and even used to adorn animals in the ancient world. As a result of being durable and portable, beads are found in great numbers in the excavations of archaeological sites from around the world especially in South Asia, clearly representing one of the most important craft industries of the ancient past. The study of archaeological beads from within a time period does not only reveal information about the raw materials, shapes and colour patterns of the ornaments that were favoured by the people but can also provide insight into the prevailing religious beliefs, cultural traditions, the manufacturing technology, the socio-economic conditions and cross-cultural connections with other geographic locations at the time. In addition, the study of archaeological beads that derive from a multi-period site, has even got the potential to shed light on the diachronic development of the ornaments and, in the process, to tell us about the lifestyle and history of various groups of people through the chronological sequence of that particular site (Deo 2000; Jyotsna 2000; Niharika 1993).

Considering how our understanding about ancient cultures could expand and transform through a comprehensive study on the beads from the past, this thesis, therefore, provides a systematic examination of the beads recovered from the archaeological site of Barikot (Bīr-koṭ-ghwaṇḍai) located in the Swat Valley of the Khyber Pakhtunkhwa province of modern Pakistan, South Asia (Figure 1). The research presented in this thesis is, moreover, not limited to a specific time period but rather covers almost the entire stratigraphic sequence of Barikot (from ca. 1300 BCE to 1500 CE), presenting us with a unique opportunity to study chronological and material variations from a local and regional point of view. Systematic archaeological field activities have been carried out in the Swat Valley since 1956 by the IsMEO/IsIAO/ISMEO Italian Archaeological Mission in Pakistan in collaboration with the Department of Archaeology & Museums, Government of Pakistan (DOAM). The fieldwork carried out by the Italian Archaeological Mission in Pakistan was started and led by its founder Professor Giuseppe Tucci, one of the most celebrated and leading archaeologists of the time. The series of surveys and archaeological excavations conducted over the last 65 years have made Swat, from an archaeological point of view, one of the most well-known and explored regions of the Indo-Pakistani subcontinent (Callieri et al. 2006; Filigenzi 2015a: 16).

Despite these productive archaeological investigations, up until recently, archaeologists were not able to provide a precise and detailed account about the history, way of life or development of the various people living in ancient Swat and, more broadly, the region of Gandhara between ca. 1300 BCE and 1500 CE. This picture is slowly beginning to change now, most notably, through the mounting archaeological evidence coming from the excavations at Barikot by the ISMEO Italian Archaeological Mission in Pakistan, revealing a great range of stratified material culture items including beads– the

study of which is currently in progress led by various archaeologists, scientists, art historians, historians and other scholars from around the world. The application of updated scientific methodologies has enabled the identification of a chronological continuum of habitation at Barikot, which allows us to better understand the socio-economic and cultural landscape of the site. Whereas the site of Bala Hisar at Charsadda near the modern city of Peshawar was considered to be the main archaeological guide-site in the 20th century (Wheeler 1950: 51), Barikot, having become a major extended archaeological project characterised by a reliable chronology, can now be considered as the 'new Charsadda' for the 21st century (Olivieri and Iori 2020; Olivieri et al. 2019). Barikot is, most importantly, the only site in the entire region where modern stratigraphic excavation methods have been tested and applied on a large scale (Olivieri 2020: 388).

As such, the latest stratigraphically controlled excavations at Barikot have, in fact, not only revealed various types of bead ornaments but, more importantly, are supported by numerous radiocarbon dates, providing a very detailed chronological-cultural framework for the social evolution of ancient Swat (Olivieri and Iori 2020; Olivieri et al. 2019). The list of raw materials includes carnelian, agate, quartz/rock crystal, lapis lazuli, serpentine, jasper, beryl-aquamarine, garnet, amber, steatite, chloritic rock, schist, marble, peridot, terracotta, reworked pottery, glazed quartz, faience, glass, marine shell, cowrie shell, dentalium shell, pearl, coral, *Engina Mendicaria*, coix seed, malachite, bone, gold and lead. Around 1350 beads are examined in this thesis. Therefore, the research on the beads from Barikot is based upon a reliable and space-time demarcated archaeological assemblage. With a well-dated dataset at hand, the study on the beads from Barikot has the potential to provide a more comprehensive interpretation of the cultural history of the site and, in the process, of the ancient urban life and economy in the north-western part of the Indo-Pakistani subcontinent.

In fact, the timing of the current study on the Barikot beads could not be better and was urgently required as there are currently no comprehensive, well-dated and critical studies on beads available that would focus on the dynamic historical periods of the subcontinent (in contrast to the beads from the preceding Bronze Age Indus Tradition). Despite the recovery of many beads from various excavations at historical sites across the subcontinent, precise information on aspects related to the typology, production technology and adornment of the ornaments is unavailable or limited by chronological uncertainties (see Chapter 3 for detailed discussion). Without the investigation of these aspects, it is neither possible to determine the prevailing bead ornamental traditions within a time period nor how they developed across the chronological sequence and, as a result, it would not be possible to shed light on the way of life of the inhabitants of a studied site as outlined above.

Bearing the above raised points in mind, the research aim of this study is, therefore, to investigate the typology, technology, iconography and chronological variation by examining the beads from Barikot (ca. 1300 BCE – 1500 CE). The aim, therefore, consists of three elements or parts (typology,

technology, iconography) – each of which forms a research chapter of their own in this thesis. As such, three main research questions are pursued and explored in this thesis, each designed to address the three components of the research aim (typology, technology, and iconography of beads). As such, the three main research questions that have been articulated in order to investigate and achieve the desired research aim, are as follows:

1) Considering the raw materials and shapes of beads that are represented at Barikot, how does their distribution develop through the chronological sequence under study?

2) Based on the study of the bead drill holes and other attributes, how does the organisation of technology change through time at Barikot?

3) In what ways do the carved bead ornaments in Gandharan art inform on the production and use of actual real types of beads as recovered from the archaeological record?

In addition, as my research on the typological and technological aspects of the beads from Barikot progressed, a complementary or secondary fourth research question was articulated, which does, however, not form a separate research chapter in its own right in this thesis. It provides some specific consideration and discussion as to how some of the recovered beads may have moved and arrived at Barikot:

4) To what degree are the raw materials, shapes and production technologies used for beads a specific barometer of political change?

The first research question seeks to determine the precise typological characteristics of the beads from Barikot within each time period and, through this process, find out how they develop or change through time at the site between ca. 1300 BCE and 1500 CE. In order to determine the typological features of the beads, it is necessary to identify the raw materials and shapes of the beads from within each period of Barikot, starting with the first cultural period of the site under investigation. This information can, then, be properly assessed and interpretated, shedding light on the prevailing ornamental traditions at the site within that specific time. The same process of analysis is repeated for the succeeding cultural periods of the site as well, which has generated a wealth of meaningful information in terms of the typological development of the beads at Barikot during the long chronological sequence under study.

The second research question on the drilling technology can only be addressed after having determined the typological features of the beads from Barikot. Without the identification of the various types of beads, both in terms of raw material and shape, we cannot proceed to determine the type of drilling technologies that were used to perforate the ornaments. The most effective type of analytical technique

that can be used to determine the bead drilling technologies and manufacturing practises is by taking silicone casts of the bead drill holes that are then studied under the Scanning Electron Microscope (SEM). As in the case of the first research question, the important rule here is to start the SEM analysis of the images that relate to the earliest cultural period under study, moving on to the succeeding periods in the correct chronological order of the sequence of the site. This study presents the results of the SEM analysis of the evidence for bead drilling technology of 41 beads, which has, likewise, provided us with new perspectives on not only the identification of the bead drilling technologies but also how their use and organisation developed through time at Barikot.

The third research question of this thesis is designed to try to investigate how the various types of beads, found from various archaeological excavations, were worn and used in reality by the people of Gandhara. The purpose of this investigation is to adopt a cross-disciplinary approach, combining the fields of archaeology and art history to reconstruct and understand the prevailing adornment practices during the dynamic Kushana period of Gandhara (1st – 3rd centuries CE). As such, this thesis will critically compare examples of archaeological beads recovered from Barikot and other sites with the forms of beads carved into the rich regional iconography, in particular, the Gandharan Bodhisattva sculptures (11 sculptures). Bead shape, size, and style from both archives will be evaluated to determine whether the carved depictions represent actual ornaments or they are simply symbolic or imaginative. This analysis can provide new insight into how bead ornaments were worn in the Kushana period of Gandhara and into the accuracy of iconographic depictions. As H. Morphy states, ‘art production is too important to be neglected because it reflects emotional and experimental dimensions of being in the world’ (Morphy 2010: 266). As a precondition, it is necessary for the typological data on the beads from Barikot and other sites to be available before cross-comparative studies with the rich sculptural iconography of Gandhara can be attempted for this purpose.

The fourth and final research question seeks to find out the degree to which the bead raw materials, shapes and drilling/other technological aspects relate to the changes in political configuration that characterised the region. It seeks to determine the role of political mechanisms and dynamics that were making it possible for certain types of beads to reach Barikot at different points in time. The consolidation of the results of such a broad approach in a section of Chapter 7 will open up the potential to emphasise the broader significance of this important study beyond the Gandharan context and give the research more wide-reaching impact. This approach will help frame the wider discussion of whether beads arrived at Barikot against/with trade flows or political shifts. In order to be able to detect shifts in patterns of connectivity and provide some broader geopolitical contextualisation of the findings, several key maps have been produced, which set the identified raw material sources against the dominant trade flows and approximate extent of various polities who controlled the site of Barikot across its stratigraphic sequence.

By addressing the research questions of this thesis using multiple lines of evidence, it has been, indeed, possible to develop a better understanding about the role of bead ornaments in the lives of the people of Barikot and, more broadly, the ancient region of Gandhara between ca. 1300 BCE – 1500 CE as the forthcoming discussions will show.

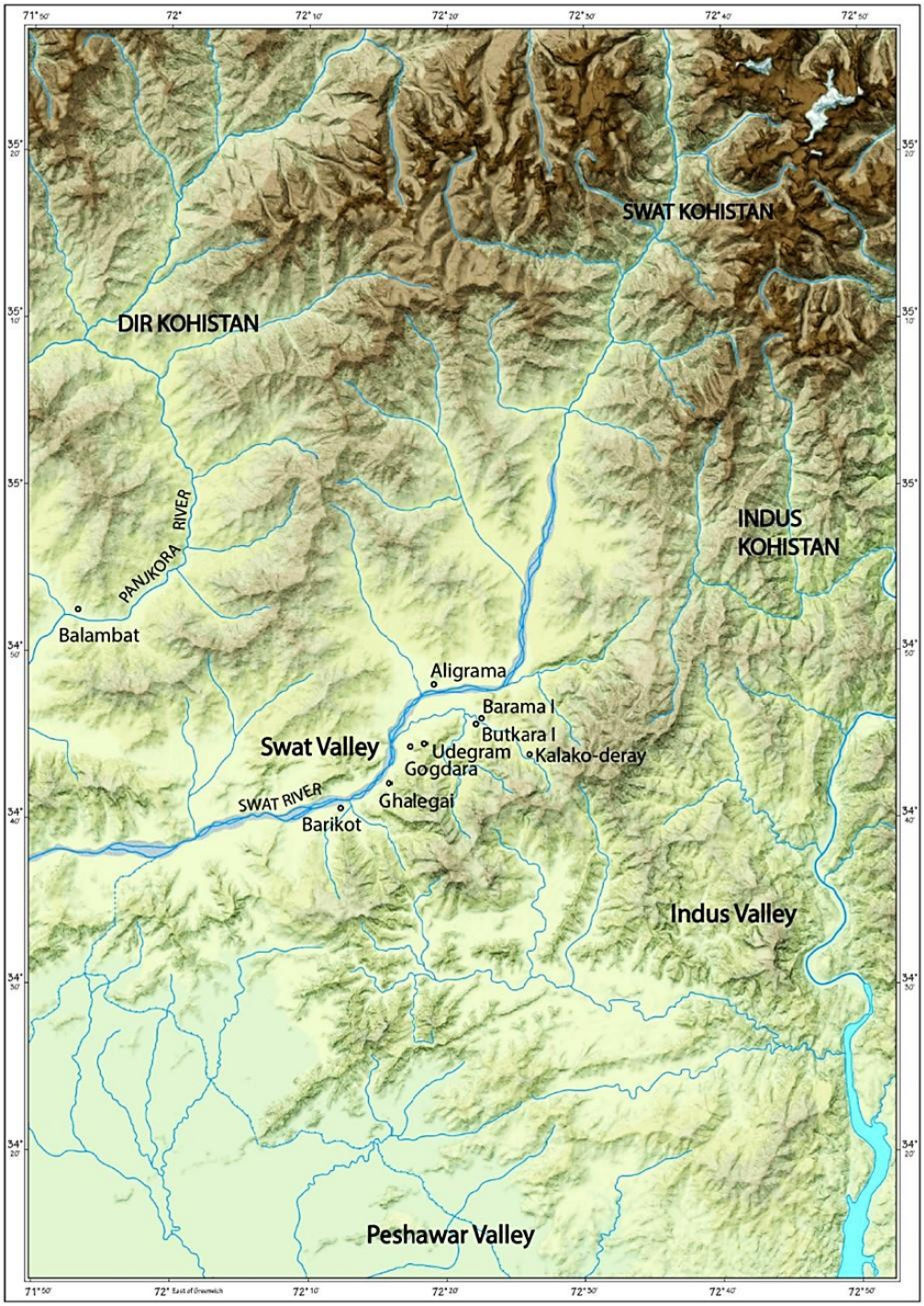


Figure 1: A topographic regional map showing the location of Barikot and some other archaeological sites discussed in this thesis (Iori 2018: 11)

1.1 Structure of the thesis

This thesis is organised into nine chapters, which are presented as follows: Chapter 2 is about the broader archaeological narrative of this study, providing a relevant summary and a critical review of the archaeology and history of the region of Gandhara. Chapter 3 gives an overview of the current study in terms of the development, current themes, and state of bead studies as well as related limitations within the published literature. In Chapter 4, the research methodology is outlined, introducing the various analytical techniques that have been specifically adopted for the current study. Chapter 5 gives a description of the geographical setting of the study site, giving valuable insight into the local, surrounding environment that shaped the lives of the inhabitants of Barikot. More importantly, it provides a comprehensive introduction to the archaeological site of Barikot together with a detailed account on the chronological sequence of the site. It also outlines the history of excavations at Barikot, providing information about the various archaeological structures and contexts that have been identified.

In Chapter 6, the results and discussions on the typological features of the studied beads are presented. Chapter 7 presents the results and discussions on the drilling technologies and manufacturing practises that were adopted to produce the beads from Barikot in the past. It also provides a section on the investigation and discussion of whether beads arrived at Barikot against/with trade flows or political shifts. In Chapter 8, 18 case-studies are presented, comparing the archaeological beads from Barikot and other sites with the forms of beads depicted in the iconography of Gandhara. It concludes with a section on the consideration, study, and discussion of systems of 'value' imbued in the beads from Barikot in the past. Lastly, Chapter 9 provides the final conclusions and future directions for the research on the beads from Barikot. Following the bibliography, the appendix section provides information on every find that is part of the current dataset in this thesis. Beads that do not form a part of the current dataset are also listed in the appendix followed by a brief visual guide on the identified raw materials.

Chapter 2: Research context: Broader archaeological narratives

As a result of strong cultural overlaps and connections, the archaeology of modern Pakistan needs to be considered within the larger framework of South Asian archaeology including the regions of modern Afghanistan, Iran, India, Nepal, Bangladesh, Sri Lanka extending into the northern areas of Central Asia (Figure 2) (Kenoyer 2015a: 1). Before moving to the main discussions on the beads from Barikot and other sites, it is important to provide a critical review of the archaeology and history of the region, in particular, regarding the political, socio-economic and religious trajectory of events that shaped this part of the world. Establishing this context will make it possible to contextualise the data and understand the cultural complexities associated with the current research and, ultimately, what forces may have influenced the lives of people and their material culture in the past. The results gained from the study on the beads from Barikot can help shed new light on the little explored historical sequence of the subcontinent, which, by extension, have the potential to support and/or challenge previously established concepts or ideas. The first part of this chapter discusses the Bronze Age Indus Tradition and attempts to define the succeeding historical sequence of the subcontinent. The second part provides a critical review of the distinct cultures and dynasties that ruled over Barikot across the chronological sequence of the site.

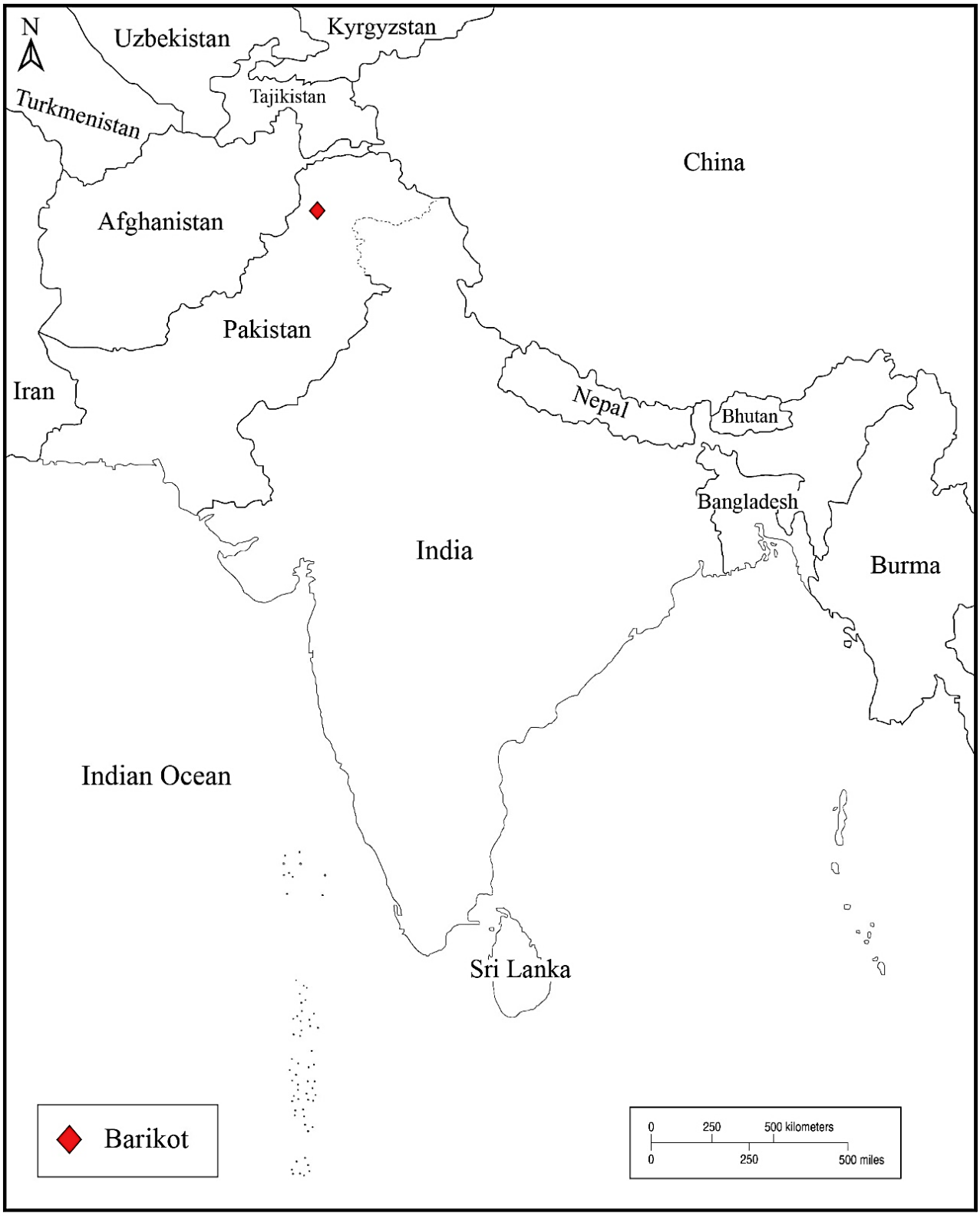


Figure 2: Map of present South Asia with the location of Barikot (Drawing: author's own, adapted from alabamamaps.ua.edu)

2.1 Archaeological framework

In the 20th century, several archaeologists understood that there were notable cultural discontinuities and transformations following the decline of the cities of the Indus Tradition in the Bronze Age (also known as the Harappan civilisation) (Ghosh 1973; Lal 1955; Marshall 1931; Wheeler 1966). Marshall, for example, stated that the Vedic Period or Iron Age had an independent development from the preceding Harappan cultural phase (Marshall 1931: 111-112). Similarly, Wheeler argued that there was 'a notable absence of any real continuity in the Indus Valley between the great Civilisation and its beggarly successors' (Wheeler 1966: 94). According to Wheeler, this period was characterised by 'insecurity and economic instability', invasions and mass human migrations (Wheeler 1966: 96). Likewise, Ghosh argued that 'Harappan urbanism could not have even remotely produced or inspired the historical urbanism, for the simple reason that there is no perceptible link between the Harappa and the later Indian culture' (Ghosh 1973: 85). B. B. Lal even refers to this period as a 'Dark Age' (Lal 1955: 6).

These conclusions were drawn because the chronological sequences following the Indus Tradition have, for a variety of reasons, received limited scholarly attention remaining, in many aspects, under-explored and poorly defined. The reasons include a lack in the proper identification of shared traits between the Indus phase and the later chronological developments, a lack in stratigraphically controlled and horizontal excavations, a research focus on historical text-based traditions and on prehistoric archaeology (see Chapter 3 for further discussion). In other words, the archaeological study of the historical periods currently remains the most neglected aspect of the archaeology of the subcontinent (Dhavalikar 1999: xii).

However, new studies have appeared in recent years indicating the existence of some cultural continuities, which continued on as evidenced by the study on various types of material culture items such as system of weights, shell bangles, beads and other objects. Agricultural subsistence strategies remained in place and the manufacture of ceramic materials did not change radically. Examples of continuity also exist between Indus and historical art traditions (Coningham and Young 2015; Kenoyer 1988: 73; 1991: 372; 1995a: 94; 1995b; 1997b; 2017c: 143; Possehl 1977; Shaffer 1993; Srinivasan 2009). As a result, Coningham and Kenoyer state that this period did not represent a 'Dark Age' (Coningham 1995: 69; Dhavalikar 1999: 160; Kenoyer 1988: 73; 1995b: 234; 2006b: 33). Instead of a 'Dark Age, new evidence indicates that the final phases of the Indus Tradition underwent a decentralisation and localisation process (Kenoyer 1991b: 370).

Previously proposed models of invasion or migration can, in fact, not explain the complex transformations occurring between the prehistoric and the historical periods of the subcontinent (Kenoyer 2006a: 39). The current research on the beads from Barikot appears to support Kenoyer's interpretations, revealing some cultural, stylistic and technological links with the types of beads

recovered from Indus sites, which will be discussed in the following chapters of this thesis. The time periods associated with the Indus Tradition should, as a result, not be viewed in isolation from the historical periods but rather as a foundation of what is to come and, where relevant, may serve as a reference point for cross-comparative analysis and discussion.

In order to attempt to define and understand the chronological sequence between 1300 BCE – 1500 CE, it is important to identify and determine some of the major political and socio-economic forces and events that characterise this dynamic time, which, in turn, can help us understand how their impact might have shaped the lives of people and, subsequently, their material culture in the past. The periods under study are characterised, most notably, by the appearance of readable writing systems and coinage, the development of urbanism, the rise of religious traditions such as Buddhism and Jainism, distinctive architectural monuments such as *stupas* (hemispherical mounds) and *chaityas* (assembly halls), the emergence of chiefdoms, dynasties, states and intensive trade and exchange both internal and external, linking the subcontinent with China, Southeast Asia, the Mediterranean, Iraq, Iran and Arabia (Chakrabarti 1997; Coningham and Young 2015: 354; Kennet 2004a: 69-71; Morrison 1997; Petrie 2020a; Salles 1996; Seland 2014; Sinopoli 2015; Smith 2006; Smith and Mohanty 2016: 688; Tomber 2007; 2009; Ray 1986; 1987).

At major crossroads and market centres, towns and cities were established (Kenoyer 2006a) with some of them developing into large, fortified sites including Kausambi, Rajgir, Pataliputra, Sravasti, and Ayodhya (Erdosy 1995a; Morrison 1997; Figure 3). This period, most prominently, witnessed the rise of the sixteen major polities or *Mahajanapadas*, which flourished in a belt stretching from Gandhara in the northwest to Bengal in the eastern part of the subcontinent and included parts of the trans-Vindhyan region (Dhavalikar 1999; Coningham and Young 2015: 358; Kenoyer 1997b; 2015b: 99-100; Morrison 1995; Petrie 2013b; Singh 2008; Smith 2006; 2016). The introduction of iron metallurgy is another important marker of the historical periods throughout which iron was extensively used (Allchin 1995; Dhavalikar 1999; Morrison 1997; Tewari 2010; Vidale and Olivieri 2019: 187).

The end of the Early Historic period around the mid-first millennium CE witnessed some further developments including the decline of Buddhism, changes in patterns of urbanism, the rising economic and political role of temples, the emergence of Hindu and Muslim dynasties, marked expansion in the volume of trade to cite a few (Hawkes and Casile 2020; Kennet 2020: 3; Morrison 1997; Rougeulle 1996; Smith 2006). Yet, many of these developments remain currently little understood and somewhat poorly defined in archaeological and historical scholarship (Ali 2012: 7-12; Hawkes 2014a; 2014b; 2020; Smith 2006). It remains unclear if the developments that have been identified on the broad scale also manifested themselves on the smaller scale of particular regions or individual settlements (Hawkes 2014b: 208; Ray 2012: 91-92).

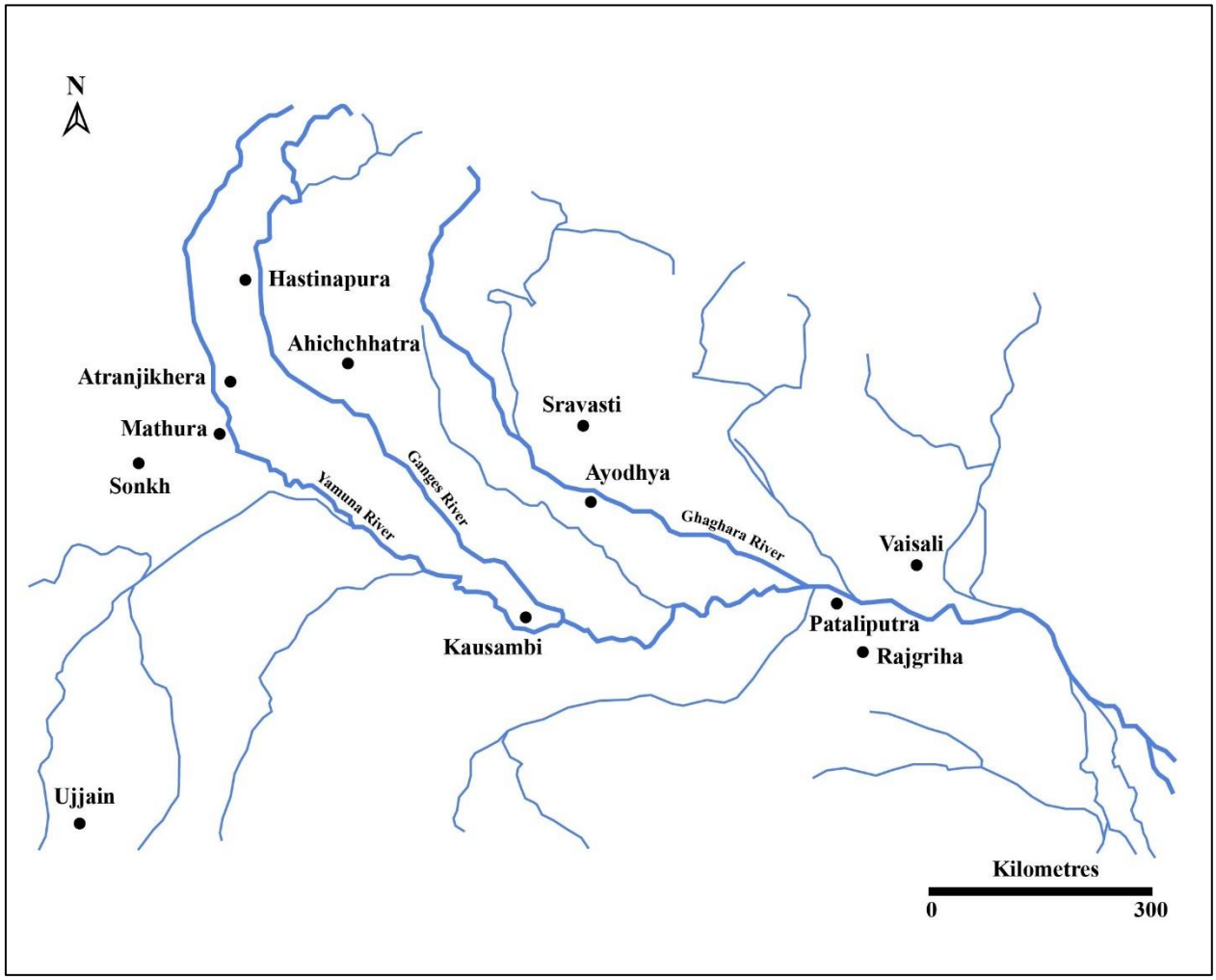


Figure 3: Location of some of the key archaeological sites in the Gangetic plain of northern India (Drawing: author's own, adapted from Coningham and Young 2015: 380)

Likewise, existing interpretative models for the historical periods that have been discussed extensively in the literature (Coningham and Young 2015: 17; Hawkes 2014a; Kulke 1995; Mukhia 1981; 1985; 1995; Renfrew 1986; Renfrew and Cherry 1986; Sirca 1966; Sharma 1985; 1987; 1995) are inadequate to explain the role of chronological change and their impact on people and material culture (Erdosy 1995b: 93; Petrie 2020a: 4-5). Similarly, there is a tendency among archaeologists to study the historical periods by trying to correlate the material record with the information provided in the written sources rather than interpretating the archaeological evidence on its own merits (Magee and Petrie 2010: 505; Petrie 2020a: 4-5; Sinopoli 2015; Smith 2006: 118; Trautmann and Sinopoli 2002). Based on the incorrect interpretation of the Chinese literary documents, for instance, some scholars have concluded that the decline of Buddhism, as indicated by the archaeological record, is directly linked to the systematic Hun attacks on Gandhara in the mid-first millennium CE (Marshall 1912-1913: 8-9; 1951: 77; Stein 1905: 73-87).

In addition, chronological uncertainties have impacted on the date range of numerous developments that transpired during the periods under study (see Chapter 3 for detailed discussion), although new evidence is beginning to challenge and/or change earlier datasets and models. New radiocarbon data, for example, has shed new light on the earliest appearance of iron objects in Swat (Vidale and Micheli 2017; Vidale and Olivieri 2019; Vidale et al. 2015; 2016; Narasimhan et al. 2019) while a secure chronology has also provided new information as to when exactly the historical Buddha lived (Coningham et al. 2013), which remained uncertain for a long time (Coningham 2001; 2011). As C. Sinopoli notes, 'While efforts to refine the archaeological chronology are underway, we have few absolute dates or careful stratigraphic excavations to anchor the sequences, and the archaeological evidence is not yet up to the task of carefully documenting, much less allowing us to explain, the changes that we know were occurring' (Sinopoli 2015: 336). Consequently, the study on the stratified beads from Barikot gives us the unique opportunity to study a reliable space-time demarcated archaeological assemblage on its own merits and, in the process, study the impact on the lives of ordinary people as Petrie points out (Petrie 2020a: 4).

2.2 Chronological terms and parameters

Another important point that needs to be addressed, which has caused considerable academic debate, concerns the date range of the historical sequence. Many scholars have not been able to reach a consensus and offer different labels, chronologies and sub-divisions for this time. With regards to the Early Historic period, G. Erdosy, for example, proposes a wide timeframe that reflects the composition of the Rigveda starting from around 1500 BCE but ending as late as the 4th century CE (Erdosy 1988; 1995b: 79). The date ranges of other scholars are, on the other hand, more narrowly defined being based around the appearance of historical personalities such as the Buddha and Mahavira. D. K. Chakrabarti, for instance, offers a date range starting from the 8th century BCE until the early centuries of the common era (Chakrabarti 2000). Kenoyer proposes a date range starting from 600 BCE and ending in 300 CE, which is mirrored by Singh (Kenoyer 1997b: 62; 2013: 16; Singh 2008: 257, 369). Sharma views the start date to be 500 BCE continuing to 500-600 CE (Sharma 1991: 9) whereas Sinopoli dates the Early Historic period from 500 BCE to 300 CE (Sinopoli 2006: 326). Dhavalikar, on the other hand, provides different dates for different parts of the subcontinent (Dhavalikar 1999: 161-163; Menon et al. 2008: 96), probably using the correct approach to assess the different chronological systems. Thus, a very broad and debatable periodisation has been created for various parts of the subcontinent.

Through the use of radiocarbon dating, Smith and Mohanty have recently broken down the entire historical sequence into two distinct phases of activity. They propose an Initial Urban phase (8th BCE – 4th century BCE) followed by the Early Historic period (3rd BCE – 4th century CE) and the Late Historic period (5th CE – 8th century CE) (Smith 2006; Smith and Mohanty 2016: 688-689). Lastly, a distinct

Medieval period (ca. 9th –16th centuries CE) has also been added (Smith 2006). To describe the dynamic cultural processes and transitions more precisely that are reflected by the beads from Barikot, I propose that the present study period of 13th BCE – 15th century CE should, indeed, be broken down into distinct phases, following broadly the sub-divisions proposed by Smith and Mohanty. Based on the data gained from the current study on beads, I hereby describe the phase occurring between 13th BCE – 7th century BCE as the Protohistoric period. Following on, the time bracket of the Early Historic period should be between the 6th BCE and the 4th century CE, which would mirror Kenoyer's and Singh's proposals as well. The subsequent addition of a Late Historic period at Barikot (5th – 15th century CE) also provides the opportunity to potentially study distinct social, economic and cultural developments and transformations that occurred between the mid-first millennium CE and the mid-second millennium CE.

A 'medieval' sub-division (ca. 9th –16th centuries CE; Smith 2006) cannot or rather should not be established for Barikot (at least for now) because the rich data obtained from the study on the recovered beads seems to show, in many respects, evidence of continuity from the 5th CE to the 15th century CE with minor signs of change. In fact, my proposed time bracket that is the Late Historic period at Barikot (5th – 15th century CE), also receives some support from J. Hawkes's proposal of ca.600 – 1200-1300 CE, which he calls the 'Early Medieval' or 'Premedieval' period (Hawkes 2014a; 2014b; 2020). Similarly, K. Morrison proposes a date between 500 CE and 1200 CE, which she calls the early Middle period (Morrison 1997). It is generally accepted that during this time, the geopolitics, social and political organisation, religious institutions and economic systems of South Asia significantly changed and when the foundations of contemporary Indian society were laid (Hawkes 2014b: 208; 2020: 169).

As a result, I will adopt the above proposed sub-divisions in my thesis and use a local variation of the terminology suited to Barikot, which define more accurately the various transitional stages along the long chronological sequence under study. However, the term 'historical periods' or 'historical sequence' will also continue to be used in this thesis where needed to refer to the entire study sequence that is 1300 BCE – 1500 CE. The date range of each archaeological site should, therefore, be assessed and defined according to its own set of data by adopting a bottom-up approach rather than attempting to impose a preconceived top-down definition. A bottom-up perspective has the potential to detect material variation more clearly and provide a more complete understanding regarding culture dynamics that occurred on the local level.

2.3 Gandhara

The ancient region of Gandhara in the north-western part of the Indo-Pakistani subcontinent was regarded as the ancient gateway to India (Schmidt 2012: 83; Vogelsang 2000; Figure 4). To describe a larger cultural sphere, the phrase 'Greater Gandhara' was coined by R. Salomon, which, in addition to Gandhara proper (the Peshawar basin), encompasses several neighbouring areas including the Swat Valley (ancient *Uddiyana*) and Kashmir to the north-west, the areas around the cities of *Takshaśilā* (modern Taxila) and *Pushkalāvatī* (modern Charsadda) to the east as well as the eastern part of Afghanistan to the west (Behrendt 2004: 1-2; Jongeward 2019; Rienjang 2017: 65; Salomon 1999: 3; Schmidt 2012: 83). It appears, however, that the precise geographical boundaries of Gandhara changed over time (Kenoyer 2010; Petrie 2020a: 184; 2020b: 635; Petrie and Magee 2012: 9; Young 2009). To reflect this entire geographic entity and avoid any potential confusion, this thesis will simply refer to it as Gandhara (rather than Greater Gandhara). Because of its strategic position and fertile area, Gandhara attracted various foreign and indigenous invaders over the centuries, who occupied the region in turn (Behrendt 2007).

Gandhara including the Swat Valley are instrumental in understanding the events and developments that occurred in the subcontinent and adjacent regions. The strategic location of Gandhara along the Silk Road trade routes ensured a constant movement of people, goods and ideas through them (Behrendt 2004; Rienjang 2017: 65-66), allowing it to remain an extremely wealthy area for centuries (Behrendt 2007). The archaeology and history of Gandhara, however, still remain under construction with many parts of the region under-explored and minimally published (Olivieri and Callieri 2020: 12; Vidale and Olivieri 2019: 188). As a result, the evidence for the cultures of the north-western subcontinent following the Indus Tradition, is, in many respects, quite complex and fragmentary based on a combination of available data from archaeological fieldwork and literary traditions. It is not possible to discuss all the different sites and material culture items in this thesis, but the most important developments are rather presented in this chapter. The aim is, therefore, not to provide a complete account of the history of each distinct culture below but rather to provide an introduction, current research gaps and how they relate to the archaeological evidence from Barikot.

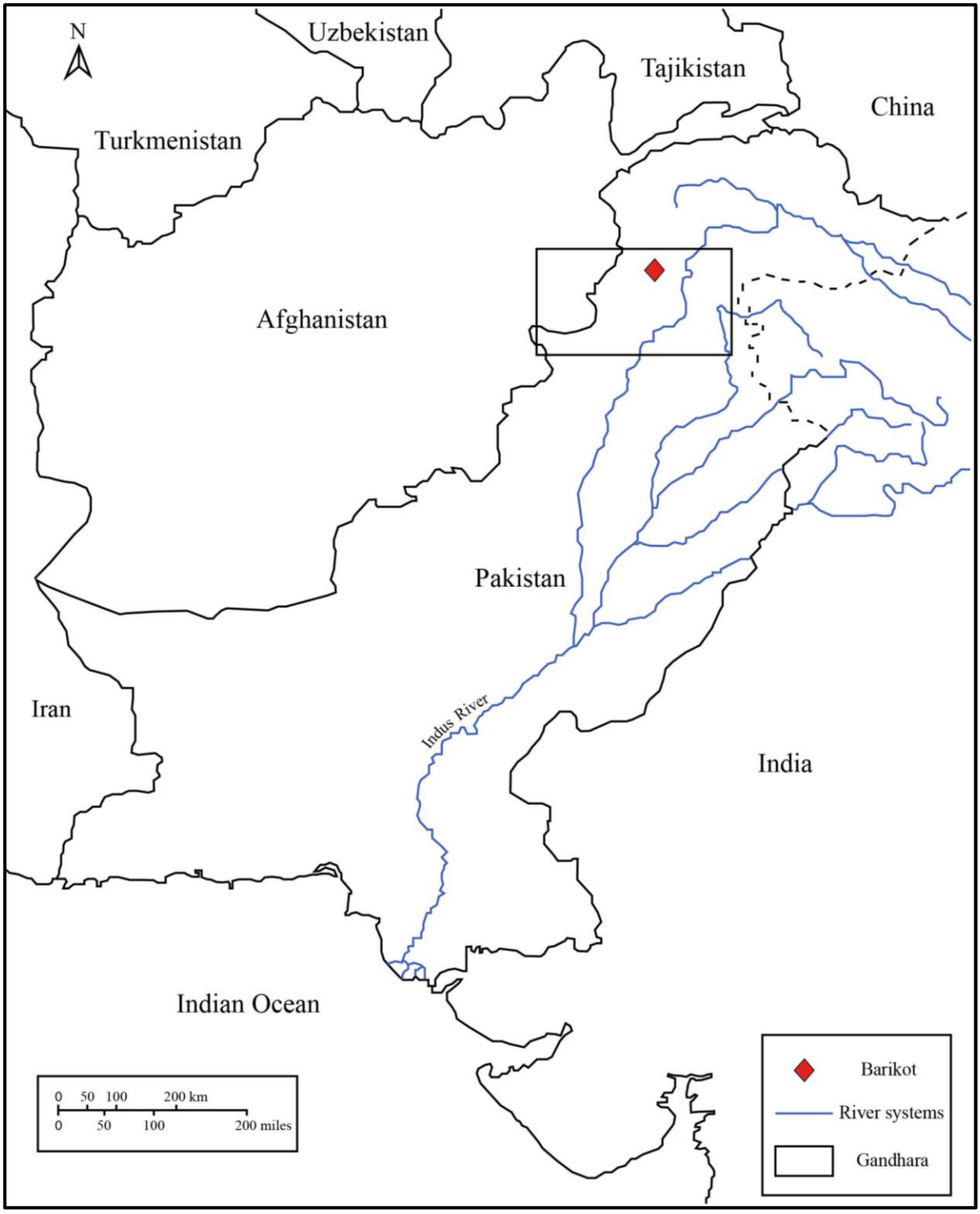


Figure 4: The location of the ancient region of Gandhara with Barikot (Drawing: author's own, adapted from alabamamaps.ua.edu)

2.3.1 Protohistoric Cemeteries

The cultural tradition associated with the Protohistoric Cemeteries or the so-called 'Gandhara Grave culture' (ca.1700 – 400 BCE) is represented, most prominently, in the form of small settlements and cemeteries in the valleys of Swat, Dir, Buner and Chitral. The cemeteries are characterised by both undisturbed interments and a practise of re-use including the exhumation, manipulation, disarticulation and spatial arrangement of selected body parts of the deceased. The specific treatment of the body varied over time. The multi-faceted funerary customs of this distinct tradition also involved the removal and/or addition of grave goods, which included ceramic, bone and ivory objects, metal items such as copper and iron, weapons and ornaments including beads (Rabbani 2018-2019; Stacul 1975a; 1984; 1987; Vidale and Olivieri 2019; Vidale and Micheli 2017; Vidale et al. 2015; Vidale et al. 2016; Vinogradova 2001; Zahir 2012). It is through the discovery of some horse burials, certain iron objects including arrowheads, the study of modern linguistic patterns, hypothetical language families and the concept of a post-Harappan 'Dark Age' that has led some scholars to relate this tradition with the widely known Indo-Aryan migration or Vedic culture (Allchin and Allchin 1982: 349; Dani 1978; Dani 1992; Mallory 1989; Parpola 1994). Regardless, without written texts it is not possible to confirm a linguistic relationship between the protohistoric tradition of Gandhara and the Indo-Aryan or Vedic culture (Kenoyer 2006a: 36).

For a long time, the protohistoric culture of the Swat Valley had been understood as 'marginal' conceived of as disjoined small-scale rural communities, who were passively receiving external influences by other cultures namely of China, the Indus Valley and Central Asia (Ali et al. 2002; Stacul 1987; Tusa 1979; Vidale and Olivieri 2019: 192). This concept developed due to the general lack in extensive excavations of protohistoric sites, which made it difficult to reconstruct the social, economic and political organisation that was in place and how it developed over time. The results of the excavation at the key settlement of Aligrama, for example, were published only to a minimum extent (Stacul 1975a; Stacul and Tusa 1977; Vidale et al. 2016: 331) while sites such as Kalako-dherai were excavated on a limited scale (Vidale 2016: 3). Besides, the similarities between the cemeteries are no longer enough to argue for an encompassing 'culture' (Zahir 2012), which, we now know, were highly diversified especially with reference to the treatment of human remains (Coningham and Young 2015; Vidale and Micheli 2017).

In contrast, the last 10 years of intense fieldwork have provided new perspectives on various aspects related to the protohistoric tradition of Swat. The recent discovery of a massive stone cobble construction, defending the protohistoric settlement at Barikot (10th – 9th centuries BCE; Olivieri et al. 2019), the existence of various settlements located in the valley together with the evidence of an early iron metallurgy that was already well-developed in the 12th century BCE, would rather point to the existence of a powerful urban centre in this early period of the site in Swat (Vidale and Olivieri 2019: 192). Consequently, the presumed lack of a 'central power' during this time (Tusa 1979: 692) is quite

questionable while long distance trade is demonstrated by the recovery of a range of material culture items including beads of semi-precious stones as the current study will illuminate in the following chapters of this thesis.

Since individuals of both sexes and all ages are represented in the excavated graves of Swat (Vidale and Micheli 2017), a good opportunity is provided to study the relationship between the recovered beads and the deceased individuals (see discussion on grave goods in Chapter 3), which has not been attempted yet (Vidale and Micheli 2017). Regrettably, however, many of the recovered beads derive from disturbed contexts (Dani 1966; Hemphill et al. 2017; Zahir and Ihsan 2005). The proposed absolute chronology of the majority of excavated graves from Swat remains controversial, mainly because the radiocarbon dates obtained in the 1960s were limited in number and biased by sampling problems (Dittmann 1984; Vidale and Micheli 2017: 391). Their chronology, however, certainly falls between 1000 – 800 BCE based on the still valid relative chronology of the ceramic evidence (Olivieri and Iori 2020: 81-82; Narasimhan et al. 2019: 138; Stacul 1969; 1975b; 1987). As a result, the possibilities at our disposal to conduct a meaningful analysis on the ornaments of the protohistoric period remained up until recently limited. A series of new radiocarbon dates taken recently from the sites of Gogdara, Udegram and Barikot are, however, now beginning to provide new reliable models for the chronology of this time (Vidale and Micheli 2017).

Moreover, it has been noted that the number of recovered beads in circulation during the protohistoric period of Barikot (Macrophase 1a-1b-1c: 1200 – 800 BCE) and Swat was possibly fewer compared to the later chronological periods of Swat (Rabbani 2018-2019; Vidale 2016: 1). Although, a potential scarcity in the number of beads may be explained by a range of factors, there is some new data from Barikot now that seems to support our initial observation. But, regardless, since the beads from Barikot have a secure chronology compared to other sites, their study has provided new, reliable information about the typology, technology and adornment of beads during this early period of the site, which are discussed in Chapters 6 and 7 of this thesis.

2.3.2. Persian Achaemenid Empire

The Achaemenid Empire covered the entire Near East, from Asia Minor to Egypt and from Central Asia to the eastern-most territories of the Indus Valley. According to the Achaemenid and Classical written sources, the Achaemenids ruled the north-western part of modern Pakistan during the 6th century BCE (Errington and Curtis: 2007: 29-34; Jacobs 1994; Kent 1953: 117-119; Magee and Petrie 2010; Magee et al. 2005: 711-714; Petrie 2020a; 2020b; Petrie and Magee 2012; Petrie et al. 2008; Rawlinson 1910: 256; Schmidt 1953: 88; Van De Mieroop 2015; Vogelsang 1990: 101). The nature of Achaemenid control, duration and its impacts in the eastern regions of the Empire have remained debatable (Callieri 2004; Iori 2018: V; Jacobs 1994; Magee et al. 2005; Petrie 2020a: 30-31; Petrie and Magee 2012;

Sinopoli 2006: 328) as difficulties have been encountered in correlating the material record of Gandhara with the Achaemenid cultural identity. In this regard, several sources of evidence have been proposed to represent the Achaemenid annexation of Gandhara including, for example, the presence of 'tulip bowls' known from both the core of the Empire and sites characterised by Achaemenid contexts and occupation deposits outside of modern Iran (Allchin 1995: 131; Callieri 1997; Greenfield 1985: 705; Iori 2018; Magee and Petrie 2010; Petrie 2020b: 644; Petrie et al. 2008: 5; Sinopoli 2006: 328).

An apparent failure to recognise a clear cultural affiliation may be related to the possibility that rather than reorganising existing political structures after achieving control over them, the Achaemenids accepted them as supported by their claim in the Behistun inscription (Jacobs 1994; Petrie and Magee 2012: 10). Regardless, the data obtained from the loosely controlled excavations of many regional key-sites including those in the Taxila Valley has decisively prevented us in clearly correlating the recovered material culture with the Achaemenid presence (Dittmann 1984: 191; Iori 2018: IX; Magee et al. 2005: 716).

In contrast, the latest stratigraphically conducted excavations at Barikot have now confirmed a clear Achaemenid acculturation phase at the site, which, in turn, supports the argument that Gandhara was, indeed, an Achaemenid satrapy as claimed in the various literary sources. The excavations have revealed that the construction of the Indo-Greek Defensive Wall at Barikot was preceded by the cut of a long foundation trench dug into an artificially modified slope that had obliterated all the pre-existing stratigraphy (Macrophase 2) all the way down to the earlier protohistoric structures (Macrophase 1 = end-2nd/beginning-1st millennium BCE). As a result, it was believed for a long time that there was a 'chronological gap' between the protohistoric and Indo-Greek periods in the region. The 2016-2017 excavation seasons at Barikot have, however, revealed evidence of an urban settlement, which had already been established before the Indo-Greek contact phase (Iori 2018; Olivieri 2019; 2020; Olivieri and Callieri 2020: 27; Olivieri and Iori 2020).

The recent excavations at Barikot have, hence, made it clear that the site was, indeed, occupied by the Achaemenids during this time (Macrophase 2a2: 5th – mid-4th century BCE) as evidenced by the recovery of the ceramic assemblage that include the distinctive 'tulip bowls', never previously documented at Barikot (Iori 2018; Olivieri 2020: 403; Olivieri and Callieri 2020; Olivieri et al. 2019). A picture of economic prosperity can be drawn from the recovery of the bead ornaments, which not only indicate the wide commercial network that linked the site of Barikot to the broader resources of the region but possibly a marked abundance in the number of beads circulating at the site at the time (see Chapter 6). Consequently, the Barikot sequence reveals reliable archaeological evidence to argue for an early urbanisation phase during the Achaemenid period (Olivieri et al. 2019).

2.3.3 Alexander the Great

A documentation of the events concerning the arrival of Alexander the Great in South Asia is mainly provided by the historical record as the archaeological evidence from concerned settlement sites and battlefields is quite limited due to a lack in archaeological excavations (Petrie 2020a: 41; 2020b; Petrie and Magee 2012). Moreover, chronological uncertainties have not enabled the identification of distinctive cultural material that could be clearly associated with the Macedonians or an 'Alexander horizon' as Petrie terms it (Errington and Curtis: 2007: 37; Petrie 2020a: 41; 2020b: 635). Other reasons that hinder potential correlations or the lack of direct archaeological evidence include the short-lived nature of Alexander's expedition in South Asia while several chronicled sites remain undiscovered (Coningham and Young 2015: 360; Fogelin 2006: 24; Kosambi 1965: 138; Petrie 2020a: 41; Olivieri 1996: 50; Sinopoli 2006: 328-329). Nevertheless, Alexander's advance into Gandhara is outlined by a series of Classical accounts (Petrie and Magee 2007), which provide us with some information about the political geography of the area, mentioning cities, kings and people encountered by the Macedonians during their travels (Petrie 2020a; 2020b; Petrie and Magee 2007: 8-13).

Alexander's campaign included the siege and conquest of Barikot in the autumn of 327 BCE, which has been positively identified with the city known as Βάζιρα/Beira the polis or *urbs opulenta* (Anabasis Alexandri I-IV: 27-8, Brunt 2004; Olivieri 1996; 2020; Olivieri et al. 2014; Olivieri et al. 2019; Stein 1930: 28-29; Tucci 1958: 296, 327; 1977; Historiae Alexandri VIII: 10, 22, Yardley 1984). The economic importance of the Swat Valley must have attracted the Macedonians to this area as a place with abundant food resources (Coloru and Olivieri 2019: 113-114; Olivieri 2020: 400-401). The Macedonian siege at Barikot occurred in Macrophase 2b of the site (end-4th - mid-3rd century BCE), which represents a time in which Swat (and Gandhara) was no longer part of the Achaemenid Empire. Instead, the area was governed by a tribe known as Assakenoi, who were allied to other northern-Indian tribes at the time (Olivieri 1996; Olivieri and Callieri 2020: 388). In the absence of comparative material, it remains, however, difficult to detect a potential cultural link between the Macedonians and the beads from Macrophase 2b of Barikot especially because there were two additional cultural groups that are known to have ruled the site in Macrophase 2b (Assakenoi and Mauryan).

2.3.4 Mauryan 'Empire'

The Mauryan period saw the introduction of the earliest inscriptions in the region at a time when virtually the entire subcontinent is believed to have been integrated into the Mauryan 'Empire' especially after the ascension of Emperor Ashoka to the throne between 272 and 235 BCE (Allchin 1995; Chakrabarti 1992; Coningham and Young 2015: 406-410; Morrison 1997; 1995; Smith 2006; Thapar 1966). Through the efforts of Ashoka, Buddhist beliefs and practises spread across the geography of the subcontinent and other parts of Asia (Fogelin 2006: 24; Sinopoli 2015: 337). Mauryan

rule, however, was short-lived and came to an end in 185 BCE, ending with Emperor Bṛhadratha, who was assassinated by Puṣyamitra, the founder of the Śuṅga dynasty in the east (Thapar 2012b). The Mauryan territories to the west including Gandhara were lost to the expanding Graeco-Bactrians from Central Asia (Petrie 2020a: 43; Sinopoli 2006: 329; 2015: 338; Smith 2006).

Here too, there is very little archaeological evidence that can be clearly attributed to the Mauryan cultural sphere while problematic chronologies continue to affect the study of the Mauryan period (Coningham 2014; Iori 2018: XIII; Jansari 2020; Sinopoli 2015: 338; Thapar 2000: 486; Tremblay 2014; Trautmann and Sinopoli 2002). The only definite material evidence for the Mauryan 'Empire' (other than coins) are the 'Ashokan' inscriptions spread throughout the subcontinent including in Gandhara (Iori 2018; Olivelle 2012; Sinopoli 2015: 338; Tremblay 2014: 75-76), although there are certain issues with the use of these inscriptions as markers of Mauryan sites (Coningham and Young 2015: 413; Tremblay 2014: 77). Besides, the inscriptions provide very limited information about the identities, traditions, and way of lives of the people over whom Ashoka ruled (Caroe 1962: 61). Other potential pieces of evidence for Mauryan presence may have been the *stūpas* of Dharmarājika in Taxila and Butkara I in Swat (Faccenna 1980-81: 167; Iori 2018: 336-337; Marshall 1951; Petech 1966), although chronological uncertainties prevent us from dating the origins of these Buddhist complexes back to the Mauryan period (Behrendt 2004: 39-40).

Our knowledge about the Mauryan capital *Patilaputra* (modern Patna) itself derives from limited excavations conducted in the 19th and 20th centuries in addition to the fragmentary writings of Megasthenes, the Seleucid ambassador to the Mauryans during the rule of Chandragupta Maurya, ca. 324–297 BCE (De Simone 2020; Sinopoli 2006: 326; 2015: 338; Waddell 1996). As a result of the limited archaeological data and chronological uncertainties, the literary evidence remains the main source of reference to study the Mauryan period, which includes the *Arthaśāstra*, the 'Ashokan' inscriptions, Megasthenes text, Pali Buddhist canonical texts, and the Purāṇic texts (Allchin 1995: 188; Cribb 2017: 5; Olivelle 2012; Trautmann and Sinopoli 2002). These written sources should be used, however, with caution as, with the exception of the 'Ashokan' inscriptions, they were written after the Mauryan period. They are also fragmentary and subject to interpretation (Coningham and Young 2015: 407, 451; Cribb 2017; Morrison 1995: 206-207; Olivelle 2012; Sinopoli 2015: 338; Tremblay 2014; Trautmann and Sinopoli 2002: 505).

Likewise, the precise geographical extent, political and economic organisation and impact of the Mauryan dynasty have been a subject of considerable debate in historical and archaeological scholarship (Coningham and Young 2015; Fogelin 2006: 26; Smith 2005; Iori 2018; Sinopoli 2006: 331-332; Thapar 1985). It has been suggested that there was a relatively centralised administration in the Gangetic region of northern India while the areas in the fringes of the 'Empire' (especially Gandhara) were less centrally administered. This is because peripheral regions such as Gandhara

apparently faced difficulties of rapid communication, and the economies of these areas relied on local production and commerce (Sinopoli 2006: 331-332; Thapar 2012a: 20-21). In addition, new research indicates that the widespread assumption of a 'second urbanisation' phase starting during the Mauryan period, apparently disconnected and unique from the earlier urbanism of the Indus Tradition, is rather now an outdated model of interpretation (Kenoyer 2006b), which the above-made and following discussions make abundantly clear.

The excavations at Barikot have established a reliable chronology for the site and have confirmed a Mauryan cultural phase (end-4th – mid-3rd BCE; Macrophase 2b). A great range of material culture items have come to light including a unique Mauryan coin issued by Chandragupta Maurya. Apart from the recovery of terracotta baroque lady figurines and the disappearance of Achaemenid vessels, the post-300 BCE assemblage from Barikot features a significant continuity in Indic ceramic forms and the introduction of Hellenistic ceramic vessels. This development probably represents evidence of connections and/or cross-cultural trade occurring between the Mauryans and their Hellenistic neighbours. It is currently difficult to assign a Mauryan affiliation to the recovered bead ornaments from this period, but, as the forthcoming discussions will show, the available evidence indicates a time of economic growth and wealth at the site.

2.3.5 Graeco-Bactrian and Indo-Greek kingdoms

The Hellenistic period in the 'Hellenistic Far East' (Mairs 2011: 9; 2014) consisted of the Graeco-Bactrian kingdom of the mid-3rd to the mid-2nd century BCE, which was situated in what is now mainly the north of present-day Afghanistan and sections of Tajikistan and Uzbekistan. Later as a result of the Graeco-Bactrian conquests, the Indo-Greek kingdom was founded in the north-western part of the Indo-Pakistani subcontinent dating to the first part of the second century BCE, existing possibly as late as the first century CE in some parts of the region of Punjab (Errington and Curtis 2007: 57; Mairs 2011: 35; Neelis 2001: 59; Petrie 2020a: 43-44).

The recovery of a remarkably large quantity of coins along with the few but influential textual records, clearly attests to the presence of Greek rulers in Gandhara (Bopearachchi and Pieper 1998; Olivieri 2020: 386). While eight kings are known from the study of the literary sources, coins of at least forty different rulers are attested from the material record (Bopearachchi 2008: 245; Neelis 2001: 59). In addition, the numismatic evidence suggests that several sub-kings, joint kings, successor kings and/or rival kings were issuing coins at the same time (Errington and Curtis 2007: 50; Petrie 2020a: 44). The available numismatic and textual evidence further indicates the adoption of Indian religions, languages, iconography and other aspects by a number of Indo-Greek rulers (Errington and Curtis 2007: 50; Neelis 2001: 59; Rienjang 2017: 82). Menander (ca.150 BCE), for example, is believed to have patronised

Buddhism according to the Pali text of *Milinda Pañha* (Questions of Milinda) (Fussman 1993a; Lamotte 1988: 419-425; Neelis 2001: 59-60).

With the exception of coins, however, the archaeological evidence for the Hellenistic presence in the region remains limited (Cribb 2005: 207-208; Fröhlich 2009: 60; Olivieri 2020: 386-388; Widemann 2000) due to chronological uncertainties and a lack of archaeological data (see Chapter 3 for details). In other words, the precise chronology of the Graeco-Bactrian and Indo-Greek kings has, as a result, remained difficult to reconstruct (Glenn 2015: 4; Petrie 2020a: 44) as it is difficult to detect a cultural link between the recovered artefacts and the Hellenistic traditions prevailing in Gandhara. The timeline of the key-site of Aï Khānum in north-eastern Afghanistan, for example, is now well-established, but there are still some unresolved uncertainties remaining in the general chronology of the site (Lyonnet 2012: 144-159; Marinez-Sève 2018: 355-359).

Moreover, despite a large number of reports, the publication of beads and other minor finds from Aï Khānum is still unavailable, which will impact on any attempt to critically study the recovered bead assemblages from this time period. Besides, only a selected number of beads have been studied by Beck reportedly from the Hellenistic levels of Bhir Mound (Beck 1941) while comprehensive, scientific studies remain to be conducted. Although the Indo-Greek numismatic evidence does portray bead ornaments adorning royal figures such as Agathokleia, the number of bead depictions is extremely limited while their precise definitions may be affected by interpretative biases, which need to be taken into consideration (Rabbani 2020a; see Chapter 3 for details).

Despite the limited data, archaeological excavations have contributed to the re-discovery of the Hellenistic period in Gandhara and have provided a key to our understanding of the tradition associated with the subsequent Gandharan art (Callieri 2007: 161; Neelis 2001: 60). The urban wall at Barikot, in particular, deserves special mention as it is the only excavated Indo-Greek defensive structure in South Asia (Callieri 2007; Olivieri 2020), representing an important record of eastern Hellenistic military architecture (Olivieri and Callieri 2020: 5). The reason for the huge military investment into the fortifications at Barikot was the necessity of protecting the local, rich resources that were used to supply the major centres of the plain such as *Pushkalāvatī* at Shaikhan-Dheri (Olivieri 2020: 401).

The excavations at Barikot have revealed Indic common ware and terracotta figurines together with locally produced luxury forms of ceramic material modelled after well-known Eastern Hellenistic styles. Moreover, the discovery of some fragmentary Greek inscriptions on ceramic sherds at Barikot and Udegram provides evidence for the use of the Greek language in the Swat Valley during this period. Other inscriptions have also been revealed, which are in Brāhmī, Kharoshti, and Aramaic, indicating the presence of a multi-lingual and probably multi-ethnic community at Barikot (Callieri 2007). Various types of beads have been identified deriving from the Graeco-Bactrian and especially Indo-Greek periods, indicating another episode of economic growth and affluence at Barikot. In general, a high

degree of economic complexity and social stratification is witnessed during the Hellenistic periods at Barikot as the forthcoming discussions will show.

2.3.6 Indo-Scythian ('Saka')

The Indo-Scythians were originally nomadic tribes from Central Asia, who are believed to have engaged the Indo-Greeks in armed conflict, managing to seize Gandhara at around 75 BCE. The coins of the earliest Indo-Scythian rulers have been found at a great range of sites including Kandahar, Begram, Kabul, Taxila, Swat and Peshawar (Errington and Curtis 2007: 59-61; Petrie 2020a: 45; Srinivasan 2007: 8). Indo-Scythian administered Taxila appears to have been conquered by the Indo-Parthians under Gondophares at around 32 CE, although other areas of Gandhara have revealed coins of later Indo-Scythian kings (Bopearachchi and Pieper 1998: 219; Errington and Curtis 2007: 62-64; Petrie 2020a: 45). After their arrival in Gandhara, the Indo-Scythians adopted Hellenistic, Persian and Indian models of administration, official titles, coinage, architecture, and art (Fröhlich 2009; Marshall 1951: 56; Neelis 2001: 69-70; Puri 1994a: 195-196).

Indo-Scythian figures can be seen carved in the Buddhist art of Gandhara as well. At Butkara I in Swat, for example, iconographic depictions of Indo-Scythians are depicted together with reliefs of standing Buddhas (Fabrègues 1987: 34; Faccenna 1964: Pl. CCCLXXII). This period, in fact, corresponds to 'the great flowering of Gandharan Buddhism' (Puri 1994a; Salomon 1999: 180) characterised by the Indo-Scythian patronage of Buddhism and other religious traditions and beliefs (Marshall 1951: 57-58; Neelis 2001: 77). The Indo-Scythian impact on architecture, artistic production, language, and other aspects of everyday life has, however, not received adequate attention in archaeological scholarship (Fröhlich 2009: 60; Neelis 2001: 78).

In terms of material culture studies, limited attempts have been made to try to link ordinary items with the specific cultural identity of the Indo-Scythians. Marshall even states, 'The misfortune of the Śakas was that they possessed little artistic ability of their own. The best that they could do was to make use of such local talent as they found in the conquered territories without contributing anything of value to its development' (Marshall 1951: 57). Marshall's observation, however, was based upon the prevailing ideas and concept of the time in addition to a lack in stratified material culture studies associated with the Indo-Scythian period (see Chapter 3). As a result, much of what we know about the Indo-Scythians is based on the numismatic evidence again while their precise chronological development remains controversial (Fröhlich 2009).

2.3.7 Indo-Parthian kingdom

Like their Indo-Scythian cousins, the Parthians were a nomadic group from Central Asia (Caroe 1962: 71). They succeeded in absorbing and spreading various artistic traditions, including Near Eastern and Greek art, to lands where they were present (Srinivasan 2007: 9). In addition to the Peshawar basin, the Indo-Parthians managed to seize control over the Swat and Taxila Valleys under the leadership of Gondophares I (ca. 32 – 60 CE), but his successors were relatively soon pushed back into Afghanistan and replaced by the Kushanas (Cribb 2018; Errington and Curtis 2007: 65-66; Petrie 2020a: 46; Rienjang 2017: 85; Rosenfield 1967: 130). As in the case of the Indo-Scythians, our understanding about the chronology and everyday life conditions during the Indo-Parthian rule is largely based on coin finds, inscriptions and art sculptures (Behrendt 2004; Bopearachchi and Pieper 1998; Fröhlich 2009; Fussman 1993b: 88; Petrie 2020a: 47; Puri 1994a: 190; Schmidt 2005).

In fact, Butkara I in Swat was up until recently the only scientifically investigated site characterised by a long stratigraphic sequence, which also covered the Indo-Parthian period (Faccenna 1964; Klimburg-Salter 1999: 11). Although the precise chronology and geographical extent in which the successors of Gondophares I ruled remains uncertain, the excavations at Taxila indicate a time of 'great prosperity and cultural achievement' (Neelis 2001: 76; Rosenfield 1967: 129). The study of the stratified beads from the Indo-Scythian and Indo-Parthian periods of Barikot, likewise, indicates a period of great affluence and diversity. The recovered bead ornaments are produced from various types of raw materials and occur in many different shapes, indicating an abundance in wealth and a high degree of social stratification within the society while the local taste for some types of beads clearly changed during this time as the forthcoming discussion will show.

2.3.8 Kushana Empire

Like the Indo-Scythians and Indo-Parthians, the Great Kushanas were yet another nomadic group from Central Asia. The Kushanas controlled and ruled over a large geographic territory, being dominantly represented in eastern Afghanistan, north-and-north-western Pakistan, Kashmir, the Punjab and parts of the Gangetic region of northern India (Allchin and Cribb 1992: 6; Bopearachchi and Pieper 1998: 215; Dani 1989: 129; Petrie 2020a: 48; Puri 1994b: 254-255; Sinopoli 2006). Considered to be a 'superpower' of its time (MacDowall 2019: 95; Jongeward et al. 2015: 3; Mukherjee 1988: 3-28), the Empire reached its maximum development during the reign of Kanishka I as evidenced by a great range of material sources including preserved inscriptions, archaeological remains, coins and by an era initiated by him and continued by his successors (Neelis 2001: 87).

Kushana control over a network of routes and corridors contributed to a favourable political and economic environment for long-distance travel, commerce and cultural exchange (Ball et al. 2019; McLaughlin 2016: 83; Neelis 2001: 79; Petrie 2020a: 4). It was during this time that Buddhism

flourished and spread into the Tarim kingdoms and China (Allchin and Cribb 1992: 6; McLaughlin 2016: 90; Petrie 2020a: 48). Religious institutions such as *stupas* and monastic settlements flourished as a result of patronage under the Kushanas (Neelis 2001: 89). Although limited material culture items have come to light that can be considered markers of Buddhist signs during the pre-Kushana periods, the situation changes during the Kushana period with the appearance of objects that are unmistakably Buddhist (Callieri 2006: 78-79). The production of Gandharan art sculptures also became widespread during the Kushana period (Callieri 2006: 78). The earlier Hinayana Buddhist tradition (lesser vehicle) expanded into the Mahayana tradition (Greater Vehicle) during this time (Fogelin 2012). Under the Hinayana tradition, the Buddha was regarded as a sage only and represented through the use of symbols but becoming divine under the Mahayana tradition (Caroe 1962: 75-76; McLaughlin 2016: 90). Just like their predecessors, the Kushana rulers adopted aspects of culture and belief of their subject peoples in Inner Asia, Iran and the subcontinent, developing their own artistic traditions and architectural styles (McLaughlin 2016: 82-83).

The chronology and archaeology of the Kushana period, unfortunately, suffers from the same kind of limitations that are characteristic of the earlier cultural periods of Gandhara. Considering the many recovered art and coin assemblages, there is still no scholarly consensus on the absolute chronology of the Kushana Empire. Few major key pieces of writing, such as the Rabatak inscription, have come to light from the Kushana period thus far, leaving us, in many aspects, confined to the study of short legends on coins and seals (Bopearachchi and Pieper 1998: 177; Errington and Curtis 2007; MacDowall 2019: 95; Klimburg-Salter 1999: 3; Mukherjee 1988; Rosenfield 1967: 8; Sinopoli 2006: 335-338). Although later Chinese Buddhist sources talk about the legends of Kanishka, these books do not provide reliable historical data, giving little information about the identity and way of life of the people in Gandhara during this dynamic time (Caroe 1962: 74-75; Rosenfield 1967: 8; Sinopoli 2006: 335-338). The archaeological data is, likewise, either partially available such as for the site of Hadda in Afghanistan or needs to be re-assessed based upon the application of modern excavation methods especially with regards to the sites in Taxila (Dhavalikar 1999: 160; Klimburg-Salter 1999: 8; Sinopoli 2006: 335; Tarzi et al. 2015).

In contrast, the systematic excavations at Barikot have clearly established that the city reached the pinnacle of its development during the Kushana period and became part of the ‘metropolitan’ territory of a larger Kushana Empire (Olivieri 1996). Barikot grew into a large, thriving settlement whose economy was largely based on agriculture and long-distance trade. Various types of beads with both geometric and figurative forms derive from the Kushana layers of Barikot, signifying a period of marked economic growth and prosperity. As the study of the recovered material culture including ceramics has shown (Micheli 2007; 2020; Olivieri 2014: 220, 241; Olivieri and Callieri 2020; Olivieri et al. 2006: 135-136), the beads from the Kushana and the succeeding chronological periods of Barikot also indicate strong typological connections with the beads found from sites located in the Taxila Valley and the

various territories of India in the north and south ('Indianisation' process; see, for example, Bellina 2003; Bellina and Glover 2004; Smith 1999) (see Chapters 6 and 7 for more details).

2.3.9 Kushano-Sasanian kingdom

In the 3rd century CE, the Sasanian dynasty, which emerged from Iran, expanded, defeated, and ruled over the Kushana Empire in Gandhara, becoming referred to as the Kushano-Sasanians. They represented a group of Sasanian princes who appear to have served as governors of major provinces, bearing the title *Kushanshah* (Errington and Curtis 2007: 82; Jongeward et al. 2015: 197; Petrie 2020a: 50; Rienjang 2017: 87). These prince-governors were appointed by the Sasanians to rule over the former Kushana territories (Baumer 2014: 54; Cribb 1990; 2018; Dani 1989; Errington and Curtis 2007: 82-84; Petrie 2020a: 50-51). The *Kushanshahs* appear to have taken control over Swat during the reign of Vashishka while Taxila appears to have been lost during the reign of Vasudeva II during the late 3rd century CE (Caroe 1962: 79; Errington and Curtis 2007: 84; Petrie 2020a: 51).

After the rule of Peroz II (309 – 335 CE), the territories controlled by the *Kushanshah* appear to have been divided up as indicated by the numismatic evidence. The coins of a *Kushanshah* named Varhran (ca. 335 – 370 CE) were issued in Bactria while the Sasanian *Shahanshah* Shahpur II (ca. 325 – 379 CE) issued coins directly in Gandhara (Cribb 1990: 153-171; Errington and Curtis 2007: 84; Jongeward et al. 2015; Petrie 2020a: 51). Furthermore, Buddhism itself continued to expand while the number of deities greatly increased during this time. The evidence from coins and sculptures indicates the popularity of Hindu deities as well while artistic depictions of the fire cult may be related to Zoroastrianism (Baumer 2014: 54; Dani and Litvinsky 1996: 114; Micheli 2020: 255; Petrie 2020a: 52). The Kushano-Sasanian dynasty was, eventually, driven out of Gandhara by the Hunnic groups from Central Asia in the late 4th century CE (Baumer 2014: 54).

Regardless, as with the preceding Kushana period, our knowledge about the Kushano-Sasanian period remains limited while studies on stratified material culture items are urgently needed. For the moment, the relative chronology of the Kushano-Sasanian period is mainly based upon their complex coinage system (Cribb 1990: 152; Errington and Curtis 2007: 84; Petrie 2020a: 50-51). There is hardly any information available about the ethnic make-up and lifestyle of the peoples living under the rule of the Kushano-Sasanians (Caroe 1962: 79). In contrast, the available material culture that can be clearly linked to the Kushano-Sasanian period indicates a time of abundant economic affluence, craftsmanship, increased trade and exchange. The rich evidence from Barikot alone consists of stone seals, numerous shell bangles, coins, high-quality beads, and luxury ceramic materials indicating the maintenance of wide-ranging connections and the socio-economic status of the people inhabiting the site at the time.

2.3.10 Hunnic groups from Central Asia

There are many research gaps that need to be filled in the history of Gandhara and adjacent regions especially between the mid-to late first millennium CE (Hawkes 2014a: 53; Kennet 2020: 5; Morrison 1997: 97; Neelis 2001: 98). Although this period is of crucial importance, our understanding about this time is again based on the numismatic evidence while the available textual sources that report about it come from outside the region most prominently from China (Caroe 1962: 81; Cribb 2010: 91-92; McLaughlin 2016: 208-217; Petrie 2020a: 52). On top of that, the apparent 'absence' of archaeological finds datable to this general time in the subcontinent (see debate on chronological issues in Chapter 3) encouraged R. S. Sharma to propose models of de-urbanisation and economic decline (Dhavalikar 1999: 95-113; Sharma 1987: 179-182). There has been, however, to date no in-depth re-examination of the evidence that was used by Sharma and, as a result, his urban decay model continues to exert considerable influence over our interpretation of this time (Kennet 2004b: 2; 2013: 347).

As a result, the precise nature, typology and chronology of the artefacts that circulated during this period remain inconclusive (Hawkes 2020: 174). The available archaeological and literary sources, however, seem to indicate the emergence of new social, political, and cultural structures during this time, reshaping the geo-cultural map of the entire region (Filigenzi 2010: 389; 2015a; 2015b). It appears that four Hun groups, namely the Kidarites, Alchon, Nezak, and Hephthalites, moved into and conquered Gandhara in the mid-first millennium CE (Alram and Pfisterer 2010; Ball et al. 2019: 349-351; Cribb 2010; Errington and Curtis 2007: 102; Petrie 2020a: 53).

The precise ethnicity of these various groups remains currently unclear (Caroe 1962: 81-82; Baumer 2014: 97; Petrie 2020a: 53-58). The first wave of Hun conquest was apparently led by the Kidarite Huns who managed to gain control over Gandhara from the last of the *Kushanshahs* at around 365 CE (Caroe 1962: 82). Caroe (1962: 83) suggested that control over Gandhara is believed to have fallen later to the Hephthalite Huns at around 455 CE, but according to the latest studies on the numismatic evidence, it appears that it was, in fact, the Alchon Huns who succeeded rather than the Hephthalites Huns (Baumer 2014: 99; Cribb 2010: 284; Errington and Curtis 2007: 85-102; Petrie 2020a: 59; Rienjang 2017: 89). Over the course of the 19th and 20th centuries, many Gandharan sites were excavated such as at Takht-i-bahi, which revealed thousands of art sculptures mainly from disturbed contexts (Behrendt 2009). The discovery of the sculptures from disrupted contexts led some scholars to suggest that Buddhist sites were systematically destroyed by the Huns in the mid-5th century CE, which seemed to confirm the accounts by Chinese pilgrims such as Sung-yun and Xuanzang (Beal 1884: c, 98; Marshall 1951: 76-77).

Recent archaeological data has, however, challenged this view, instead indicating the continued occupation of many Buddhist sites into the 6th century CE and later (Behrendt 2009: 17; 2016; Errington 1999-2000: 211-13; Kuwayama 1992: 4; Petrie 2020a; Verardi 2012). While Buddhism was probably

in decline by the late 5th century CE (Filigenzi 2015b; Olivieri 2010: 358), many of the sites show evidence of occupational continuity and patronage between the 6th – 8th century CE including Butkara I in Swat (Behrendt 2009: 18; Faccenna 1980-1981: part 1 11ff., part 3: 635; Filigenzi 2015b: 121). It has been proposed that it was the disappearance of the Huns and the subsequent breaking of connections that caused trade routes to shift in favour of the Kabul Valley as opposed to the eastern territories of the region in the mid-sixth century CE (Behrendt 2018: 149; Kuwayama 2006: 124-127).

As in the case of the earlier chronological periods of Gandhara, iconographic sources represent the main line of evidence that shed light on the prevailing ornamental traditions and styles of the people of this time. Hun kings, including Khingila (ca. 430/40 – 490 CE), who ruled over Gandhara, are seen adorned with personal ornaments on their coinage including numerous beads (Alram et al. 2016; Baumer 2014: 99). In fact, the analysis of the archaeological beads from Barikot reveals a credible amount of evidence to allow us to challenge the concept of economic decline during this time as the following discussions will show.

2.3.11 Turki Shahi and Hindu Shahi dynasty

After the downfall of the Sasanian Empire, the western Turkish dynasty rose to power ruling parts of Iran, Afghanistan as well as the north-western areas of Pakistan between ca. 666 – 843 CE (Alram 2014; Petrie 2020a; Rehman 1979). The Turki Shahis are mostly known through their military conflicts with the Islamic Abbasid Caliphate (Petrie 2020a; Rehman 1979: 85-89). The succeeding Hindu Shahi dynasty was apparently founded by a Brahman minister in the Turki Shahi cabinet called Kallar (Azeem 2005: 225; Khan 1976: 96; Khan 2017: 24; Masih 2002: 4, 71; Mishra 1972: 39; Stein 1944: 7; 1973: 15). The religion of the Shahis seems to have been originally Buddhism but changed to Brahminical Hinduism as early as 644 CE (Caroe 1962: 101).

Despite the long reign of the Shahis (7th – 11th century CE), very little is known about the local history and the people of this time. The available literary accounts are found in Chinese, Arabic and Persian sources while the only contemporary sources are represented by a small number of inscriptions that can be attributed to the Shahis. With the exception of the presence of Shahi coins, for example, there is little evidence for Bannu's place within the politico-administrative framework of the borderlands in the 10th century CE (Cribb 2002: 73; Petrie 2020a: 111). The chronology of the Shahis, thus, largely derives from their coins. Archaeological fieldwork is in part hindered by the presence of modern cities such as present-day Kabul, sitting above the ancient ruins of the city (Fussman 2008; Klimburg-Salter 2010a: 180; 2010b: 39) while, with the exception of Barikot, relatively little work has taken place in terms of the study of Shahi archaeology in the region.

None of the many metal sculptures that have been attributed to this region and time have a precise provenance or verified archaeological context (Khan 2017: 22; Klimburg-Salter 2010b: 39). As a result, it has been difficult to comment on the way of life and the traditions of the people living under Shahi rule (Caroe 1962: 111-112). It appears, however, that there were major cultural and economic developments occurring during this time as evidenced, for example, at Barikot where we see the appearance of new ceramic forms, changes in sculptural and architectural styles, which seem to differ from those seen during the earlier Kushana periods (Filigenzi 2015b; Klimburg-Salter 2010a; Olivieri et al. 2006: 140-141). A notable number of rock sculptures appear in Swat between the 7th – 8th centuries CE probably representing a form of proto-Vajrayanic Buddhist art (Filigenzi 2006; 2015a; 2015b; Olivieri 2010; 2016), showing cultural links with the art traditions of the Indian heartland as well as Kashmir (Olivieri 1994; 2010: 361).

Numerous Hindu Shahi sites can be found on both sides of the Swat River (Khan 2017: 67-68; Olivieri 1996; Stein 1927; Tucci 1958), characterised by watchtower settlements probably serving a defensive function (Olivieri 1996: 70; Tucci 1958: 286). According to Olivieri, after the invasion of the Peshawar basin, Swat became a stronghold of the Hindu Shahis (Olivieri 1996: 74-75). The excavations at Barikot have revealed a great range of archaeological structures and materials from the Shahi period including a tower-house fortified settlement housing a turreted building that encloses a pillared hall with fireplace, a Brahmanical temple and various items of material culture. In accordance, the recovered bead ornaments are found produced from various types of raw materials and occur in many different shapes, representing another period of economic growth and affluence rather than a time of cultural regression.

2.3.12 Ghaznavid dynasty

The second half of the tenth century CE saw the decline of Hindu-Shahi control over Gandhara and the arrival of the Ghaznavids from the Islamic world, led by Sultan Mahmud of Ghazni (997 – 1030 CE) (Ball and Fischer 2019: 462-463; Bosworth 1998: 124; Petrie 2020a: 83-86; Shah 2012; Wink 1990: 23). It has long been the general narrative that the arrival of Islam and the rule of the various Muslim states, devastated the society and economy of the subcontinent and adjacent regions, marking the onset of a 'Dark Age' (Chakravarti 2002; Dhavalikar 1999: 111-112; Elliot and Dowson 1869; Fogelin 2015: 218-224; Mill 1840; Verma 1978: 244-248). Recent studies, in contrast, are beginning to challenge existing models of mere conflict and destruction (Asif 2015; Auer and Strauch 2019; Eaton 2000; Inaba 2019; Petrie 2020a: 2; Raza 2011; Thapar 2008; Truschke 2019; Ziad 2016). With regards to the archaeological evidence, various types of Ghaznavid period structures have been unearthed in the systematic excavations taking place in the Swat Valley. At Udegram in Swat, for instance, a Ghaznavid period mosque has been discovered, which is believed to be the oldest mosque in the northern part of Pakistan (1048 – 49 CE), possibly built at the time of the campaign to mark the authority of the

Ghaznavids in this region (Faccenna et al. 1985: 439; Khan 2017: 52). Prior to the discovery of the mosque, information about the arrival of Islam in Swat was limited to oral traditions rather than archaeological or historical evidence (Bagnera 2006: 205; 2015; Khan 1985: 153; Khan 2017: 33; Scerrato 1985; 1986: 57-62).

The rise of Ghaznavid rule, therefore, marks an important development in the history of the region, although it has not received much research interest in archaeological scholarship and literature. The sources for understanding the Ghaznavid history are currently all products of an elite and court culture while information relating to the everyday life of the people of this time remains speculative (Bosworth 1998: 115). It is, for example, not clear when and how the Bannu region was subdued by the Ghaznavids where the use of Ghaznavid coins is well-documented (Cribb 2002; Petrie 2020a: 473). The precise chronology, nature and impact of Ghaznavid rule on the inhabitants of Swat and, indeed, the wider region, are the research agendas that need to be thoroughly investigated in future studies. Various types of material culture items have come to light from the excavations of the Ghaznavid contexts at Barikot including bead ornaments made from different raw materials and in a range of styles, which provide, in many instances, evidence of continuity in pre-existing practises. Also, it is important to note that there is currently little data available to allow us to culturally define with precision the time period succeeding the Ghaznavid period of Barikot that is Macrophase 9b (13th CE – 15th century CE). This is why we are currently not in the position to provide an introduction to Macrophase 9b of Barikot in terms of cultural affiliations. Based on the currently available evidence, however, Macrophase 9b may be culturally linked to the Timurid-Dardic horizons.

2.4 Archaeological and historical contexts: key issues

In summary, this chapter has outlined the archaeological narrative and framework of the current study so that the reader can better contextualise the data and understand the complexities of the cultural differences and hybridisation dynamics that were characteristic features of the time periods under study. There are major chronological uncertainties, which are affecting our interpretations in archaeological and historical studies, making it difficult to precisely reconstruct the cultural history of the various polities that ruled over Gandhara at various times in the past. At the same time, the general lack in archaeological examinations especially of stratified material culture items leaves us, in many instances, confined to the use and study of textual sources and coins. In other words, there is limited information available to us that would shed light on the prevailing bead ornamental traditions and way of life of the inhabitants of Gandhara at any point in time. The following Chapter 3 will provide an account about the field of beads studies and will introduce the types of analytical techniques that are used by investigators to study aspects of typology, production technology, and adornment of bead ornaments.

Chapter 3: Research context: Bead studies

In this chapter, the research context of the current study will be explicated in order to highlight the development, current themes, and state of bead studies in association with the limitations or gaps within the large corpus of available literature, which I am to address in my research. A range of analytical techniques that are used in the study of the production technology, typology, and adornment of beads will be discussed below that are most relevant to the research aim of the present study. This chapter will, therefore, discuss the benefits and limitations of the different analytical methods and justify why some of them were favoured over others to study the bead assemblages from Barikot. In addition, a consideration and discussion on the concept of 'value' as perceived in the past and the chronological limitations associated with contemporary archaeological sites is provided in order to emphasise the need of the current study on the beads from Barikot.

3.1. History of Technological and Typological Studies of Beads

The first major pioneering research on beads was carried out by Horace C. Beck (Beck 1928; 1941) and Ernest Mackay (Mackay 1933; 1937; 1943), whose contribution to bead studies from around the world, involving methods of manufacture, shape and material, made them the leading authorities in bead research of their times with Beck being referred to as 'The Bead Man' by his contemporaries (Westlake 1976). Mackay, however, was the first to study the bead drilling technologies of the Indus sites of Mohenjo-Daro and Chanhu-Daro, identifying different types of stone drills that were used to perforate various types of stone beads. Mackay also contributed to growth in our knowledge about the production of 'bleached' or 'etched' carnelian beads (Holé et al. 2020; Kenoyer 2017b; 2020; Mackay 1937; Reade 1979). The various types of stone beads associated with the Indus Tradition that were studied by Beck and Mackay led to the development of a systematic and comprehensive typology for describing bead shapes and styles. As a result, many subsequent archaeological studies on beads have adopted (Bannerjee 1959; Behar et al. 2015; Chakraborty 2012; Durrani et al. 1995; Kenoyer 2005; Ludvik 2012; Pande 2000; Rao 1979; Reade 1979; Schüssler et al. 2001; Sharma 1969; Uesugi and Rienjang 2018; Vats 1940) and/or further developed the general terminology, methods and systems proposed by Beck and Mackay (Kenoyer 1991a; 2017b).

As Dorothy Mackay wrote in 1944, 'The great amount of work quietly done by Mr Beck has placed the study of ancient beads of the East on a firm footing. There is an immensity of comparative work still to be done, not least among the hoards of beads that make such colourful and attractive, but unscientific, shows in many of our museums, More will be added after the war [WWII], when excavations will no doubt be resumed, and it is to be hoped that among the new generation of archaeologists Mr Beck's sound and scientific foundations will be appreciated and put to good use' (D. Mackay 1944: 204). With the availability of new data from his research, J. M. Kenoyer has elevated the protocols produced by

Beck and Mackay up to a new level to create an updated classification system that is characterised by further critical evaluation (Carter 2013; Kenoyer 2017b). In this regard, Kenoyer has introduced a coherent methodology, which is more sensitive to chronological changes in technology and style.

It involves the documentation of new variables providing data about the specific variety of raw material, the way it was shaped, drilled, polished, decorated, and used (Kenoyer 2005; 2017b). Mackay, for example, did not differentiate between two specific types of cylindrical stone drills (Figure 5): The tapered cylindrical drill was used to perforate short stone beads whereas the constricted cylindrical form was a uniquely standardised and specialised drill to perforate long beads made from agate, carnelian and jasper (Kenoyer and Vidale 1992: 498-499). In addition, the effects of post-depositional processes such as weathering and burning were not recorded in the earlier studies on beads, which can lead to notable misinterpretations of the data produced (Kenoyer 2017b). Beck (Beck 1933: 384) and Mackay (Mackay 1937: 14), for example, define some types as 'black-on-white etched beads', while, in reality, they have been affected by post-depositional alterations in the form of burning rather than being the result of cultural choices made in the past (Kenoyer 2017b: 152).

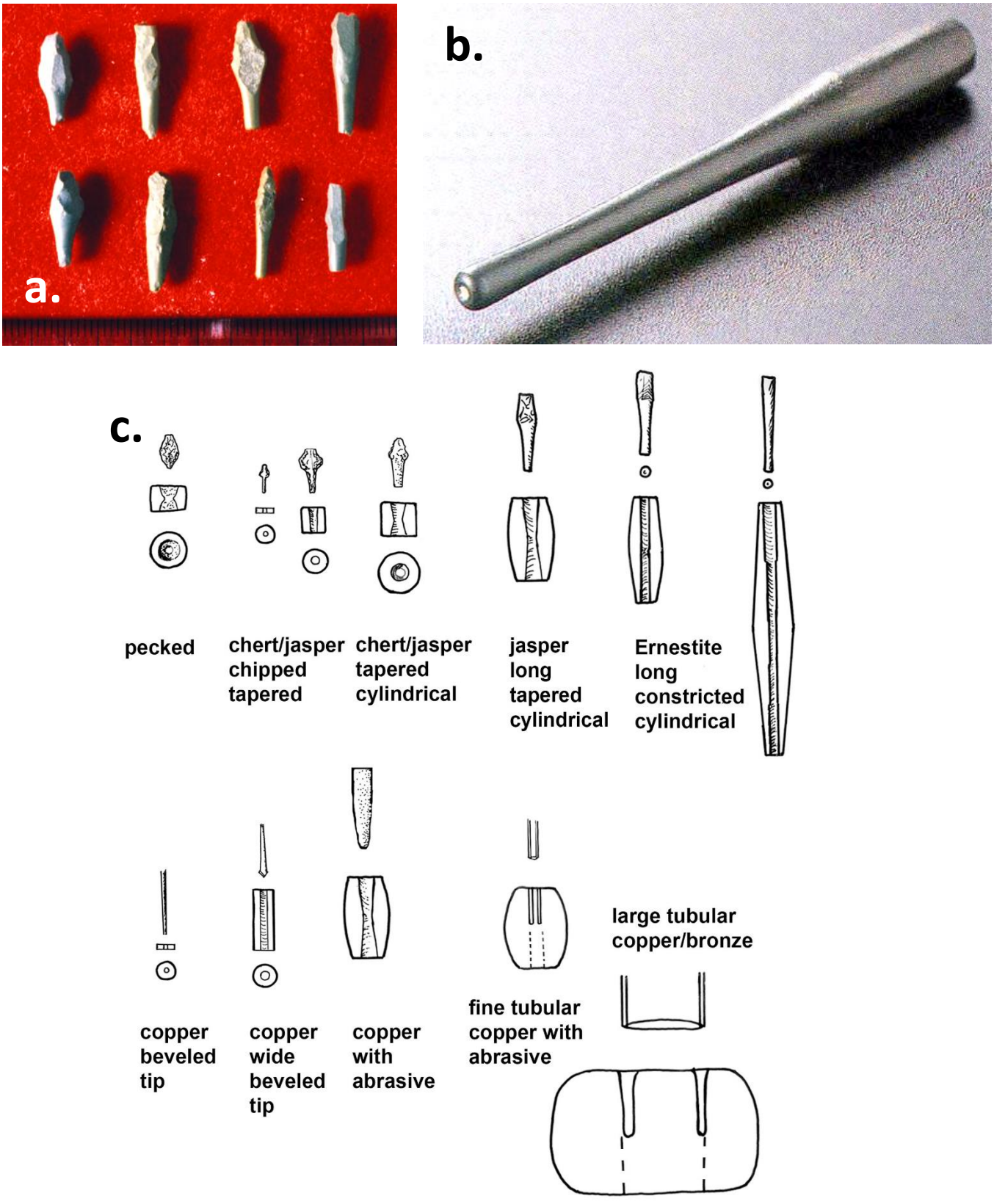


Figure 5: a) Tapered cylindrical drill b) Constricted cylindrical drill c) Various drill types to perforate beads (Kenoyer 2017b: 135)

Furthermore, the studies on the drilling technologies for bead production using silicone casts with Scanning Electron Microscopic analysis were first introduced to archaeology by J. Gwinnett and L. Gorelick (Gorelick and Gwinnett 1983; Gwinnett and Gorelick 1979; 1988; 1991; 1998), providing a good source of reference to study the development of drilling technologies from various periods and parts of the ancient world. Gwinnett and Gorelick, however, studied the drill holes of selected beads mainly at low magnification (15x to 25x) among other limiting factors, which was not sufficient to distinguish specific types of surface modifications and abrasives such as quartz, emery and diamond. Consequently, Kenoyer and Vidale carried out further studies and produced higher magnification and resolution images of the drill holes of various beads (20x, 50x, 100× and 300×), enabling them to better differentiate between the different drilling abrasives (Kenoyer 1997a; 2017a; Kenoyer and Vidale 1992). The study of silicone casts of the long carnelian beads from Chanhudaro in modern Pakistan, for example, reveals similarities with the beads found in the Ur graves, providing evidence of cross-cultural links and trade or the presence of bead production centres at Mesopotamian sites using the same methods and materials that were utilised in the domain of the Indus Tradition in the mid-third millennium BCE (Kenoyer 1997a; 2008: 21-26).

On top of that, the recent introduction of trigonometric functions of Elliptical Fourier transforms (EFTs), a new methodological analysis, enables investigators to compare variations in bead shapes and drill diameters to define distinctive workshop styles. This technique was recently applied on numerous carnelian beads from Bronze Age Levant and the results support the possibility of defining distinctive workshop traditions related to bead production of the Indus Tradition, which may well have taken place in Mesopotamia or the Indus region (Kenoyer 1997a: 272; 2008: 21-26; Ludvik 2018; Ludvik et al. 2020a). Because of such successful breakthroughs, the application of taking silicone casts has expanded and has become firmly established in the academic world of archaeology (Carter 2013; Frenez et al. 2016; Glover 2019; Glover and Kenoyer 2019; Heo 2018; Kelly 2013; Ludvik 2012; 2018; Ludvik et al. 2015; Ludvik et al. 2020b; Rienjang 2017; Rienjang et al. 2017; Uesugi 2019; Uesugi and Ananova 2019; Uesugi and Jeneepeter 2019; Uesugi and Rienjang 2018; Uesugi et al. 2018; Rabbani 2018-19; 2020a).

3.1.1 *Chaîne opératoire* and Ethnographic documentation

Another analytical technique to investigate ancient technologies is the *chaîne opératoire* approach (operational sequence) from collecting and preparing raw materials to finishing the product - in other words to examine the complete process of the manufacture of objects (Leroi-Gourhan 1964; Ludvik 2018: 83; Vidale et al. 1992; Vidale and Lazzari 2017; Wendrich 2012: 3). This method has been applied in several studies on beads and other material culture items deriving not only from the subcontinent but also from other parts of the world (Francis 2002; 2004; Georjon et al. 2021; Kelly 2013; 2016; Ludvik

2018). In addition, experimental replication and systematic ethno-archaeological studies have seen a surge in academic scholarship particularly in the context of the Indus Tradition and have provided significant new perspectives onto the *chaîne opératoire* process of bead production (Figure 6).

The Khambhat Bead Project in the Gujarat region of north-western India, most notably, was used to study the organisation of a specialised craft at the modern bead making industry of Khambhat and, in the process, understand how different aspects of social, economic and political organisation might be reflected within the ancient urban communities of the Indus Tradition (Bhan et al. 2017; Kenoyer et al. 1991; Vidale et al. 1993). This project has contributed to the development of interpretive models that can be used to refine our understanding about the complex processes involved in the complete manufacture of beads in the past, which have been applied in subsequent bead studies (Rienjang et al. 2017; Uesugi and Rienjang 2017).

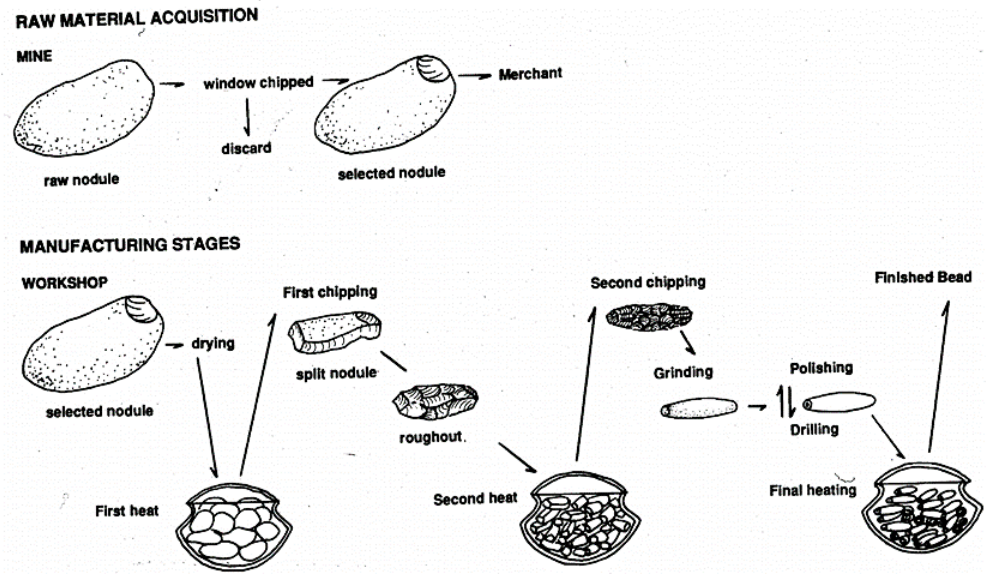


Figure 6: *Chaîne opératoire* process of stone beads at the Khambhat workshops, India (Kenoyer et al. 1994: 289)

A linear (normal) operational sequence that would be the ideal choice, however, cannot always be taken for granted when there is evidence of the coexistence of alternative steps taken by ancient crafts people (technological variations). In this regard, Vidale's studies (1998; 2000) represent a landmark on the investigation of ancient manufacturing sequences. By discussing different archaeological case-studies from the ancient world, the author convincingly demonstrates the use of five alternative deviations or steps from a linear (normal) operational sequence. A skilled craftsperson, for example, may be able to skip some manufacturing steps whereas less experienced individuals may need to go through longer, more painstaking technical steps (Vidale 1998). These processes have been documented, for example, in a talc bead making area at the site of Mehrgarh, Pakistan (Vanzetti and Vidale 1995). Similarly, since

the *chaîne opératoire* technique remains limited to the sequence of manufacture, it cannot be utilised to infer the use, changes in use or meaning(s) associated with the object (Joy 2009: 542). Schiffer's Behavioural Chain and subsequent publications do, however, extend into the investigation and consideration of the concept of 'use' (1975a; 1975b; 1976; 1979; et al. 2001: 731).

3.2 Typological and Technologies Studies of Beads from Historical South Asia

The processes of creating typologies are fundamental to archaeological interpretation having been applied in the study of a great range of cultural artefacts from different parts of the world (Dales and Kenoyer 1986; Clarke 1978; Gijn 2010; Gadekar and Ajithprasad 2018; Jamison 2018; Lefrancq and Hawkes 2020). Studies on bead ornaments have often adopted typological approaches to classify large sets of beads based on similar attributes and properties. Consequently, such classifications have the potential to answer questions related to the reconstruction of relative chronologies, cultural attributions, the provenance of the raw materials, the diachronic development of the objects and can also contribute to a broader understanding of social and economic aspects of past societies (Bar-Yosef Mayer 2013; Dhavalikar 1999: 161; Gijn 2010: 25; Sørensen 2015: 93).

Nevertheless, it should be stressed that the conscious cultural choice of the bead maker or the requirement of the user may not have been considered within an arbitrary typology (Baysal 2019: 6, 21; Hill and Evans 1972: 266; Whittaker et al. 1998). Variables such as raw material, shape, meaning and even colour may have been perceived differently in the past as opposed to what a formal typological analysis would indicate to the archaeologist (Adams and Adams 1991; Baysal 2019: 20-21). Groupings of artefacts proposed by archaeologists (etic perspective) may not necessarily correspond to the views of cultural groups (emic perspective) who actually used them (Hayden 1984). Despite receiving some criticism, several scholars continue to emphasise the significance of a typological approach as one of the main tools to create both order and direction within our data (Sørensen 2015: 93).

For a variety of reasons, the evidence regarding the typology of beads from historical contexts of the subcontinent is currently limited (Deo 2000: 51). The use of the traditional typology system has often been applied, for example, in an unsystematic way characterised by inaccurate descriptions and the general lack of a consensus among archaeologists. Several published studies are characterised by descriptive catalogues with few drawings and measurements, simply listing the different types of materials and general shapes as has also been noted by Kenoyer and Kanungo (Kanungo 2004; Kenoyer 2007). To cite some relevant examples, the distinct 'ghata-shaped' beads that were originally defined as such in the literature (Dikshit 1952; Ghosh 1947-48) are overwhelmingly found produced from terracotta and resemble the shape of a pot. Several imprecise terms have been introduced to describe them over the years including 'vase-shaped' (Coningham and Ali 2007; Lal 1954-55) or 'flat based

with collar at one end' (Dani 1965-1966) while the Barikot 'ghata-shaped' beads were initially recorded as 'collared' in the early excavation campaigns of the site. The term 'collar' is, at the same time, often applied in the published literature for another type of beads usually produced from glass and stone in the subcontinent (Beck 1941; Francis 1986; 2002).

Another misunderstood type of beads is the 'areca nut' shape (Sankalia and Deo 1955; Sankalia et al. 1958). Several reports have labelled this distinct group of beads with imprecise terminologies such as 'pear-shaped' (Wheeler 1946) or 'beehive-shaped' (Coningham and Ali 2007; Khan 2010) while the beads from Barikot were defined as 'convex cone' or 'conical' when they were first recorded (Figure 7). Therefore, there is a need to use the standard terminology for these beads as presented by Ghosh and other scholars rather than applying terms that can refer to multiple forms. In other examples, the shape of a bead has come to be described as 'rounded' only, which does not differentiate between a 'globular' or 'spherical' shape (Deo 2000: 51). In the excavation report of Rang Mahal, for instance, there are many beads of marine shell and glass that have been described as 'round beads' only. The excavators probably referred to the cross-section of the referenced beads only while their profile/longitudinal shapes have not been described, which are barrel and cylindrical (Rydh 1959: Pl. 82 no. 37-44, no. 29-35). Another example relates to the description used as 'hexagonal bead' in the literature, which as, B. Deo also notes, 'fails to bring out the exact geometric shape of the bead' (Deo 2000: 51).

In terms of raw material, many misidentifications have also been noted in the available corpus of academic literature based on the published photographic documentation of the beads. They include, for example, the marine shell beads that have often been mistakenly identified as 'quartz'. Similarly, glass beads with a distinct yellowish-brown colour have been inadvertently described as 'paste', 'terracotta' or 'carnelian' in the literature.



Figure 7: An areca nut bead of terracotta from Barikot (Ser. 4344) (Photograph: author's own)

In the Gandharan context, typological and technological studies on bead ornaments remain relatively limited due to chronological uncertainties (Beck 1941; Ludvik 2012; Rienjang 2017; Rienjang et al. 2017; Uesugi 2019; Uesugi and Rienjang 2018), although numerous archaeological sites have yielded a great range of beads over the past 100 years. With regards to the key-sites of Bhir Mound and Sirkap in Taxila (Beck 1941; Marshall 1951), a clear understanding of the chronology is still lacking for the occupation phases of both sites (Allchin 1993: 69-70; Erdosy 1990; Fussman 1993; Petrie 2013a: 655-660; Petrie 2020b: 636). Besides, only a selected number of beads have been studied by Beck, Uesugi and Rienjang while comprehensive scientific studies remain to be conducted. Moreover, a holistic approach to the study of beads from various sites is further hampered by the non-publication of archaeological reports, which has also been noted by D. Kennet and B. Deo (Deo 2000: 4; Kennet 2013).

The publication of beads and other minor finds from the key-site of Aï Khānum, for example, is still unavailable, which will impact on any attempt to critically study the recovered bead assemblages from this time period. Similarly, the excavations of the key-site of Bhir Mound in Taxila that were supervised by M. Wheeler were never published (Petrie 2013a: 657). As Olivieri and Callieri correctly observe, 'the urban archaeology of the historic era of the Sub-Continent remain a field of studies in which further work remains to be done. This is particularly true for the NW region [Gandhara], where few well-conducted excavations have been done and only very few have been published' (Olivieri and Callieri 2020: 12).

Likewise, a huge number of archaeological beads lie undocumented in several museums and private collections. The Allahabad Museum alone houses more than twenty thousand beads. Although nearly the entire collection of beads from the historical sites of Kausambi (Sharma 1969) and Rajghat (Narain and Roy 1976) represents surface finds, they remain not fully documented and published (Deo 2000: 4). Besides, the beads from these collections often lack information about their findspots (Ahuja 2018: 273; Deo 2000: 52). Also, the printed illustrations of beads in site reports are shown, in many instances, unprofessionally depicting 'white roundels or cylinders which we are to take as crystal, glass, carnelian or shell beads' as Deo notes (2000: 4, 51). Many photos are found in black-and-white colour patterns, which is why they cannot provide the necessary resolution to help the reader visualise or verify the finer surface details, facets, raw material, and/or shape (Figure 8). Similarly, around 500 beads were found in the excavations of the key-site of Shaikhan Dheri at Charsadda (an ancient regional capital) - the sequence of which is well-defined based on the numismatic evidence and some radiocarbon dates. However, only a small number of beads have been illustrated in the excavation report of the site (Dani 1965-1966).

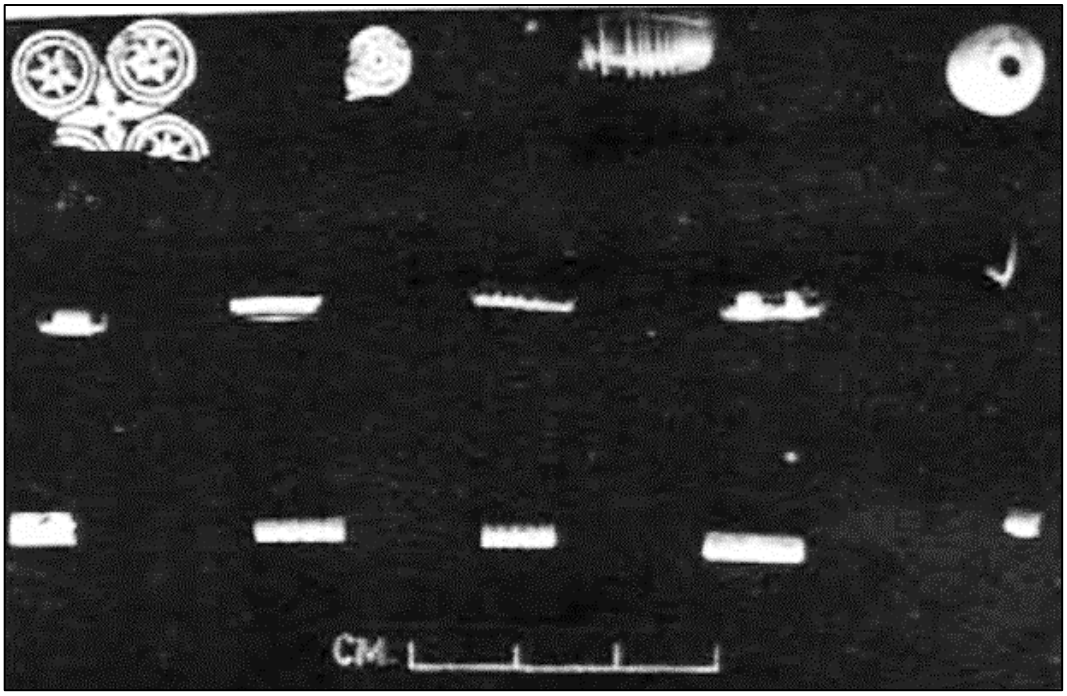


Figure 8: Beads from the historical site of Sanghol (Indian Archaeology 1987-1988 – A Review: Joshi 1992-1993: Pl. XL)

Consequently, the beads from Barikot will be subjected to a traditional typological analysis. Adopting a typological approach is currently the only way forward, which will allow us to test the validity, longevity and relevance of typological studies in modern archaeological research (Baysal 2019: 6). Besides, bead ornaments remain a suitable set of material assemblage for typological studies while the

beads from Barikot, in particular, have the unique advantage of deriving from stratigraphically controlled contexts (unlike the bead assemblages from many other sites): A systematic categorisation of types will enable us to investigate specific research questions, which, in the current study, involve the identification of raw materials and shapes of beads within each time period at Barikot, which, in turn, can be used to understand how they potentially developed or changed through time at the site. The results of the study on the beads from Barikot has provided important new data and revealed the identification of interesting patterns, attesting to the fact that the application of a coherent typology system can, indeed, be meaningful in modern archaeological research.

The current study will identify bead raw materials and shapes mostly according to the well-established formats developed by Beck and Kenoyer, thereby providing the opportunity to archaeologists to correct many of the earlier identifications recorded in the literature that derive from the excavations of various sites across the subcontinent. In a similar way, the examination of the drill holes of the beads from Barikot will equally provide new perspectives not only on the identification of the types of drilling technologies prevailing in each time period but also how they developed or changed through time at the urban site. Previous studies on the drill holes of beads from sites of north-western Pakistan were limited both in scale and chronological resolution mainly confined to small and unrepresentative sample sets.

3.3 The concept of 'value' in the past

By analysing the typological and technological aspects of the beads, it will also become possible to investigate the challenging concept of 'value' as perceived in the past (Miller 2008; Moffett and Chirikure 2016; Papadopoulos and Urton 2012), which can be instrumental in identifying the presence of a complex social stratification system. The production of wealth items plays a crucial role in distinguishing socio-economic classes and detecting the emergence of power in an urban context (Kenoyer 2000: 88). The relative value of bead ornaments can be assessed by examining the evidence in relation to the availability or scarcity of raw materials, elite control, technological skills, and time required for the manufacture. Other factors that can be used to help us to assess potential systems and degrees of value involve the investigation of the archaeological contexts of the finds, the identity of producers, the identity of consumers, and the abundance/quantity of a particular group of beads relative to others (see details below).

The results obtained from various studies show that such factors mattered in the ancient world as, for example, research on the Indus Valley Civilisation by J. M. Kenoyer has shown (Flad 2012; Baysal 2019; Glover and Kenoyer 2019: 182; Kenoyer 2000: 91; Kenoyer et al. 1991; Ludvik 2018; Miller 2008; Vidale and Miller 2000; Vidale et al. 1992). The investigation of systems of 'value' has provided evidence that at least some of the beads from Barikot were also imbued with socio-economic value (in terms of rank, status display, and acquisition/cost value) as well as symbolic-ideological value (in terms

of spiritual, cultic or religious value). On the basis of available information, a selection of beads from the Kushana and Kushano-Sasanian periods of Barikot will be discussed in section 8.3 (Chapter 8). The following variables or parameters were used to try to find evidence for the existence of systems of value:

1) Raw materials, which are rare or difficult to acquire tend to have more value than local ones (Glover and Kenoyer 2019: 182). Difficulty of procurement includes both the costs of obtaining raw materials and the complexity of production in terms of, for example, specialised knowledge, skills, and tools (Miller 2008: 148). Raw materials such as marine shell and glass beads, for instance, may not have been considered high-value or prestige at their place of origin/manufacture, but could have been attributed greater value by traveling a long-distance (Carter 2013: 7; Helms 1993: 48). The variable of distance should ideally also consider the modes and technologies of transportation that were utilised to move goods as well as the evidence for any existing socio-political and cultural barriers to procurement (Kelly 2013: 181-182; Vidale and Miller 2000; Wilkinson 2012). Various modes of transportation including carts, ships, horses, camels and cattle were utilised in the past to acquire goods and materials, which had a considerable effect on costs (Wilkinson 2012: 101).

Emperor Babur of the Mughal dynasty, for example, talks about several camels and mules that were loaded with jewels, gold, silver, and other materials in the Kabul province (Beveridge 1970: 194). Likewise, to judge the rarity of materials, their quality must be considered as well to determine if only high or only low-quality stones were being imported (Miller 2008: 147). On the other hand, evidence of abundance in materials may serve as an indication that they were not limited to a specific group of people (Smith 2017: 5), potentially a marker of social cohesion and ritual affirmation (Smith 2017: 8). It should be noted, however, that, 'if a system is flooded with prestige goods, the control of them is meaningless. Alliances with individuals who have control of prestige goods are not necessary if individuals have easy access to them' (Peregrine 1992: 31).

2) Attempts to determine the relative value of artefacts can, by extension, help us to evaluate the concept of 'Sanskritisation' ('emulation') in societies in which lower caste members attempt to imitate the practises and beliefs of high-status groups (Miller 1985: 185-188; Srinivas 1966: 6). Painting terracotta, for example, was a known tradition in the Indus period where long biconical beads of terracotta were painted red to imitate the valuable, long biconical carnelian beads (Kenoyer 2005: 164). On the other hand, if the differences between the original types of materials and their imitations are discernible or the imitations proliferate beyond strict elite control, then we may expect a decrease in the value (Glover 2018: 43; Kenoyer 2003: 164). In the study of the various types of contexts and deposits of archaeological sites, the only direct, material indicators for elite control would be either provided by written records (primarily talking about taxation) or in the form of evidence of spatial segregation of craft workshops within the confines of walled enclosures of palaces, temples or other architectural units (Kenoyer et al. 1991: 48). In order to increase their prestige, ruling elites may become involved, through

various ways, in the crafting process themselves: Evidence for control over the production of certain objects is a sign of high value, which can be achieved by restricting access to raw materials, by sponsorship or even captivity of craftspeople (Kenoyer 1995c: 217; 2000: 91; Costin 1991: 11; Helms 1993: 70; Glover 2018: 42; Sherratt 2008: 220).

In the Japanese archipelago, for example, there is evidence that the ruling elites of the Wa polity in Nara brought together artisans from across the archipelago to produce stone beads in their palace in order to control the manufacture and distribution of the beads (Barnes 1987: 98; Glover 2018: 42). Similarly, at the Indus site of Harappa, the manufacture of various types of material culture items including steatite and agate beads has been identified in a restricted area inside the city wall for the purpose of elite consumption and trading operations, indicating a degree of indirect control through the regulation of movement into and out of the craft zone area (Kenoyer 1997: 269-270; Meadow and Kenoyer 1997). In contrast, evidence of dispersed craft production in many workshops and no sign for accounting of the number of end-products is usually a marker of low value (Miller 2008: 146-147).

3) The investigation of the functions of the various types of contexts and deposits at archaeological sites is a powerful method to determine the relative value of materials and shed light on systems of the existing socio-economic hierarchy. At Harappa, for instance, variability in the types and ranks of ornaments was detected among different burials as well as the occupation areas of the settlement (Kelly 2013: 22; Kenoyer 2000). Moreover, if some materials are known to be of high value, their frequent association with other materials can provide indications about the value of the second set of materials (Miller 2008: 146). In addition, the degree of wear, curation and repair of artefacts can serve as an excellent indicator of the value attached to them in the past (Miller 2008: 147). The use-wear evidence from within the interior drill hole and on the outside of stone beads, for example, can be used to determine if a bead was used over a long period of time in the past (Glover 2018: 42-43).

It is also important to raise another point of consideration when discussing the value of archaeological materials. It is generally assumed that ordinary people or the lower classes did not or rather could not afford to consume high-value or prestige goods, which remained reserved for higher status groups and the ruling elites. Caution must be exercised, however, when interpreting the archaeological record of South Asia. Research on the Indus period in north-western India, for example, has highlighted the evidence for ‘complexity in the rural context’, as indicated by the discovery of beads made from precious or exotic raw materials such as carnelian, agate, lapis lazuli, and gold in small village settlements (Parikh and Petrie 2019). Likewise, there has been a long and well-established tradition in the history of South Asia where kings, emperors, and elite groups bestowed or rewarded the lower classes with precious gifts, gold and, on occasion, with their own jewellery. Mughal emperors are reported to have distributed money with their own hands among the poor, calling people in congregation and bestowing gold and silver upon them. Emperor Akbar, for example, once ordered people to gather

in the *chawgan* ground in Fatehpur to receive a gold piece each (Ansari 1974: 184; King 2011: 179). Although such examples occurred comparatively on a rare basis, a more careful approach needs to be adopted when attempting to associate high-value raw materials straight forwardly with the ruling elites.

Likewise, ruling elites could also prefer to wear simple clothes and choose to disregard traditions of wearing elaborate ornaments as Emperor Aurangzeb did (Pandey 1963: 372). Examples also exist in the archaeological record, which appear to caution us to associate low-value or easily available materials with the lower classes straight forwardly. At the large Early Historic site of Sisupalgarh, for example, various types of terracotta ornaments have been found throughout the city in contexts of differential wealth ranging from substantial multi-roomed domestic units to the smallest habitations and are apparently not associated with distinct status or ethnic groups or with particular neighbourhoods (Smith 2015: 33, 37-38).

3.4 Adornment

Ornaments, including beads, form important parts in the reconstruction of adornment practices and traditions existing in the past. Adornment is regarded as one of the strongest indicators of cultural identity inside a group or between social groups (Bellina 2003: 287; Wobst 1977). Although the study of trade and technology of beaded ornaments is a popular and growing field of investigation especially in relation to the prehistoric period, critical studies on the reconstruction of adornment practises during the historical periods of South Asia, on the other hand, are very few in numbers. The study of a range of sources, including literary references, household and burial contexts, can shed light on the function and adornment of beads in the past.

3.4.1 Literary Sources and Beads

Literary traditions in the form of inscriptions and texts can be one of the most useful and powerful proxies to investigate adornment practises in the past. They provide information on various types of raw materials, circulating in the subcontinent including beryl, rock crystals, amethyst, pearls and carnelian. Most of these sources, however, deal within the context of trade and exchange and often do not define the shapes, quantities, dimensions and/or colours of the ornaments (Ryder 1905: 70). They also lack references to the types of ornaments worn during special events such as wedding celebrations or religious ceremonies. In addition, the quality of the historical evidence itself remains inconsistent, fragmentary and difficult to test or confirm archaeologically, which is why it cannot be used as a primary reference point to reconstruct a coherent historical narrative on the use of adornment practices as they existed in the past (Erdosy 1995: 84; Thapar 1985: 16). The *Kauṭilīya Arthaśāstra* text, for example, which may reflect the conditions of life during the Mauryan period, provides valuable information regarding the source, properties of colour, brightness, transparency, hardness of many

jewels. The issue of correct identification, however, remains, in many cases, open to interpretation and can only be tackled if the terminology of the modern jewellers is collected and examined (Bisht 2017: 27).

3.4.2 Grave Goods and Beads

Another heavily applied technique involves the study of grave goods that include beads to discuss aspects of adornment, ethnicity, status, gender roles and religion. However, as F. Ekengren argues that 'using terms such as grave wares, grave gifts, burial offerings, possessions and equipment, the archaeologist intentionally or unintentionally endows the objects with meanings which inadvertently have wider, social implications than the mere mortuary context' (Baysal 2019: 28; Ekengren 2013: 174). Besides, richly deposited ornaments in burials have often been straightforwardly linked to infer a high-status identity of the deceased, however, a more complex set of factors need to be considered as in the case of the abundantly deposited grave goods in hunter-gatherer child burials, which are not necessarily indicative of high-status and ranking (Byrd and Monahan 1995).

Likewise, ornaments deposited in burials do not make it clear if the deceased individual was adorned in the same fashion during his or her real lifetime. Ornaments found in graves, moreover, may have been, in reality, the property of the living relatives of the deceased who disposed their own jewellery, signalling important changes in their own status. This tradition can be observed, for example, when ornaments such as bangles are traditionally broken upon widowhood by the female members of certain ethnic groups at their husband's funeral in modern India today (Chaiklin 2019: 9). Furthermore, since cultural traditions of Hindus and Buddhists require the burning of the deceased (Micheli 2014: 240; Olivieri 2019), grave goods are usually not common in the Early Historic period. The existence of burial or inhumation sites of the protohistoric and Late Historic periods of South Asia is, however, well-documented, providing evidence for changes occurring in funerary practises in the historical sequence of the subcontinent over time.

3.4.3 'Household' Archaeology and Beads

In addition, 'household' archaeology is a broad methodological approach that can be used in studies involving the investigation of functions of archaeological sites and material assemblages (Arnold 2015; Brody 2015; Coningham 1998; Kenoyer 2012; Maeir 2015; Miglus 2015; Sinopoli 1995; Spencer 2015; Varma and Menon 2016; Yasur-Landau 2011). Households form 'the smallest and most abundant activity group' (Wilk and Rathje 1982: 618), allowing us to study patterns of continuity and change from a local point of view. Generally, few effective and comprehensive studies have been conducted with reference to the periods under examination. The excavations carried out at the key historical site

of Atranjikhera, for example, revealed an almost complete occupational sequence, beginning around 1800 BCE and ending ca. 50 BCE, but not a single dwelling unit was excavated in its entirety (Allchin 1986: 152).

Likewise, with reference to the key-sites in the Taxila Valley, very little effort has been made to investigate the specific distribution of cultural artefacts within the architectural layout (Coningham 1998) while a lack of detailed reports with information on the precise patterning of artifacts makes it difficult to present any conclusive statements about their use (Kenoyer 2006a: 42). It would, thus, require the critical study of the archaeological contexts and finds to try to determine the potential function of the recovered beads within the domestic urban environment of Barikot. Although the information that we have on the precise patterning or find spots is currently limited, the current study does adopt this methodological approach especially in relation to the investigation of systems of 'value' imbued in the beads specifically from the Kushana and Kushano-Sasanian periods of Barikot, which have the necessary contextual data that is required (see Chapter 8.3).

3.4.4 'Use-wear' analysis and Beads

Studying the 'use-wear' or 'use-life' of an object is instrumental to accurate archaeological interpretation (Kopytoff 1986). 'Use-wear' analysis of archaeological objects for evidence of surface wear and damage can inform us, for example, how long an object was used for and for what purpose (York 2002: 79). Although the long 'use-wear' of Gandharan beads is documented by the research of K. Rienjang (Rienjang 2017), more critical and comprehensive discussions are found on a limited scale in archaeological scholarship. Other limiting factors include the fact that the 'life' of a bead does not necessarily follow a linear pattern as in the case of the *chaîne opératoire* methodological approach. 'Use-wear' analysis, for instance, does not consider changes in meanings or use that did not result in physical signs of wear while changes to the form of an object itself may also not be recognisable (Baysal 2019: 22). Archaeological artefacts may have been reused in multiple ways at any point in the past even after discard, which need to be considered when tracing the history of objects under study. Beads may not always be used for ornamental purposes exclusively and may function as a form of currency, toys or spindle whorls (Baysal 2019: 31; Kelly 2017: 117; Pallaver 2009).

3.4.5 Iconography and Beads

Although large collections of beads have been recovered from numerous archaeological sites in the north-western part of the subcontinent, comparisons with the forms of beads adorning the visual art assemblages were not carried out. Several Kushana period coins and seals depict human figures and/or deities adorned with bead ornaments of various materials, shapes, and size (Baumer 2014: 46; Callieri

1997). The number of bead depictions is, however, limited while their precise definitions may be affected by interpretative biases: The depicted representations may be exaggerated, fictionally created, or deliberately omitted. Drawing simplistic deductions about bead materials and forms from any artistic depiction may also prove problematic especially when the coexistence of precious ornaments and cheap replicas in low-cost materials is well-documented in South Asian contexts such as in the Indus Tradition (Kenoyer 1991a; 2005; Vidale and Miller 2000).

Likewise, art figurines, sculptures, and iconographic depictions on coins or seals that depict bead ornaments are often produced smaller or larger than actual size, making it a challenge to extrapolate the probable material and/or shape of any portrayed bead. Also, the portrayed ornaments may include the representation of organic materials such as leather, silk, wood, and vegetal fibres that do not survive in the archaeological record. Furthermore, with regard to seals, despite incorporating specific physiognomic features, it is possible that some of the engraved figures represent generalised or idealised human images rather than real individuals as has been argued for the portraits on the seals from Bactria and the Indo-Iranian borderlands (Lerner 2010). Consequently, any portrayed jewellery on any particular seal, coin, or sculpture may similarly reflect generalised images of beads rather than specific real objects.

C. Schmidt has, most notably, authored several pioneering studies in which she was able to successfully link excavated archaeological objects of various types, such as an eight-sided cylinder amulet case and loop-in-loop chains, with the forms of depictions in the Gandharan art (Schmidt 1990; 1995; 1997). No attempt has, however, been made to link archaeological beads from excavated sites with the carved ornaments and jewels decorating the art sculptures of Gandhara. One exception is, however, presented in a recent publication by the author comparing the archaeologically recovered beads from Barikot and other sites with the carved images of beads in Gandharan art (Rabbani 2020b). These case-studies and others are critically discussed in Chapter 8.

Although several other innovative studies have proved that ornaments (other than beads) are reproduced in Gandharan art as they were (Fabrègues 1991; Tissot 1999) – especially the seminal article on the ear plugs from Barikot (Micheli 2007) – the problem is related to the chronology. With the exception of the excavated material from Swat, no precise dates can be proposed for the Gandharan sculptures, although the limits of their chronological bracket cannot exceed the 1st – 3rd centuries CE (Olivieri and Filigenzi 2018). As Tissot comments, ‘we cannot tell when the carvers of the statues copied the real jewels, and if these jewels were new in fashion, or ancient princely belongings, treasured for centuries by their families’ (Tissot 1999: 402). Nevertheless, the studies carried out by scholars such as Schmidt, Tissot, Fabrègues, Micheli, and the present author have shown that at least some of the objects adorning the Gandharan sculptures were based on real prototypes, which is why this research carries out a comprehensive, comparative study between the archaeological beads from Barikot (and other sites) and

the forms of beads adorning the Gandharan art sculptures especially the Bodhisattva statues (Chapter 8). The following Chapter 4 will outline the methodological approach adopted for this cross-comparative investigation in more detail.

3.5 The problem of chronology

In order to better understand the importance of the current study on the beads from Barikot, it would be appropriate to discuss the chronological issues that characterise the excavations of many historical sites in South Asia, a little more in depth. This discussion will highlight the immense benefits that can be gained from the study on the beads from Barikot, which were excavated from a stratigraphically controlled environment. In the 1940s, the Indo-Pakistani subcontinent was still missing a basic chronological sequence for a considerable part of its history. By conducting deep vertical excavations at several archaeological sites, Wheeler (Kennet 2013; Wheeler 1954: 143-148) set out to excavate small trenches of very limited size to quickly establish the chronological sequence of the occupation, architectural organisation as well as the finds including the ceramic and numismatic assemblages. This strategic approach, however, does not necessarily provide a representative view of the horizontal development of an entire archaeological site (Kennet 2013).

It should be noted, however, that although some fieldwork carried out before that of Wheeler (in the 1940s) did involve the horizontal exposures of archaeological occupation phases, there were other limitations to that earlier work (Bellasis 1856a; 1856b; Chakrabarti 1982: 335; Marshall 1915). Wheeler's approach of conducting vertical excavations has, unfortunately, remained in place in contemporary archaeological investigations in the subcontinent despite being outdated now (Kennet 2013). As a result, the study of archaeological beads that were recovered through such field investigations cannot be regarded as representative of entire individual sites. Also, an accurate reconstruction of the diachronic development of beads, found from various sites, cannot be carried out at present because the excavated stratigraphic layers have not been properly identified and defined according to modern standards (Hawkes 2014a: 73; Kennet 2004b: 2-3). Often, only a small number of layers per meter of excavation depth have been identified, each of which accounts for a considerable period of occupation history. The excavations on Mound 1 at the site of Bhokardan, for instance, resulted in the definition of only six cultural layers, covering nine or ten centuries (Deo 2000; Deo and Gupte 1974: 17-18).

Likewise, period III at Ujjain suffers from an even longer chronological periodisation (200 BCE – 1300 CE), which is also unfortunate as both Ujjain and Bhokardan have revealed evidence of large-scale bead production with thousands of finished and unfinished beads (Banerjee 1959; Deo 2000; Deo and Gupte 1974: 118-142; Morrison 1995: 212-213). Another key-site was Arikamedu, an ancient seaport with

evidence of on-site bead manufacture. Because the excavation was not stratigraphically controlled and the investigators failed to recognise the accumulation of disturbed deposits, all finds were initially assigned to one period (mid-1st century BCE) (Ravitchandirane 2007: 207; Wheeler et al. 1946). Only subsequent attempts in the re-evaluation of the chronology provided evidence of continuation in the occupation history of the site (Begley et al. 1996). Moreover, no detailed explanations for the periodisation or interpretation of the chronological sequences of historical sites is provided in the journal 'Indian Archaeology: A Review' (Deo 2000; Dhavalikar 1999: 20; Kennet 2013). As a result, many sites, dating to the historical periods, suffer from very broad cultural or chronological periodisation, making it difficult to determine the precise chronological context of the raw materials and shapes of the recovered beads.

In addition, there are various other reasons, which have not allowed the proper reconstruction of the chronology of many historical sites in the subcontinent. At present there are few radiocarbon dates available from several key historical sites such Rang Mahal (Rydh 1959), Hastinapura (Lal 1955) and Bhir Mound (Marshall 1951; Petrie 2013a; 2020b) while for the latter two no radiocarbon dates are available for any of the occupation phases. In addition, there is a tendency among archaeologists to rely on the presence or absence of key ceramic vessel shapes or wares such as the PGW and NBPW to date specific occupation phases rather than tracing the excavated stratigraphic layers (Olivieri 2020: 394; Olivieri and Callieri 2020: 12). A chronological reconstruction based on ceramic or coin typology remains complicated for a variety of reasons (see, for example, Coningham and Young 2015: 360-361; Dar 1993; Erdosy 1995: 100-105; Kennet 2013; Petrie 2013a for more detailed discussions).

3.6 Summary

In summary, the precise chronological placement of the occupation phases of historical sites in the subcontinent can only be verified by systematic radiocarbon dating determinations from new, stratigraphically controlled excavations, followed by the publication of the results. This approach would allow us to securely date the newly recovered beads, which in turn, may provide us with a template to assign a more reliable date to the many, unstratified beads found during the earlier excavation campaigns. This chapter has discussed a range of analytical techniques, which have been employed in the past to determine the role of beads in the ancient cultures of the subcontinent. The results of the various approaches have, however, not provided a clear account on the types of beads produced and adorned within the historical periods of the subcontinent. The available studies highlight the urgent need to carry out a comprehensive study on archaeological beads that is, above all, characterised by a reliable chronology. The following Chapter 4 will explain and justify the research methodology adopted for the current study to fill the gaps in our understanding about the typology, technology and adornment of bead ornaments during the historical periods of South Asia.

Chapter 4: Research methodology

To address the research aims and questions outlined in Chapter 1, an integrated suite of methodologies has been employed to study the typological and technological aspects of the beads from Barikot. A systematic methodological approach was also adopted with reference to the study of the iconographic representations of beads as depicted in the visual art to reconstruct aspects of adornment during the Kushana period of Gandhara (1st – 3rd century CE). This chapter will articulate and justify how different analytical techniques were applied to study the beads from Barikot. It will also explain the rationale behind using the selected methods.

In order to fulfil the research aims of the current study, two research trips were carried out: The first trip involved visiting various relevant museums in Pakistan and France in order to take high-magnification and high-resolution photographs of the Gandharan art sculptures on display especially the Bodhisattva images that are adorned with bead ornaments. The other major research trip took place in the Swat Valley of the Khyber Pakhtunkhwa province of Pakistan with the aim to document and study hands-on the archaeological beads from Barikot in an attempt to determine the typological and technological aspects of the ornaments under study. The details of the various methods of analysis that were carried out as part of this thesis are provided below:

4.1 Typological classification

As already outlined in Chapter 3, the typological classification of the beads from Barikot can help us address specific research questions not only on the distribution of the bead raw materials and shapes within a specific period of time but also how they developed through time at the site. This approach has, by extension, the potential to provide information on the provenance, production, use and discard of beads. The typological study will, in addition, enable us to carry out direct comparisons between the types of beads found at Barikot and the types of beads found at other contemporary sites such as in the Taxila Valley, which, as the forthcoming discussions will show, have proven meaningful. The classification of the beads from Barikot is mainly based on the well-established formats by Beck and Kenoyer (Beck 1928; Carter 2013; Kenoyer 2017b), supplemented by the observations of M. Vidale and the author. Despite the limitations associated with a typological approach, which have already been cited (see Chapter 3), Beck's typology currently represents the most appropriate system to study the beads from Barikot. To a large extent, Beck's typological scheme is characterised by consistency, adaptability and precision of the definitions for various types of beads (Basa 2017: 2; Baysal 2019: 21), which covers a range of unusual shapes including various types of faceted beads (Carter 2013: 186).

4.1.1 Inventoried beads from Barikot

After each excavation field season concludes at Barikot (Figure 9), the recovered and inventoried finds are transported to the Swat Museum where they are stored for research purposes.



Figure 9: Recovering various types of beads in the middle of the excavations at Barikot (Photograph: author's own)

With the valued collaboration of the staff and officers of the Swat Museum (Figure 10) and my co-supervisor M. Vidale, the metal boxes, containing the inventoried beads of the 2011-2017 field seasons of the trenches BKG 11 and BKG 12 of Barikot, were identified and daily inspected in the reserve collections of the Swat Museum.



Figure 10: Main entrance of the Swat Museum (Photographs: author's own)

Equipped with a notebook, the bead inventory list and a storage basket, the metal boxes, marked as 'BKG' (site code of Barikot), were opened. The beads, which are kept in small plastic bags, were

collected and placed in the provided basket, starting the process of documentation and analysis (Figure 11).



Figure 11: Recovering the Barikot beads from the reserve collections of the Swat Museum (Photograph: author's own)

A suitable working environment was kindly provided by the Swat Museum in the form of a study room (Figure 12). Once I had completed my documentation and analysis on a group of beads, they were returned to their respective metal boxes in the reserve collections of the Museum. Thanks to the kind permission accorded by the curator of the Museum (Mr. Faizur Rehman) and the officer in-charge of the reserve collections (Mr. Amanullah Afridi), some of the beads were occasionally transported to the Italian Mission headquarters to continue the analysis of the inventoried beads. The original register books of the field seasons were also checked to retrieve additional information related to the archaeological descriptions of some of the finds. Several inventoried beads on display of the Swat Museum derive from the trenches BKG 1, BKG 2, BKG 3, BKG 4, BKG 5, BKG 6, BKG 7, BKG 8 and BKG 9 of Barikot. They were also subjected to study as part of the current research but some of them could not be studied due to time constraints related to the length of time in the field. In addition, the inventoried beads recovered from the excavations between 2018-2020 (field seasons 14-17) were also later added to my study. These beads mostly derive from the Late Historical period of the site

(Macrophase 8 and 9), which has provided us with crucial information about the little explored Late Historical sequence of Barikot and, indeed, the wider region.



Figure 12: The study room of the Swat Museum (Photograph: author's own)

4.1.2 Non-inventoried beads from Barikot

The non-inventoried beads from Barikot include all the materials that are not kept by the Swat Museum and are identified by a serial number. These beads are, instead, in the custody of the Italian Mission and were stored in the restoration room of the Italian Mission headquarters in Saidu Sharif during their respective field seasons (between 1984-1999). For various reasons, these beads could not be inventoried at the time of their recovery:

1) They were kept for further studies and analysis

2) They were found on the last day of the excavation

3) They were found as stray finds and had no provenance

The material includes large collections of beads recovered from the excavations of the trenches BKG 1, BKG 2, BKG 3, BKG 4, BKG 5, BKG 6, BKG 7, BKG 8 and BKG 9. My supervisors and I agreed that it would be highly beneficial to study both the inventoried and non-inventoried beads from the site as part of the current research. With this additional data, it would be possible to gain a more representative understanding about the typological and technological features of the beads and, by

extension, potentially detect evidence of relationships and patterns between different parts of the settlement. Eventually, it may help us to better understand the distribution and 'value' of the different types of bead raw materials and shapes at the site. To document and study the non-inventoried beads, the restoration room in the Italian Mission headquarters was visited by the author to retrieve any bags filled with the non-inventoried samples (Figure 13). In total, four large bags were recovered and studied. These bags contained the samples from the trenches BKG 2, BKG 3, BKG 4, BKG 5 and BKG 6. Due to time constrains, the non-inventoried beads from trench BKG 1 could not be studied by the author.



Figure 13: Non-inventoried beads from the restoration room of the Italian Mission headquarters (Photograph: author's own)

4.2 Photography of the beads from Barikot

As already stated in Chapter 3, low-magnification and low-resolution images of archaeological beads often do not allow us to identify and/or verify the raw material, shape and other surface features of the ornaments, which, ultimately, affects our interpretation on the collected data. To avoid this scenario, a high-magnification and high-resolution photography was undertaken in the study room of the Swat Museum to document the beads from Barikot. The camera used for the documentation was the Canon EOS M3 attached with a macro lens together with a tripod, which were specifically bought for this fieldtrip. Under the guidance of M. Vidale, a specific photographic protocol was developed. To get some practise, photos of modern beads were taken and reviewed well in advance of my upcoming trip to Swat. The photographic procedure adopted in the Swat Museum was as follows: To take the photos,

a bead was placed on a wide thin glass plate set ca. 15 cm above a light grey background and placed on top of the in-built table of the study room. The presence of the glass plate eliminated and dissolved the shadows of the beads from below. A microscale was also placed on the glass plate to have a record on the dimensions of the beads in the photos. The glass plate itself was held by two small equally sized books on either side of the plate. The tripod was equipped with a horizontal extension arm and the camera was fix on its end. The camera was tilted vertically downwards to photograph the beads top-down.

Most beads were photographed with one transverse/cross-section view and one profile/longitudinal view only due to time constraints. If the height of a bead turned out to be large, the resolution of the smaller microscale decreased. To compensate, small boxes of matches were used to raise the microscale up to the height of the bead, creating an equal level of resolution of both the bead and the microscale. Due to morphological features or post-depositional damage, some beads were prone to roll away, which is why kneadable putty eraser was gently applied in small amounts to glue the beads to the glass plate in the wanted position, causing no damage to the beads. If some beads were found in large numbers from the same plastic bag, deriving from the same stratigraphic layer, they were photographed as a group together. The photos of the beads were checked for their quality and resolution by M. Vidale at the end of the day (Figure 14a).

Regarding the non-inventoried beads, which could not be transported to the Museum, a suitable room was selected in the Italian Mission headquarters. Upon availability, professional LED 126 and LED 64 lights attached to small tripods were also utilised to try to eliminate intruding shadows and balance the light conditions from all angles (Figure 14b). Post-processing work on some of the photos started back in the United Kingdom. Adobe Photoshop and Illustrator were used to improve the quality of some of the photos and eliminate any remaining shadows, which managed to affect the beads (Figure 14c).

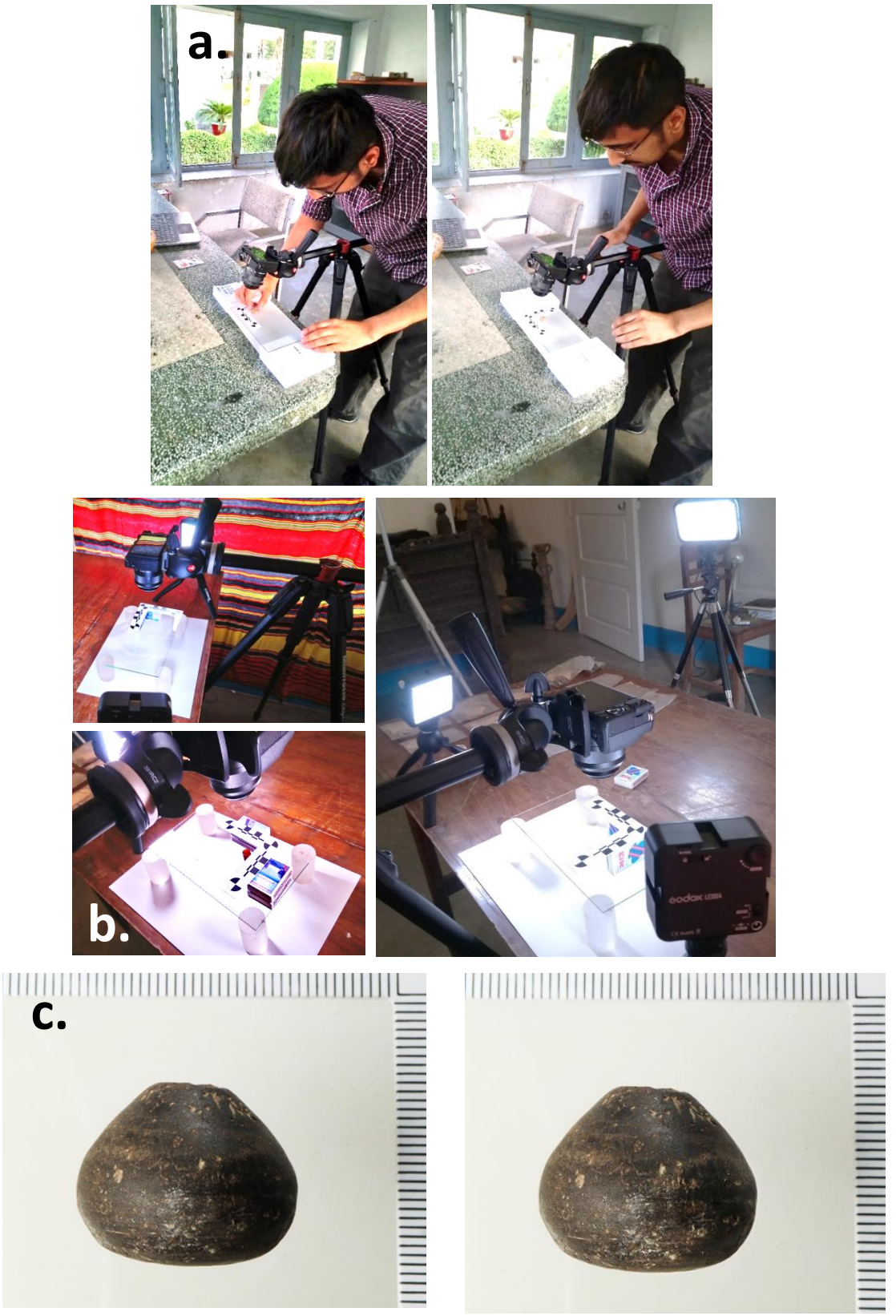


Figure 14: a) Taking high-resolution photos with the Canon EOS M3 and a tripod in the study room of the Swat Museum (Photographs: author's own) b) Photographic documentation of the non-inventoried beads in the Mission headquarters (Photographs: author's own) c) Areca nut bead of terracotta with and without shadows (Photographs: author's own)

The beads from Barikot were recorded in a spreadsheet in Microsoft Excel and in a Word file table (see Appendix). This data is related to the inventoried and non-inventoried beads from Barikot that are part of the current study. It includes information about the inventory or serial number, context/locus, raw material, proportion, shape, dimensions, state, chronology, year/season of recovery, and some general notes. All beads are arranged in the order of their respective chronology or Macrophase. The information provided can, therefore, be used to study the typological characteristics of the beads as well as detect potential chronological variations. In future studies, more data can be added to it to be used to determine sub-types, use-wear patterns, colour and decorative patterns. Rather than adopting a set of elemental/chemical methods, the raw materials of the beads from Barikot were identified using specialist observation, which was provided by M. Vidale and I. Angelini (University of Padova and ISMEO, Italy) using 10X hand lens (Figure 15a) and a stereomicroscope equipped with a digital camera (OM imaging). The raw materials and shapes of some of the studied beads that required confirmation or remained obscure, were later identified with the assistance of J. M. Kenoyer, although a small minority remained unverified.



Figure 15: a) Raw material identification of beads under the supervision of M. Vidale (Photograph: author's own) b) The stereomicroscope equipped with a digital camera (OM imaging) in the study room (Photograph: ISMEO and author's own)

Many of the raw materials were, as a result, identified visually by the naked eye while the application of other techniques such as specific gravity and hardness could not be carried due to time constraints. The stereomicroscope that was kindly provided by I. Angelini (University of Padova, Italy and ISMEO) proved quite useful in providing macro and microscopic photographic images on-site, enabling us to identify several obscure raw materials (Figure 15b). The close-up images showed, in some cases,

microscopic features relating to different production technologies and practises. A cylindrical pendant of red carnelian (BKG 3822: Figure 128b), for example, was initially believed to be an unfinished product apparently with no evidence of a drill hole. The absence of a drill hole led us to believe that the ancient inhabitants of Barikot may have been experimenting with local carnelian production.

The application of the stereomicroscope, however, revealed minor traces of the drill hole, which had broken away in the past. Similarly, a gold sandwich glass bead was identified as such using the stereomicroscope, which is a luxury form of glass where a decorative design in gold foil is sandwiched between two layers of glass (BKG 3817: Figure 71). In general, the identification of the bead raw materials during my research trip to Swat corrected many of the earlier recorded misidentifications. Re-examination of the raw materials, for example, enabled the identification of marine shell that was, in some cases, previously recorded as bone or ivory. In addition, based on the presence of tiny air bubbles, shiny surfaces, and other microscopic features, many beads from Barikot have now been correctly identified as glass, which were previously recorded down as terracotta, schist stone, coral, and marine shell.

4.3 Description of shape and surface features

As already mentioned above and in Chapter 3, the shape of the beads was largely described using Beck's system in combination with Kenoyer's format (Beck 1928; Carter 2013; Kenoyer 2017b) as they represent the most suitable typological systems available to identify the shape of the beads from South Asia. As a supplement, some shapes have been defined by M. Vidale and the author to accomplish our research aims within the available timeframe of the research. The shape descriptions of some beads were later improved by Kenoyer to better reflect the shape characteristics of the ornaments. All beads were selected for detailed measurements using a digital calliper, which were taken in mm but converted to cm (Figure 16). Thus, all measurements, as taken and noted in the data, are in cm (this excludes those beads, which could not be documented and studied by the author).



Figure 16: Digital calliper for measurements (Photograph: author's own)

Due to time constraints, additional measurements could not be taken as outlined in Kenoyer's typology (Kenoyer 2017b), however, basic measurements relating to length and diameter were taken by the author under the direction of M. Vidale (Figure 17).

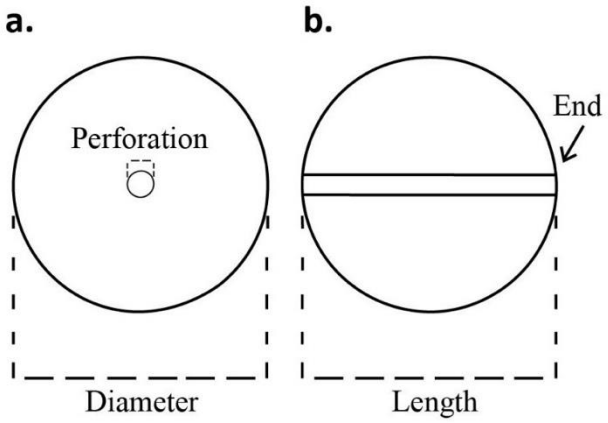


Figure 17: a) Basic measurement of the diameter of the transverse/cross-section b) Basic measurement of the length of the profile/longitudinal section (Drawing: author's own, adapted from Beck 1928 and Carter 2013)

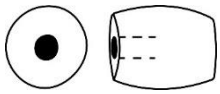
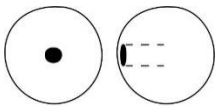
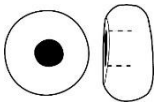
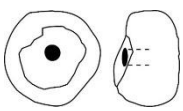
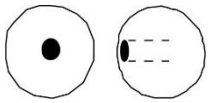
Beck has defined measurements for short, standard, and long bead sizes (Beck 1928: 4), which were not considered for the current study. Instead, Kenoyer's more effective proportion criteria was used to define the beads from Barikot. If beads were found in large numbers (see, for example, beads: BKG 3905, BKG 3817, Ser. 4175 in appendix) from the same plastic bag deriving from the same stratigraphic layer, they were divided up into three groups regardless of the material. The groups were named: large beads, medium beads and small beads with only the most representative bead being measured and noted due to time constraints. In addition, decorative features such as grooves, incision marks and bleached patterns were recorded while post-depositional effects such as damage or animal activity were, likewise, noted. The colour of the ornaments was described with the naked eye rather than with the aid of a proper colour system such as a Munsell colour chart.

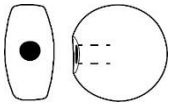
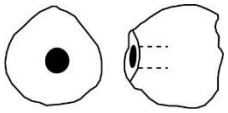
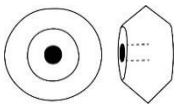
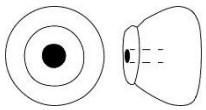
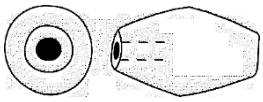
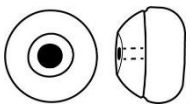
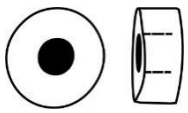
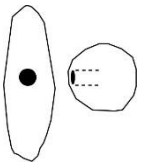
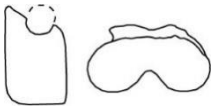
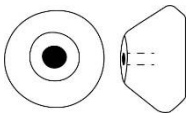
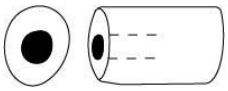
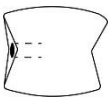
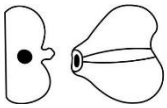
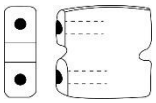
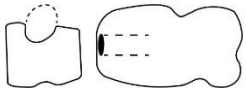
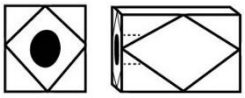
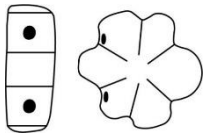
4.4 'Unidentified' beads from Barikot

Some beads could not be studied hands-on due to time constraints, which is why the raw materials and shapes of those respective beads could not be verified. The excavators had, however, recorded their materials and shapes with the naked eye when they were first found in the excavations. It has been noted, however, that as in the case of the raw materials, the shape of these beads was not accurately described in some instances at the time. Upon examination, for example, it turned out that some of the so described 'biconical' terracotta beads had, in fact, the areca nut shape. It was, however, possible to

verify some of the raw materials and shapes by applying an internal system of control: Based on the information provided by the excavators specifically on the shape, dimensions and raw material, it was possible to verify many of the recorded beads as terracotta. This procedure was successfully carried out by comparing the earlier recorded beads with the types of beads documented and studied hands-on by the author. Group photos taken of beads in the showcases of the Swat Museum have also enabled the verification of several bead raw materials and shapes.

In some cases, available drawings and sketches of the respective beads additionally contributed to the verification of the finds. In other cases, photos were available, but the materials could not be identified with the naked eye. Such beads and those that remained unverified both in terms of material and shape, do not form part of the current dataset as they may lead to an alteration of the results and, ultimately, to misinterpretations of historical data. Instead, they have been arranged in the Appendix section of this thesis. The number of these beads has been, nevertheless, included and counted within the current dataset of this study under the heading 'Unidentified' (see dataset tables in Chapter 6). Recording their number will, at least, provide us with more representative information about the actual number of beads in circulation within a time period and possibly allow us to better detect chronological and material variations from a local point of view. Table 1 shows an illustration of the main bead typology used, which is based upon the shape and raw material. As already stated, Beck's classification system (Beck 1928) and the Harappan bead code system (Carter 2013; Kenoyer 2017b) were used wherever possible to classify the beads from Barikot (Table 1), although several additional bead shapes were encountered that did not fall into either category (N/A: Not Applicable).

Bead shape	**Bead material**	**Bead code system**	**Bead shape**	**Bead material**	**Bead code system**
Long Barrel 	Carnelian, Agate, Serpentine, Jasper, Quartz, Glass, Marine shell, Garnet, Lapis lazuli, Faience, Chloritic rock, Steatite, Terracotta	I.D.1.b. HBCS: Type 5	Spherical 	Carnelian, Agate, Quartz/rock crystal, Marine shell, Glass	I.C.1.a. HBCS: Type 22
Short Barrel  Irregular Short Barrel 	Glass, Carnelian, Agate, Garnet, Lapis Lazuli, Marine shell, Chloritic rock, Terracotta, Faience Malachite, Quartz/rock crystal, Gold	I.B.1.b. HBCS: Type 4	Irregular Spherical/Globular 	Carnelian, Lapis Lazuli, Quartz/rock crystal, Pearl, Steatite, Marine shell, Faience, Schist, Glass, Terracotta	HBCS: Type 23

Rectangular Circular 	Carnelian, Quartz/rock crystal	XVI.C.1.a.	Ovoid 	Carnelian	N/A
Short Biconical 	Carnelian, Terracotta, Glass, Marine shell	I.B.2.f. HBCS: Type 6	Ghata-shaped 	Terracotta, Garnet, Glass	N/A
Long Biconical 	Carnelian, Glass, Terracotta, Agate, Quartz	D.2.f. HBCS: Type 7	Areca nut 	Terracotta	N/A
Disc-shaped 	Marine shell, Marble, Amber, Faience, Reworked pottery, Glass, Terracotta	I.A.2.b. I.A.1.b.	Lenticular Short Biconical 	Carnelian, Glass, Marine shell	IV.C.1.a.
Lobe-shaped  Broken pendant (BKG 3869)	Steatite	N/A	Short Asymmetrical Truncated Biconical 	Terracotta	N/A
Cylindrical (short and long) 	Carnelian, Lapis lazuli, Coral , Steatite, Marine shell, Glass, Bone, Faience, Chloritic rock, Terracotta, Dentalium shell, Beryl-aquamarine	I.B.2.b. I.C.2.b. I.D.2.b. HBCS: Type 2 HBCS: Type 1	Double axe  Cross-section view not available	Faience, Marine shell	N/A
Butterfly nut 	Glazed quartz	N/A	Double Comb 	Marine shell	N/A
Crimped in the Centre with Grooves ground at the Ends  Broken bead (BKG 2637)	Glass	N/A	Drop shaped 	Carnelian, Marine shell	N/A
Cornerless Cube 	Garnet, Glass	N/A	Flower shaped 	Marine shell	N/A

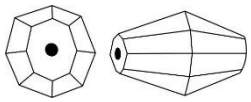
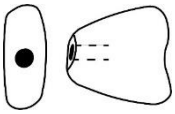
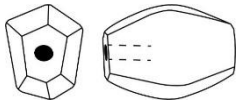
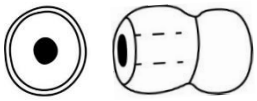
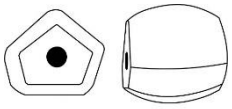
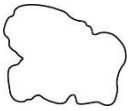
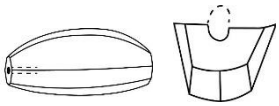
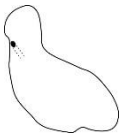
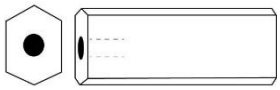
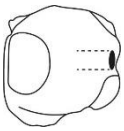
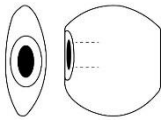
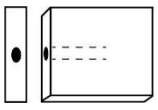
			Several variations exist in shape and style		
Long Octagonal Faceted Biconical 	Rock crystal, Lapis Lazuli	XIVC.2.e.	Rectangular Conical 	Marine shell	N/A
Long Hexagonal Faceted Barrel 	Carnelian, Rock crystal, Beryl-Aquamarine, Marine shell, Glass, Lapis lazuli	XIII.C.2.b	Segmented 	Glass	N/A
Long Pentagonal Faceted Barrel 	Rock crystal	XII.C.2.b	Couched lion  Unperforated	Uncertain	N/A
Long Octagonal Faceted Barrel  Broken bead (Ser. 4359)	Rock crystal	N/A	Bird 	Marine shell	N/A
Long Hexagonal Faceted Cylindrical 	Beryl, Lapis lazuli	XIII.C.2.b	Tortoise 	Faience	N/A
Lenticular Barrel 	Marine shell, Glass	N/A	Rectangular long Rectangular 	Schist, Chloritic-schist, Marine shell, Glass, Lapis Lazuli, Peridot	XVI.C.2.b.

Table 1: Illustration of the main bead typology based upon the shape and raw material

4.5 The volume of excavated earth/soil

Since an archaeological site is usually never excavated in its entirety, it always remains difficult to assess the true number of specific types of cultural artefacts including beads circulating at a site and, thereby, gain a better understanding about their true distribution and determine potential spatial and/or

temporal fluctuations occurring at the local level. In the context of the current study, although a large number of beads were recovered from the excavations at Barikot, their current number cannot be taken as representative of the total or true number of beads in circulation at any point in time as the site is still in the process of excavation. Therefore, the beads recovered from trench BKG 11 K-105 of Barikot were used to calculate a more accurate quantification of the beads in order to give us not only a more accurate estimate of the calibrated bead frequency by earth/soil volume within a period but to provide us with a more accurate estimate on the potential variations in bead frequencies occurring through time at the site. Trench BKG 11 K-105 of Barikot has the unique advantage that it is the only area inside the settlement that has been excavated vertically all the way down to the earliest chronological periods of the site (Figure 18-19).

Figure 20 below presents a hypothetical example, which highlights further the benefits for adopting this methodological approach. According to the illustrated model, 150 beads were recovered from time period two compared to time period one, which revealed only 100 beads. As a result, one would assume that there were more beads in circulation in time period two as opposed to time period one. This conclusion can be drawn naturally as time period two is larger than time period one (volume-wise), hence one would assume the total number of beads to be larger in time period two, apparently reflecting a higher number of beads circulating at the site during this time. A deeper investigation, however, reveals the opposite to be the case: A more accurate estimate of the bead frequency can be calculated by taking the total number of beads found within a certain time period and dividing it up by the volume of earth excavated. For the sake of argument, assuming x equals 10 (x = volume of excavated earth), 150 (150 = number of beads) is to be divided by 10 that would give a total number of 15 beads for time period two. In the same way, 100 (100 = number of bead) is to be divided by 5 that would give a total number of 20 beads for time period one. The reason why time period one reveals a higher number is because the beads are more densely concentrated or clustered there as opposed to the beads from time period two. The result shows that by taking into account the variable of the volume of earth excavated, we can approximately calculate a more accurate frequency of beads in a given time period and can conduct a fairer bead frequency comparison between any two given time periods.

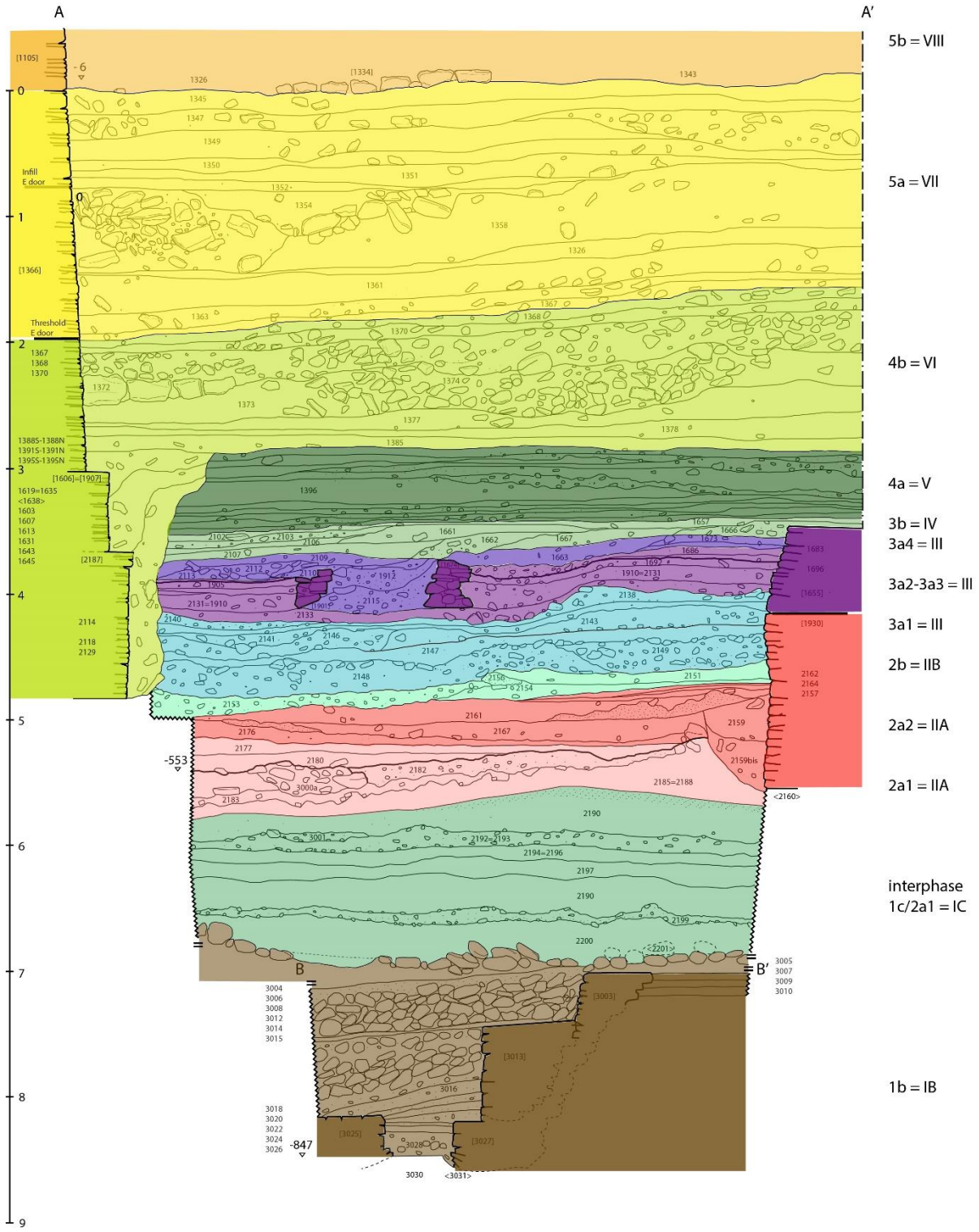


Figure 18: Stratigraphic section of trench BKG 11 K-105 of Barikot (Drawing: ISMEO)

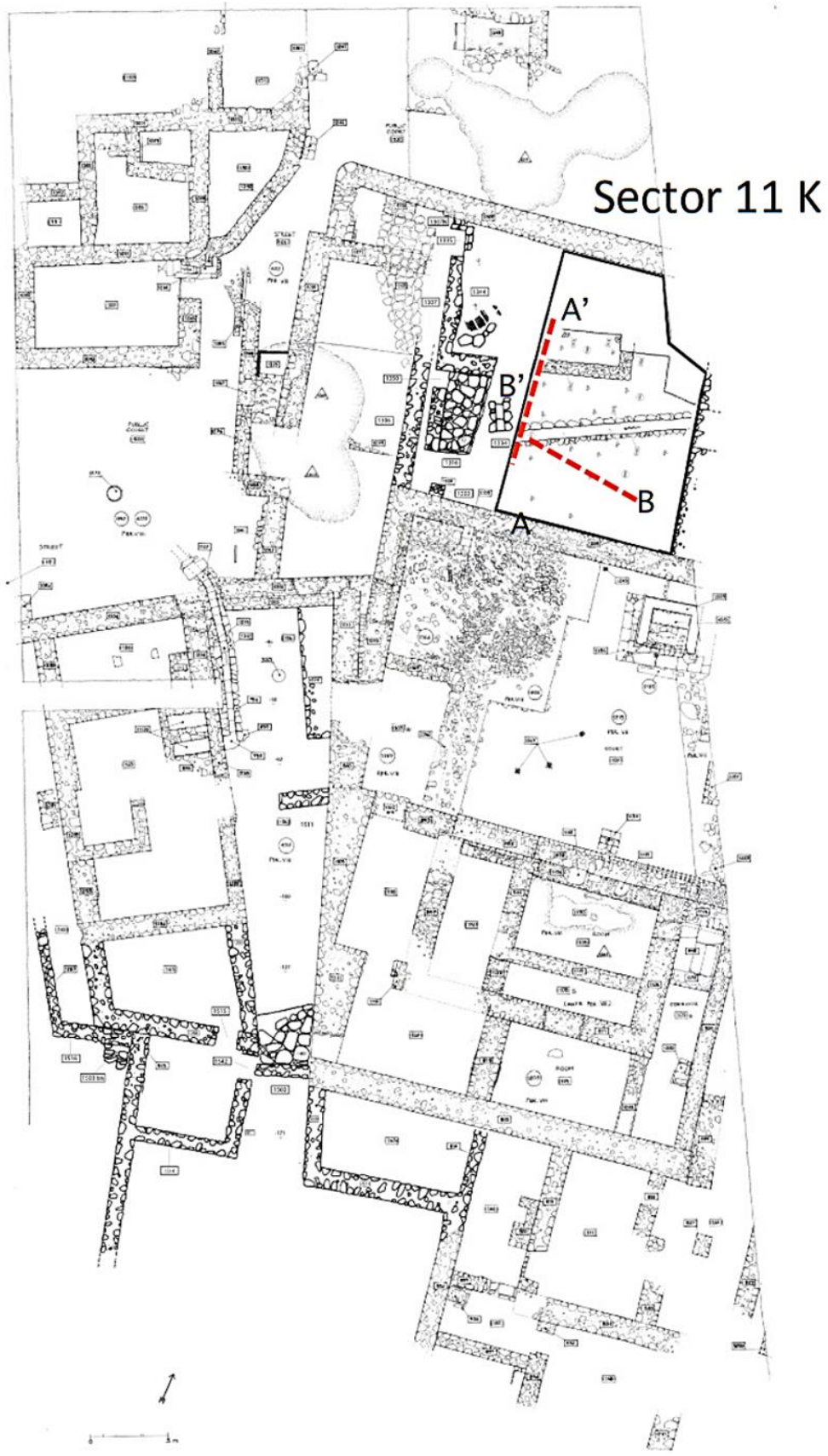


Figure 19: Partial plan of trench BKG 11 with the location of K-105 of Barikot (adapted from Olivieri et al. 2014: Pl. V)

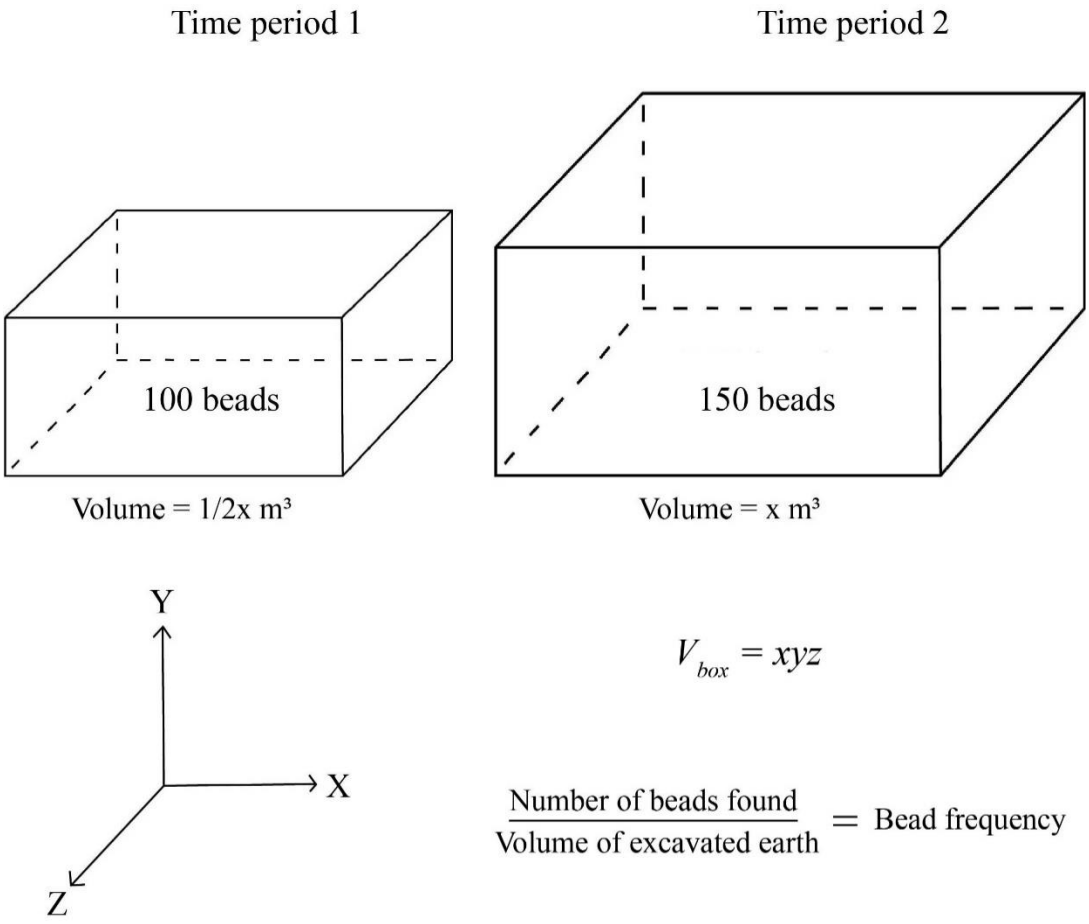


Figure 20: The number of beads versus the volume of excavated earth (Drawing: author's own)

If there were fragments of walls present within any particular time period (as seen in Figure 18), the volume of the walls was subtracted, which would provide an approximate volume of earth removed for that individual time period. This estimate, however, could be calculated for the beads deriving from trench BKG 11 K-105 only based on the availability of a well-illustrated and high-resolution stratigraphic section of trench BKG 11 K-105. The author managed, however, to calculate the calibrated bead frequency by soil volume of trench BKG 11 K-107 as well, although under challenging conditions (Figure 21). The only reason for attempting to conduct another calculation and selecting trench BKG 11 K-107 was to try to find out the calibrated bead frequency by soil volume of the Kushana and Kushano-Sasanian periods (Macrophase 5a and 5b). Both periods appear to have been marked by a fairly low bead frequency based on the data on the calibrated bead frequency by soil volume coming from trench BKG 11 K-105. Therefore, the additional investigation on the calibrated bead frequency by soil volume from trench BKG 11 K-107 of Barikot can be compared with the data coming from BKG 11 K-105 to look for potential similarities and differences. This study, in turn, has the potential to provide us with new insight into the culture dynamics unfolding during the early centuries of the common era (see discussions in Chapter 6).

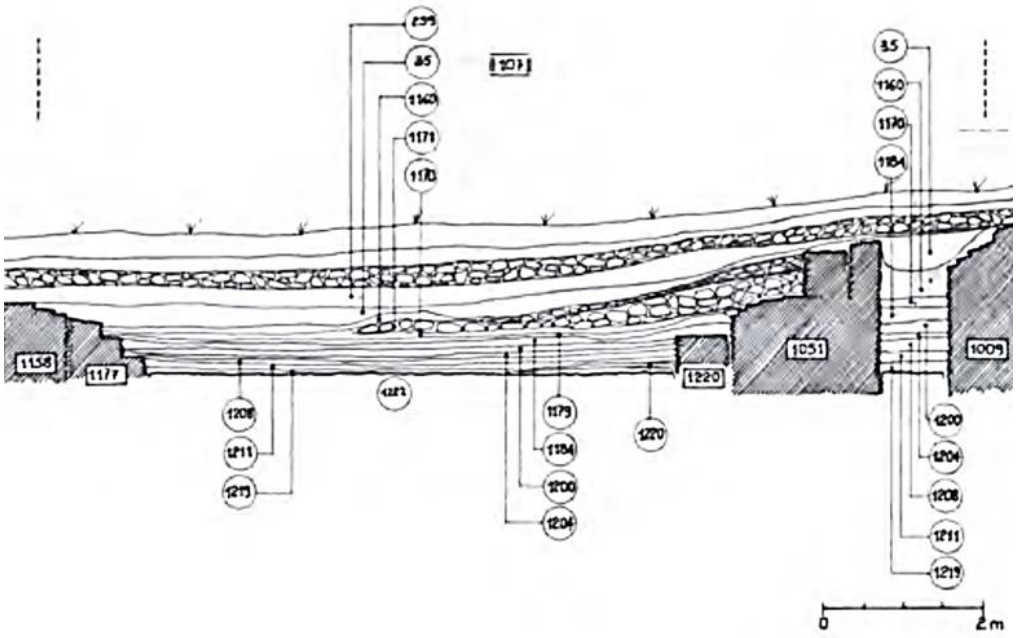


Figure 21: Stratigraphic section of trench BKG 11 K-107 of Barikot (IsIAO) (Olivieri 2014: Pl. V)

To carry out a calculation for any other areas of the settlement, each excavated archaeological context within a trench, say a room, would require a well-illustrated and high-resolution stratigraphic section and plan to attempt to make this work as in the case of BKG 11 K-105 (Figure 18-19). Even, when such detailed sections and plans become available in the future, it should be noted that the excavated area may not have necessarily revealed bead ornaments. Furthermore, for such a calculation to work, stratigraphic layers will need to have grown horizontally and the published section must be oriented as such, which is, however, not always the case as, for instance, in the case of trench BKG 12. Trench BKG 11 is, however, roughly horizontal in growth making it the most appropriate place to calculate the volume of excavated earth. It should be noted, however, that trench BKG 11 K-105 does not provide archaeological evidence and any occupation history beyond the Kushano-Sasanian period of Macrophase 5b, so the calibrated bead frequency by soil volume of any chronological period after this limit cannot be calculated.

It is also important to stress that the measurements made of stones, walls and trenches are not completely accurate and, as such, represent sources of some uncertainty and limitation. Moreover, although soil volume is a useful measure to consider, there were almost certainly differences in frequency produced by the types of deposits being excavated. This method of quantification that forms a part of this thesis (see Chapter 6) should be viewed as a pilot or exploratory investigation that would require a separate study of its own if the contexts of the entire site were to be examined. As a result, a comprehensive approach to calculate the calibrated bead frequency by soil volume of every context of the site extends beyond the limit of this thesis. This is a long-term exercise that should be applied on the beads from Barikot in future studies when relevant data of each excavated context becomes available.

4.5.1 The variable of 'time'

In addition to the calculations of the volume of excavated earth/soil, this thesis also discusses the variable of time (number of years within a specific time period), which is yet another aspect that can be used as a supporting factor to shed further light on the calibrated bead frequency by soil volume of a time period at Barikot. The higher the number of beads per unit time, the likelier it is that the number of beads circulating at the site was higher for that specific time period. It can be argued that the variable of time is reflective of the natural build-up of earth and soil, so there would be no need to consider the number of years as it is apparently already included in the discussion on the calibrated bead frequency by soil volume.

It should be noted, however, that the natural build-up of earth may have been affected by a number of factors such as climatic and environmental events including earthquakes, increased soil erosion and even human activity such as construction work. Such events could have encouraged increased build-up of natural soil within a very short period of time. In contrast, time is linear and free from such influences. The integration of this variable into our interpretation can, as a result, prove useful when attempting to better understand the results obtained on the calibrated bead frequency by soil volume from Barikot. The data obtained on the number of beads per unit time has, in fact, proven meaningful and appears to be mostly in agreement with the data on the calibrated bead frequencies by soil volume (Tables 3-4: Chapter 6).

4.6 The study of the bead drill holes

The study of the interior drill holes of beads, using silicone casts and Scanning Electron Microscopy (SEM), is a methodological approach that has become well-developed due to extensive experimental drilling studies and rigorous comparative investigations with archaeological samples (Glover and Kenoyer 2019: 185; Kenoyer 2017a). The study of the bead drill holes provides important information about their size and shape, which is useful for determining the type of drill employed to make them, which, in turn, sheds light on the production process of the ornament (Glover and Kenoyer 2019; Gwinnett and Gorelick 1979; 1991; 1998; Heo 2018; Kelly 2016; Kenoyer 2017a; Uesugi et al. 2018; Figure 22). As the forthcoming discussions will show, the way beads were drilled varied from workshop to workshop and changed with the passage of time. Drilling technologies and techniques are, therefore, often distinctive of a specific timeframe and cultural tradition (Bellina 2003; Bellina 2007; Carter 2013; Francis 2002; Kenoyer 1992), preserving the individual actions of the bead driller (Glover and Kenoyer 2019: 185).

The study of the drilling features can also be indicative of different workshops traditions (Kenoyer and Frenez 2018: 65-66). In addition, the SEM examination of the silicone casts of the bead drill holes can reveal meaningful information about the way beads may have been used or worn in the past (see Chapter

7). As will be discussed in Chapter 7, the stone beads from Barikot were drilled using a metal drill and a fine or coarse abrasive. The other major drilling technology that was applied to perforate the beads is the use of diamond drills. Only by carefully comparing the drilling and shaping of the beads can such details be seen. The drill types and shapes of the drill holes as well as the angles of drilling suggest that the stone beads of Barikot may have been made in different workshops or by craftspeople who were trained in different workshop traditions.

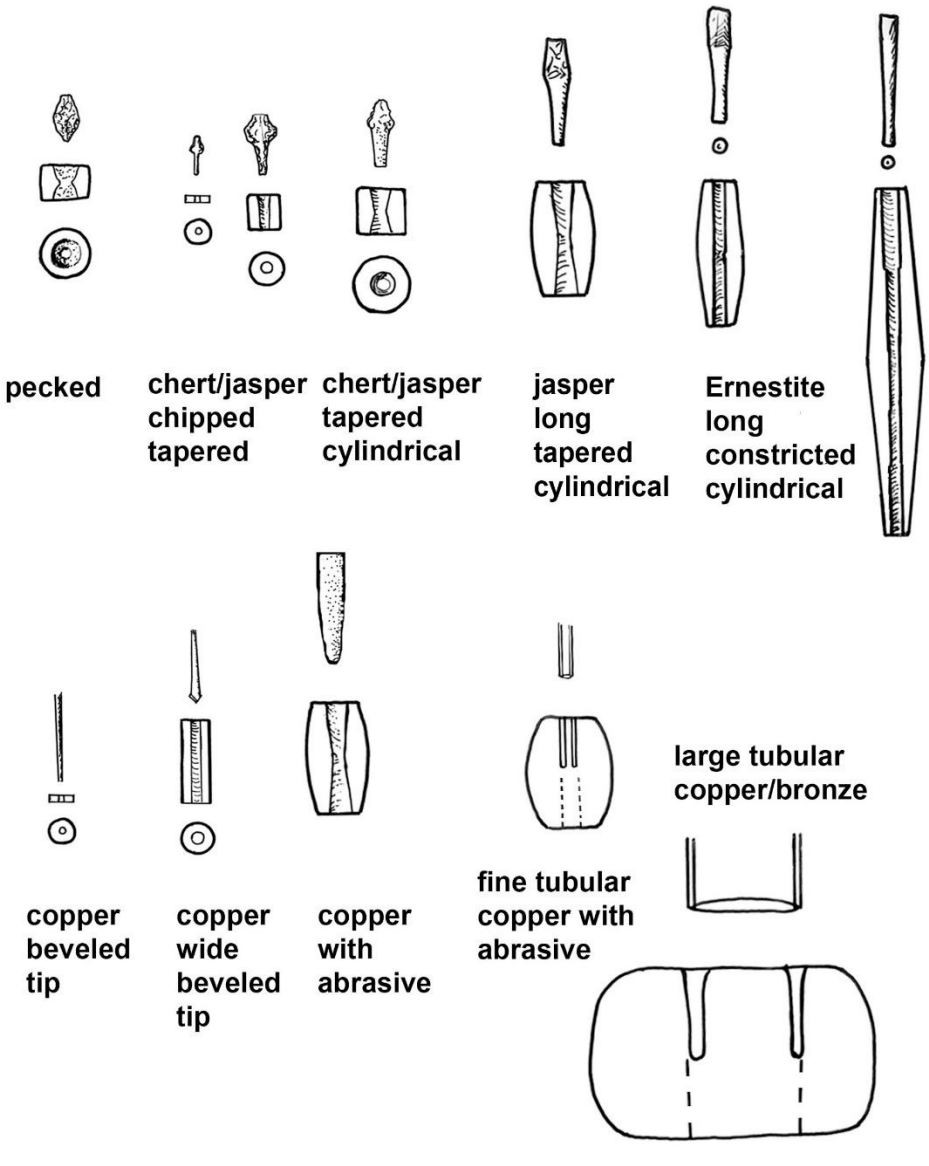


Figure 22: A variety of drill types to perforate beads (Drawing: J. M. Kenoyer)

4.6.1 The process of taking silicone casts

It is important to note that necessary preparations are needed to be made in advance before taking the silicone casts of the bead drill holes. The investigator needs to become familiar with the number, type of raw material and chronology of the beads so that a representative selection of beads can examined within a limited space of time preferably covering the entire chronological sequence of the site. Fortunately, nearly all chronological periods of Barikot have revealed beads of various types of stone, making this study a highly important and promising component of this research. The silicone casts discussed in the current study were taken after the beads had been measured, photographed and cleaned in order to avoid any small, microscopic traces of silicone resin to become attached to the beads and, in the process, contaminate the photographic documentation.

First, small plastic bags were prepared for each single silicone cast and were labelled with their inventory or serial number and raw material identification. Once the bags were ready, all beads were taken out of their plastic bags and were placed on their respective bags. The stone beads were cleaned in a bowl of water mixed with small amounts of soap. Soft wooden toothpicks were dipped in the water and were then used to clean the drill holes from any dirt stuck inside. It was important to try to gently clean the drill holes to avoid damaging the interior hole surfaces. After cleaning, the drill holes were given a final clean up by blowing into the perforation from both ends to clear off any dust particles (Figure 23). This procedure helps mitigate the chances of dirt particles remaining attached to the interior drill holes, which tend to become attached to the silicone casts and, ultimately, the SEM images produced later.



Figure 23: Various types of equipment items to take silicone casts of the bead drill holes (Photograph: author's own)

To take the silicone casts, the plastic dispenser D2 (Zhermack) DS50 1:1/2:1 was used, which was kindly provided by Dr. Dennys Frenez, University of Bologna (Italy). This dispenser is durable, accurate and easy to use. Impressions of the bead perforations were made using silicone products for dental impression (Zhermack hydrorise). The Silicone paste (hydrorise) was selected as it is precise in the detail reproduction and has a high tear strength. It also produces the model immediately within seconds. It provides a record of the abraded or polished surface at extremely high-resolution suitable for study at various magnifications using a Scanning Electron Microscope. The casts also do not shrink during hardening and can be used to document precise measurements of the drill hole diameters (Kenoyer 2017a). This method is adapted from the technique used by J. M. Kenoyer who trained me in how to study the bead drill hole impressions.

The top part of the dispenser was opened and the rack was pulled to reach the maximum limit. The silicone paste tubes were fixed and locked on the top of the dispenser while a small mixing tip was attached to the tubes, which is there to mix the bi-component silicone adhesives (dental impression material). The beads were held with their drill hole oriented towards the exit hole of the mixing tip. When ready, the trigger of dispenser was pulled to make the silicone mixture come out smoothly from the tubes, getting slowly injected into the interior drill hole of the selected beads from Barikot. Once the silicone paste exited the drill hole from the other end, extra resin was added to both bead ends to create a ball-like shape. This addition was done in order to be able to carefully pull out the silicone cast once it had dried solid with a tweezer. As a rule, silicone casts of several beads were quickly taken in one go because otherwise the resin would dry up and get stuck in the mixing tips if the dispenser was left unused for even a few minutes. If that happened, the used mixing tips had to be replaced with new ones.

Using a laboratory scalpel, any loose or unwanted amount of silicone resin was carefully cut off from the ball-shaped ends to smoothly pull out the silicone casts from the drill holes. After having taken this step, each cast was placed inside its respective already labelled plastic bag, which was later transferred into a suitable plastic container for transport. In case both ball-shaped ends broke during the pull-out process, and the silicone cast became stuck inside the drill hole, a needle or cable wire was smoothly applied to gently squeeze the cast out without damaging it or the drill hole. Despite cleaning the interior bead drill holes, a few silicone casts were found to be too dirty for use and, as a result, had to be taken again. Figure 24 illustrates the author in the process of taking silicone casts of the bead drill holes under the supervision of M. Vidale.



Figure 24: Taking silicone casts of the bead drill holes in the Swat Museum and Italian Mission headquarters (Photographs: author's own)

Apart from the stone beads, silicone casts were also taken of the interior drill holes of some of the marine shell and coral beads to provide insight into their manufacturing technologies and production steps. In this regard, the results gained from their examination have been both beneficial and, at the same time, disappointing, which will be discussed in detail in Chapter 7. To complement the low number of beads from Macrophase 1 of Barikot, stone beads unearthed from the contemporary protohistoric sites of Loebanr, Katelai 1, Kalako-dherai and Aligrama (Swat Valley) were documented and studied as well (Figure 25). The information retrieved from their analysis has provided a more comprehensive insight into the typological and technological characteristics of the beads coming from the little understood protohistoric period of Gandhara.

In this regard, silicone casts of four stone beads in total were taken by the author and are discussed in Chapter 7. It should be noted, however, that unlike the Barikot beads, the proposed periodisation and absolute chronology of these four stone beads is somewhat imprecise, mainly because the radiocarbon dates that were obtained when the ornaments were excavated in the 1960s, were limited in number and biased by sampling problems (Vidale and Micheli 2017: 391; Dittmann 1984). Their chronology, however, certainly falls between 1000 - 800 BCE based on the still valid relative chronology of the ceramic evidence (Olivieri and Iori 2020: 81-82; Narasimhan et al. 2019: 138; Stacul 1969; 1975b; 1987).

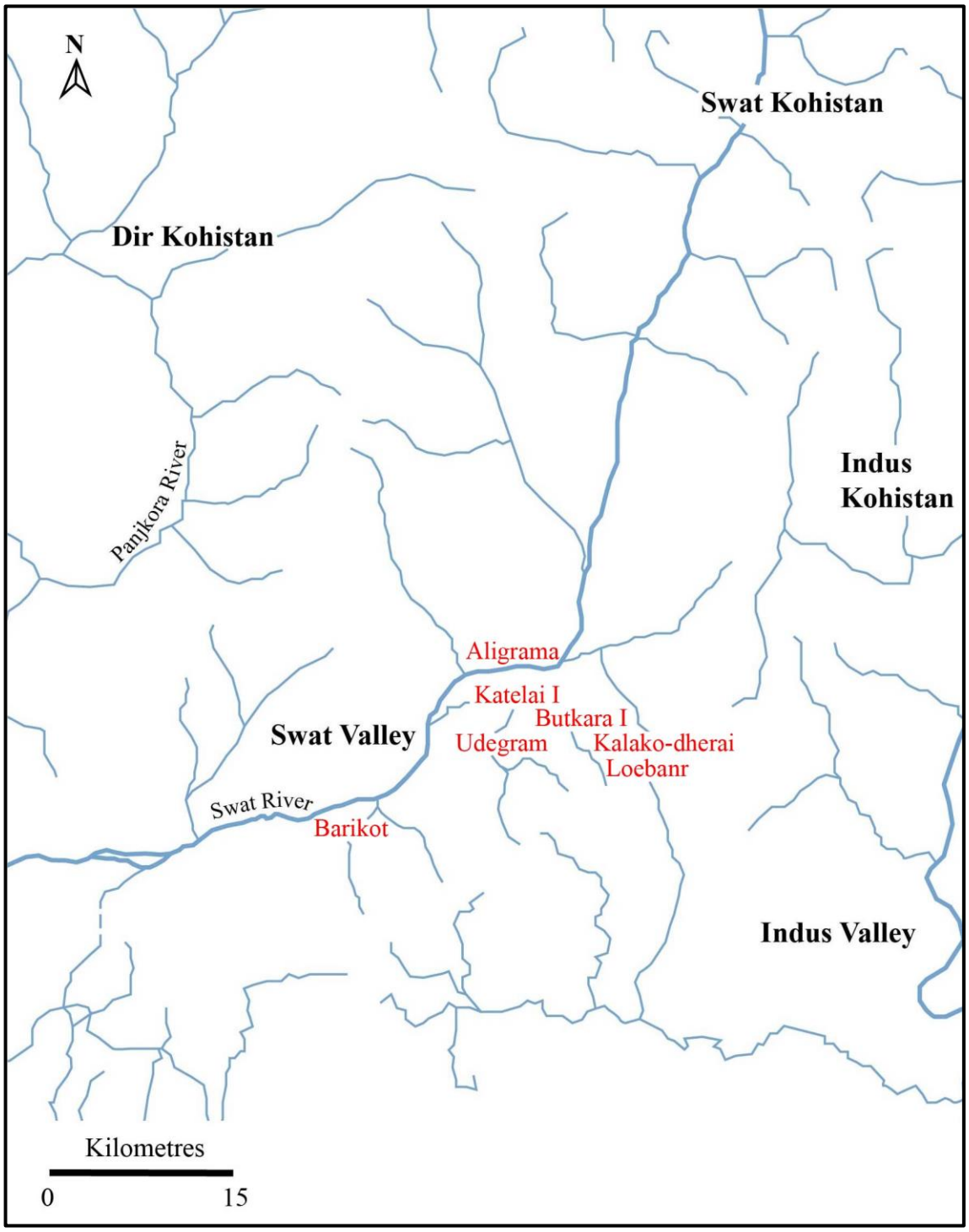


Figure 25: Archaeological sites (highlighted in red) in the Swat Valley discussed in the following chapters (Drawing: author's own, adapted from Iori 2018: 11)

4.6.2 The production of SEM images

To identify the type of technology used to perforate the beads, selected drill hole casts were studied under the EVO60 ZEISS (Scanning Electron Microscope) at the Chemist Laboratory of Material Testing of the Ministry of Cultural Heritage and Activities in Rome, Italy (Figure 26).

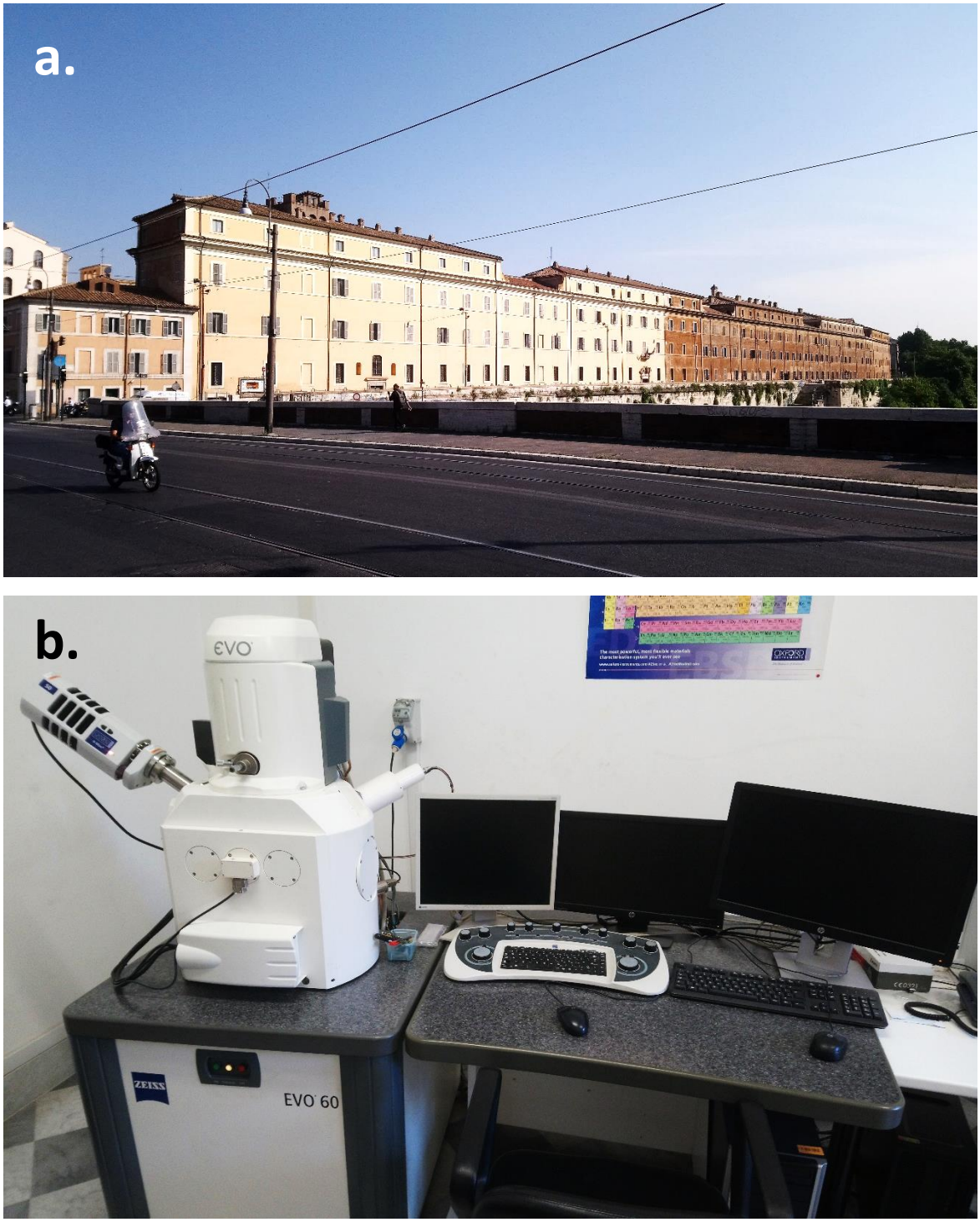


Figure 26: a) Chemist Laboratory of Material Testing of the Ministry of Cultural Heritage and Activities in Rome, Italy b) EVO60 ZEISS (Scanning Electron Microscope) (Photographs: author's own)

The drill hole impressions were studied at low-magnification and low-resolution (60×, 80× and 100×), which was the only integrated setting of the SEM in use. To avoid contaminating the surface of the silicone casts with dust, all casts were cleaned with compressed, forced air to blow off dust fibres before the actual procedure started (Figure 27).



Figure 27: The use of a FX90 to release compressed air to clean the silicone casts off any dust fibres (Photographs: author's own)

Despite the use of compressed air, some fibres managed to remain attached to the casts, which became obvious when the SEM images were created. In that case, Adobe Photoshop was used to erase any remaining fibres from the images (Figure 28).

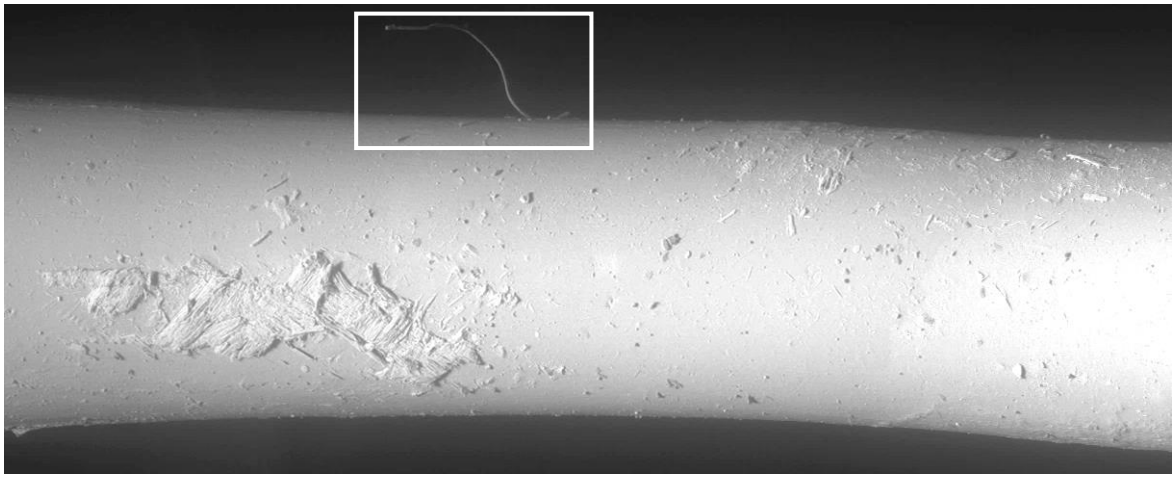


Figure 28: A dust fibre attached to the surface of the silicone cast of a bead drill hole (Photograph: author's own)

Samples are usually evenly coated with a thin layer of carbon, gold/palladium or some other conductive material so that the electrons in the SEM do not damage the sample and cause imaging problems. However, because the samples were analysed at low magnification, they did not require any coating. There were four round aluminium stubs that were fixed on a brass/stage to keep the samples from falling off the mount when the brass is tilted or rotated during the SEM examination. The aluminium stubs were cleaned with tissue so that no contamination happens and double tape was applied on these stubs so that a sticky surface is created to mount the silicone casts in place. It is very important to note that each of the four aluminium stubs was marked with a certain number of dots while the plastic bags of the silicone casts were labelled with the same respective number of dots. This step was taken to allow the identification of each cast and image at the end of the procedure rather than ending up with casts and images with no way to know their inventory number (Figure 29).



Figure 29: Four silicone casts mounted on round and labelled aluminium stubs fixed on a brass (Photographs: author's own)

Once mounted, the samples were then placed in the SEM chamber (Figure 30) and images of the casts were taken at multiple magnifications (60×, 80× and 100×).

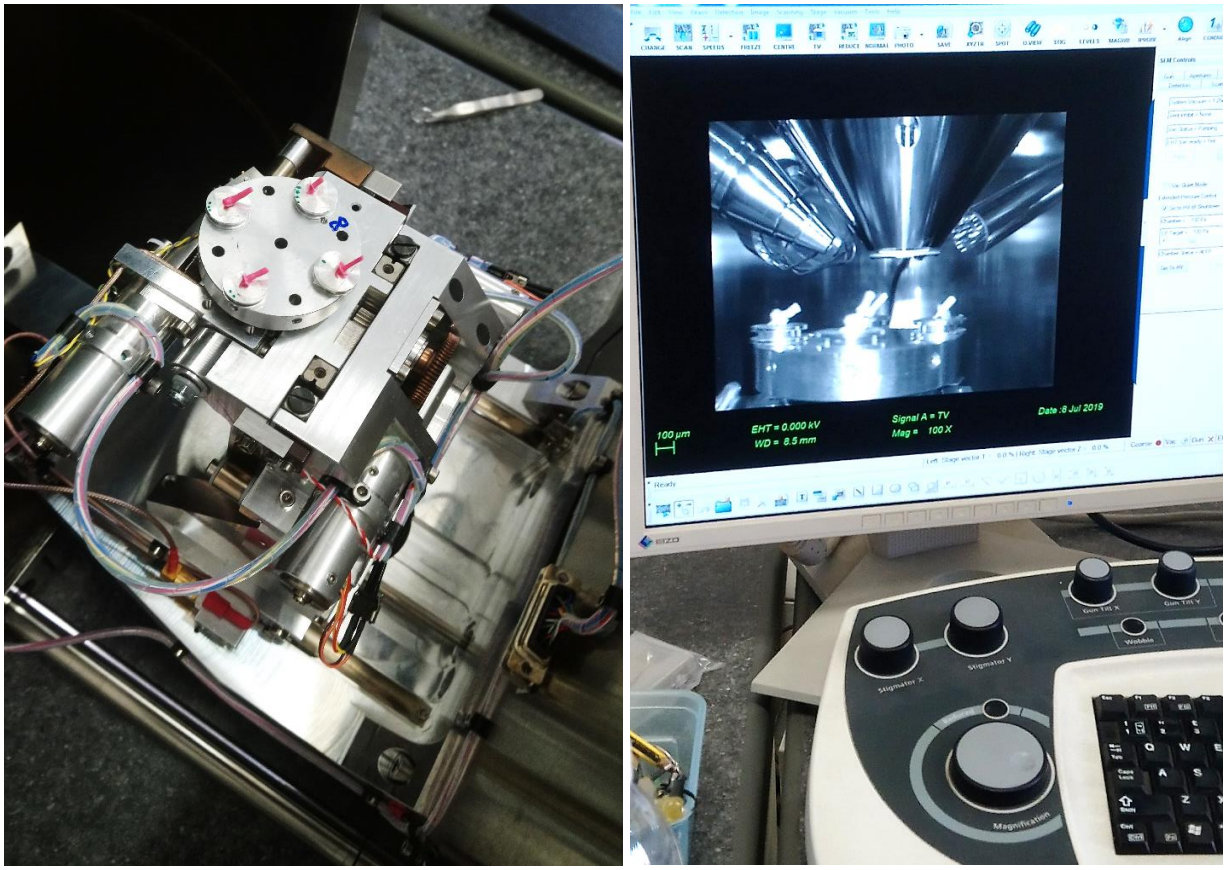


Figure 30: Silicone casts placed in the SEM chamber of the EVO60 ZEISS to produce images (Photographs: author's own)

In most cases, only one type of detector of the EVO60 ZEISS was used to produce the SEM images (secondary electron). However, this detector would, in some instances, not provide a clear view of the drilling striations of the perforation of a bead. Consequently, the second detector was used (variable pressure), which did reveal the interior drill hole features of the examined beads more clearly (see, for example, the drill hole impression of the following bead: BKG 2630 in figure 31).

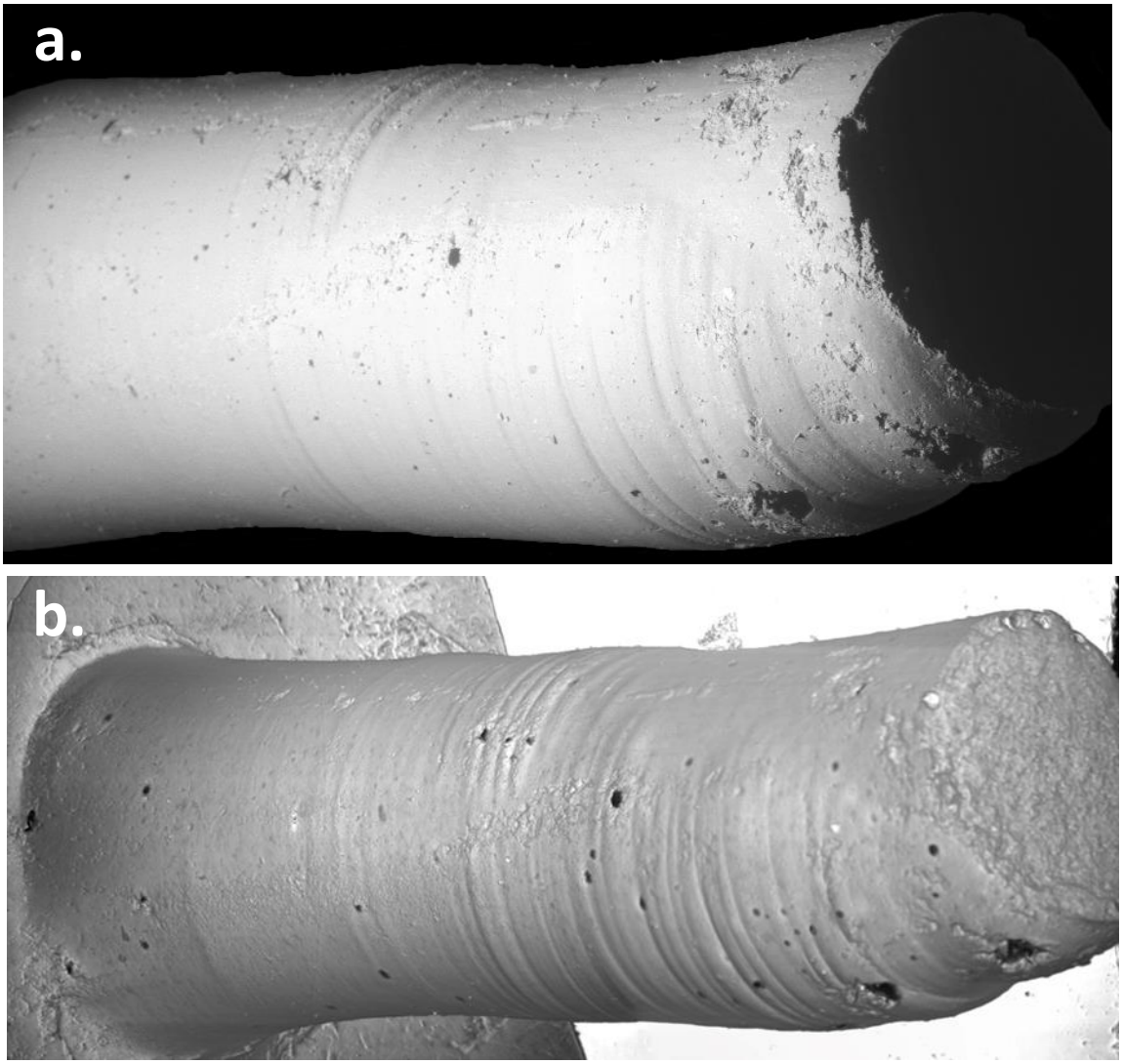


Figure 31: a) First detector of the EVO60 ZEISS (secondary electron; BKG 2630) b) Second detector of the EVO60 ZEISS (variable pressure; BKG 2630) (Photographs: author's own)

The silicone casts of the interior drill holes of various types of stone, marine shell and coral beads were taken in Rome (Italy), covering almost the entire chronological sequence of Barikot, providing a very comprehensive and detailed technological framework for this research. Together with M. Vidale, the author produced the interpretation on the casts first by examining the SEM images of the drill holes of the Barikot beads and comparing them to earlier published studies on bead drilling technologies, which have already been cited in Chapter 3. Once completed, the interpretation on the SEM images was shared with J. M. Kenoyer for his feedback.

Later, additional studies using higher magnification (20×, 50×, 100× and 300×) were undertaken using the Hitachi 570 SEM at the Department of Anthropology, Laboratory of Experimental Archaeology, University of Wisconsin, Madison, USA in an attempt to refine the current dataset and extract detailed information about the different drilling properties and effects. For this, the silicone casts themselves

were sent to J. M. Kenoyer who was able to produce high-magnification and high-resolution SEM images of 21 different stone beads that turned out to be meaningful for our research purposes. He was able to identify various types of drilling technologies and manufacturing practises and shared the results with me.

The drilling features of the remaining beads were assessed through the analysis of the low-magnification and low-resolution SEM images, the examination of the casts using a Dinolite™ digital microscope and the photos of the archaeological beads. A comparable procedure to Rome was adopted at Madison (USA) to produce the high-magnification and high-resolution SEM images of the silicone casts of the bead drill holes. To ensure that high-resolution and quality images were produced, the casts were placed in a *SeeVac Auto Conductavac IV* sputter coater for three minutes and evenly coated, which is between 3 and 5 nanometres (30 to 50 ångströms) of a 60/40 gold/palladium alloy (Kenoyer 2017c: Figure 32). Once the samples were coated, they were placed in the SEM chamber and images of the casts were taken.

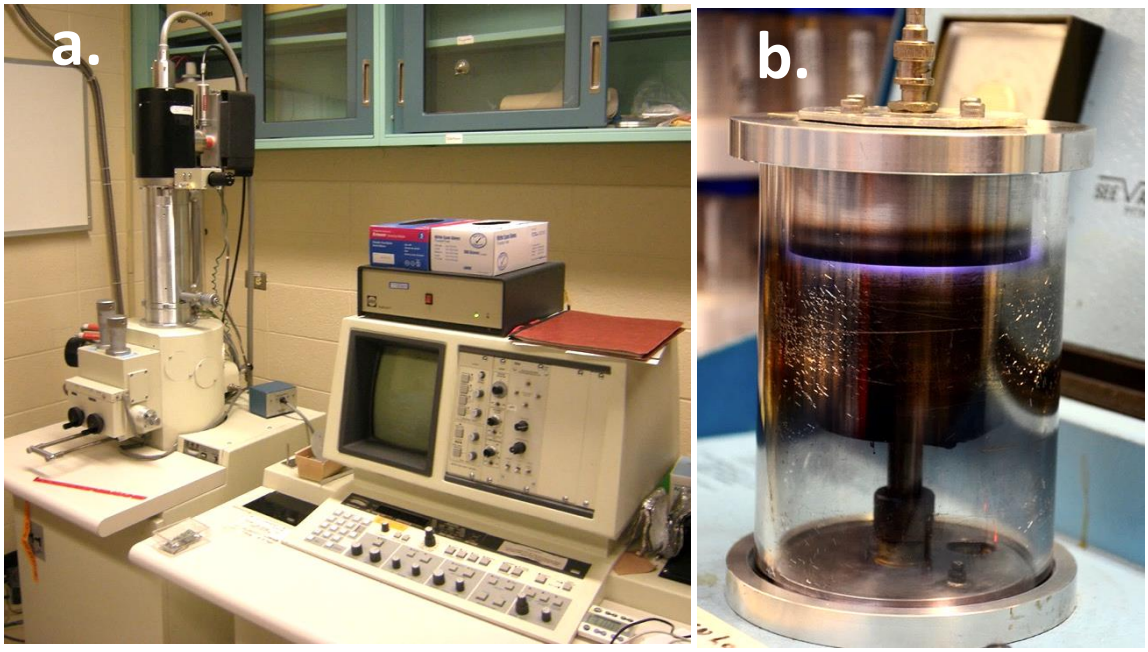


Figure 32: a) Scanning Electron Microscope, Hitachi 570 b) Sputter coating with *SeeVac Auto Conductavac IV* (Kenoyer 2017c: 413)

4.7 The study of the Gandharan art ornaments

Apart from studying the archaeological beads from Barikot, this research involves the analysis of the forms of beads carved on the various types of Gandharan art sculptures especially the Bodhisattva images. The research aim is not only to reconstruct adornment practices during the Kushana period of Gandhara (1st – 3rd centuries CE) but also to investigate whether the carved depictions represent actual, real ornaments or they are simply symbolic or imaginative. Consequently, this analysis can provide us with new insight into how ornaments were worn in the Kushana period of Gandhara and into the accuracy of iconographic depictions.

Consequently, five museums were selected for a high-resolution photographic campaign, which featured the most extensive and relevant Gandharan art collection on display. These included the Guimet Museum in Paris (Musée national des arts asiatiques), the Taxila Museum and Lahore Museum in the Punjab province of Pakistan followed by the Swat Museum and Peshawar Museum in the Khyber Pakhtunkhwa province of Pakistan. Official permission for photographing and publishing purposes was sought and kindly granted by the respected directors and curators of the Museums. The main focus of this work involved the documentation and study of the princely Bodhisattva sculptures found from a great range of archaeological sites in the region of Gandhara. As a secondary objective, other types of Gandharan art sculptures, which included the representation of female groups adorned with bead ornaments, were also documented to attain a more complete picture on the prevailing ornamental traditions across the different levels of social strata of ancient Gandhara.

This process also included the documentation of relevant Gandharan narrative relief panels and friezes that depicted characters decorated with bead ornaments to shed additional light on adornment practises of the people living in the region at the time. Besides, the major publications by Faccenna, Taddei and Verardi on the extensive collection of art sculptures recovered from Butkara I (Swat) and Tapa Sardār (Afghanistan) (Faccenna 1964; Taddei and Verardi 1978) were also examined, which provide important evidence on the visual aesthetic art of Gandhara. They represent another rich source of evidence that can be used to rigorously compare the iconographic representations of beads with the archaeological record. As K. Behrendt comments on the Butkara I reports, ‘the resulting multi-volume report is the most detailed account of any excavation in northwest Pakistan and Afghanistan, making this site central to the study of Greater Gandhara’ (Behrendt 2004: 48; Fussman 1996). The same conclusion must be drawn for the excellent excavation reports of Tapa Sardār, representing a benchmark site for the study of Buddhist art (Klimburg-Salter 2010a: 177).

When taking photographs of the sculpted beads, the aim was to take shots from different angles to ensure the shape and any other surface features of the carved ornaments are encapsulated as accurately as possible. The sculptures themselves were also completely photographed to create a permanent record of their size. This information, in turn, would allow the investigator to better understand the proportion

of the carved ornaments, which can then be compared more effectively with the archaeological beads from Barikot and other sites. In addition, it is important to note down the information provided by the labels associated with the displayed art in the museums (if available) as it identifies the type of Bodhisattva as well as the approximate provenance and chronology of the investigated visual art.

This information, in turn, may be used to determine the potential movement of bead raw materials and prevailing trading networks. With the support of the museum staff, the showcases on display were occasionally opened if the glass reflection from the showcase would interfere with the images. When required, the integrated lights of my camera were switched on to highlight or illuminate visible iconographic features. Having a ruler as part of the documentation process has also proven beneficial as measurements of specific carved beads could be recorded instantly, which were later compared with the beads from Barikot (Figure 33). Due to time constraints, absolute measurements of many carved beads could not be taken on site. However, the approximate measurements of those beads were later extrapolated based on the dimensions of the sculptures.



Figure 33: Taking measurements of a ghata-shaped pendant on a Bodhisattva Maitreya (Shari-Bahlol; Peshawar Museum) (Photograph: author's own)

To make a reliable correlation between an archaeological bead from Barikot and the carved image of a bead in a sculpture, the main variables considered were the shape, size, style, and chronology of the two. In addition to the beads from Barikot, the research presented in this thesis also discusses, as already mentioned above, the beads recovered from the excavations of other contemporary sites to identify potential matches with the sculptural evidence. The study on the reconstruction of adornment practises and traditions in this thesis is, therefore, not limited to the Barikot bead assemblages but expands the comparative beads to the published reports from other sites that have the specific data that is needed. The final raw material identifications of the forms of beads produced in the art sculptures were confirmed with the assistance of J. M. Kenoyer.

4.8 Methods and materials: key issues

Since there is, for a variety of reasons (such as chronological uncertainties, see Chapter 3), very limited typological data on beads available, we are currently not in the position to determine the distribution of specific bead raw materials and shapes within a specific time period and, therefore, also not how they developed through time in Gandhara and adjacent regions. Similarly, we are currently unable to comment on the prevailing drilling traditions of beads within each period and, consequently, also not how they developed through time in the region. For the same reasons, attempts to precisely reconstruct the prevailing adornment practises during this time cannot succeed in the presence of such key challenges. In contrast, this chapter has outlined and justified the importance of adopting an integrated, multi-stranded approach, which is used to provide the very data on the beads that is so urgently required, filling major gaps in our understanding about the prevailing bead ornamental traditions at Barikot and, by extension, the wider region. The following Chapter 5 provides a description on the geographical setting of the study area and introduces the archaeological site of Barikot as the study-site of the current research.

Chapter 5: Geographical location and study site

5.1 Geographical Setting

The Swat Valley is located in the north-west of modern Pakistan between latitude 34˚40' and 35˚40' north and longitude 72˚ and 73˚ east. To the north, the valley is bound by a series of high mountains and drained by the Chitral River while to the east it is bound by the watershed between the Swat and Indus Rivers. To the west, it borders the Dir District, which is drained by the Panjkora River. The Swat River originates from near the present-day village of Kalām in Swat Kohistan (land of hills) some 2000 m above sea level, flowing for a total of approximately 600 km (Stacul 1987: 4). The Swat Valley is characterised by a warm, dry summer and a damp, cold winter. Rainfall is common during the winter and early spring seasons while snow rarely reaches the valley floor (Kureshy 1977: 42; Stacul 1987: 3-6). Thick, terraced layers of post-Tertiary alluvial soils with varying quantities of silt, clay and organic matter cover a large part of the valley floor in the Mid-and Lower Swat Valley (Kureshy 1977: 23; Stacul 1987: 3-6).

The Swat River flows through an area of great geological complexity marked by the meeting of the Indo-Pakistani Plate and the Kohistan Island Arc across a Suture Zone consisting of ophiolitic mélange (Di Florio et al. 1993; Tahirkheli 1982; Tahirkheli and Jan 1979a; 1979b; Tahirkheli et al. 1979). The Swat area lies in the Indo-Pakistani Plate, which consists of two different geological units meeting in subduction, namely the Jambil Unit and the Saidu Unit. The lower Jambil unit consists of various types of granites, Augen-gneiss and other types of gneiss of medium-high metamorphic grade. The upper Saidu Unit consists of phyllites, greenschists, prasinites, marbles, calce schists, ophiolites, amphibolites and mica schists. The tectonic contact between the Jambil Unit and the Saidu Unit is characterised by presence of muscovite, tourmaline leucogranites and granodiorites. The area of Barikot is primarily one of marbles, although phyllite outcroppings are not infrequent. Based on the fieldwork and studies carried out thus far (Di Florio et al. 1993; Faccenna et al. 1993), this area is characterised by a powerful outcropping of phyllites and mica schists with garnets and andalusites, forming the structure of the northern side, eastern spur and western crest of the hill. The central cliff face of the southern side of the hill consists of the white marble that is characteristic of the elevations rising on either side of the Swat Valley in the Barikot tahsil (Olivieri 2003: 14-16).

The modern village of Barikot is situated in the Swat District and represents the major centre of the homonymous tahsil (administrative area), rising above the left bank of the Swat River (Middle Swat; 34º4' N, 72º12' E; 799.00 a.s.l.: Marussi 1964; Olivieri 2003). The area of Middle Swat refers to the river course embedded between the confluence with the Ugad (at Manglaor) and the confluence with the Panjkora Rivers. As already stated above, the area of Barikot is characterised by an isolated, steep and crescent-shaped hill, rising from the north above the course of the Swat River (942.40 m a.s.l.). The eastern side of the hill is bordered by a short torrent called Bir-kot khwar (Pashto: torrent). Two more

torrents, called the Kandak (or Kandag) and the Karakar, flow into the Bir-kot khwar from the western border of the modern village. The southern side of the hill overlooks a semi-arid plain (miana), which slopes down gently towards the Kandak Valley (Olivieri 2003: 13).

To the east, the plain is defined by the course of the Bir-kot khwar while the western side is marked by a rough crest, sloping down from the south-western spur of the hill (Chirgai-gat). The crest is seen extending southwards as a ridge to the western side of the Kandak Valley whose plain, from a geographical point of view, Barikot belongs to. The top of the hill has undergone artificial modification, representing an ancient phase of occupation (see above) and has, as a result, significantly changed its profile and shape. The hill was abandoned in the past and remains unoccupied today, characterised by sparse crops of cereals, which are growing on the terraces of the hill (Olivieri 1996; 2003: 13; Olivieri et al. 2006). Figure 34 shows the geological sketch of the Swat Valley including Barikot.

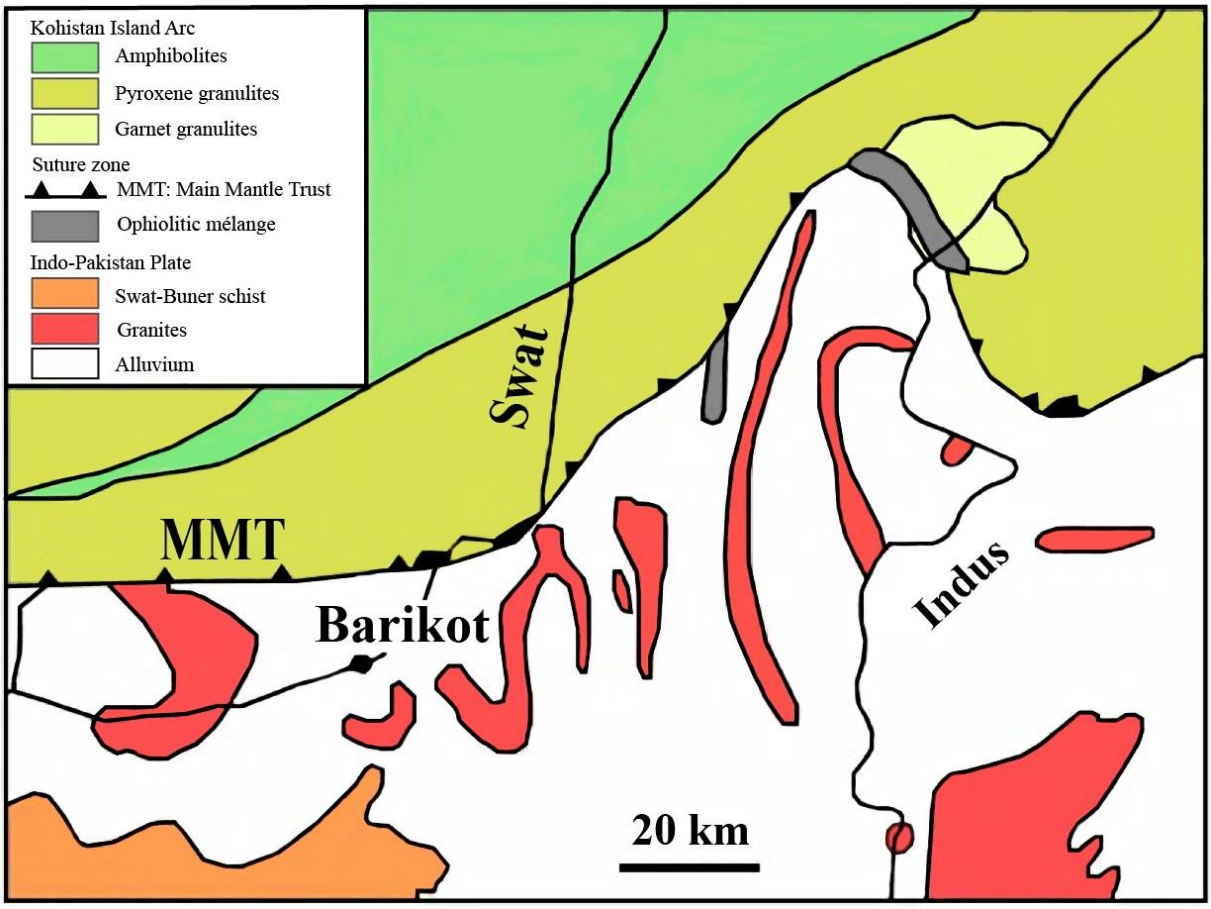


Figure 34: Geological sketch of the Swat Valley (adapted from Faccenna et al. 1993 and Maritan et al. 2018)

5.2 The archaeological site of Barikot (Bīr-koṭ Ghwaṇḍai)

The archaeological site of Barikot (34°40’51”N, 72°12’46”E; approx. 799 m asl) is located in the middle of the Swat Valley of the Khyber Pakhtunkhwa Province in Pakistan (Figure 35).

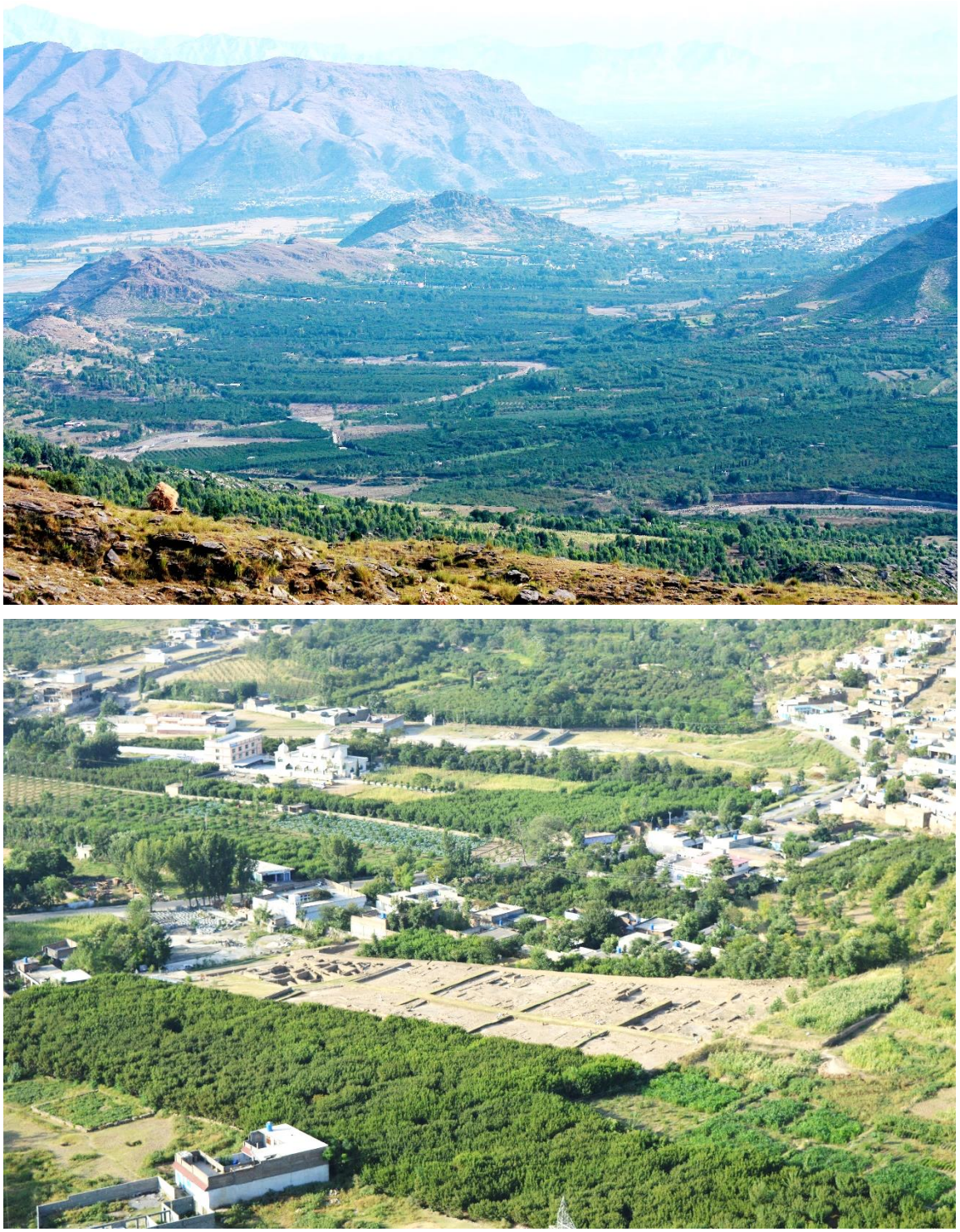


Figure 35: The archaeological site of Barikot in the Swat Valley of north-western Pakistan (Photographs: ISMEO Italian Archaeological Mission in Pakistan)

The site can be found to the west of the modern village of Barikot and is bound to the north by a crescent-shaped hill (Ghwaṇḍai: Pashto for hill). The site is also bordered by the Swat River to the north and to the south by the Kandak and Karakar streams (Figure 36).

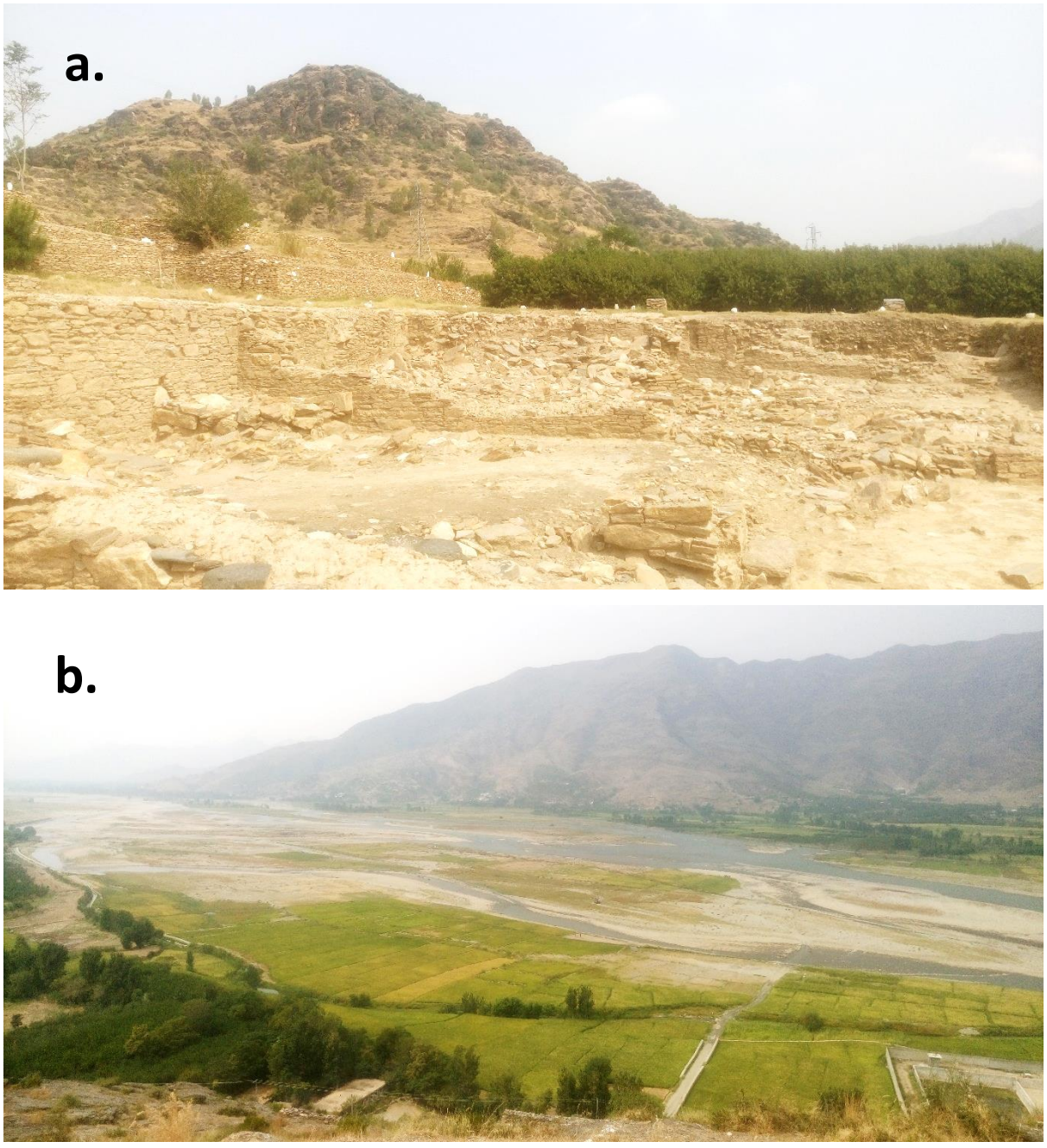


Figure 36: a) The crescent-shaped hill viewed from the south-western quarter (trench BKG 11) of the ancient city b) The Swat River flowing to the north of the ancient city (Photographs: author's own)

Barikot is located in a strategic position, dominating the roads leading to the upper and lower Valley of Swat and to Buner. The site became a major excavation project for the Italian Archaeological Mission in Pakistan from 1978 onwards when the G. Stacul investigated the flat area located south of the

crescent-shaped hill, uncovering evidence of human occupation starting from ca. 1700 – 1400 BCE (Swat Period IV; Stacul 1987), which was later confirmed by the systematic excavations conducted by the current director of the Italian Mission that is Luca M. Olivieri (Professor Pierfrancesco Callieri was the director of the excavations at Barikot before L. M. Olivieri). By no means does the second millennium BCE represent the starting point of the ancient history of Swat as evidence of human presence in the area dates back to at least the early 3rd millennium BCE (Stacul 1987) probably even earlier. At Barikot, Stacul uncovered the remains of a large historical settlement, which led to a successful series of systematic excavation campaigns starting from 1984 onwards in order to expand our knowledge of the historical urban periods of the site and, by extension, the wider region (Callieri 2007; Callieri et al. 2000: 194-204; Narasimhan et al. 2019; Olivieri 2003; 2014; Olivieri and Callieri 2020; Spengler et al. 2020; Stacul 1978; 1980; 1987; Vidale and Olivieri 2002).

Moreover, archaeological fieldwork together with the subsequent study of the material assemblages and the textual sources have provided confirmation of the identification, proposed by A. Stein and G. Tucci (Olivieri 1996; Olivieri et al. 2019; Stein 1930: 28; Tucci 1958: 296, 327), of the site with the city of *Bazira*, reported by classical historians to have been conquered by Alexander in 327 BCE. The name of the site is recorded as *Beira* or *Bazira* in the accounts of Alexander's expedition (Anabasis Alexandri I-IV: 27-8, Brunt 2004; Historiae Alexandri VIII: 10, 22, Yardley 1984) (Stein 1930: 28). In the later sources, the site has been referred to as *Vajīrasthāna* based on the discovery of a 10th century CE inscription found at Barikot (Tucci 1958: 296). The excavations at Barikot have revealed an impressive stratigraphic sequence that shows an astonishing occupational continuity divided into cultural phases or 'Macrophases', starting from ca. 1700 BCE until ca. 1500 CE. The area of the ancient city, as a whole, measures about 12 hectares. As a result, Barikot can be considered, together with the urban site of Sirkap in Taxila, the most important excavated settlement in the north-western part of the subcontinent, providing valuable insight into the cultural evolutionary processes of the region (Olivieri and Callieri 2020). In fact, it is fair to say that the excavations at Barikot are more important than those at Taxila as they incorporate the use of modern archaeological methods.

As stated above, the site has been excavated by the Italian Archaeological Mission in Pakistan (ISMEO: International Association of Mediterranean and Oriental Studies). The Mission was previously known under the Italian Institute for the Middle and Far East (IsMEO) or Istituto Italiano per il Medio ed Estremo Oriente. The excavations at Barikot were first led by G. Stacul (with contributions by L. Costantini and other archaeologists). The succeeding archaeological field campaigns at Barikot were directed from 1984 to 2000 by P. Callieri (with contributions by A. Filigenzi and other archaeologists) in cooperation with the Department of Archaeology and Museums (DOAM), Government of Pakistan. The excavations at Barikot have been ongoing since 2006 under the leadership of L. M. Olivieri, Università Ca' Foscari Venezia (Callieri 2007; Olivieri and Callieri 2020; Spengler et al. 2020).

5.2.1 Outline and history of excavations of Barikot

Numerous trenches were opened during the long course of the excavations at Barikot. From 1984 to 1990, four trenches were opened (BKG 1, BKG 2, BKG 3 and BKG 4-5), revealing a stratigraphic sequence that stretched from the 2nd century BCE to the 4th – 5th century CE while continuing into the Islamic period in the hillside area (13th – 14th century CE) (Olivieri 2014). The excavations at the site were extended from 1998 onwards, opening four additional trenches (BKG 6, BKG 7, BKG 8 and BKG 9). The earliest materials that have come to light from these excavations are dated to the 2nd millennium BCE, but the revealed structures are dated to the 1st – 2nd centuries CE (BKG 7 and 9) as well as the 7th to 11th centuries CE (BKG 6) (Callieri 2007; Callieri et al. 2000; Olivieri 2014). In 2006, a new trench was opened (BKG 10) in an attempt to reconstruct the eastern section of the defensive wall of the city. Although the wall sections were not found, the discovery of a series of external channels has provided valuable information to enable the excavators to propose a hypothetical reconstruction (Olivieri 2014). Trench BKG 10 including BKG 1 and 3 were refilled after the excavations concluded.

Later, two more trenches were opened (BKG 11 and 12) where excavations have been taking place from 2011 onwards. These trenches are located in the south-western quarter of the city, respectively to the north and south-west of trench BKG 4-5. This new area was selected with the aim of exposing the largest possible horizontal area of the ancient city and, thereby, gain a more comprehensive insight into the urban layout and the distribution of the various structures in the city. In this part of the city, the archaeological evidence indicates a chronology starting from around the mid-second millennium BCE until the abandonment phases of the lower city in the 3rd – 4th century CE (Iori et al. 2015; Iori and Olivieri 2019; Moscatelli et al. 2016; Olivieri 2011; 2014; 2015; 2018a; Olivieri and Callieri 2020; Olivieri and Iori 2020; Olivieri et al. 2019). Figures 37-39 show the various trenches of Barikot and the surrounding topographic features of the site.





Figure 37: Trench BKG 11, the largest horizontally excavated trench of Barikot (Photographs: ISMEO Italian Archaeological Mission in Pakistan and author's own)

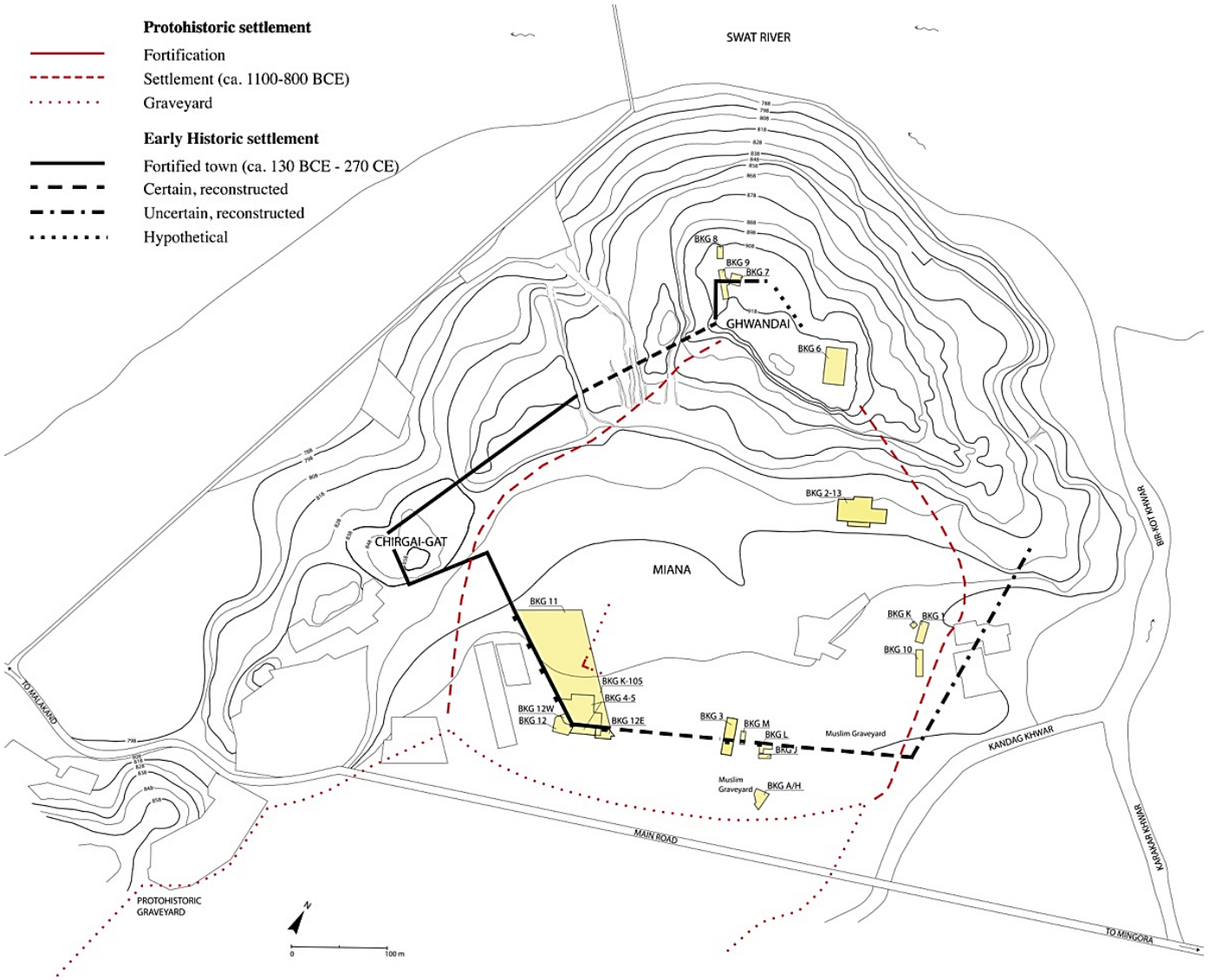


Figure 38: Archaeological map of BKG area with trenches (Drawing: E. Iori and L. M. Olivieri)

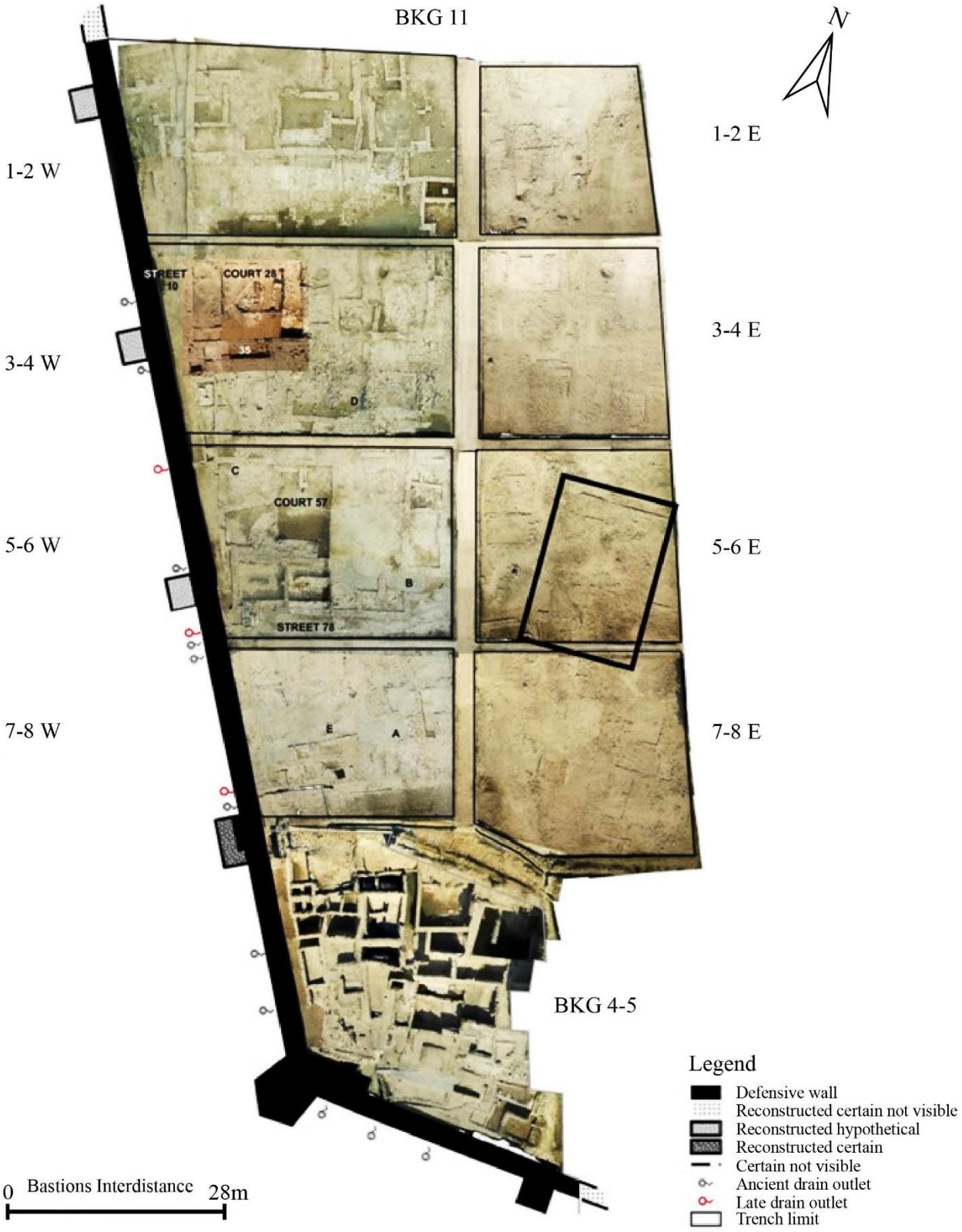


Figure 39: Aerial photograph of excavated trenches BKG 4-5 and 11 divided into eight sectors with the location of K-105 (adapted from Olivieri 2014: 12)

5.2.2 Chronological sequence of Barikot

The following data represents the chronological-cultural sequence (Macrophases) of Barikot, integrated with the information coming from the excavations at the various trenches of the site discussed above. The chronological framework and summary given below has been provided to the author by L. M. Olivieri and is also published in a recent, major volume on the ceramic material from Barikot (Olivieri and Callieri 2020).

Macrophases 0

Macrophase 0 corresponds to period IV (1700-1400 BCE) of the Ghalegai sequence. The stratigraphic layers that belong to Macrophase 0 were identified in the trenches BKG 3, BKG 4-5 (and BKG A-M, see Stacul 1987: 60-63) and exposed more extensively in trench BKG 12 only.

Macrophase 1

Macrophase 1 corresponds to periods V-VI (dated to 1200-900 BCE) of the Ghalegai sequence as well as to period VII of the Ghalegai sequence (now dated to 1200-800 BCE, see Vidale and Micheli 2017; Vidale et al. 2016). The associated layers were located in all trenches of the site (including BKG A-M; Stacul 1987: 60- 63) but were revealed extensively in trench BKG 12 only. This Macrophase is subdivided into Macrophase 1a (period V of the Ghalegai sequence?), 1b (period VI-VII of the Ghalegai sequence) and 1c (period VIII of the Ghalegai sequence?)[1].

Macrophase 2

Layers associated with Macrophase 2 have been identified at the trenches BKG L and M (Faccenna et al. 1985) including BKG 11 and 12 (Olivieri and Iori 2020). Although it may also be present in some layers of BKG 4-5 (for example loci/context 413, 441-444, 452, 457 and 459), Macrophase 2 corresponds to a little known chronological horizon that is situated between the end of the late

[1] Inside the area of the site, evidence of a stretch of a massive mud and stone defensive rampart was found in the excavations (Macrophase 1b). The wall (preserved ca. 1.5 m. in height and more than 3.5 m wide), of which the part of the upper surface and the inner side were exposed, is oriented North-South. It was, basically, a massive rampart made of thick layers of cobble stone with inclined pebble-masonry facing, plastered with thick layers of purified clay. The wall collapsed at least once and the inner face was rebuilt. The upper surface was equipped with a wooden palisade, as at least two post-holes survived in the final collapse of the rampart. The difference in the level between the inner floor of the rampart and the floors of the outer structures, at a distance of 50 metres from each other, is just 1.50 m., which pictures a settlement lying on an almost flat surface. Overall, the information available indicates the existence of a large settlement in Macrophase 1b, which, including the acropolis, was larger than the future Early Historic city (15 to 20 hectares) surrounding an inner stronghold (probably 5 to 7 metres wide) connected to the acropolis. Outside the settlement, there was an extensive coeval graveyard measuring at least 15 hectares.

protohistoric period and the construction of the defensive wall of the site. The recovered material assemblage is associated with the Achaemenid and Mauryan cultural phases (from the 6th-5th BCE to the 3rd century BCE; see Olivieri and Iori 2020). Macrophase 2 is also subdivided into Macrophase 2a1 (pre-Achaemenid), 2a2 (Achaemenid acculturation phase) and 2b (localization phase/Mauryan).

Macrophase 3

Macrophase 3 is dated between the 3rd century BCE (radiocarbon dating + Indo-Greek coin assemblage) and the 1st century BCE (Saka-Parthian coin assemblage + radiocarbon dating) (= Periods III and IV, Phases 3 and 4 in BKG 4-5; Periods I, II, III and IV in BKG 1; Periods IIA, IIB and III; Phase 1a in BKG 3) (=Macrophase 3b). Macrophase 3 is, most notably, characterised by the construction and the maintenance of the defensive structures of the city. This includes the reconstruction of some bastions of the city wall that were probably damaged by one of the frequent earthquakes that hit the region (mid-1st BCE – mid-1st century CE, Saka-Parthian coin assemblage). A massive earthquake first occurred and hit the city in the first half of the 1st century CE. This event was followed by a series of repairing works carried out all along the defensive wall and marked by the partial reconstruction of the bastions that were provided with escarpments (Olivieri 2015).[2] Macrophase 3a is subdivided into Macrophase 3a1 (Graeco-Bactrian acculturation phase), 3a2 (early Indo-Greek acculturation phase), 3a3 and 3a4 (mature Indo-Greek = construction of the Defensive Wall; conventional date = ca. 150 BCE).

Macrophase 4

Macrophase 4 reveals stratigraphic layers that can be dated between the 1st and the 2nd century CE (early mature Kushan coin assemblage) (= Periods V and VI, Phases 5 and 6 at BKG 11 and BKG 4-5; = Periods V, VI and VII at BKG 1; Periods IVA and Phases 1b and 2a at BKG 3). This Macrophase witnessed the pinnacle of the development period of the ancient city. It also characterised by the construction of a small, dedicated Buddhist sacred area within the city walls (BKG 4-5). In addition, it

[2] The evidence regarding the organisation and function of the extramural area during the Saka-Parthian period derives from trench BKG 12E located in the area outside the bastion close to the south-western corner of the defensive wall (Period IV, Phase 3). Besides the reconstruction of the bastion, which had partially collapsed after the impact of an earthquake, some additional structures were built in the phase related to the 1st century BCE in order to reinforce the stability of the bastion (i.e. an escarpment), and to facilitate rainwater run-off from the area close to the wall down to the ditch. Once the reinforcement process was completed, further efforts were taken towards the construction of a pit-well and related structures. The presence of an external pit-well clearly connected with the urban centre raises, however, some issues. A possible explanation for the location of the pit-well in the outer area may well indicate the presence of a city gate in the immediate surroundings. Certainly not a main gateway, but possibly a secondary gate nearby, which may, to some extent, be compared to the function of the so-called 'water-gates'. The latter were meant to allow the access to water through the confines of a secure environment, which have been proposed for Sirkap at Taxila as well (Iori et al. 2016; Olivieri 2015).

is also possible to observe the progressive loss related to the function the defensive wall during this time, which simply turned into a revetment wall for the layers inside the city. As argued in the past (Olivieri et al. 2006: 135), it is likely that the end of the defence function of the wall potentially represents a part within the broader demilitarisation process occurring in the region as a result of the so-called *pax kushanica* (Tucci 1977: 49- 50).

Macrophase 5

Macrophase 5 represents the last occupation phase of the lower city (= Periods VII and VIII at BKG 11; = Periods VII-IX at BKG 4-5; = Period VII at BKG 1, Periods IVB and V, and Phases 2b, and 3 at BKG 3). The process of functional modification of the outer wall is fully completed in this phase, which is also characterised by the construction of structures to allow an easier passage to the inner areas (Period 4b of BKG 3 and Phase 8 of BKG 4-5). Based on the radiocarbon data, the stratigraphic layers belonging to this phase are dated to the second half of the 3rd century CE (late Kushana- Kushano-Sasanian coin assemblage) (Olivieri 2014; 2015; Jongeward et al. 2015).

The south-western quarter of the city was divided into 11 single floor dwelling units of different sizes (from 300 to 700 square metres), always arranged around a central courtyard, sometimes provided with domestic worship areas. The blocks were served by a network of connected streets while the main street runs *intra muros* along the western section of the walls. Dwelling unit B has an open courtyard that is flanked by a continuous low bench characterised on the northern side by the presence of three votive niches. Several Buddhist steles were found in situ in one of them together with a statue in the round depicting a kneeling man carrying a lamp holder. An open raised shrine runs along the entire western side in communication with the courtyard through two short staircases. An altar with ex voto was also uncovered in front of the main niche (including a laminated armour bracelet) and a large stone basin of the "alms bowl" type. On the lateral benches numerous fragments of shell bracelets and luxury ceramic material were found, which were deliberately broken. The complex is defined as "Sacred Building B".

Furthermore, the excavations have revealed a second building (defined as "Temple B") stylistically very similar to the previous one and datable to the same chronological horizon. The two buildings are linked and inter-connected through a raised corridor. Temple B features a raised rectangular paved space closed on three sides and open to the north where at least three quadrangular bases were originally meant to support a series of huge wooden pillars. Although only three bases have been discovered, it is highly likely that the building featured a 4-pillar or 4- column façade as supported by the discovery of a rough altar in the lower space between the second and third base. A flight of steps at the southern end of the platform gave access to a lower open area that featured a rectangular tank. Close to the tank, a distiller was documented in situ while two fireplaces were found a few steps away from the central altar (Moscatelli et al. 2016; Olivieri 2012).

Dwelling unit D has a central courtyard used as a cooking area and housed a small Buddhist shrine where a range of decorative art sculptures were also found. The corridor leading to the courtyard from the main street yielded, among other materials (jars and millstones), a small stele depicting an unknown bearded male deity sitting in European style holding a chalice and a goat's head. The stele was found inside a small stone cyst next to a fireplace. Dwelling unit K has an alignment that is different from the other dwelling units and may be linked to the original alignment of the Period V and VI structures (Phase 4). The layout is particularly interesting as it consists of a rectangular enclosure around a rectangular building in the same axis made up of a courtyard and with a distyle building open to the north. In front of the courtyard stands a small shrine, which still houses a miniature *stupa*. Also, numerous votive offerings were found here including horse figurines originally with (now missing) riders and lions. The distyle building (defined as "Temple K") has an open antecella with traces of combustion on the clay floor, an adjacent cell and a side corridor leading to a rear chamber or thesauron (that can be accessed also via the cell), in which a deposit of valuable objects, no doubt donations, was discovered. The latter include intact ceramic material (belonging to the three classes documented in Building B), a glass ampulla imported from the West and a precious elephant's tusk. Temple K displays clear similarity with the temple of Mohra Maliaran at Taxila.

The archaeological data seems to indicate that both Period VII and VIII of BKG 4-5 (and BKG 11) were marked by destructive seismic events. Ample traces of two successive earthquakes occurring in the space of less than 50-70 years have been clearly documented in the 3rd century CE stratigraphy of Barikot. This evidence, alongside the political upheaval represented by the collapse of the Kushana empire, eventually led to the abandonment of the lower city. The urban elites compromised with the Kushana system of local alliances or the new families ruling the city during the early Kushano-Sasanian period would probably have had less financial power, or interest, regarding the maintenance of the complex metropolitan system. A complex series of events eventually led the urban elites to abandon the city when it was already partly in ruins at the very beginning of the 4th century CE. When the city was just a field of ruins, it was re-occupied and transformed into a sort of slum by non-urban or low-class settlers (C14-dated to the early years of the 4th century CE)[3].

Macrophase 6

After Macrophase 5, the settlement was reduced to the foot of the acropolis where the occupation sequence (without urban features) continues uninterrupted until the Shahi periods (BKG 2). We know very little about the central part of the ancient town, which is not available for excavation. According to the available data, the abandoned area corresponds (a) to the area within a distance of about 150 m from the defensive wall, and (b) to the acropolis. If the settlement was reduced to the central and eastern

[3] See Cupitó 2013; Olivieri 2012; 2014.

parts of the site, we may infer that the town had effectively lost its urban features and was reduced to nothing more than a small mansion settlement while the number of inhabitants drastically decreased[4].

Macrophase 6, hence, represents an early and short post-abandonment occupational phase (=Periods IX and X at BKG 11; = Period X at BKG 4-5; =Phase 4 at BKG 3). It was documented in the south-western sectors of the ancient town only representing the last phase of organised re-use of the site when the town was already in ruins (C14 chronology: beginning 4th century CE) (Olivieri 2012; 2014). From the material culture point of view (including beads), Macrophase 6 can be considered as a continuation of Macrophase 5.

Macrophases 7-8

Macrophase 7-8 correspond respectively to the post-urban phases of Barikot. Unfortunately, agricultural levelling, scattered spoliation pits and the small number of structures and materials found, do not allow us to establish a more detailed dating or periodisation for these times. The above-described sequence and the concordance between the trenches BKG 1, 3, 4-5 (lower city) and BKG 7, 8 and 9 (hill-top) is illustrated in the following table 2 below. Trench BKG 2 is not included in the table below.

[4] There must have been political and natural reasons for the sudden decline and abandonment of the ancient town towards the end of the 3rd century CE (Olivieri 2012). Besides, two massive earthquakes occurring in the space of about half a century, the collapse of the Kushana empire and the rise of the Sasanians from the east may be viewed through a broader perspective as described by G. Verardi (2011): from the contemporary collapse of the Buddhist "open society" politically supported by the Kushans in India, to the collapse of the Han dynasty in China (221 CE), to the crisis of the Roman Empire aggravated by the St Cyprian plague (251-266 CE). "By that time [mid-3rd century CE], we observe a change in the Indian landscape, namely, a rapid process of deurbanisation. It is every archaeologist's experience that even in the case of continuous human occupation, post-Kushana levels display much poorer building techniques and reuse of earlier building material. A great number of small and large towns were abandoned in the third century, and in certain areas, as is shown by territorial surveys, the collapse of the whole network of roads and small settlements, which had been kept functioning by Buddhist monasteries, is observable" (Verardi 2011: 106).

Cultural phase	Lower Town						Macro-events	Acropolis			Macro-events	Relative Chronology Absolute Chronology Coin assemblage
	BKG 4-5	BKG 11	BKG 4-5 outside the urban Wall BKG 12	BKG 1	BKG 3 outside the urban Wall	BKG 3		BKG 7	BKG 9	BKG 8 outside the Wall		
10							From 16th century Pashtun village; early-20th century *thana* (check-post in BKG 10).			Per. VII	Abandonment phase. Sporadic human presence	16th-early 20th CE Yusufzai - Miangul
9b				Per. X	Per. VII	Ph. 5	Dardic settlement (clan of Baira or Baria) abandoned in 16th century.	Per. VII	Per. VIII		Fortified *kot*	**13th-15th CE** Dardic - Timurid
								Per. VI			Earthquake. Destruction of the Brahmanical Temple ⬇	
9a		Per. X		Per. IX	Per. VI	Ph. 4	At least from 13th century Islamic occupation and graveyard.		Per. VII	Per. VI	Construction of a *masjid* (?)	**11th-12th CE** Ghaznavid
8b								Per. V	Per. VI	Per. V	Reconstruction phase	**9th-10th CE** Hindu Shahi
8a											Brahmanic Temple (BKG 6) ⬆ Palatial phase (BKG 13)* Demolition of the Buddhist sacred area (?) ⬇ Construction of a turreted Sacred Building (BKG 2)*	**7th-9th CE** Turki Shahi
7							Up-hill fortified settlement				Up-hill "urban" phase	5th-7th CE
6	Per. X	Per. IX		Per. VIII	Per. V	Ph. 3	Temporary non-urban re-occupation	Per. IV	Per. V *seq.*	Per. IV		**4th CE** Kushano-Sasanian; sub-Kushan
	Per. IX	Per. VIIIb	Ph. 8			Ph. 2b	Earthquake.				Abandonment phase.	

Cultural phase	Lower Town						Macro-events	Acropolis			Macro-events	Relative Chronology Absolute Chronology Coin assemblage
	BKG 4-5	BKG 11	BKG 4-5 outside the urban Wall BKG 12	BKG 1	BKG 3 outside the urban Wall	BKG 3		BKG 7	BKG 9	BKG 8 outside the Wall		
5b					Per. IVB		Abandonment of the drainage system		Per. V		Sporadic human presence	**3rd CE (second half)** Kushano-Sasanian; sub-Kushan
5a	Per. VIII	Per. VIIIa		Per. VII								
	Per. VII	Per. VII	Ph. 7				Earthquake. Reconstruction	Per. III			Demolition of the Defensive Wall and construction of two substructed terraces. Buddhist sacred area	**3rd CE (first half)** late Kushan
4	Per. VI	Per. VI	Ph. 6	Per. VI	Per. IVA	Ph. 2a	Intense building activity Abandonment of the Defensive Wall.					2nd CE Kushan
	Per. V	Per. V	Ph. 5	Per. V		Ph. 1b	Initial abandonment of the Defensive Wall.		Per. IV			1st-2nd CE Early Kushan
3b	Per. IV	Per. IIIB	Ph. 4	Per. IV	Per. III	Ph. 1a	Earthquake. Retrofitting of the Defensive Wall					**1st BCE-1st CE** Saka/Parthian
3a4	Per. III	Per. IIIA4	Ph. 3	Per. III			Fortified urban phase. Demolition of the previous structures and stratigraphy for the construction of the urban Defensive Wall	Per. II	Per. III	Per. III	Construction of the Defensive Wall on the Acropolis	**end-2nd BCE** Indo-Greek Local Coins
3a3		Per. IIIA3		Per. II	Per. IIB							
				Per. I	Per. IIA							
3a2		Per. IIIA2					Urban occupation phase.					

Cultural phase	Lower Town						Macro-events	Acropolis			Macro-events	Relative Chronology Absolute Chronology Coin assemblage
	BKG 4-5	BKG 11	BKG 4-5 outside the urban Wall BKG 12	BKG 1	BKG 3 outside the urban Wall	BKG 3		BKG 7	BKG 9	BKG 8 outside the Wall		
3a1		Per. IIIA1					Probably fortified (traces of earthen rampart and moat/ditch)					mid-3rd – early-2nd BCE
2b		Per. IIB	Ph. 2b									end-4th - mid-3rd BCE Mauryan
2a2		Per. IIA					Urban occupation phases					5th - mid-4th BCE
2a1												6th-5th BCE
1c	Per. II (?)	Per. IC			Per. I		Final collapse and abandonment of the fortified cluster	Per. IB	Per. II	Per. II	Settlement	Iron Age = period VIII Ghalegai sequence? (1000-900 BCE)
1b		Per IB	Ph. 1b (only in BKG 12)				Settlement/ Reconstruction of the fortified inner cluster/ Graveyard					Iron Age = period VII Ghalegai sequence (1200-1000 BCE)
1a		Per. IA	**Ph. 1a** (only in BKG 12)				Settlement/ Fortified inner cluster/ Graveyard				Settlement	Late Bronze-Iron Age = periods V -VI Ghalegai sequence (1300-1200 BCE)
0	Per. I (?)		Ph. 0 (only in BKG 12)		Per. 0		Settlement	Per. IA	Per. I	Per. I	Settlement	Chalcolithic =

Cultural phase	Lower Town						Macro-events	Acropolis			Macro-events	Relative Chronology Absolute Chronology Coin assemblage
	BKG 4-5	BKG 11	BKG 4-5 outside the urban Wall BKG 12	BKG 1	BKG 3 outside the urban Wall	BKG 3		BKG 7	BKG 9	BKG 8 outside the Wall		
												period IV Ghalegai sequence **(1700-1400 BCE)**

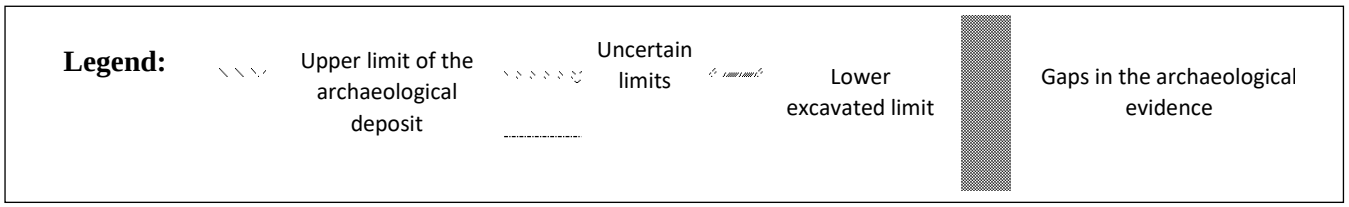


Table 2: Concordance table between Periods-Phases/Macrophases of BKG 1, 3, 4-5, 11 and 12 (lower area), and BKG 7, 8 and 9 (hill-top) (Olivieri and Callieri 2020)

Macrophases 8-9-10

Very little is known of the post-abandonment periods of Barikot, when a tower-house fortified settlement was established possibly between around the 5th – 6th century CE during the pre-Shahi phase. As there was also no fieldwork in progress that would shed light on the pre-Shahi and Shahi archaeology anywhere in the region a new excavation trench was opened at the foot of the acropolis in 2018 (BKG 2-13). This specific campaign, which is still in progress, is aimed at the study of the structural features surrounding the exposed turreted building and exploring the pre-Shahi stratigraphy related to the tower-house settlement (Figure 40). In other words, the excavations demonstrate that the entire settlement was not abandoned but was reduced significantly in size during this time. Various types of archaeological structures have come to light from the excavations of these levels, the details of which are as follows:

During the excavations of the trenches BKG 2-13, several structures were documented belonging to the pre-Temple phase (Periods I-IV) the Temple's phases (Periods V-VI), and two phases immediately later to the latter (Periods VII and VIII). In other words, the exposed stratigraphic sequence spans an occupational history across multiple time periods from the 1st century BCE to ca. 1500 CE (Macrophase 3b – 9b). The excavations revealed, for example, scanty traces of a series of structures with complex stairs, drains and fireplaces between Temple BKG 215 (Figure 41) and the sloping area BKG 132 dated to the pre-Shahi phase (Period I-III). Period IV of the sequence revealed ceramic materials dated between the 5th CE and 6th century CE (Macrophase 7).

Macrophase 8a (Period V) can be, chronologically, associated with the Turki Shahi period that is characterised by the construction of a large palatial structure reinforced by bastions built in a neat masonry. For the construction of this massive building, all the previous structures were demolished and spoiled. Moreover, various types of material culture items have been found in the excavations including black-on-red phytomorphic painted ceramics, shell bangles (*turbinella pyrum*), large terracotta earplugs, numerous animal figurines and bead ornaments. Macrophase 8b (Period VI) represents the post-Turki Shahi period of the site as evidenced by the recovery of a coin of king Samantadeva (ca. 890 – 900 CE). As it is evident from the stratigraphic record of Period VI, the lower and earlier part of the bastion of the palatial structure were already buried by the debris that accumulated from above. The material culture is, similarly, marked by typical Shahi white-and-black-on-red painted ceramic material as well as beads made from various materials and in different shapes.

Macrophase 9a (Period VII) represents the post-Shahi phase of Barikot. The building units of this time have revealed evidence of the use of white plaster in the construction of walls, floors provided with fireplaces and a walled storage pit. In addition, a range of material culture items have been found in the excavations including ceramic material and various types of glass ornaments including beads. While conclusive evidence was found at the trenches BKG 6, 7, 8 and 9 that can be positively linked to the Ghaznavid cultural tradition (such as the types of fortifications and Islamic ceramic material including glazed sherds), the material record of trench BKG 13 has, thus far, not revealed any specific cultural marker for the Ghaznavid presence in this part of the site.

The Macrophases 9b-10 (Periods VIII-IX) feature a settlement area that is characterised by the construction of house dwelling units and working areas. Two small paved lanes have been discovered as well that connect the various dwelling segments with one another. Furthermore, the presence of a large sub-circular precint filled with depured ash, charcoal, and tiny fragment of semi-combusted bones, denote the possible identification of this structure with that of a crematorium. Due to the post-abandonment period of collapse, Macrophases 9b-10 are poorly represented at trench BKG 13, but are preserved on the top of the slope of the hill. The excavations that were conducted on top of the hill at the trenches BKG 6, 14 and 15 between 2018-2020 revealed an occupational history spanning from the 3rd – 5th CE to the 15th – 16th century CE.



Figure 40: A turreted building enclosing a pillared hall with fireplace (Temple BKG 215) and cultic spaces (Trench BKG 2) (Photographs: ISMEO)



Figure 41: The remains of a deva Brahmanical temple from the Shahi period sitting on the hilltop/acropolis at trench BKG 6 (Photograph: ISMEO)

Chapter 6: Typology

Although Macrophase 0 (period IV of the Ghalegai sequence: 1700 – 1400 BCE) reveals 134 beads made from a range of raw materials and in a wide range of styles, their study falls outside the scope of the current research as they were not studied hands-on by the author (due to time constrains). The data on these beads, as recorded by the original excavators, is, nevertheless, provided in the appendix section. The excavations at Barikot indicate a long period of abandonment setting in at around 1500 BCE continuing until around 1200 BCE, although trench BKG 12 reveals settlement layers dated between ca. 1300 – 1100 BCE. Macrophase 1 of Barikot marks the first cultural period of the current study, which corresponds to periods V-VIII (1300 – 800 BCE) of the Ghalegai sequence. It is subdivided into Macrophase 1a (period V-VI), 1b (period VII-VIII) and 1c (period VIII).

As stated in Chapter 4, trench BKG 11 K-105 of Barikot is located inside the urban area in the eastern sector K of BKG 11. This trench represents the only area inside the settlement that has been excavated vertically in depth, although any layers earlier than the defensive wall and the virgin soil have not been reached yet. Still, the excavated depth covers the occupation phases from the protohistoric until the Kushano-Sasanian period of Barikot (Macrophases 1 – 5b). As a result, this area forms the most suitable place to study the typological characteristics of the beads spatially and chronologically. BKG 11 K-105 is especially relevant because this trench reveals most of the beads that derive from the Macrophases 1a-b-c, 2a-b, 3a1 and 3a2-3a4 while excavations have not reached these early occupation levels in the other trenches of Barikot yet. The following discussions on the typological aspects of the beads are organised according to a phase-by-phase review. The numbers of beads (regardless of trench) are sorted into their specific Macrophase column and pie charts, representing a crucial analysis on the distribution of specific types of bead raw materials and shapes in the various cultural periods of the site, setting out to achieve the aim of the first research question.

The typological analysis on the beads from Barikot, therefore, forms an important chapter in the study of bead ornaments for the little explored historical sequence of the subcontinent as already discussed in Chapters 2 and 3. It is beyond the scope of this thesis to discuss the typological aspects of every bead from Barikot on an individual basis, but the most notable specimens are examined in the forthcoming discussions. The site code and a progressive numbering system (inventory or serial number) are used to identify the beads from Barikot but so are the areas, rooms and trenches of the site, which is why it is important to provide some clarification: With regards to trench 4, for example, the rooms and areas revealed were identified with the system of progressive numbering from 1 to 99 preceded initially by the number 4 to indicate that they belong to trench BKG 4 and, subsequently, when this series was exhausted, by the number 5. The stratigraphic units (SU) identified according to the Harris system were also given progressive numbering (Callieri et al. 1992: 5). The numbering system of the beads is based upon the order of their documentation among the finds, which is not relevant to our discussions in this

thesis. I have tried to make references to a bead or beads in clear terms in the discussions of this thesis in order to try to differentiate them from the numbering system of areas, room or trenches of the site. Fortunately, the examination of the archaeological contexts of Barikot does not form a major component of our study in this thesis, which is why wherever the site code and numbering system is used in our discussions, it usually refers to beads unless otherwise indicated.

As outlined in Chapter 4, to enable calibration of the bead frequency per period, this thesis discusses calculations of the volume of earth/soil excavated as well as the variable of 'time' (number of years within a specific time period). The results and information of these calculations are provided in summary tables below (tables 3-4), which will then be cross-referenced in the subsequent discussions. The discussion on the bead frequency per period in terms of soil volume are also carried out according to a phase-by-phase review while the discussion on the calculation of the relative length of each period is presented in section 6.3.

Macrophase	Volume of excavated earth (m^3)	Total number of beads (n)	Bead frequency (m^{-3})	Trench
1 + 1c/2a1	36.77	11	0.29	BKG 11 K-105
2a1	15.17	17	1.12	BKG 11 K-105
2a2	11.47	84	7.32	BKG 11 K-105
2b	4.29	51	11.88	BKG 11 K-105
3a1	20.27	27	1.33	BKG 11 K-105
3a2-3a4	18.79	44	2.34	BKG 11 K-105
3b	7.25	26	3.58	BKG 11 K-105
4a	23.97	31	1.29	BKG 11 K-105
4b	-	0	0	BKG 11 K-105
5a	-	0	0	BKG 11 K-105
5a	19.17	4	0.20	BKG 11 K-107
5b	18.50	2	0.11	BKG 11 K-105
5b	27.45	4	0.14	BKG 11 K-107

Table 3: The calibrated bead frequencies by soil volume from the trenches BKG 11 K-105 and K-107

Time period	Years	Total number of beads (n)	Bead frequency (m^{-3})	Beads per unit time (yr^{-1})	Trench
1 + 1c/2a1	700	11	0.29	0.022	BKG 11 K-105
2a1	100	17	1.12	0.17	BKG 11 K-105
2a2	150	84	7.32	0.56	BKG 11 K-105
2b	70	51	11.88	0.72	BKG 11 K-105
3a1	70	27	1.33	0.38	BKG 11 K-105
3a2-3a4	120	44	2.34	0.36	BKG 11 K-105
3b	130	26	3.58	0.20	BKG 11 K-105
4a	40	31	1.29	0.77	BKG 11 K-105
4b	80	0	0	0	BKG 11 K-105
5a	50	0	0	0	BKG 11 K-105
5a	50	4	0.20	0.08	BKG 11 K-107
5b	50	2	0.11	0.04	BKG 11 K-105
5b	50	4	0.14	0.08	BKG 11 K-107

Table 4: Variable of 'time' with the calibrated bead frequencies from the trenches BKG 11 K-105 and K-107

6.1 Results and Discussion

6.1.1 Protohistoric period (Macrophase 1a-c: 1300– 800 BCE)

The types of raw material that characterise the bead assemblage from Macrophase 1 include steatite, terracotta, carnelian, chloritic rock, marine shell, glass and faience. One unidentified raw material is also noted (Figure 42).

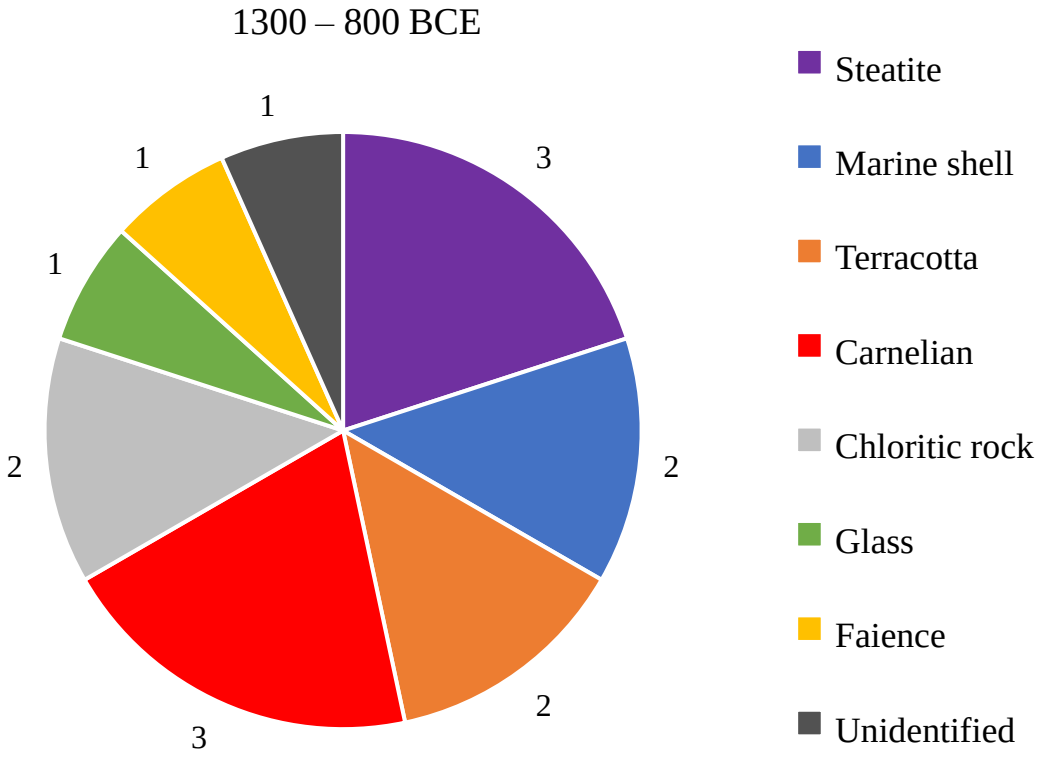


Figure 42: Raw materials of beads from the protohistoric period of Barikot (N=15)

A range of bead shapes is represented in the assemblage from Macrophase 1 including barrel forms followed by disc-shaped, biconical, conical, rectangular conical with a concave end, rectangular biconical, rectangular circular and lobe-shaped forms. Two additional beads were found, but the identification of their forms is not possible as the specimens are broken (Figure 43). A total of 15 beads were recovered from the trenches BKG 11 K-105 and BKG 12, corrsponding to the protohistoric period of Barikot (Table 5).

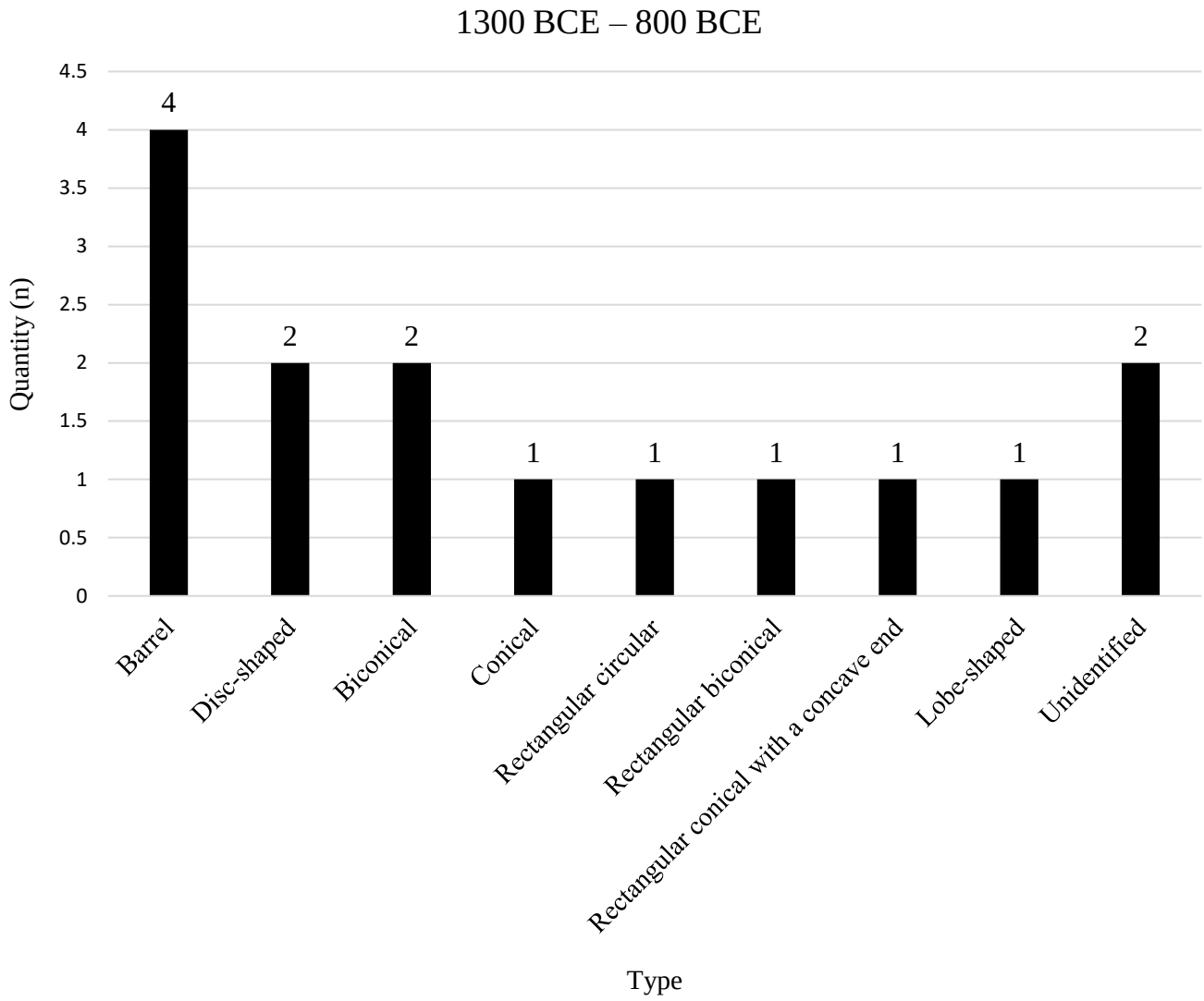


Figure 43: Bead shapes from the protohistoric period of Barikot (N=15)

Material	Type									
	Barrel	***Disc-shaped***	***Biconical***	***Conical***	***Rectangular circular***	***Rectangular biconical***	***Rectangular conical with a concave end***	***Lobe-shaped***	***Unidentified***	***Total***
Steatite	1 (6.66%)					1 (6.66%)		1 (6.66%)		3 (20%)
Marine shell		1 (6.66%)					1 (6.66%)			2 (13.33%)
Terracotta			1 (6.66%)						1 (6.66%)	2 (13.33%)
Carnelian	1 (6.66%)		1 (6.66%)		1 (6.66%)					3 (20%)
Chloritic rock	1 (6.66%)			1 (6.66%)						2 (13.33%)
Glass	1 (6.66%)									1 (6.66%)
Faience		1 (6.66%)								1 (6.66%)
Unidentified									1 (6.66%)	1 (6.66%)
Total	4 (26.66%)	2 (13.33%)	2 (13.33%)	1 (6.66%)	1 (6.66%)	1 (6.66%)	1 (6.66%)	1 (6.66%)	2 (13.33%)	**15 (100%)**

Table 5: Numbers and percentage of bead materials and shapes during the protohistoric period of Barikot

The scarcity of beads from both funerary and non-funerary protohistoric contexts is quite unusual (Müller-Karpe 2009: 226; Rabbani 2018-2019; Vidale 2016: 1). A similar trend also appears to have characterised the protohistoric period of Barikot, which may potentially suggest that there were comparatively few beads in circulation at the site during this time. The results on the calibrated bead frequency from trench BKG 11 K-105, in fact, seem to support this interpretation. For every cubic metre of earth excavated, 0.29 beads were found in Macrophase 1 and 1c/2a1. Although the volume of excavated earth of Macrophase 1 and 1c/2a1 is quite large (36.77m^3), the bead frequency is very small. The calculations, thus, appear to suggest that the total number of beads circulating at Barikot was probably lower during this time compared to the succeeding chronological periods (see Table 3).

Since the number of beads recovered from protohistoric Barikot is currently low, it is not possible to detect detailed patterns in terms of determining the precise role played by beads during this time, although some general inferences can be made. The bead typology of Macrophase 1 is currently characterised by eight bead forms: Only a single short biconical bead made from terracotta (Figure 44b) was retrieved from Macrophase 1a, which become quite popular during the later chronological periods of Barikot. The beads from the succeeding Macrophase 1b of Barikot are made from various types of raw materials and occur in several different shapes including a long biconical carnelian bead, a short conical and a long barrel bead made from chloritic rock (Figure 44a and f). In addition, three steatite beads have been found - one made in a short barrel shape (Figure 44e) while the second bead has been manufactured in the shape of four lobes (Figure 47). The third bead is a rectangular biconical bead of fired steatite that has been engraved with double concentric circles and a central dot (Figure 46).

Similarly, the succeeding Macrophase 1c reveals additional new types of beads including a long barrel-shaped bleached carnelian bead, a rectangular circular carnelian bead as well as two disc-shaped beads made from faience and marine shell (Figure 44c and d). A rectangular conical bead with a concave end produced from marine shell was also found. Further studies are needed to determine the precise locations from which the raw materials could have been acquired, but based on preliminary observations, it is likely that terracotta and chloritic rock were the only materials that were accessed from local sources.

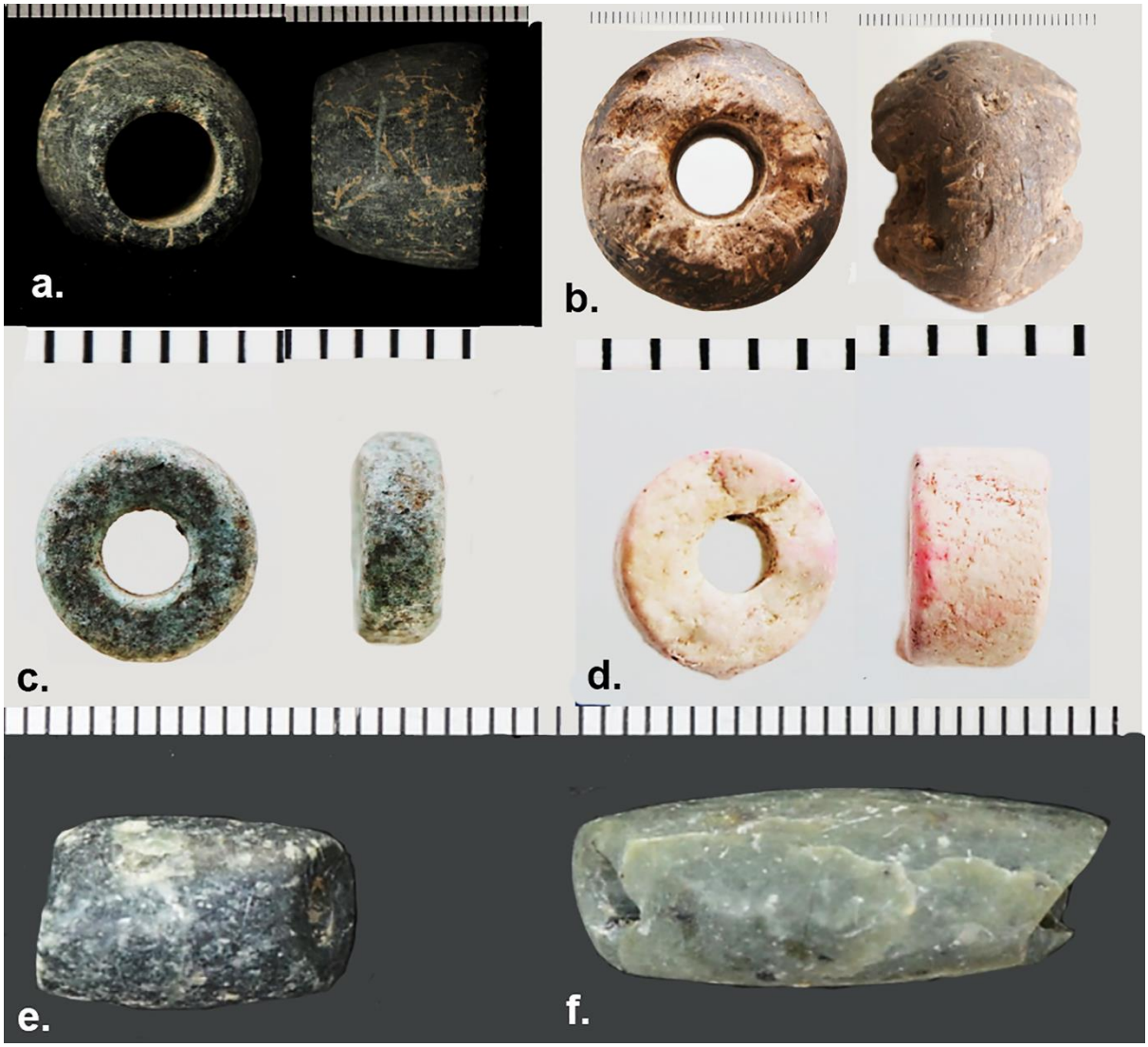


Figure 44: a) Conical bead of chloritic rock (BKG 2733) (Photograph: IsMEO Italian Archaeological Mission in Pakistan) b) Short biconical terracotta bead (BKG 3920) (Photograph: author's own) c) Disc-shaped faience bead (BKG 3974) (Photograph: author's own) d) Disc-shaped marine shell bead (BKG 3977) (Photograph: author's own) e) Long barrel bead of steatite (BKG 3016) (Photograph: IsMEO Italian Archaeological Mission in Pakistan) f) Long barrel bead of chloritic rock (BKG 3016) (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

The importance of bead ornaments in the society of this time may be reflected by a series of distinct terracotta figurines that have punctate decorations possibly depicting beaded necklaces over the breast and shoulders (Müller-Karpe 2009: 228; Stacul 1987: 111; Vidale and Olivieri 2005: 460), which are also found from protohistoric Barikot (Figure 45). Female figurines with punctate decorations could indicate, although not exclusively, the association of beads with the female sphere of life (Figure 48).



Figure 45: Female figurine with dotted and incised pattern from Barikot, possibly representing beads (BKG 1521) (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

An association of beads with female groups is, in fact, well-documented through the recovery of various ornaments including stones beads found in female burials of protohistoric Swat (Müller-Karpe 2009: 228). A single cubic steatite bead, for example, has been found placed near the wrist of a female individual from the protohistoric site of Udegram, Swat (Vidale et al. 2016: 113, 115). In fact, it appears that steatite as a material endowed some significance during Macrophase 1. A fired steatite bead, rectangular biconical in shape (BKG 2719), has been discovered from Macrophase 1b of Barikot (Figure 49), having double concentric circles with a central dot engraved on either side of the bead. The distinctive circle and dot motif have a long tradition in South Asia being found on fired steatite seals from several Indus sites (Kenoyer 2009: 12, 22; Parpola 2013: 40-41). Fired steatite beads were primarily produced in the form of disc beads that range in size from very small microbeads to large discs (Kenoyer 2005: 163). The maker of BKG 2719 was probably aware of this ancient tradition, choosing to stay faithful to the original idea as far as the material and motif are concerned.

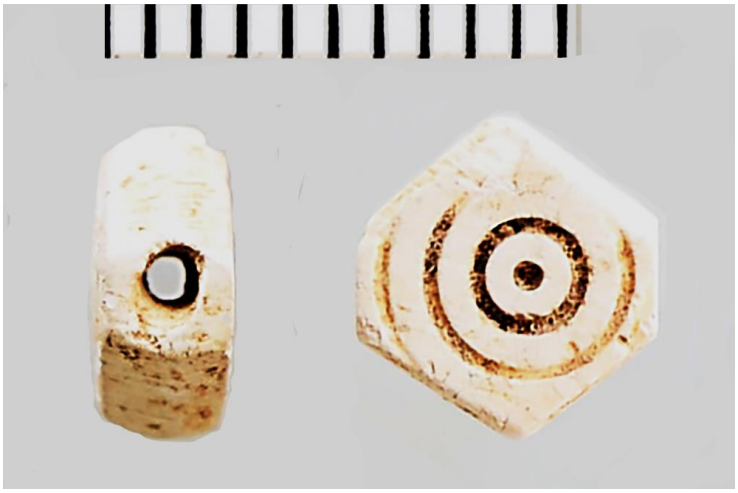


Figure 46: Fired steatite bead with concentric circles and dot motif (BKG 2719) (Photograph: author's own)

Another bead produced is a dark-green bead made from steatite with two lobes preserved (BKG 3869: Figure 47). It is likely that the complete bead had four lobes or petals and this shape is similar to certain Bronze Age seals (Kenoyer 2009; Parpola 2013: 40-41). Both specimens (BKG 2719 and BKG 3869) could have been used to stamp clay and may have been used as seals similar to button seals found during the earlier Indus period (Parpola 2013: 40-41). Steatite sources can be found in the nearby regions of Shangla (64 km east) and Hazara (85 km east) (Law 2011), but there are no occurrences in close proximity to Barikot, so this material is not available locally.



Figure 47: Steatite bead broken with two lobes preserved, drilled from two sides (BKG 3869) (Photograph: author's own)

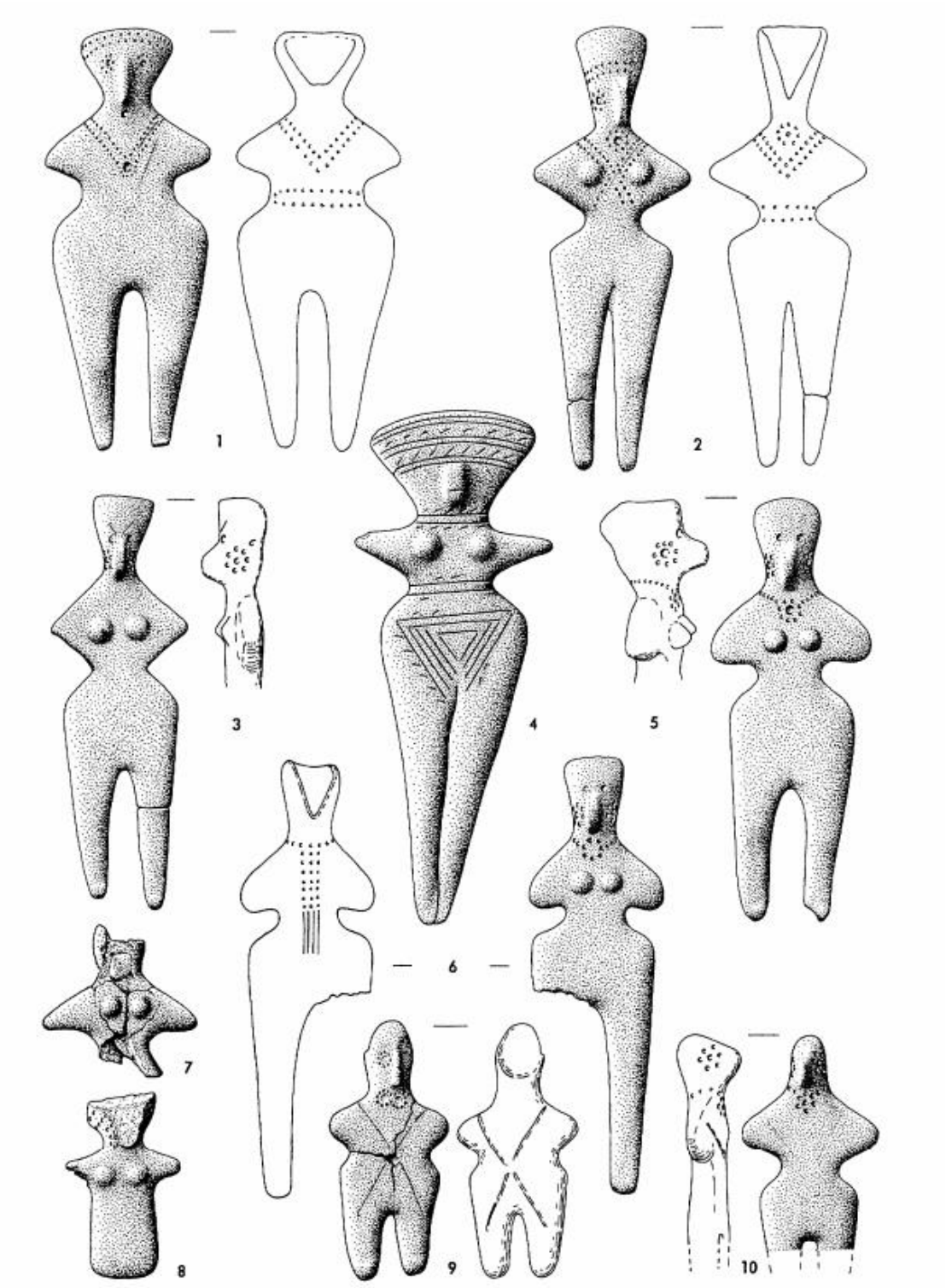


Figure 48: Ten terracotta figurines from protohistoric Swat possibly adorned with bead ornaments (Müller-Karpe 1983: Pl. 36; Vidale and Olivieri 2005: Figure 12)

Another noteworthy example is found in the shell repertoire in the form of a rectangular conical bead with a concave end produced from marine shell (BKG 3945: Figure 49) that has been drilled from two sides as indicated by the SEM data on the interior drilling. The marine shell would have been acquired from the coastal regions that are some 1200 km to the south (Kenoyer 1983) and, therefore, represents a material acquired through long-distance interactions.



Figure 49: Rectangular conical bead with a concave end of marine shell (BKG 3945) (Photograph: author's own)

The earliest evidence for glass at Barikot comes in the form of a single, broken, short barrel-shaped bead from Macrophase 1c. It is, however, only in the pre-Achaemenid period of Barikot (Macrophase 2a1) that the number of glass and faience beads increases as the forthcoming discussions will show. Most beads of vitreous material that derive from Macrophase 2a1 are typologically similar to the glass and faience beads from Macrophase 1c. According to Beck, there is reportedly no evidence for the production and use of any glass at Taxila before 7 - 6th century BCE (Beck 1941: 21). It should be noted, however, that the glass beads that were found at Taxila have not been precisely defined in the excavation reports by Marshall, making it difficult to detect potential stylistic similarities or differences between the glass beads from Barikot and the various sites in the Taxila Valley. Glass and faience could have been produced locally from sands but so far there is no conclusive evidence for their production at Barikot and, therefore, they may have been traded in finished form.

The study of the carnelian beads found at Barikot and other sites in Swat has also revealed new insight into the prevailing typological trends in semi-precious stone beads during the protohistoric period. The sourcing of the carnelian still needs to be done, but they appear to have been made with raw material that derives from multiple source areas. The carnelian could have come from either Iran over 1200 km

to the west or Gujarat some 1200 km to the southeast (Law 2011). The use-wear analysis of several carnelian beads from Macrophase 1 indicates that they played an important part in the lives of the people who used them. A long biconical carnelian bead from Macrophase 1b (BKG 2564: Figure 50) shows traces of having been reground and curated for a long period of time (Kenoyer, personal communication).



Figure 50: Long biconical carnelian bead from Barikot (BKG 2564) (Photograph: author's own)

The examination of a long barrel-shaped bead recovered from the graveyard of Katelai 1 (KI-254), a long barrel-shaped bead from the graveyard of Loebanr (LI-637) and a short biconical bead from the Kalako-dherai settlement (KL 467) (Figure 51a-c) has, likewise, revealed evidence that the recovered specimens were reground and curated for a long period of time (Kenoyer, personal communication).

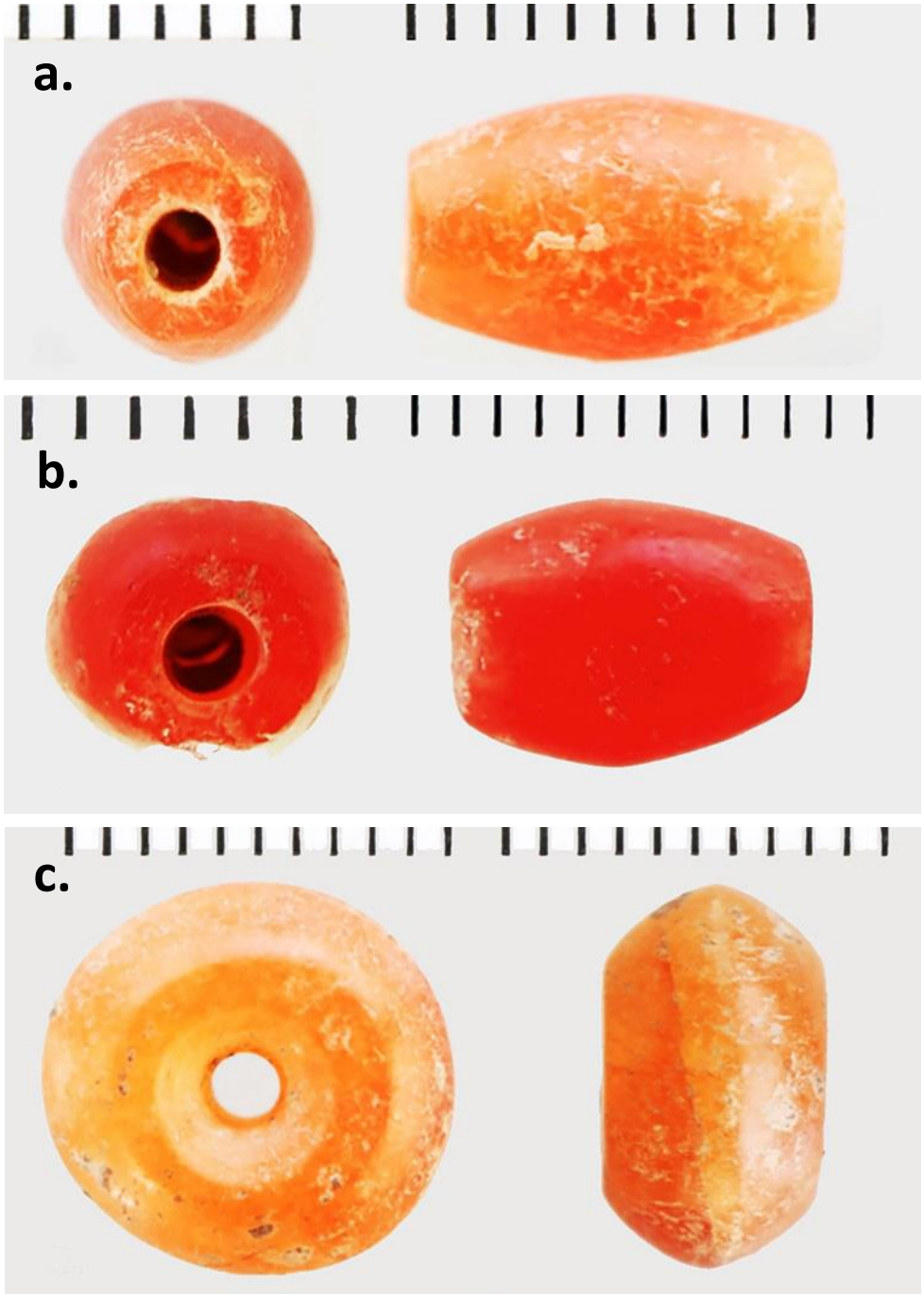


Figure 51: a) Long barrel-shaped carnelian bead, Katelai (KI-254) b) Long barrel-shaped carnelian bead, Loebanr (LI-637) c) Short biconical carnelian bead, Kalako-dherai (KL 467) (Photographs: author's own)

There is also evidence of wear on the interior drill holes of the carnelian beads from Swat (see Chapter 7). The degree of wear, curation and repair of cultural artefacts can serve as an excellent indicator of the value attached to them in the past (Miller 2008: 147). Therefore, as far as the carnelian beads are concerned, it is possible that they were passed on as heirlooms to the next generation, progressively

becoming enriched with memories of ancestors in the process – a cultural tradition supported by the several re-uses of the graves. The uniformity in the use-wear of several carnelian beads also suggests that there were probably connections among the inhabitants of Swat. It is likely that the raw material, shape, and colour played a role in the selection of the carnelian, which appear different from the carnelian beads produced in the later chronological periods of Barikot. A more detailed analysis of the beads coming from the funerary contexts is currently difficult to carry out because the graves underwent many episodes of re-use at different times.

Moreover, as already stated in Chapter 2, none of the graves is radiocarbon-dated, although their chronology certainly falls between 1000 – 800 BCE (Narasimhan et al. 2019: 138). As a result, additional discussion on aspects related to raw materials, shapes, colours, and change cannot be carried out at present. With regards to the carnelian beads from the late protohistoric period of Barikot (Macrophase 1c), we see evidence for variation in shape and style as indicated by the discovery of a rectangular circular carnelian bead (BKG 3976: Figure 52).

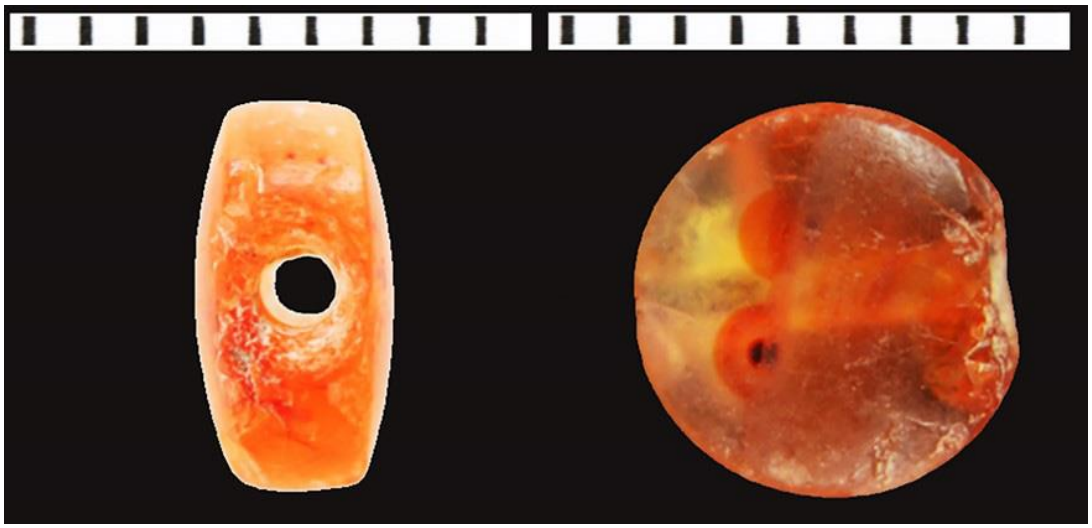


Figure 52: Rectangular circular carnelian bead, Barikot (BKG 3976) (Photograph: author's own)

Another important discovery is a long barrel shaped carnelian bead that has a blackened 'bleached' band across the centre (BKG 3978) (Figure 53). This band is actually the remains of a bleached line that would have originally been white (Kenoyer 2017a). The bead itself was probably originally red-orange carnelian but it has been blackened and carbonised by fire. One edge is partly whitened, and this evidence too is characteristic of some burned carnelian beads (Kenoyer, personal communication; see Chapter 3).



Figure 53: Long barrel-shaped bead, with bleached line in the middle, blackened carnelian (BKG 3978) (Photograph: author's own)

It appears that while long-distance products and semi-precious stone beads were important to the people of protohistoric Barikot and Swat, they may have not been commonly available. It is possible that since Swat is a relatively isolated mountainous region, long-distance products including semi-precious stones did not reach this region in sufficient amounts. Also, it may be possible that some of the beads were made from perishable materials, which may explain their apparent scarcity in the archaeological record. In fact, recent research indicates the inclusion of perishable items of wood, wickerwork and cloth in the grave goods, which lends support to this argument (Vidale and Micheli 2017: 403). It is, however, clear that not only were locally available materials such as chloritic rock acquired, but long-distance materials were equally important in the lives of the protohistoric communities at Barikot and Swat. It appears that the physical characteristics and external features of the beads were considered by the people of the protohistoric period, but their precise cultural significance remains currently debatable.

If beads were considered quite valuable by their owners during this time, few ornaments may have become lost and become part of the archaeological record. A potential scarcity in the number of beads could be, alternatively, related simply to the fact that the excavations just missed the areas where beads were discarded rather than reflecting a low bead frequency at the site. Therefore, there is a need to increase the sample size of the beads from Macrophase 1 to gain a more representative insight into the typological developments that were occurring during the protohistoric period. The discussions made above have, nevertheless, demonstrated that it would be incorrect to assume that beads formed only a minor role in the lives of the protohistoric people of Barikot and Swat.

6.1.2 Pre-Achaemenid period (Macrophase 2a1: 6th BCE – 5th century BCE)

The types of raw material that characterise the bead assemblage from Macrophase 2a1 include glass, followed by faience and dentalium shell. A single unidentified material is also noted (Figure 54).

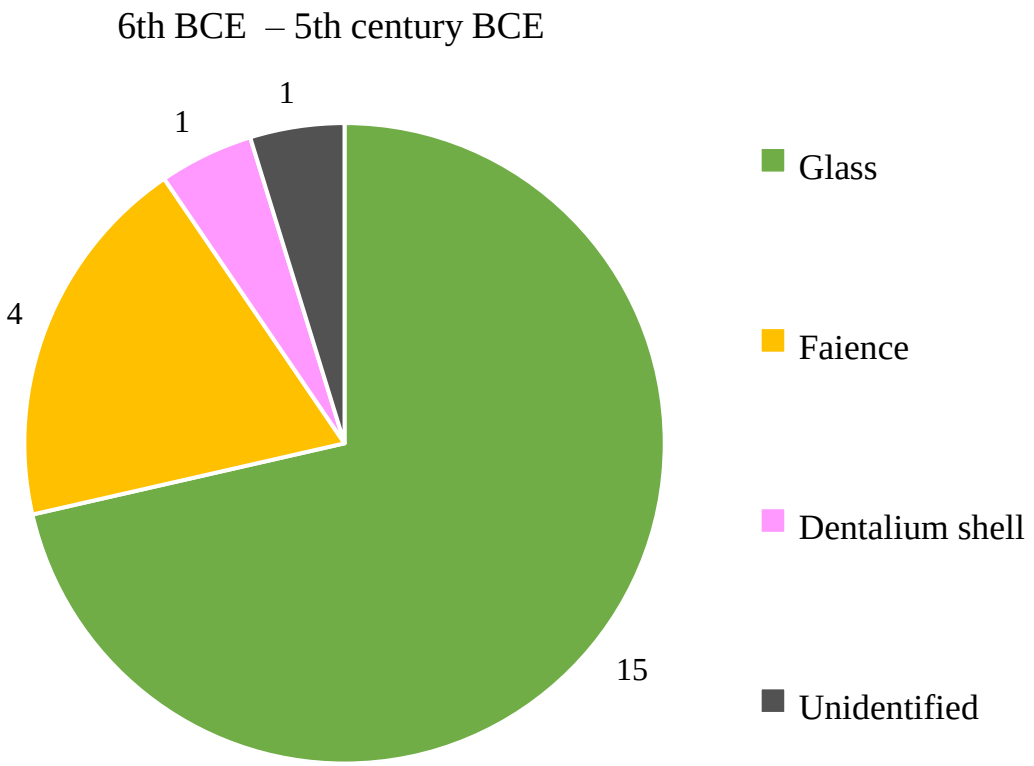


Figure 54: Raw materials of beads from the pre-Achaemenid period of Barikot (N=21)

The range of bead shapes identified from Macrophase 2a1 include barrel forms followed by disc-haped, cylindrical, biconical, pear-shaped and biconical/pear-shaped forms. The identification of three additional beads was not possible as the specimen are broken (Figure 55). A total of 21 beads were recovered from trench BKG 11 K-105 only since the excavations have not reached the same levels in the other trenches of the site yet (Table 6).

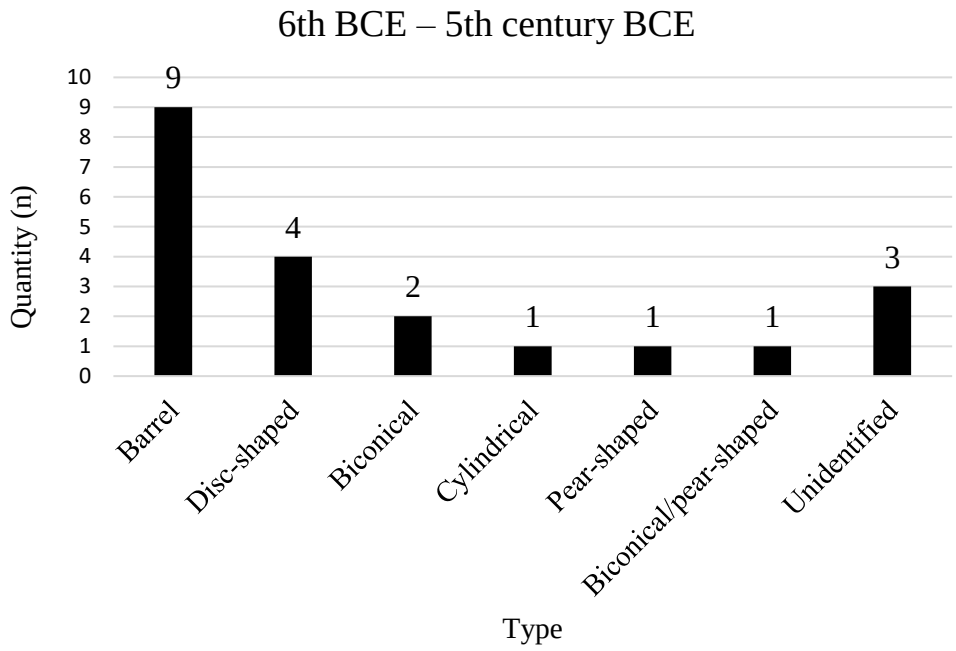


Figure 55: Bead shapes from the pre-Achaemenid period of Barikot (N=21)

	Type							
	Barrel	***Disc-shaped***	***Pear-shaped***	***Cylindrical***	***Biconical***	***Biconical/Pear-shaped***	***Unidentified***	***Total***
Glass	9 (42.86%)		1 (4.76%)		2 (9.52%)	1 (4.76%)	2 (9.52%)	15 (71.43%)
Faience		4 (19.05%)						4 (19.05%)
Dentalium shell				1 (4.76%)				1 (4.76%)
Unidentified							1 (4.76%)	1 (4.76%)
Total	9 (42.86%)	4 (19.05%)	2 (9.52%)	1 (4.76%)	1 (4.76%)	1 (4.76%)	3 (14.29%)	**21 (100%)**

Material

Table 6: Numbers and percentage of bead materials and shapes during the pre-Achaemenid period of Barikot

These beads correspond to the pre-Achaemenid period of Barikot, which is dated between the 6th BCE – 5th century BCE. Based on figure 54, it is clear that with the exception of a single bead made from dentalium shell, the entire assemblage is produced from vitreous material in the form of glass followed by faience. The earliest confirmed archaeological evidence for the arrival of glass at Barikot comes in the form of a single glass bead from the late protohistoric period (Macrophase 1c), although the use of glass and faience is well-documented in the earlier periods of Swat (Stacul 1987). A barrel-shaped glass bead (KI-280), for example, was found from the protohistoric graveyard of Katelai 1 (Swat), which was produced through the wound technique (Figure 56). Stacul reported the presence of 'paste' or 'faience' beads at Barikot, dating between 1700 – 1400 BCE or Stacul's Ghalegai sequence IV (Stacul 1987: 101), but this evidence awaits verification.

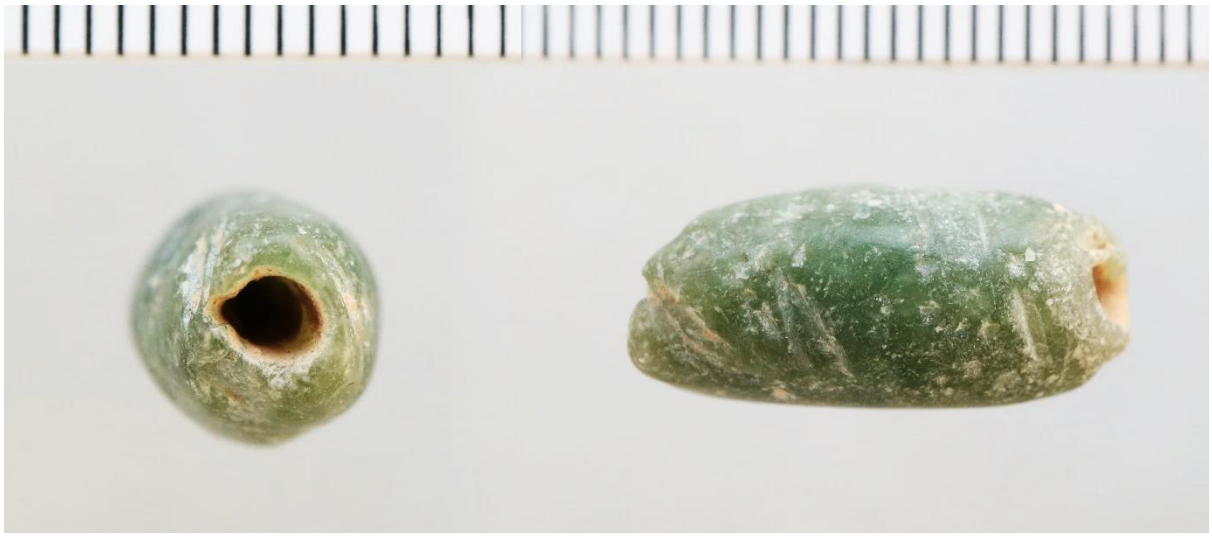


Figure 56: A long barrel-shaped glass bead from the graveyard of Katelai 1 (KI-280) (Photograph: author's own)

It is in Macrophase 2a1 that the number of glass and faience beads appears to increase at Barikot, which may possibly reflect a growing demand for ornaments made from vitreous material (Figure 57). The data on the calibrated bead frequency from trench BKG 11 K-105 suggests that the number of bead ornaments circulating at Barikot was most probably higher during Macrophase 2a1 compared to Macrophase 1 and 1c/2a1. For every cubic metre of earth excavated, 1.12 beads were found in Macrophase 2a1. In comparison, only 0.29 beads were found in the preceding Macrophase 1 and 1c/2a1 for every cubic metre of earth excavated. Although the volume of excavated earth of Macrophase 1 and 1c/2a1 is quite large (36.77m^3), the bead frequency is smaller compared to Macrophase 2a1, which has a much smaller volume of excavated earth (15.17m^3). These results indicate that the number of beads circulating at Barikot was most probably higher in Macrophase 2a1 as opposed to the earlier Macrophase 1 and 1c/2a1 (Table 3).

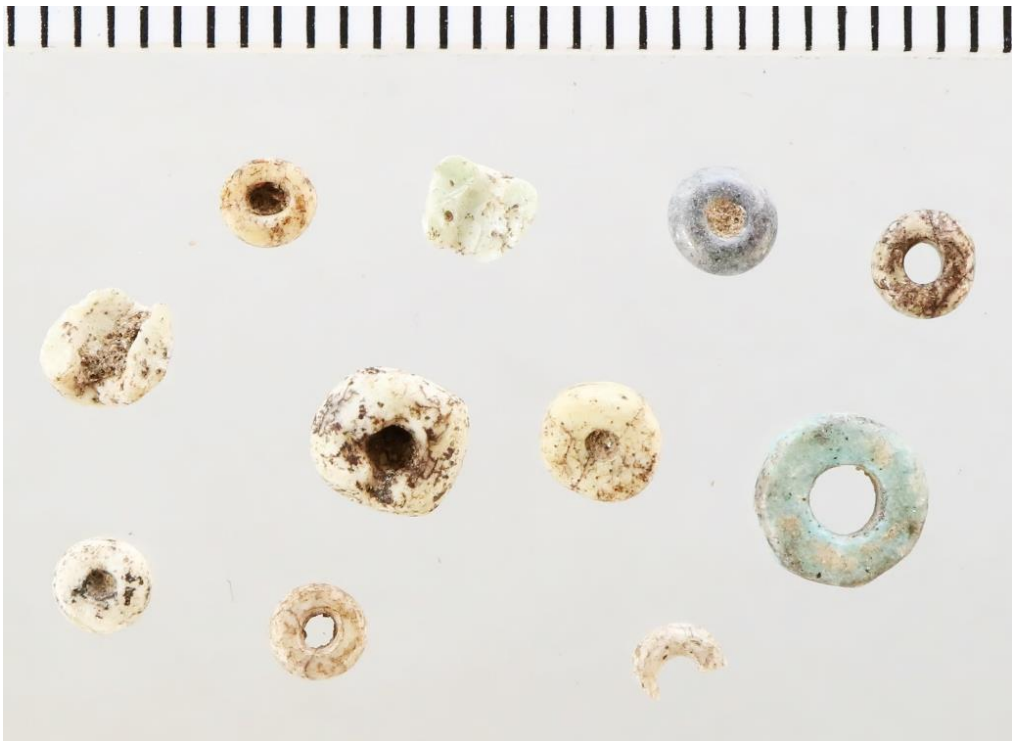


Figure 57: Short barrel-shaped glass beads and a single disc-shaped faience bead (BKG 3929) (Photograph: author's own)

The archaeological evidence indicates that Barikot was transformed into an urban walled site in Macrophase 2a1, possibly reflecting a period of economic growth, craft specialisation, and increased social stratification. Such conditions may have encouraged the development of new craft technologies and an expansion in existing traditions that would have included the production of bead ornaments. As opposed to faience, the production of glass suggests that it was produced independently from the former since glass has to be worked when still hot, requiring a completely different layout of the workplace and technology (Nightingale 2008: 91). The recovery of typologically similar beads made from vitreous material at Barikot indicates the existence of skilled or specialised bead makers who produced them. The importance of vitreous material may also be reflected by the fact that no other raw material has been identified within the assemblage of Macrophase 2a1 with the exception of a single dentalium shell bead (Figure 58). It should be noted, however, that trench BKG 11 K-105 is currently the only excavated trench that has reached the levels coeval with Macrophase 2a1, so it is difficult to comment on the complete range of raw materials of this time at present.

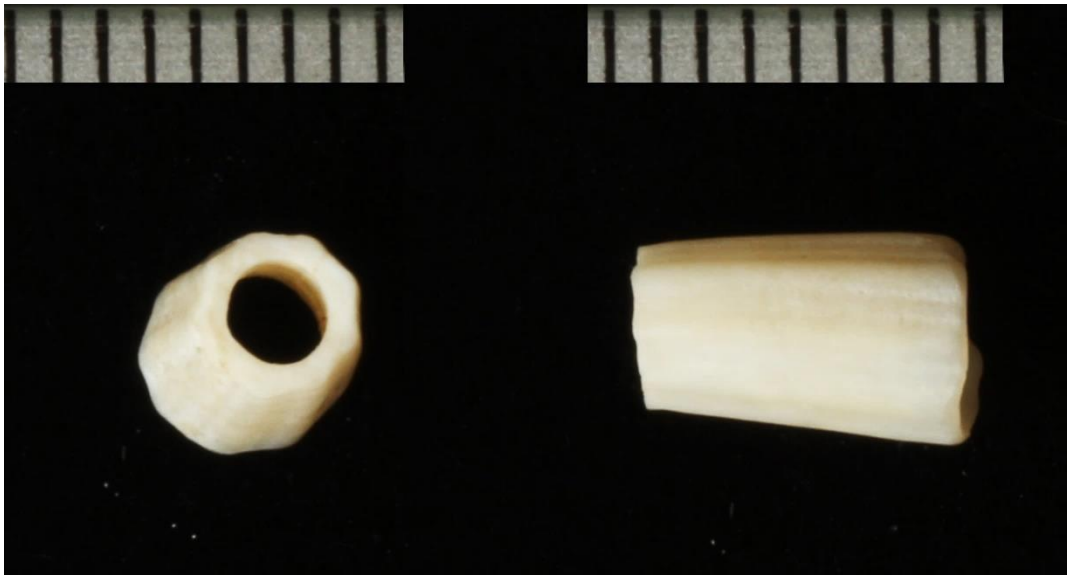


Figure 58: Dentalium shell bead (BKG 4026) (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

Dentalium shell, as a raw material, seems to mark its first appearance at Barikot during Macrophase 2a1, which indicates a time in which new materials were sought and acquired by the people of Barikot. Just like marine shell, dentalium shell would have been acquired from the coastal regions that are some 1200 km to the south (Gaur et al. 2005: 944; Kenoyer 1983; Micheli 2014: 225; 2020: 246–247). Further, an indigo-blue glass bead has been found (BKG 3893), which clearly stands out within this assemblage (Figure 59). Since the colour of the majority of glass beads from the current assemblage has faded due to post-depositional alterations (Figure 57), further detailed discussions cannot be produced at present.

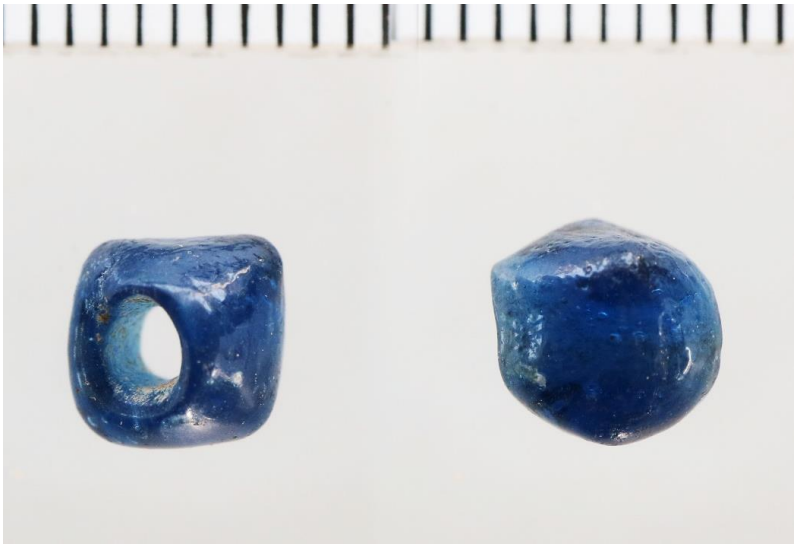


Figure 59: A biconical glass bead with an indigo-blue colour (BKG 3893) (Photograph: author's own)

The majority of the short barrel-shaped glass beads that characterise the bead assemblage from Macrophase 2a1 are, in fact, very fragile and in a highly corroded state, potentially hinting at their common origin and production. The shapes and colours of the four disc-shaped bluish-greenish faience beads are quite consistent, giving the impression that they were formed as part of a standardised process. They may well have been mass-produced as part of a larger group of beads since they are the simplest types of beads to produce. For various chronological and methodological reasons (see Chapters 2-3), very little is known about the organisation and production of vitreous material in ancient Gandhara and northern India, which is why it is currently not possible to carry out cross-comparative discussions between the glass beads of Barikot and other potential sites. Nevertheless, it appears that glass, as a material, achieved a popular status among the people of the pre-Achaemenid period of Barikot (Macrophase 2a1), which developed further in the succeeding periods of the site.

6.1.3 Achaemenid period (Macrophase 2a2: 5th BCE – mid-4th century BCE)

The types of raw material that characterise the bead assemblage from Macrophase 2a2 include glass followed by marine shell, terracotta, carnelian, steatite, lapis lazuli, reworked pottery and lead. A pendant of bone is included in the assemblage as well. Two unidentified materials are also represented (Figure 60).

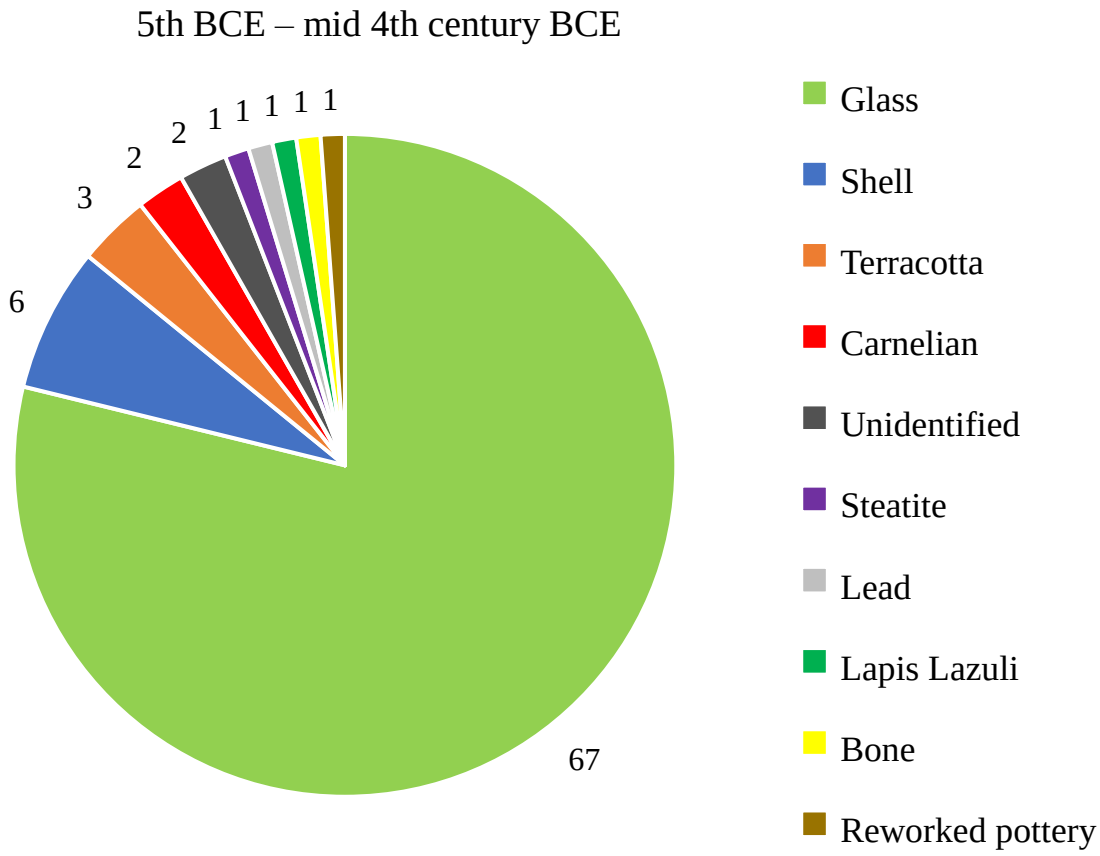


Figure 60: Raw materials of beads from the Achaemenid period of Barikot (N=85)

The range of bead shapes identified from Macrophase 2a2 includes barrel forms followed by biconical, cylindrical, disc-shaped, irregular spherical/globular, lenticular barrel, lenticular rectangular, conical, lenticular-biconical and triangular-barrel forms (Figure 61). A total of 85 beads were recovered from trench BKG 11 K-105 and trench BKG 4S, corresponding to the Achaemenid period of Barikot (Table 7).

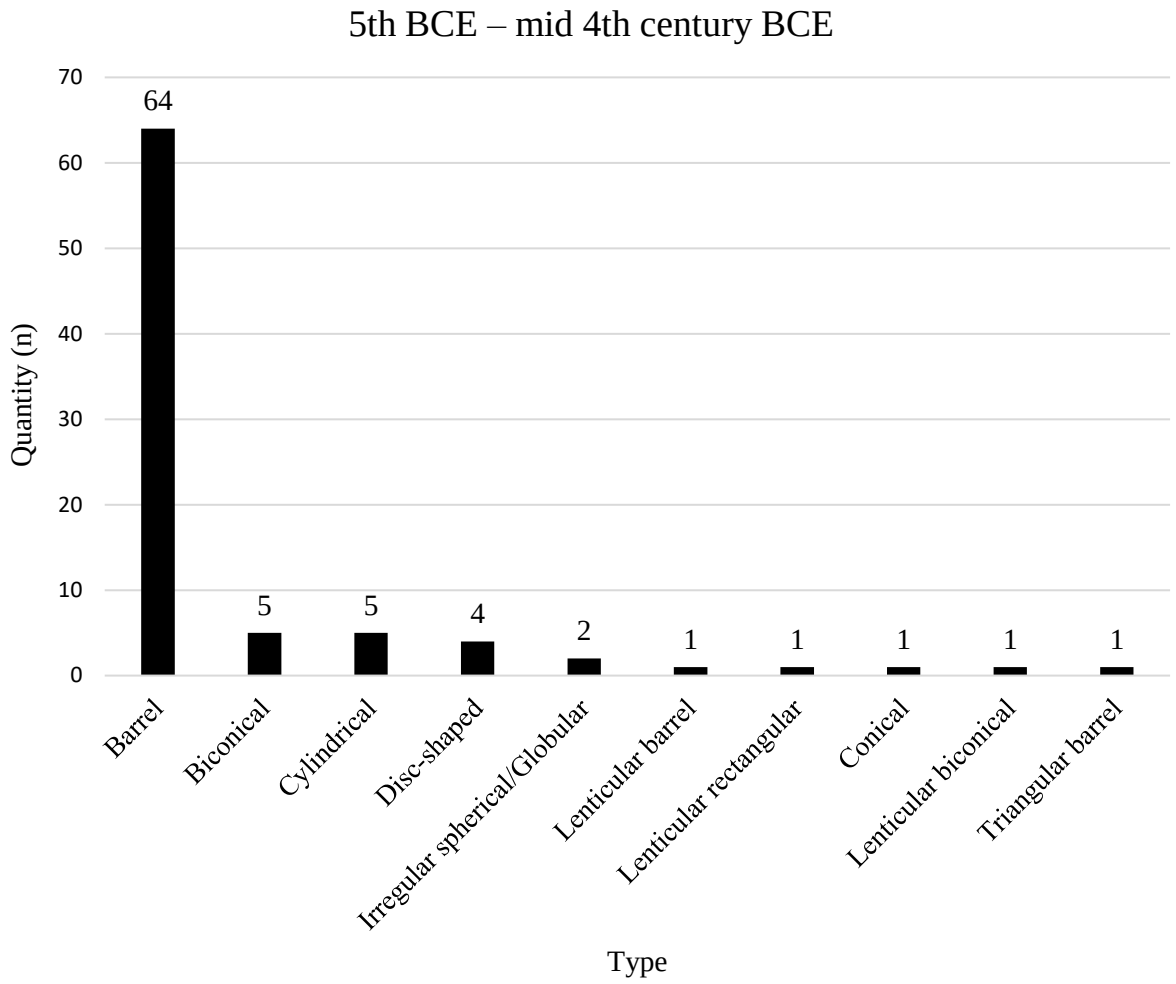


Figure 61: Bead shapes from the Achaemenid period of Barikot (N=85)

Material	Type										
	Barrel	***Biconical***	***Cylindrical***	***Disc-shaped***	***Irregular spherical/ Globular***	***Lenticular barrel***	***Lenticular rectangular***	***Conical***	***Lenticular biconical***	***Triangular barrel***	***Total***
Glass	62 (72.94%)	2 (3.53%)		1 (1.18%)	1 (1.18%)			1 (1.18%)			67 (78.82%)
Shell	2 (2.35%)		1 (1.18%)	1 (1.18%)		1 (1.18%)	1 (1.18%)				6 (7.05%)
Terracotta		2 (2.35%)		1 (1.18%)							3 (3.53%)
Carnelian									1 (1.18%)	1 (1.18%)	2 (2.36%)
Steatite			1 (1.18%)								1 (1.18%)
Lead			1 (1.18%)								1 (1.18%)
Lapis Lazuli			1 (1.18%)								1 (1.18%)
Bone			1 (1.18%)								1 (1.18%)
Reworked pottery				1 (1.18%)							1 (1.18%)
Unidentified		1 (1.18%)			1 (1.18%)						2 (2.36%)
Total	64 (75.29%)	5 (5.88%)	5 (5.88%)	4 (4.72%)	2 (2.36%)	1 (1.18%)	1 (1.18%)	1 (1.18%)	1 (1.18%)	1 (1.18%)	**85 (100%)**

Table 7: Numbers and percentage of bead materials and shapes during the Achaemenid period of Barikot

The number of beads appears to have increased significantly since the previous Macrophase 2a1 based on the sampled deposits of Barikot. This assessment is supported by the calibrated bead frequency from trench BKG 11 K-105. For every cubic metre of earth excavated, 7.32 beads were found in Macrophase 2a2. In comparison, 1.12 beads were found in the preceding Macrophase 2a1 for every cubic metre of earth excavated. Although the volume of excavated earth of Macrophase 2a1 is larger (15.17m^3), the bead frequency is smaller compared to Macrophase 2a2, which has a smaller volume of excavated earth (11.47m^3). This example indicates that the total number of beads circulating at Barikot was most probably higher in Macrophase 2a2 as opposed to the earlier Macrophase 2a1 (Table 3). The interpretation of this data would, therefore, indicate an increase in the demand for bead ornaments among the inhabitants of Barikot during the Achaemenid period (Macrophase 2a2).

Furthermore, the beads from Macrophase 2a2 not only show several continuities with the types of beads deriving from the previous Macrophase 2a1 but are also characterised by the introduction of new stylistic varieties. The most notable feature of this assemblage is represented by the abundance in the number of the short barrel-shaped glass beads whose popularity seems to have significantly increased compared to the previous Macrophase 2a1 (Figure 62). Their recovery indicates that the same craft tradition and mechanism that existed in the previous pre-Achaemenid period (Macrophase 2a1) has endured and potentially expanded in the Achaemenid period (Macrophase 2a2). Their large number may even suggest the mass-production of these ornaments, although it is currently difficult to determine if they were imported from the Achaemenid heartland or produced in their eastern peripheral area somewhere in Gandhara.

The future application of scientific, compositional techniques on the glass beads of Barikot will determine the origin of these ornaments and possibly, by extension, reveal evidence of connections and provide support in the reconstruction of the prevailing trade networks during the Achaemenid period. The application of such techniques may even reveal if the Achaemenids imported glass technologies from parts of Egypt or Syria that are indicated as sources of glaze and glassmaking in cuneiform texts (Ignatiadou 2010; Oppenheim 1967; Wiseman 1966). The Achaemenid period at Barikot (Macrophase 2a2) may, thus, be labelled tentatively as the first major ‘glass bead period’ in the history of the site potentially characterised by large-scale glass working activities by skilled craftspeople at specific workshops.

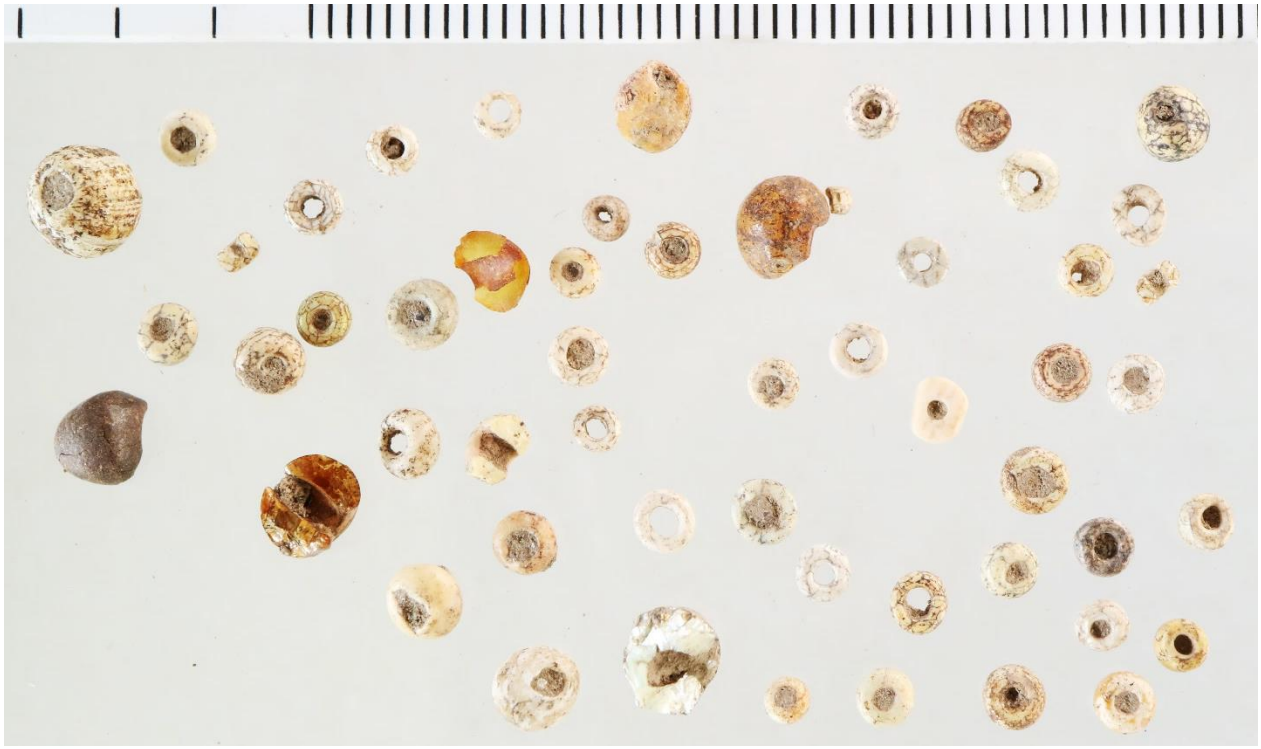


Figure 62: The distinct short barrel-shaped beads of glass (BKG 3905) (Photograph: author's own)

In comparison, glass, as a material, seems to be virtually non-existent during the pre-and Maurya-Shunga periods at the well-excavated site of Sonkh (Period II) (Härtel 1993: 298). This contrasting pattern may potentially suggest a different typological development that was taking place at Sonkh compared to Barikot. In fact, the types of glass beads that have been reported from Sonkh (Period II) include oblique cylinder, hexagonal cylinder and prism hexagonal shapes (Härtel 1993: 299) as opposed to the many short barrel-shaped beads of glass from Barikot. This assessment, however, may need to be revised in the future as the sample size of the beads from Sonkh is currently small and may eventually reveal evidence in agreement with the data from Barikot.

Additional bead raw materials that have been identified from Macrophase 2a2 are carnelian, marine shell, steatite and terracotta, indicating that both local and long-distance materials were favoured by the people of Barikot during the Achaemenid period. In fact, new types of materials appear to have been favoured as evidenced from the recovery of a single, short cylindrical bead made from lapis lazuli (BKG 3922: Figure 63). According to the archaeological data, lapis lazuli, as a material, appears to have been absent in the pre-Achaemenid period at Barikot (Macrophase 2a1: 6th BCE – 5th century BCE), but it may be identified among the beads found in the trial trenches of Barikot (dated to the second millennium BCE).



Figure 63: A short cylindrical bead of lapis lazuli (BKG 3922) (Photograph: author's own)

Lapis lazuli was, as a matter of fact, either absent or under-utilised by the communities of the earlier Indus period compared to other contemporary civilisations of the ancient world including Egypt and Mesopotamia (Hickman 2012: 80; Mackay 1938: 499; Miller 2008: 152). The archaeological evidence indicates that this tradition of under-utilisation remained unchanged during the protohistoric period of Swat and even during the Achaemenid contact phase at Barikot. This phenomenon may simply be related to the low popularity of the material among the different segments of the local population rather than to the inaccessibility of the source, which was located in the Badakhshan province of north-eastern Afghanistan approximately 260 km to the northwest of Barikot (Law 2008: 144). Furthermore, another noteworthy material was identified from the study of the assemblage from Macrophase 2a2 in the form of a bone pendant, which is, however, too small to allow a taxonomic identification (Figure 64).



Figure 64: A pendant made from bone (BKG 3894) (Photograph: author's own)

Other notable beads in the assemblage from Macrophase 2a2 include a biconical bead made from glass (BKG 3862: Figure 65). Beads produced from vitreous material with a biconical shape seem to have not been circulating at Barikot in the earlier chronological periods of the site.



Figure 65: A biconical bead of glass (BKG 3862) (Photograph: author's own)

With regards to carnelian, new types of beads appear at Barikot in Macrophase 2a2 in the form of a lenticular short biconical bead (BKG 3906) as well as a triangular long barrel bead (BKG 3887) as illustrated in figure 66. It is also noteworthy to point out that like BKG 3887, several triangular long barrel shaped beads of carnelian have been found from sites across Gandhara and northern India including Akra in the Bannu Basin (Petrie 2020a: Reg. no. 221), Jandial in Taxila (Beck 1941: VIII.D.1.b.) and Ahichchhatra (Dikshit 1952: Figure 2 no. 50). It is difficult to say if triangular long barrel beads of carnelian already made an appearance in one of the earlier periods as BKG 3887 may possibly represent an heirloom similar to the carnelian beads of the protohistoric period of Barikot.

With the exception of BKG 3887, none of the examples from the other sites can be used as a reliable chronological marker and, hence, it remains difficult to assess the longevity of this important carnelian bead in the cultural history of South Asia. Their widespread distribution does, however, indicate the existence of inter-regional connections as well as the popularity attached to this bead type in different parts of South Asia. Equally important is another find comparable to BKG 3906, which is a lenticular short biconical bead of carnelian found in the excavations from Akra (Petrie 2020a: Reg. no. 251), possibly representing another important feature associated with the ornamental traditions of the Achaemenid period.

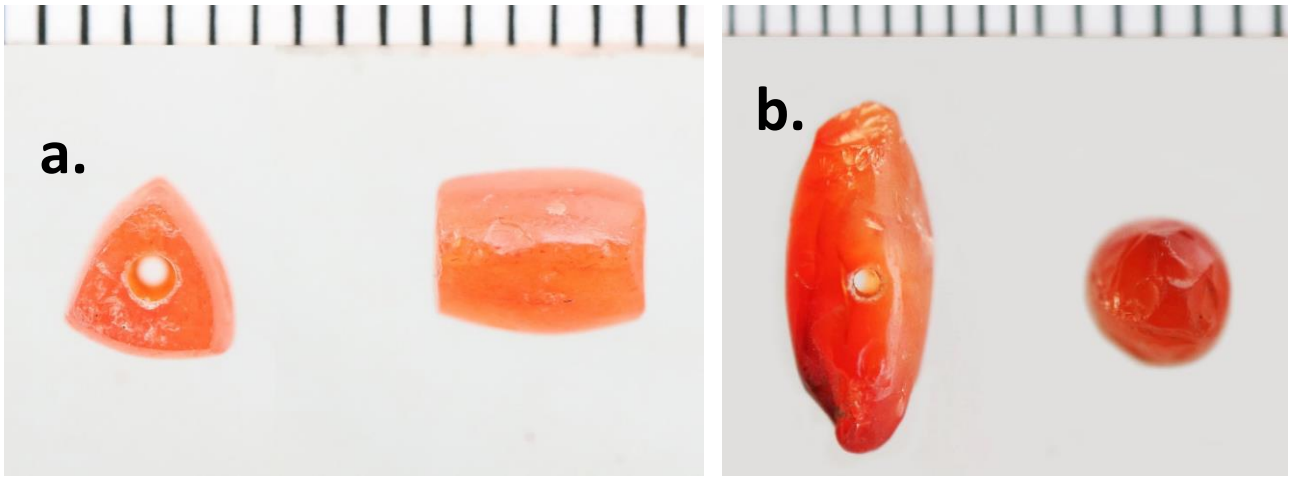


Figure 66: a) A triangular long barrel bead of carnelian (BKG 3887) b) A lenticular short biconical bead of carnelian (BKG 3906) (Photographs: author's own)

Although the number of beads made from marine shell appears to be small in the Achaemenid period, the recovered specimens are represented in the form of two-hole spacer beads. They include, for example, a lenticular barrel-shaped bead (BKG 3845: Figure 67). The recovery of spacer beads indicates the presence of more beads possibly situated along the same string that would have constituted the necklace or any other form of jewellery potentially used to display a greater degree of visibility, which is supported by the great range of colours that characterise the beads from the Achaemenid period of

Barikot. The possibility of more beads circulating at Barikot during the Achaemenid period is, anyhow, supported by the calibrated bead frequency by soil volume calculated for Macrophase 2a2 as already stated above.

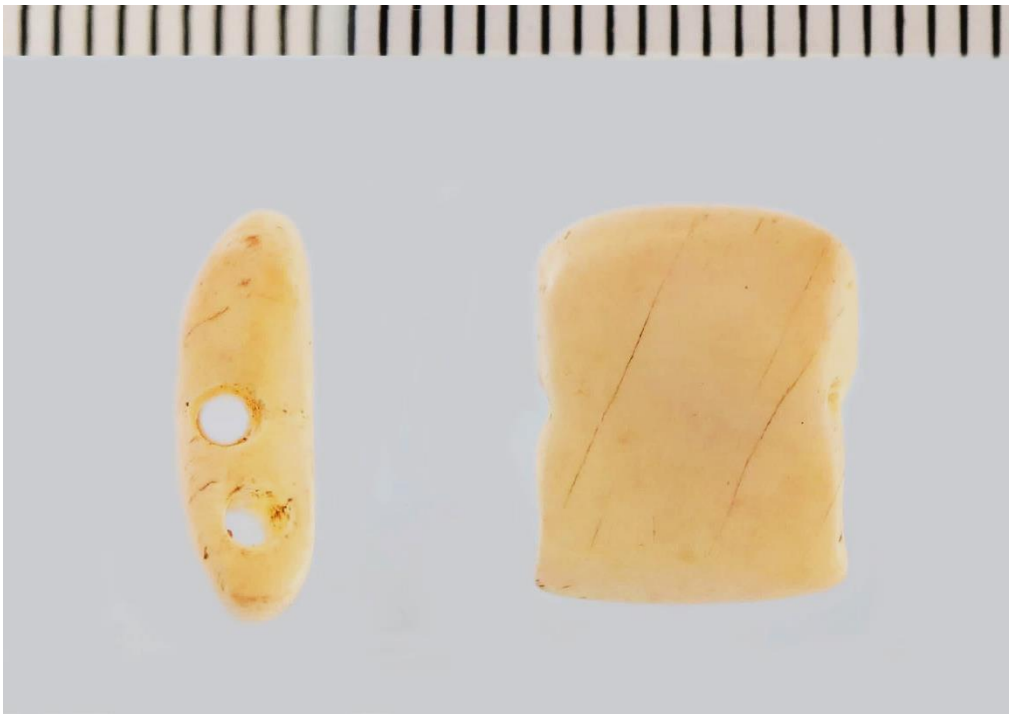


Figure 67: A lenticular barrel-shaped two hole spacer bead bead of marine shell (BKG 3845) (Photograph: author's own)

6.1.4 Mauryan period (Macrophase 2b: End-4th – mid-3rd century BCE)

The types of raw material that characterise the bead assemblage from Macrophase 2b include glass followed by carnelian, steatite, schist stone and terracotta (Figure 68).

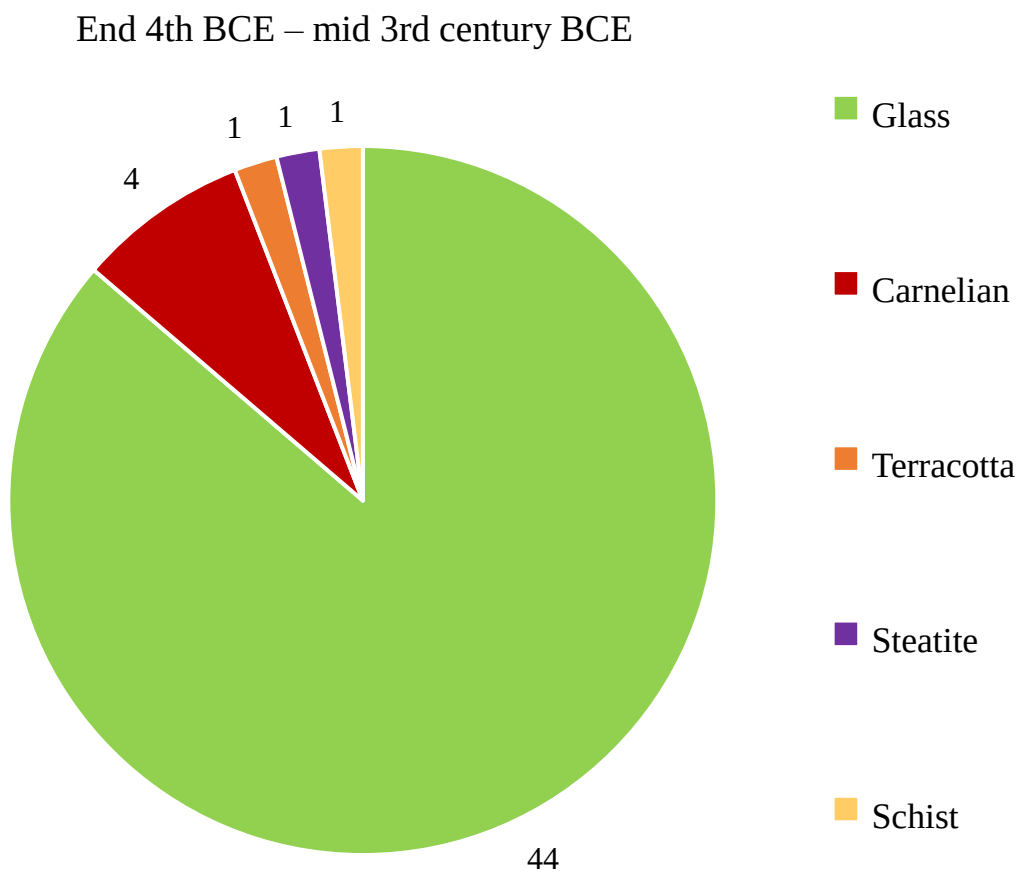


Figure 68: Raw materials from the Mauryan period of Barikot (N=51)

The range of bead shapes identified from Macrophase 2b include mostly barrel forms followed by biconical, spherical, irregular spherical/globular, ovoid, lenticular short biconical and rectangular circular forms (Figure 69). A total of 51 beads were recovered from trench BKG 11 K-105, which correspond to the Mauryan period of Barikot (Table 8).

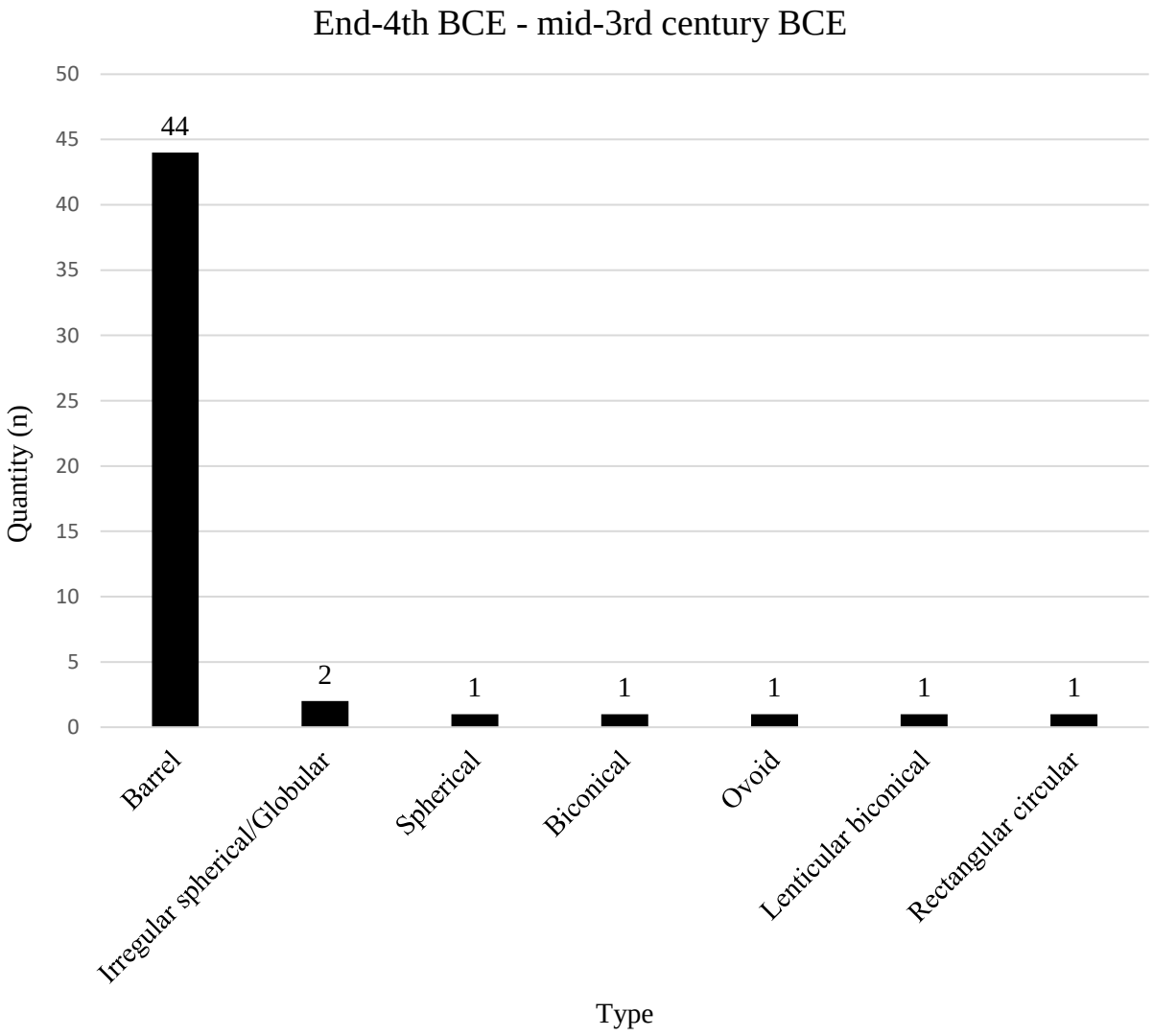


Figure 69: Bead shapes from the Mauryan period of Barikot (N=51)

Material	Type							
	Barrel	***Biconical***	***Spherical***	***Irregular spherical/ Globular***	***Ovoid***	***Lenticular biconical***	***Rectangular circular***	***Total***
Glass	44 (86.27%)							44 (86.27%)
Terracotta		1 (1.96%)						1 (1.96%)
Carnelian			1 (1.96%)		1 (1.96%)	1 (1.96%)	1 (1.96%)	4 (7.84%)
Steatite				1 (1.96%)				1 (1.96%)
Schist				1 (1.96%)				1 (1.96%)
Total	44 (86.27%)	1 (1.96%)	1 (1.96%)	2 (3.92%)	1 (1.96%)	1 (1.96%)	1 (1.96%)	**51 (100%)**

Table 8: Numbers and percentage of bead materials and shapes during the Mauryan period of Barikot

At a first glance, the number of beads appears to have decreased from 85 beads in Macrophase 2a2 to 51 beads in Macrophase 2b based on the current number of recovered finds. Considering the volume of excavated earth from BKG 11 K-105, however, an alternative model of interpretation needs to be formulated. 11.88 beads per cubic metre were found in Macrophase 2b. In comparison, 7.32 beads per cubic metre were found in the preceding Macrophase 2a2. Although the volume of excavated earth of Macrophase 2a2 is larger (11.47m^3), the bead frequency is smaller compared to Macrophase 2b as the latter has a much smaller volume of excavated earth (4.29m^3). This example indicates that the total number of bead ornaments circulating at Barikot was potentially higher in Macrophase 2b as opposed to the earlier Macrophase 2a2 (Table 3). This example, thus, demonstrates that, without considering the volume of excavated earth, the number of recovered beads from the excavations at Barikot may not always reflect an accurate picture of the actual bead frequency at the site at a given time.

Furthermore, Macrophase 2b represents the third cultural period at Barikot in which the distinct short barrel-shaped beads of glass dominate the assemblage (Figure 70), potentially indicating that the manufacture of these distinct types of beads was controlled and maintained by indigenous bead-makers rather than by the Achaemenid ruling elites – the technical knowledge of which may have been passed down through several generations possibly originating in the pre-Achaemenid period (Macrophase 2a1). The production of these distinct glass beads should have, otherwise, ceased when the Achaemenids lost control over Gandhara in Macrophase 2a2.

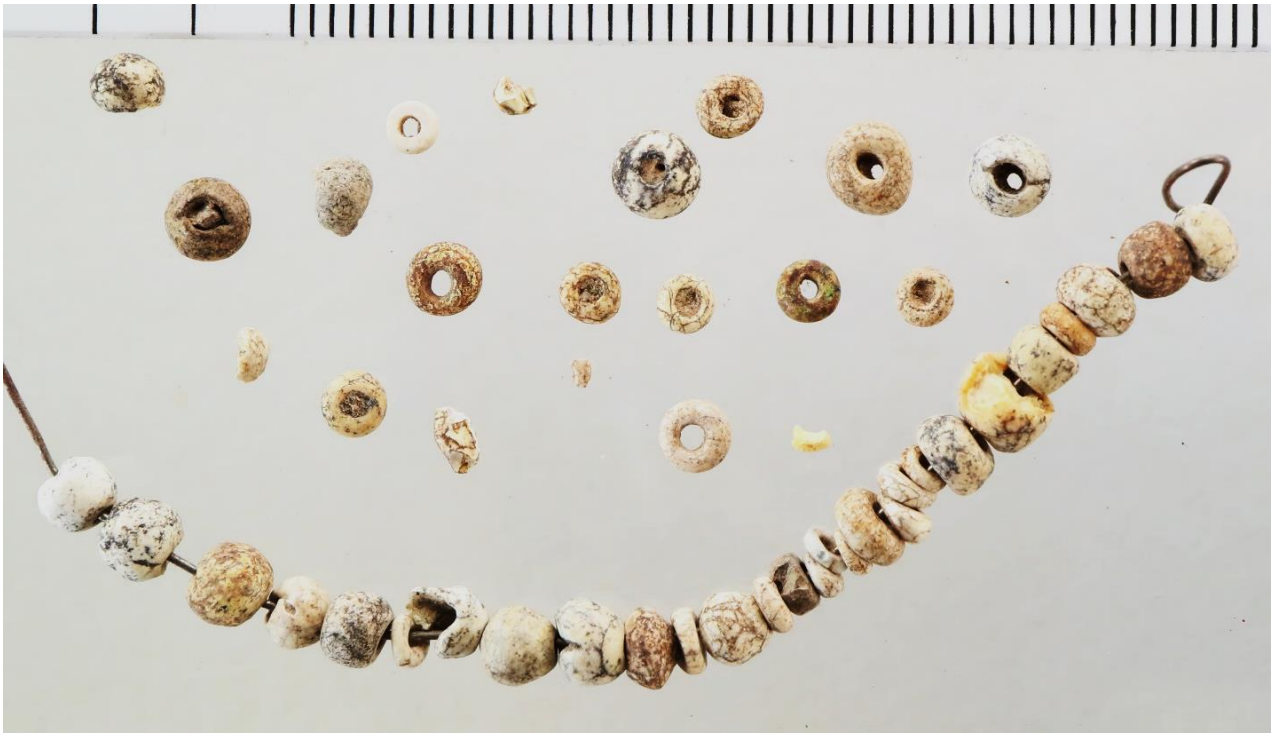


Figure 70: Short barrel-shaped beads of glass, steatite and schist (BKG 3817) (Photograph: author's own)

Among the most notable specimens in the bead assemblage from Macrophase 2b is a single gold sandwich glass bead made in a short barrel form (BKG 3817: Figure 71) where gold foil is sandwiched between two layers of glass. In this case it is possible to note the decoration with a strip of blue glass and gold foil. Apart from their practical use, sandwich techniques ensured a better preservation of the decoration (Cesarin 2018). Known to have been introduced between the 3rd - 2nd century BCE in Greece, gold glass beads were produced to address the needs of the elites and aristocracy. However, there have been limited studies on their technological aspects, the location of their workshops and chronology (Cesarin 2018). As a result, it remains to be seen if this particular glass bead was a product of long-distance trade from the Hellenistic world or if it was produced at a presently unknown location in South Asia. It is interesting to note that the *Arthaśāstra* refers to gold or silver glass (*Arthaśāstra* II: 14.45; 2016), possibly suggesting for the existence of production centres in South Asia (Dhavalikar 1999: 176).

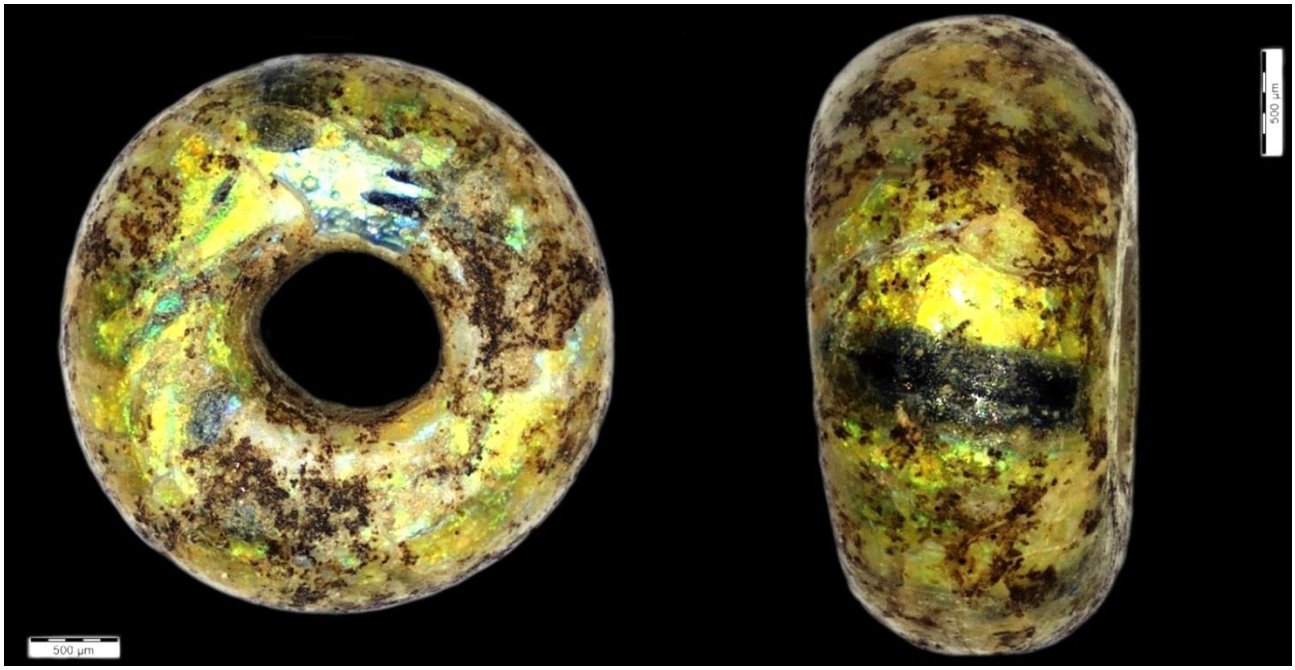


Figure 71: A gold sandwich glass bead with visible, alternating layers using a stereomicroscope equipped with a digital camera (BKG 3817) (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

With regards to the carnelian beads from Macrophase 2b, there is evidence for both typological continuity and discontinuity with the beads from the earlier chronological periods of Barikot. New types of beads have been identified in the assemblage from Macrophase 2b including spherical and ovoid shaped beads (BKG 3583 and BKG 3835: Figure 72b, d). Evidence for continuity is represented in the form of a rectangular circular carnelian bead (BKG 3800: Figure 72c), which is a type of bead that appeared at the site during the late protohistoric period apparently for the first time (BKG 3976: Figure

52). Another piece of evidence for continuity is represented in the form of a lenticular short biconical carnelian bead (BKG 3815: Figure 72a), although it is of lower quality than the carnelian from Macrophase 2a2 (BKG 3906: Figure 66b).

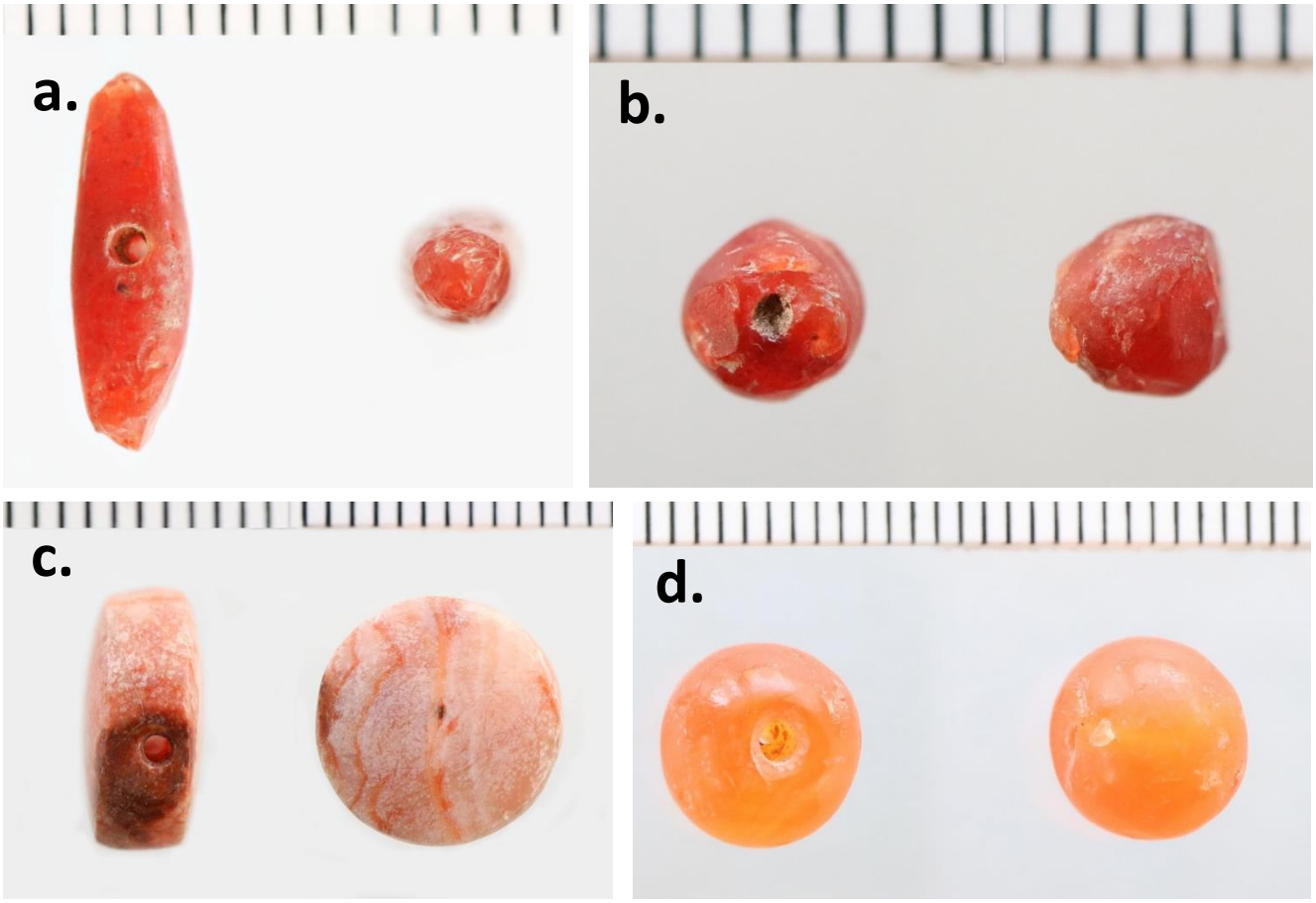


Figure 72: a) A lenticular short biconical carnelian bead (BKG 3815) b) An ovoid shaped carnelian bead (BKG 3835) c) A rectangular circular carnelian bead (BKG 3800) d) A spherical carnelian bead (BKG 3583) (Photographs: author's own)

In addition, other bead raw materials of the assemblage from Macrophase 2b include terracotta, steatite and schist, which are currently represented as solitary examples. Macrophase 2b represents a time of great political and cultural changes that would have affected everyday life at Barikot: The Macedonian siege of the city and its implications, the transfer of political power from one group to the next within a short time interval (Assakenoi > Macedonia > Mauryan). Despite these major developments of stability and instability, it is interesting to note the high number of beads circulating at Barikot during this time, suggesting that the inhabitants of the site were able to adapt to cycles of major change at the site.

6.1.5 Graeco-Bactrian period (Macrophase 3a1: mid-3rd – early-2nd century BCE)

The types of raw material that characterise the bead assemblage from Macrophase 3a1 include terracotta followed by glass, marine shell, carnelian, coral and pearl (Figure 73).

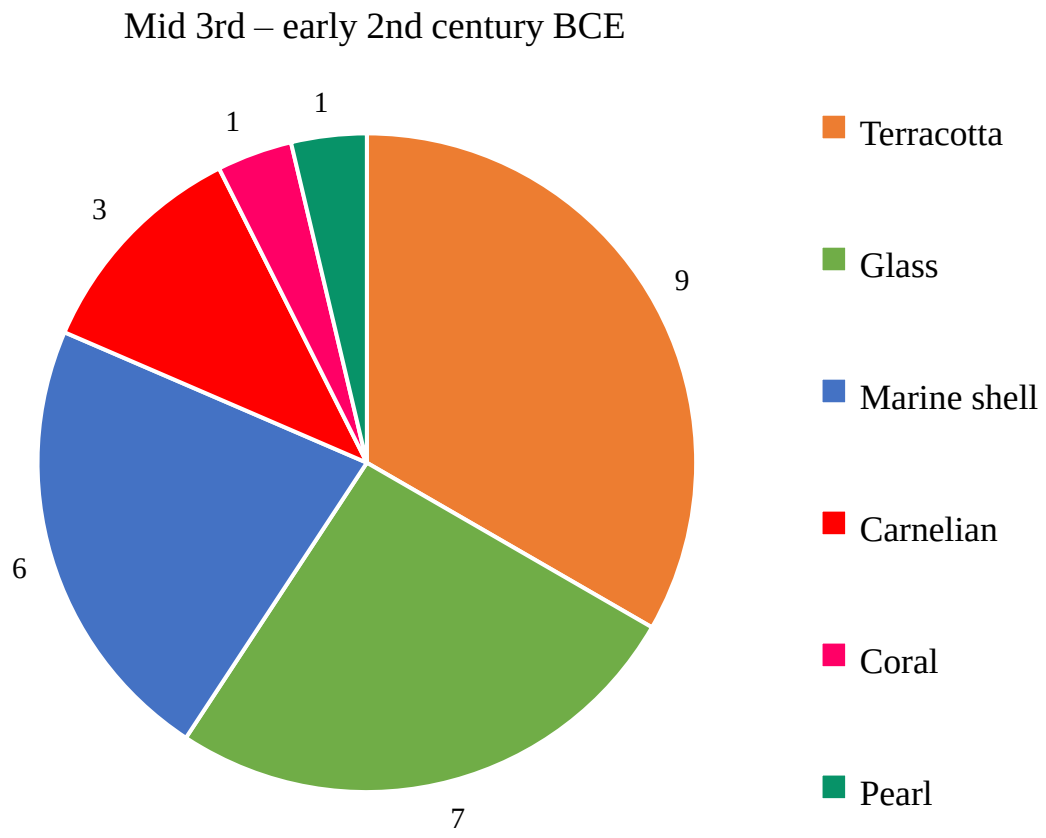


Figure 73: Raw materials from the Graeco-Bactrian period of Barikot (N=27)

The range of bead shapes identified from Macrophase 3a1 include biconical forms along with barrel, disc, cylindrical, spherical, and irregular spherical/globular forms (Figure 74). The identification of the bead shapes appears to represent a contrast to the predominance of short barrel forms that characterised, in particular, the earlier Achaemenid and Mauryan periods of Barikot. A total of 27 beads were recovered from trench BKG 11 K-105 only since the excavations have not reached the same corresponding levels in the other trenches of the site yet (Table 9).

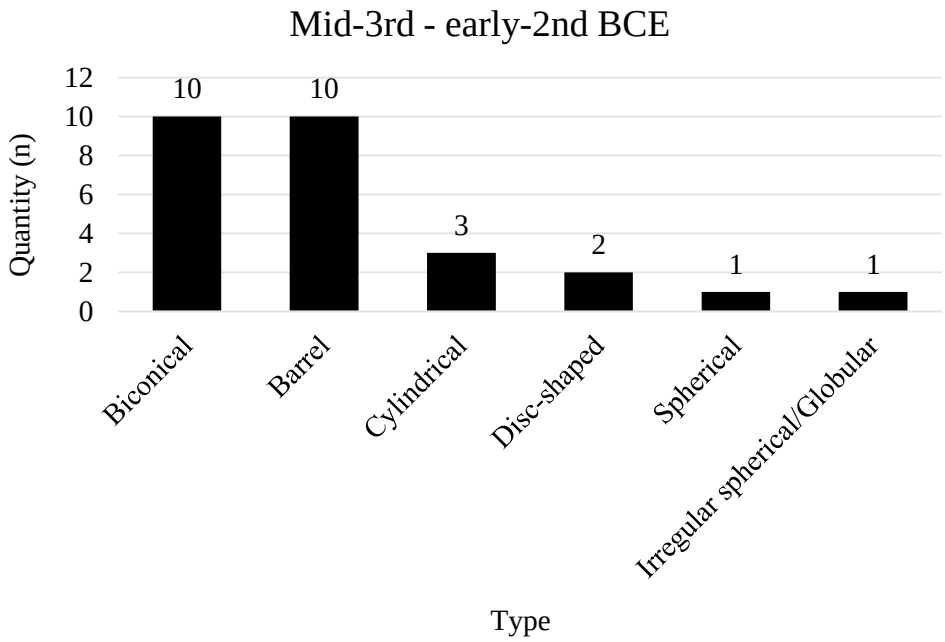


Figure 74: Bead shapes from the Graeco-Bactrian period of Barikot (N=27)

	Type						
	Biconical	***Barrel***	***Disc-shaped***	***Cylindrical***	***Spherical***	***Irregular spherical/ Globular***	***Total***
Terracotta	8 (29.63%)			1 (3.7%)			9 (33.33%)
Glass		7 (25.92%)					7 (25.92%)
Shell	1 (3.7%)	2 (7.4%)	2 (7.4%)	1 (3.7%)			6 (22.22%)
Carnelian	1 (3.7%)	1 (3.7%)			1 (3.45%)		3 (11.11%)
Coral				1 (3.7%)			1 (3.7%)
Pearl						1 (3.45%)	1 (3.7%)
Total	10 (37.03%)	10 (37.03%)	2 (7.4%)	3 (11.11%)	1 (3.45%)	1 (3.45%)	**27 (100%)**

Material

Table 9: Numbers and percentage of bead materials and shapes during the Graeco-Bactrian period of Barikot

1.33 beads per cubic metre were found from trench BKG 11 K-105 attributed to Macrophase 3a1. In comparison, 11.88 beads per cubic metre were found in the preceding Macrophase 2b. Although the volume of excavated earth of Macrophase 2b is smaller (4.29m^3), the bead frequency is larger compared to Macrophase 3a1 even though the latter has a much larger volume of excavated earth (20.27m^3). This example indicates that the total number of beads circulating at the site has probably decreased in Macrophase 3a1 as opposed to the earlier Macrophase 2b (Table 3). This interpretation also seems to be in agreement with the current number of beads recovered from the excavations with 51 beads in Macrophase 2b decreasing to 27 beads in Macrophase 3a1.

Eight out of the nine terracotta beads from Macrophase 3a1 are made in a biconical shape, which, as the forthcoming discussions will show, plays a popular role in the Indo-Greek and Saka-Parthian periods of Barikot. Moreover, the discovery of a pendant made from a perforated coral branch (BKG 3818: Figure 75a) provides an important parallel to the perforated coral branches recovered from Aï Khānum (Rapin 1992: Pl. 79). Another unique find is a perforated pearl (BKG 3820: Figure 75b), potentially *Pinctada margaritifera*, which confirms that the site was linked to trade networks extending to the southern and/or south-western coastal regions. Pearls arrived probably either from the Arabian Sea to the south or from the Persian Gulf nearly 2000 km to the southwest (Carter 2012: 10-21). Coral may have either come from the Arabian Sea or from the Mediterranean region to the west (De Romanis 2000; Vidale et al. 2015).

Due to the limited area of excavation, these solitary examples may appear to be rare, but the discovery of pearls and coral at Aï Khānum as well as in *stupa* deposits at Taxila (Carter 2012: 19; Marshall 1951: 243, 734; Rapin 1992: Pl. 79; Vidale et al. 2015: 64-65) suggest that these materials were an important commodity that was ritually significant and traded throughout the region. Several examples of marine shell beads were also recovered and though the species is difficult to determine, they appear to have been made from a large gastropod, probably *Turbinella pyrum* (BKG 3779: Figure 75c), which is not only represented at larger sites such as Taxila (Beck 1941: 19-20; Marshall 1951: 667-673) but was also common during the Late Kushana and Kushano-Sasanian periods of Barikot (Micheli 2014; 2020).

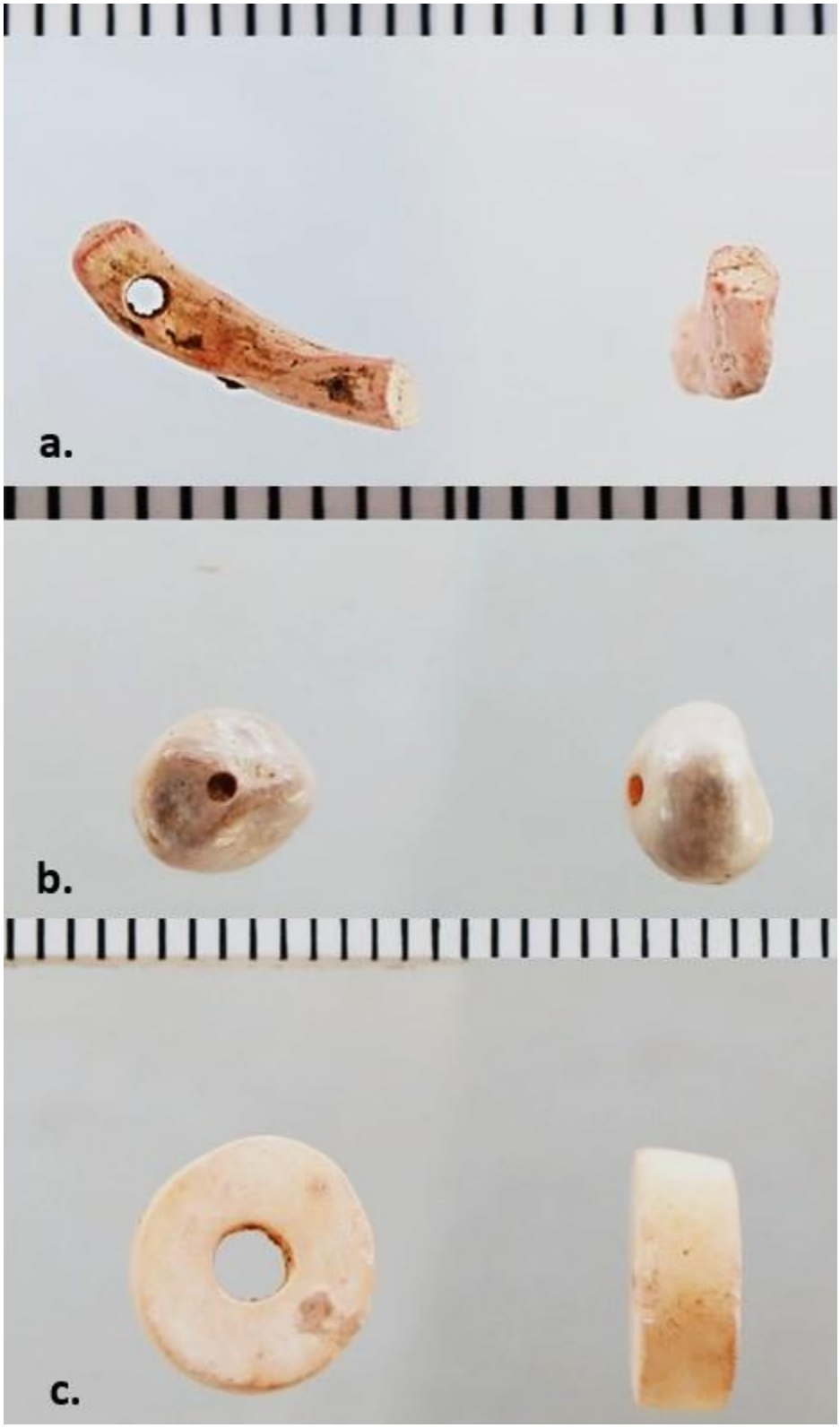


Figure 75: a) Perforated coral branch (BKG 3818); b) Irregular spherical/Globular bead of pearl (BKG 3820); c) Disc-shaped bead of marine shell (BKG 3779) (Photographs: author's own)

In addition, three carnelian beads made in a biconical, barrel and irregular spherical/globular shape have been found deriving from Macrophase 3a1. It is noteworthy to point out that there is evidence for the use of decorative designs on beads from this time, both hard stone and terracotta. In South Asia, the hard-stone beads, particularly agate and carnelian, were decorated with an alkaline bleaching technique that was called 'etching' by the earlier excavators (Kenoyer 2003: 18-19). The Graeco-Bactrian period of Barikot reveals a barrel-shaped bleached carnelian bead (BKG 3799: Figure 76a) that is decorated with a zig-zag line between two parallel lines. This is a common design motif that has been well documented at other sites. A barrel-shaped bleached carnelian bead from Bhir Mound (reportedly from the 3rd century BCE) with a wavy pattern between two parallel lines, for instance, represents a comparative analogue (Beck 1941: Pl. II no. 9). Similarly, a spherical carnelian bead with zig zag lines between two parallel lines has been identified from Kosam / Kausambi (Dikshit 1949: Pl. XIII no. 6). Since at present, there is no evidence for the local manufacture of bleached carnelian beads at Barikot, BKG 3799 must have been produced in one of the larger urban centres such as in Taxila (Beck 1941; Marshall 1951) or Kausambi (Dikshit 1949: 10) where there is evidence for the local production of these types of beads.

The use of bleached carnelian beads is well-documented in the earlier Indus Civilisation and the various designs probably had specific apotropaic or ritual significance (Kenoyer 2014). During the Early Historic period, the proliferation of designs on carnelian beads of many different shapes also may have had some special ritual significance, but it is also possible that they were simply decorative elements to cater to the diverse urban populations. This specific motif of a zig-zag line running between two parallel lines appears to be a new addition as it is not found on beads deriving from Indus contexts. Interestingly, the use of stylistically similar zig-zag designs has been documented on three biconical terracotta beads from Barikot that derive from the Graeco-Bactrian and Indo-Greek periods (BKG 3571, BKG 3589, BKG 5192: Figure 76b-c). It may be possible to argue for a common origin and symbolic meaning of this motif. They may represent initial attempts to imitate the carnelian motif as a sign to communicate status or the scarcity of the material. Painting terracotta was a known tradition within the context of the Indus Tradition where long biconical beads of terracotta were painted red to imitate the valuable, long biconical carnelian beads (Kenoyer 2005: 164). The parallel zones are, however, absent on the terracotta beads and the shape of the two materials is also different as seen in figure 76b-c. The terracotta beads from Barikot need to be closely examined in the future for any residual evidence of applied reddish ochre that would imply an attempt to imitate carnelian.

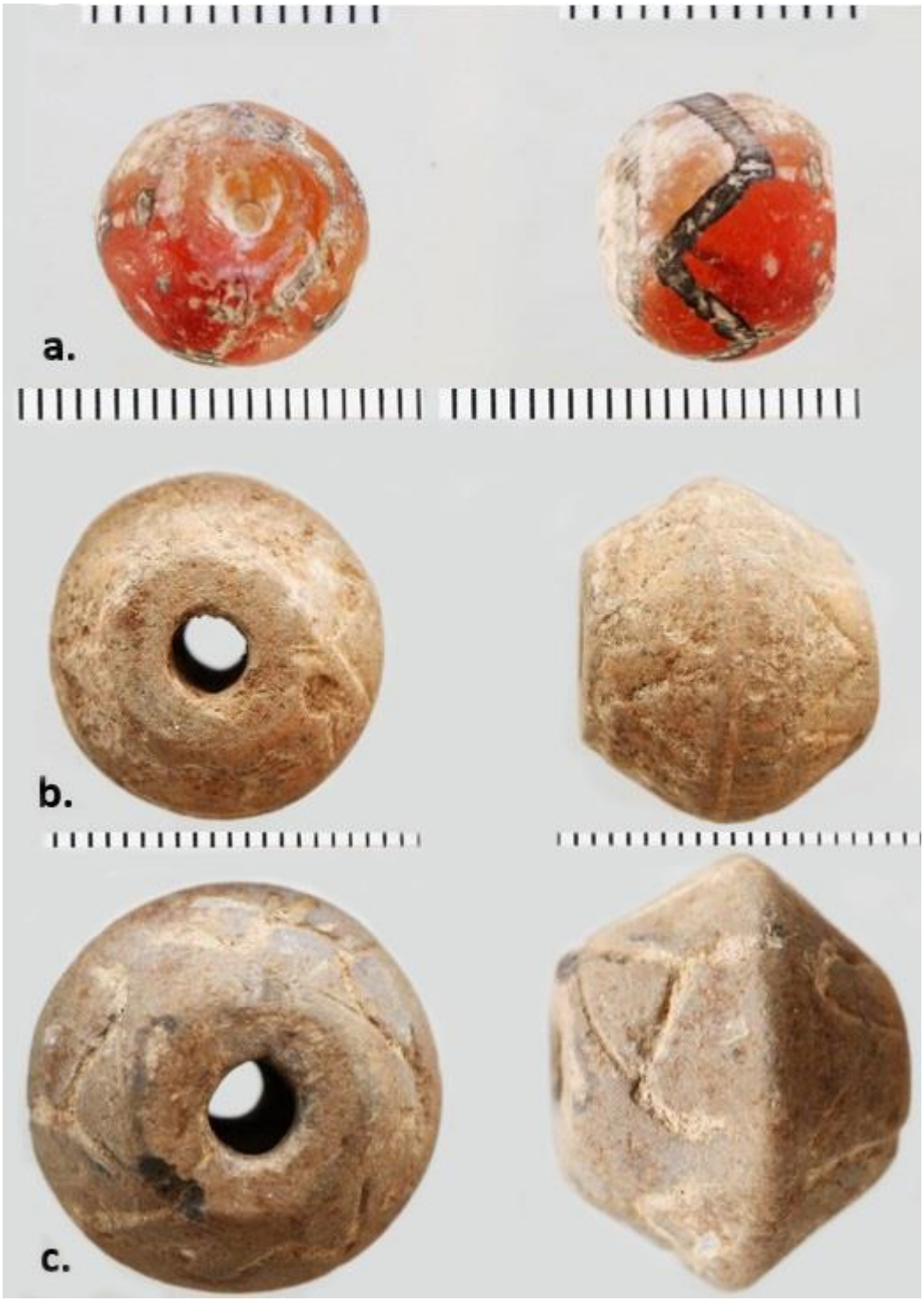


Figure 76: a) Barrel-shaped bleached carnelian bead (BKG 3799) b) Biconical terracotta bead (BKG 3571); c) Biconical terracotta bead (BKG 3589) (Photographs: author's own)

7.1.6 Indo-Greek period (Macrophase 3a2-3a4: End-2nd century BCE)

The types of raw material that characterise the bead assemblage from Macrophase 3a2-3a4 include terracotta followed by glass, marine shell, chloritic rock, dentalium shell, carnelian, lapis lazuli, agate and faience. The identification of the raw material of three beads was, however, not possible (Figure 77).

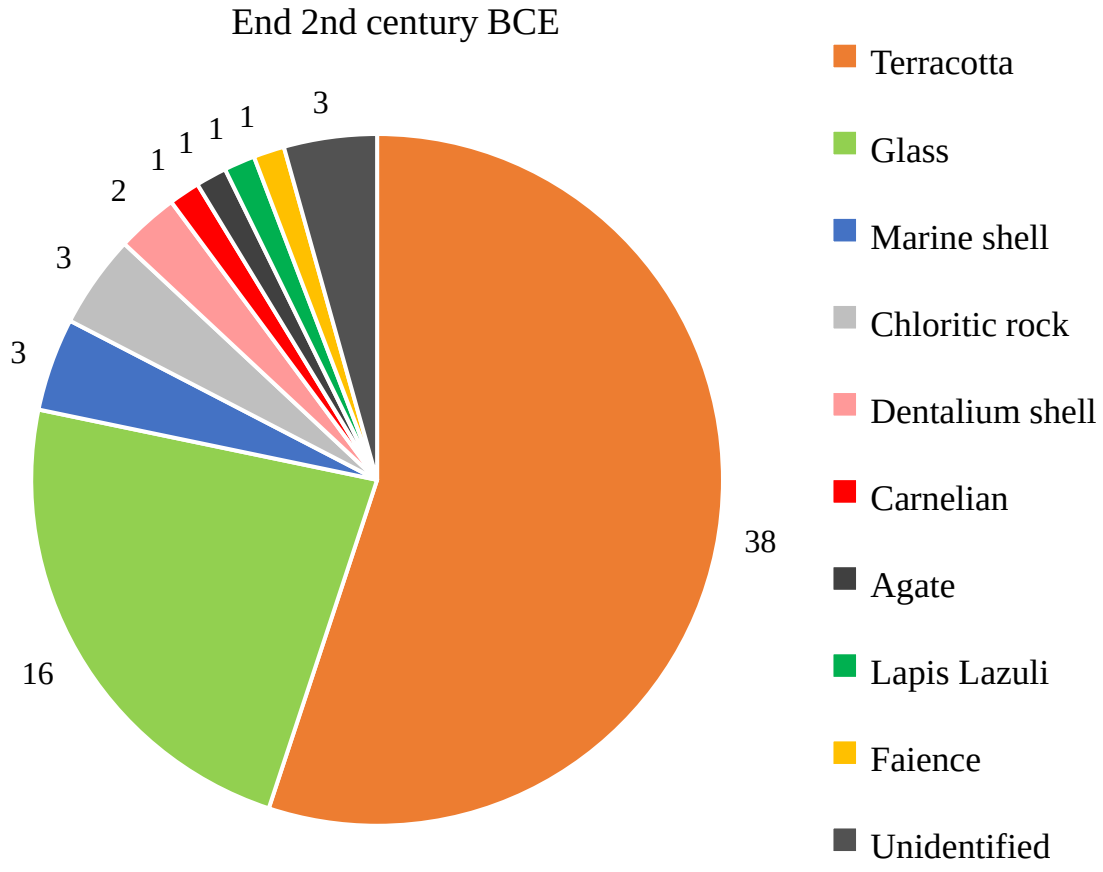


Figure 77: Raw materials from the Indo-Greek period of Barikot (N=69)

A wide range of bead shapes were identified from Macrophase 3a2-3a4, including biconical, barrel, cylindrical, short truncated asymmetrical biconical, ghata-shaped, areca nut, circular conical and barrel collared and irregular spherical/globular forms (Figure 78). Like Macrophase 3a1, the types of beads from Macrophase 3a2-3a4 represent a contrast to the predominance of short barrel forms that characterise the earlier Achaemenid and Mauryan periods of Barikot. A total of 69 beads have been recovered thus far from the excavations at Barikot, corresponding to the Indo-Greek period. (Table 10).

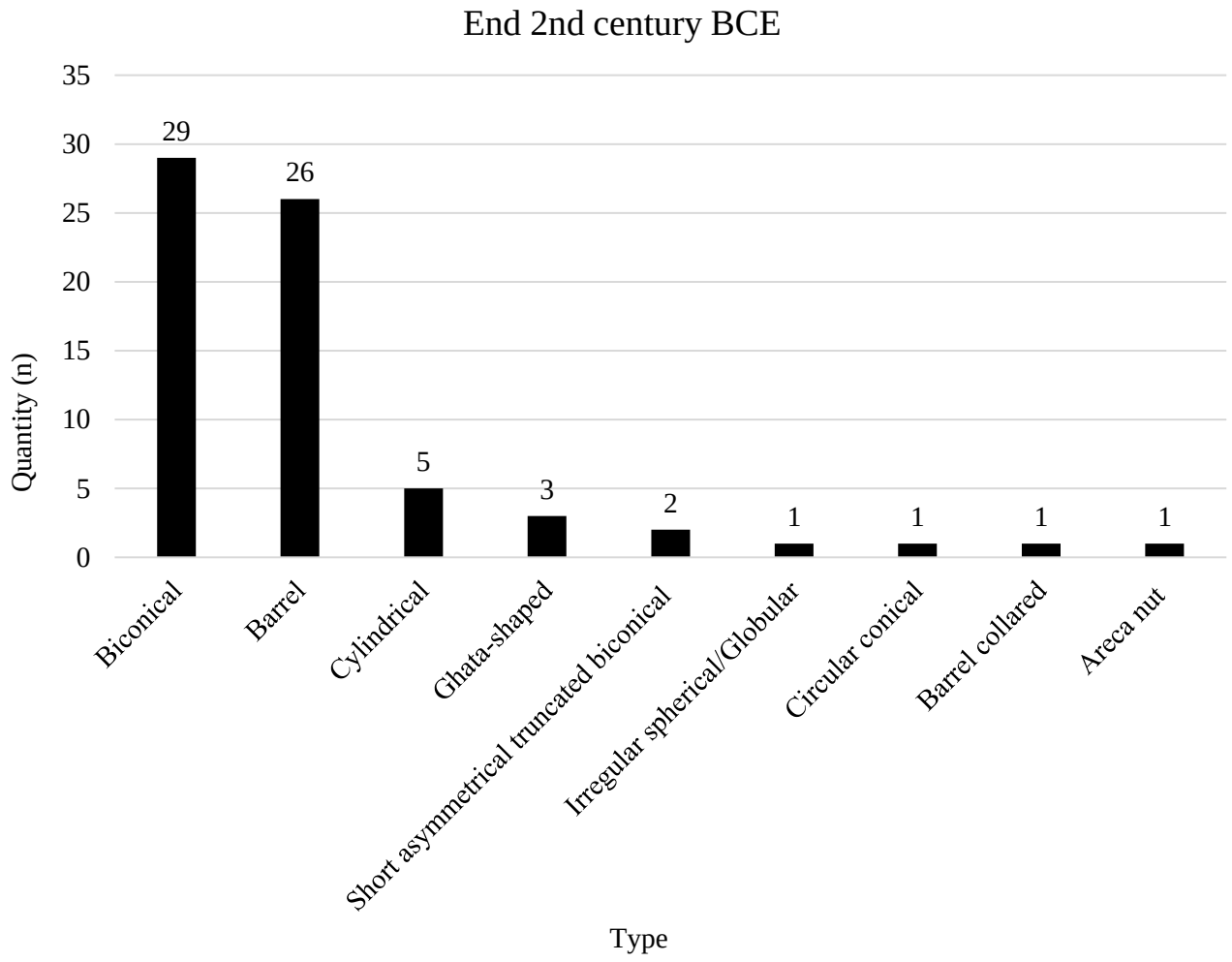


Figure 78: Bead shapes from the Indo-Greek period of Barikot (N=69)

Material	Type									
	Biconical	***Barrel***	***Cylindrical***	***Irregular spherical/ Globular***	***Short asymmetrical truncated biconical***	***Ghata-shaped***	***Areca nut***	***Circular conical***	***Barrel collared***	***Total***
Terracotta	25 (36.23%)	6 (8.69%)	1 (1.45%)		2 (2.90%)	3 (4.34%)	1 (1.45%)			38 (55.07%)
Glass	3 (4.34%)	12 (17.39%)		1 (1.45%)						16 (23.19%)
Shell		2 (2.90%)	1 (1.45%)							3 (4.34%)
Chloritic rock		3 (4.34%)								3 (4.34%)
Dentalium shell			2 (2.90%)							2 (2.90%)
Carnelian			1 (1.45%)							1 (1.45%)
Agate	1 (1.45%)									1 (1.45%)
Lapis Lazuli		1 (1.45%)								1 (1.45%)
Faience		1 (1.45%)								1 (1.45%)
Unidentified		1 (1.45%)						1 (1.45%)	1 (1.45%)	3 (4.34%)
Total	29 (42.02%)	26 (37.68%)	5 (7.24%)	1 (1.45%)	2 (2.90%)	3 (4.34%)	1 (1.45%)	1 (1.45%)	1 (1.45%)	**69 (100%)**

Table 10: Numbers and percentage of bead materials and shapes during the Indo-Greek period of Barikot

2.34 beads per cubic metre were found in Macrophase 3a2-3a4. In comparison, 1.33 beads per cubic metre were found in the preceding Macrophase 3a1. Although the volume of excavated earth of Macrophase 3a1 is larger (20.27m^3), the bead frequency is smaller compared to Macrophase 3a2-3a4 as the latter has a smaller volume of excavated earth (18.79m^3). This example indicates that the total number of beads circulating at Barikot has most probably increased slightly in Macrophase 3a2-3a2 since the previous Macrophase 3a1 (Table 3). This interpretation also appears to be in agreement with the current number of beads recovered from the excavations of trench BKG 11 K-105 with 27 beads in Macrophase 3a1 increasing to 44 beads in Macrophase 3a2-3a4.

The bead assemblage of the Indo-Greek period from Barikot is marked by several continuities with the types of beads from the earlier Graeco-Bactrian period but there is also evidence of notable changes: The most dominant material appears to be terracotta with 38 beads. In terms of typology, the biconical beads of terracotta are the most popular types of beads in the assemblage as already mentioned above. In addition, the apparent introduction of three ghata-shaped beads of terracotta in the city during this time is also noteworthy (Ser. 4375: Figure 79).



Figure 79: Ghata-shaped bead of terracotta with a distinctive pot shape (Ser. 4375) (Photograph: author's own)

Ghata-shaped beads have usually a short globular shape with a distinct collar or rim on one side and were described by Beck as resembling a vase or pot (Beck 1941: 33) but eventually have come to be

referred to by the Hindi word for a traditional terracotta water pot called ‘ghata’ or ‘ghara’ (Dikshit 1952: 52-63; Ghosh 1947-48: Pl. 43-46). Ghata-shaped beads are abundantly represented in the later cultural periods of Barikot as well as at other historical sites. Ghata-shaped beads of terracotta comparable to the Barikot specimens, for example, have been positively identified from the site of Aligrama, Swat (Stacul and Tusa 1977: Figure 91). Several of the Bodhisattva Maitreya and Avalokiteśhvara stone art sculptures of the later Kushana dynasty (1st – 3rd century CE) appear to be wearing ornaments that incorporate various sizes of ghata-shaped beads according to the research by the present author. The sculptural evidence shows them suspended as pendants probably produced from high-quality stone beads (garnet, rock crystal, beryl, carnelian) held by short stems possibly made from gold (see Chapter 8).

As a future direction, the interior drill holes of the ghata-shaped beads need to be carefully examined to see if there are traces of wear from this type of suspended attachment. This analysis may clarify if they were used as beads or pendants. As evidenced by the large number of monastic settlements and *stupas* in Swat, the Kushanas were passionate followers and great patrons of Buddhism. As such, ghata-shaped beads may be imbued with some form of symbolic meaning possibly in connection with Buddhism. Evidence of a Buddhist presence in the city is, anyhow, provided by the recent excavation campaigns, which have revealed a Buddhist monument in the central area of Barikot that was created at the time of the Indo-Greek Kingdom (Olivieri, personal communication) while Buddhist sacred areas were already established in Swat as early as the 3rd century BCE (Olivieri and Filigenzi 2018: 72).

In addition, a total of 16 beads of glass have been recovered thus far from the excavations of the Indo-Greek layers. A new glass variety emerges in the form of the Indo-Pacific group as indicated, for example, by a single short barrel-shaped bead with a greenish-blue colour (BKG 3681: Figure 80a). Indo-Pacific glass beads have been found in huge quantities at numerous sites in South Asia and as far as Southeast Asia (Abraham 2016; Bellina and Glover 2004; Carter 2013; Francis 1990; 2002; Heo 2018), providing evidence of inter-regional connections and their wider popularity in various parts of the world. Moreover, a very long quadrangular barrel-shaped glass bead has been recovered from Barikot, which is translucent, lustrous and orange brownish in colour (BKG 1532: Figure 80b) probably intended for display and aesthetic purposes. It is clearly unlike any other glass bead encountered in the earlier chronological periods of Barikot, which are mostly found made in short barrel forms as shown above. The later chronological periods of Barikot have also not revealed a bead comparable to BKG 1532.

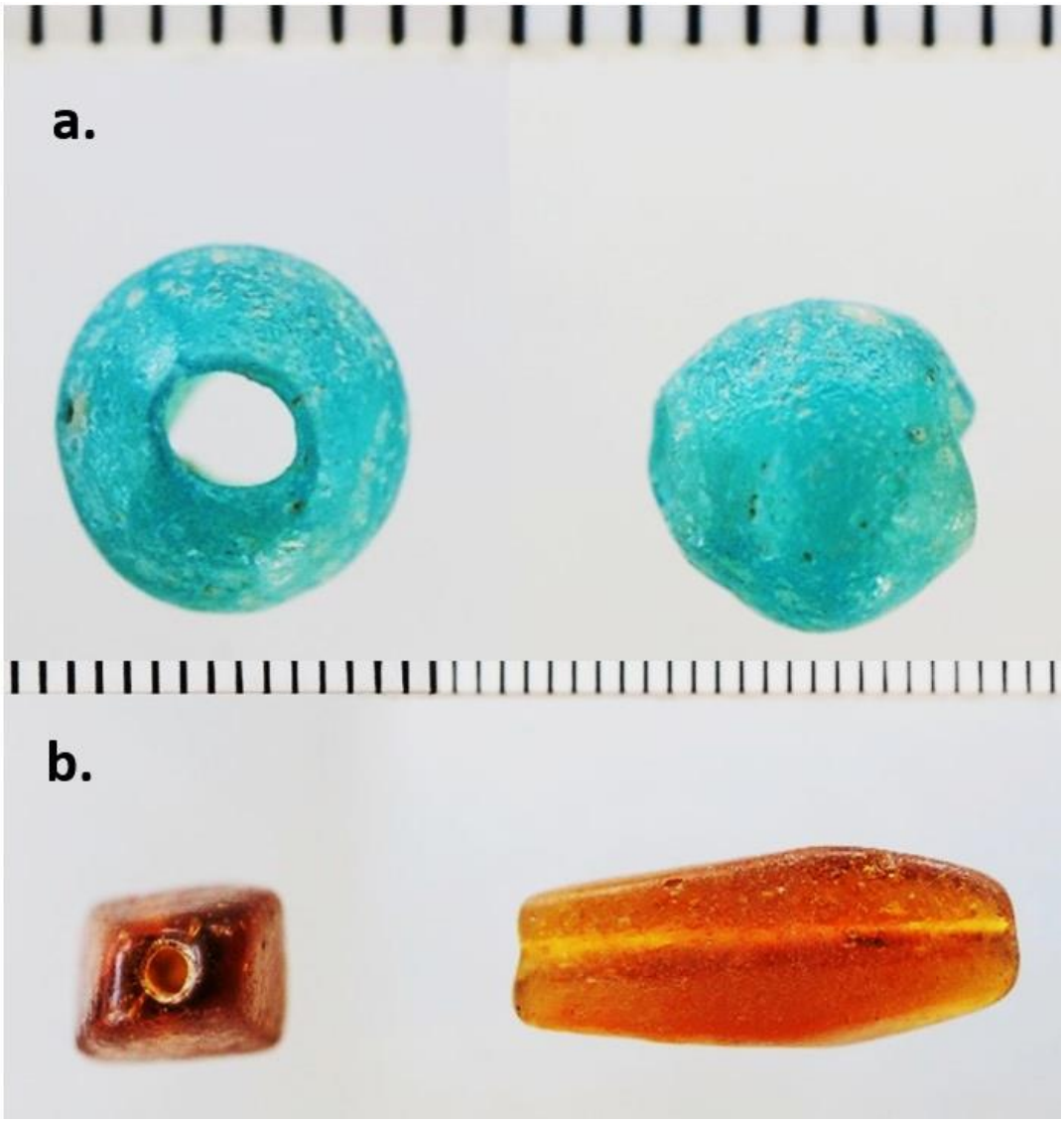


Figure 80: a) Short barrel-shaped glass bead (BKG 3681); b) Long quadrangular barrel-shaped glass bead (BKG 1532) (Photographs: author's own)

Two gold foil glass beads made in a barrel and biconical shape (BKG 3646 and BKG 3819) are among the most unique and precious finds from this assemblage (Figure 81a-b). The production of gold foil beads is thought to have originated in the eastern Mediterranean region based on the discovery of a gold foil bead workshop on the island of Rhodes dating to the late 3rd century BCE (Spaer 1993: 10). If this association can be confirmed through more extensive research, the Indo-Greek period gold foil beads of South Asia would have been introduced to the region by traders from the west. Although Indo-Greek metal working areas have been discovered at trench BKG 11 K-105, containing abundant copper slags and crucibles, at present no manufacturing areas of beads made from metal materials have been reported.

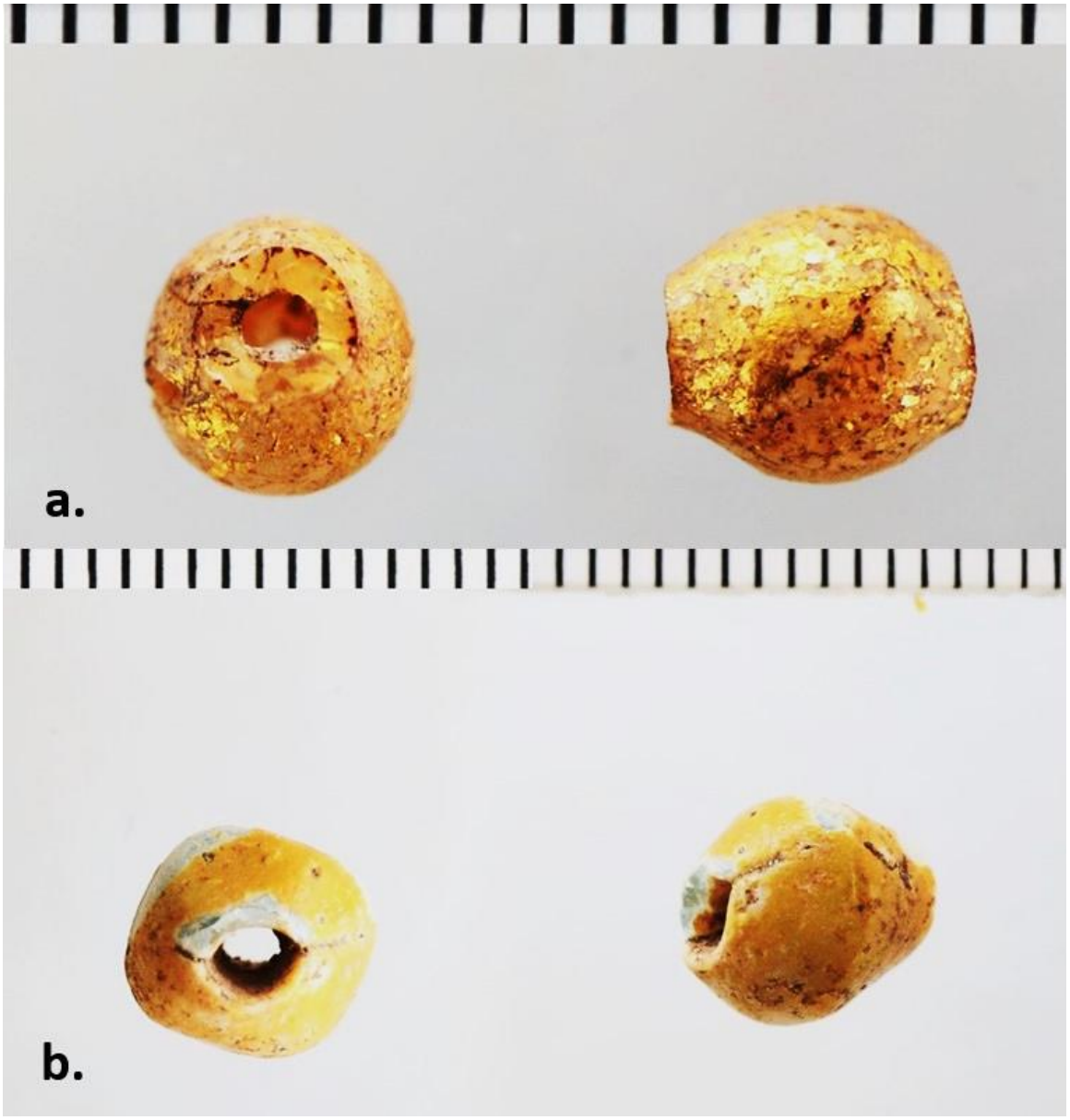


Figure 81: a) Barrel-shaped gold foil glass bead (BKG 3646); b) Biconical gold foil glass bead (BKG 3819) (Photographs: author's own)

In terms of semi-precious stone beads, three specimens have been found deriving from the Indo-Greek period, which are a black-and-white agate bead, a red carnelian pendant and a lapis lazuli bead. The banded agate bead appears to have been dyed (Ser. 4298: Figure 82) and could have been produced in any major bead centre such as in Taxila, but the raw material may have come from even more distant regions in Iran or peninsular India (Kenoyer, personal communication). By soaking agate in honey or sugar water, the porous layers can take on the organic sugars, and by later heating the stone, the sugar can be carbonized to turn brown or black (Kenoyer 2017b: 143). During the production process of this bead, its banded black colour has cracked and has leaked leftwards whereas the cracks visible in other

parts of the bead surface occurred after the bead was made (Kenoyer, personal communication). The identification of these stone varieties, therefore, demonstrates the wide network of trade that linked the site of Barikot to the broader resources of the region during the Indo-Greek period.



Figure 82: Long biconical bead of agate (Ser. 4298) (Photograph: author's own)

6.1.7 Saka-Parthian period (Macrophase 3b: 1st BCE – 1st century CE)

The types of raw material that characterise the bead assemblage from Macrophase 3b include terracotta followed by marine shell, glass, cowrie shell, dentalium shell, carnelian, agate, rock crystal, malachite (copper material), schist and garnet. One additional bead was studied by the author, but the identification of the raw material was not possible (Figure 83).

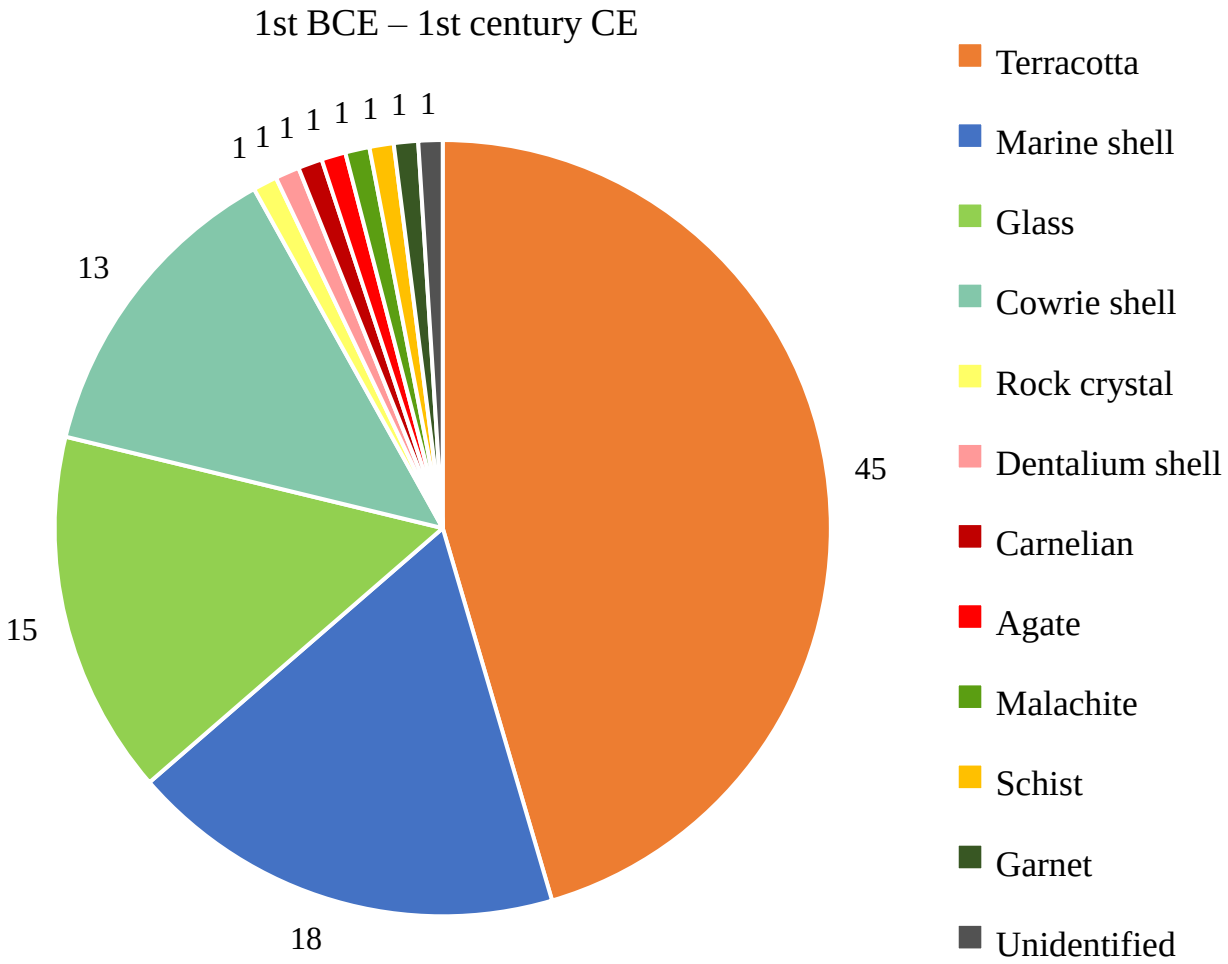


Figure 83: Raw materials from the Saka-Parthian period of Barikot (N=99)

The range of bead shapes identified from Macrophase 3b include biconical along with barrel, disc, areca nut, ghata-shaped, irregular spherical/globular, cylindrical, barrel collard, square short cylindrical, rectangular long rectangular and parallelogram shapes (Figure 84). 13 perforated cowrie shells are also present in the assemblage. The raw material and shape of four additional beads could not be verified by the author, which were documented by the original excavators (Table 11). In total, 103 beads have been recovered thus far from the excavations at Barikot, corresponding to the Saka-Parthian period (Table 11).

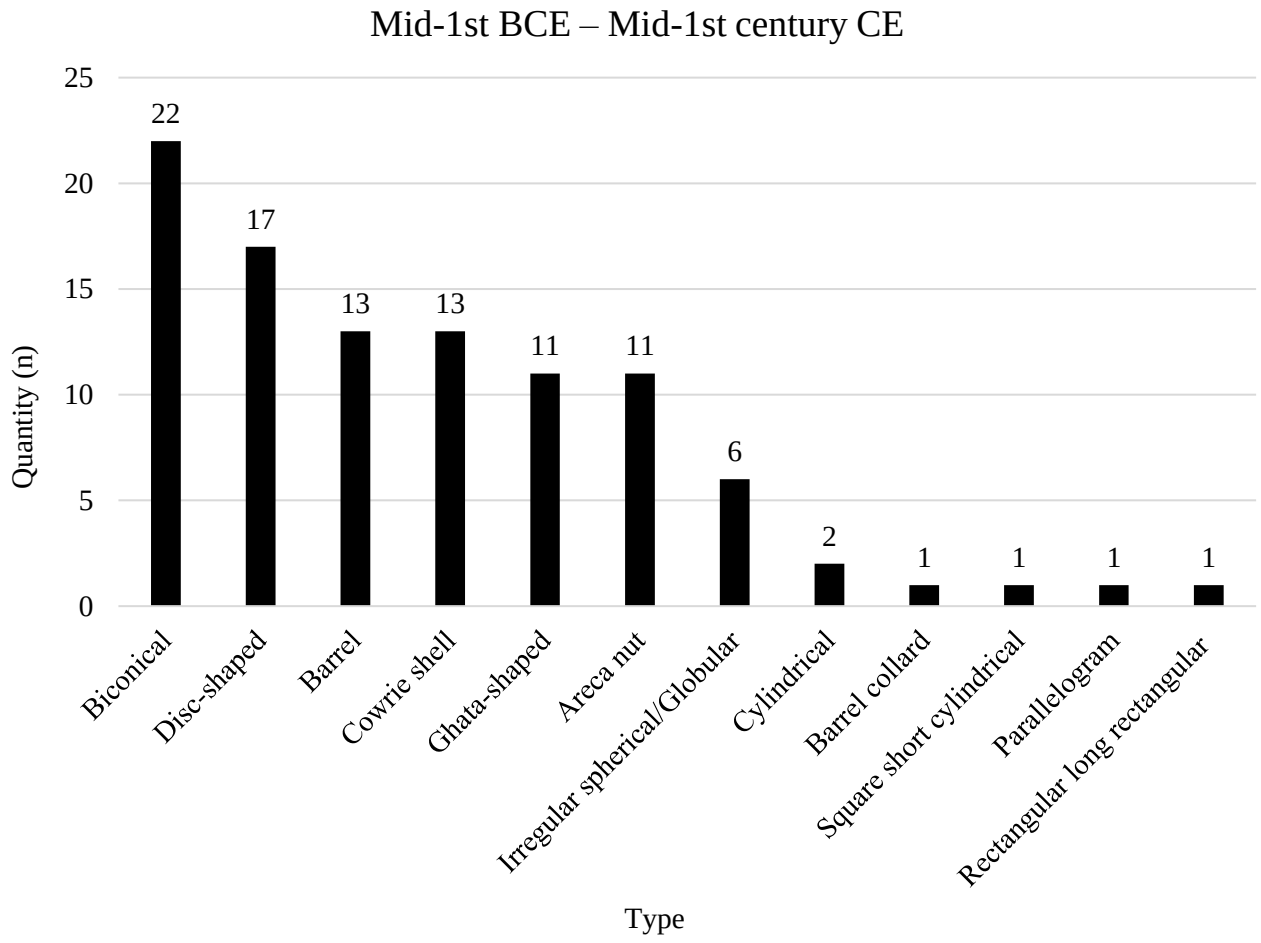


Figure 84: Bead shapes from the Saka-Parthian period of Barikot (N=99)

Material	Type													
	Biconical	***Disc-shaped***	***Barrel***	***Cowrie shell***	***Areca nut***	***Ghata-shaped***	***Irregular spherical/ Globular***	***Cylindrical***	***Barrel collared***	***Square short Cylindrical***	***Parallel ogram***	***Rectangular long rectangular***	***Unidentified***	***Total***
Terracotta	18 (17.47%)	2 (1.94%)			11 (10.67%)	11 (10.67%)	3 (2.91%)							45 (43.68%)
Glass	1 (0.97%)	8 (7.76%)	5 (4.85%)				1 (0.97%)							15 (14.56%)
Shell		7 (6.79%)	5 (4.85%)				2 (1.94%)	1 (0.97%)	1 (0.97%)	1 (0.97%)	1 (0.97%)			18 (17.47%)
Cowrie shell				13 (12.62%)										13 (12.62%)
Carnelian	1 (0.97%)													1 (0.97%)
Agate			1 (0.97%)											1 (0.97%)
Rock crystal	1 (0.97%)													1 (0.97%)
Garnet			1 (0.97%)											1 (0.97%)
Dentalium shell								1 (0.97%)						1 (0.97%)
Schist												1 (0.97%)		1 (0.97%)
Malachite			1 (0.97%)											1 (0.97%)
Unidentified	1 (0.97%)												4 (3.88%)	5 (4.85%)
Total	22 (21.35%)	17 (16.50%)	13 (12.62%)	13 (12.62%)	11 (10.67%)	11 (10.67%)	6 (5.82%)	2 (1.94%)	1 (0.97%)	1 (0.97%)	1 (0.97%)	1 (0.97%)	4 (3.88%)	**103 (100%)**

Table 11: Numbers and percentage of bead materials and shapes during the Saka-Parthian period of Barikot

For every cubic metre of earth excavated, 3.58 beads were found in Macrophase 3b. In comparison, 2.34 beads were found in the preceding Macrophase 3a2-3a4 for every cubic metre of earth excavated. Although the volume of excavated earth of Macrophase 3a2-3a4 is larger (18.79m^3), the bead frequency is smaller compared to Macrophase 3b even though the latter has a much smaller volume of excavated earth (7.25m^3). This example, likewise, indicates that the total number of beads circulating at Barikot was most probably higher in Macrophase 3b as opposed to the earlier Macrophase 3a2-3a4 (Table 3). This interpretation is not in agreement with the current number of beads recovered from the excavations of trench BKG 11 K-105 with 44 beads in Macrophase 3a2-3a4 seemingly decreasing to 26 beads in Macrophase 3b. Like the data from Macrophase 2b, as a result, this example indicates that it would be incorrect to assume prematurely the current number of recovered beads as the true reflection of the bead frequency at a given time.

The bead assemblage from the Saka-Parthian period of Barikot is marked by some typological continuities with the beads recovered from the previous Indo-Greek period but there is also evidence for the introduction of new types of beads: The dominant bead raw material continues to be terracotta, seemingly increasing from 38 beads in Macrophase 3a2-3a4 to 45 beads in Macrophase 3b. For the terracotta beads, the biconical shape continues to represent the most popular bead form at Barikot as appears to have been the case during the previous Graeco-Bactrian period as well. In addition, 11 areca nut beads of terracotta have been found in the present period (Ser. 4344: Figure 85). It is possible that several areca nut beads formed part of a single necklace, each bead adjoining the same corresponding part of the bead next to it. An in-depth analysis in the future will determine if a similar use-wear pattern is seen on each bead end that would corroborate this interpretation while several experimental replicas should be created to assess the number of beads that could be worn comfortably. The function(s) of the areca nut beads remains debatable, but they clearly embody some important symbolic meaning as the ghata-shaped beads.

It would be useful to carry out compositional analyses including XRF on a number of selected beads to distinguish different clay sources. As a comparative material, local soil samples can be collected from Swat. The study of both sample sets could eventually determine if the terracotta beads derived from the locality or from sacred Buddhist sites. These distinctive objects could have also served a multi-function purpose as beads, spindle-whorls as well as adorning animals as put forward by P. Francis (Francis 1978: 95; Hawkes 2020; Kelly 2009; Stacul and Tusa 1977: 202). Future studies on their dimensions and weight will reveal if they are spindle whorls, or beads for tying around the neck of an animal in a similar manner to the modern donkey beads used in present-day Iran and Pakistan. Preliminary observations of some of the traditional donkey beads suggest that their size is similar to the areca nut beads. Detailed and comprehensive ethnographic research is required on these two lines of evidence.



Figure 85: Areca nut terracotta bead with a circular cross section and a short convex truncated conical longitudinal section (Ser. 4344) (Photograph: author's own)

With regards to the marine shell beads, this material appears to be the second most dominant material circulating at Barikot during the Saka-Parthian period. The number of recovered marine shell beads currently stands at 18 compared to only three beads in Macrophase 3a2-3a4. Similar developments are mirrored by the evidence from the well-excavated site of Sonkh (Period IV) where shell appears to be the most dominant material in the bead assemblage during this time (Härtel 1993: 298). Moreover, it is important to point out that although shell beads are found from the early chronological periods of Barikot, by contrast, bangles of shell are absent and get introduced during the Late Kushana and Kushano-Sasanian periods of the site. Shell bangles were already worn by women of the Indus period (Kenoyer 1984a: 218) and are even used today by the female sphere of South Asia, representing symbols of marriage and traditions (Micheli 2014: 223; 2020: 245-246).

Enriching the shell repertoire further are 13 perforated cowrie shells (BKG 809: Figure 86), appearing for the first time at Barikot (excluding a few specimens from the second millennium BCE), potentially suggesting for a cultic and female fertility function. This argument is potentially supported by the discovery of three terracotta female figurines (dating to around the first century BCE) found from the same residential complex as the cowrie shells (Callieri 2007: 151; Faccenna et al. 1984: 489). Although perforated cowries could equally be worn as earrings, there is no evidence to support this practise of adornment in the context of Barikot and Swat. In fact, the adornment tradition of cowrie shells is reflected by a female sculpture from the sacred *stupa* area of Butkara I in Swat, which is adorned with a cowrie shell necklace (Faccenna 1964: Pl. CDXXXII, no. 3969). Although it is difficult to assign a precise date, the sculpture does not belong to the earliest stylistic group, but to a production that is

certainly later than the early 1st century CE (see Chapter 8). As in the case of the marine shells, the cowrie shells would have been acquired from the coastal regions some 1200 km to the south (Yang 2011: 2-3; 2018).



Figure 86: Perforated cowrie shells from Barikot (BKG 809) (Photograph: author's own)

With reference to the stone beads, five beads have been found in the excavations of the Saka-Parthian contexts, which include a short biconical bead of carnelian (BKG 3378: Figure 87) and an octagonal-faceted long biconical bead made from rock crystal (BKG 3618: Figure 88). The current archaeological data seems to indicate that there were very few short biconical beads of carnelian circulating at Barikot during the Saka-Parthian and Kushana periods, which seems to mirror similar typological trends at several other key-sites including Sonkh and Ahichchhatra (Dikshit 1952; Härtel 1993). Besides, only one Gandharan Bodhisattva sculpture of Siddhārtha Gautama that is on display in the Musée Guimet is seen adorned with a short biconical bead (see Chapter 8). It should be noted, however, that the sample size of the carnelian beads is very small at present, which is why we may need to revise this observation as more carnelian beads become available from future excavations.



Figure 87: Short biconical bead made from red carnelian (BKG 3378) (Photograph: author's own)

Moreover, a faceted stone bead made from rock crystal has appeared at the site possibly for the first time (BKG 3618: Figure 88) with the ability to receive and reflect light, potentially to generate a visual and symbolic effect as outlined in Buddhist literary traditions (Granoff 1998). Several faceted stone beads have, likewise, been found in the excavations of other sites in the region (Rienjang et al. 2017; Uesugi and Rienjang 2018) while a great range of faceted beads are seen adorning the Bodhisattva sculptures of Gandhara (see Chapter 8). It remains difficult, however, to identify the precise variety of the stone represented on the sculptures, which probably reflect high-quality stones such as carnelian, rock crystal, garnet or beryl-aquamarine. The potential function(s) of these faceted beads must be critically and closely examined on an inter-regional scale with a larger sample size in combination with the study of the archaeological contexts of the finds. Macro-crystalline varieties of quartz are present in northern Pakistan (Law 2008: 157), so beads made from rock crystals were probably manufactured at the local and regional level.

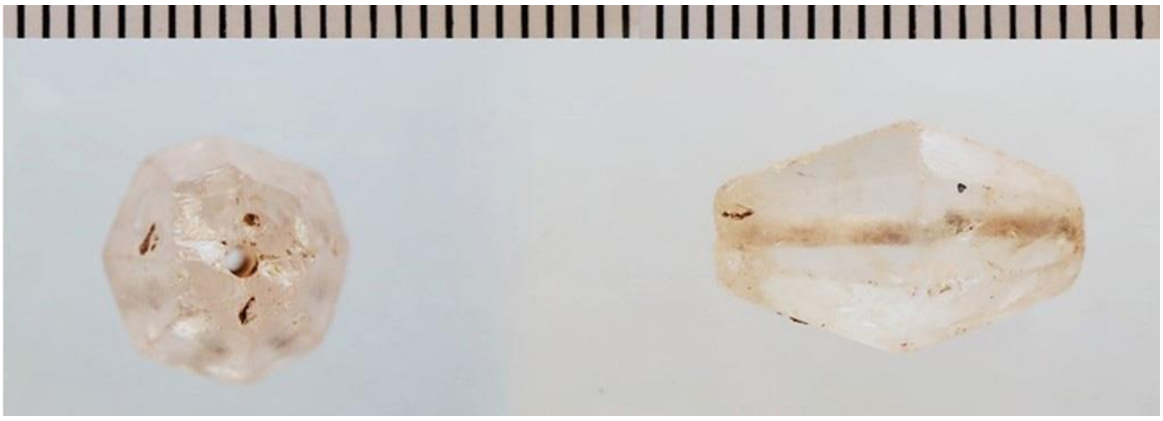


Figure 88: Octagonal-faceted long biconical bead made from rock crystal (BKG 3618) (Photograph: author's own)

6.1.8 Early Kushana period (Macrophase 4a: 1st CE – 2nd century CE)

The types of raw material that characterise the bead assemblage from Macrophase 4a include terracotta followed by marine shell, glass, faience, carnelian, beryl-aquamarine, quartz, jasper, malachite and cowrie shell. The raw material of one bead could not be identified by the author. (Figure 89).

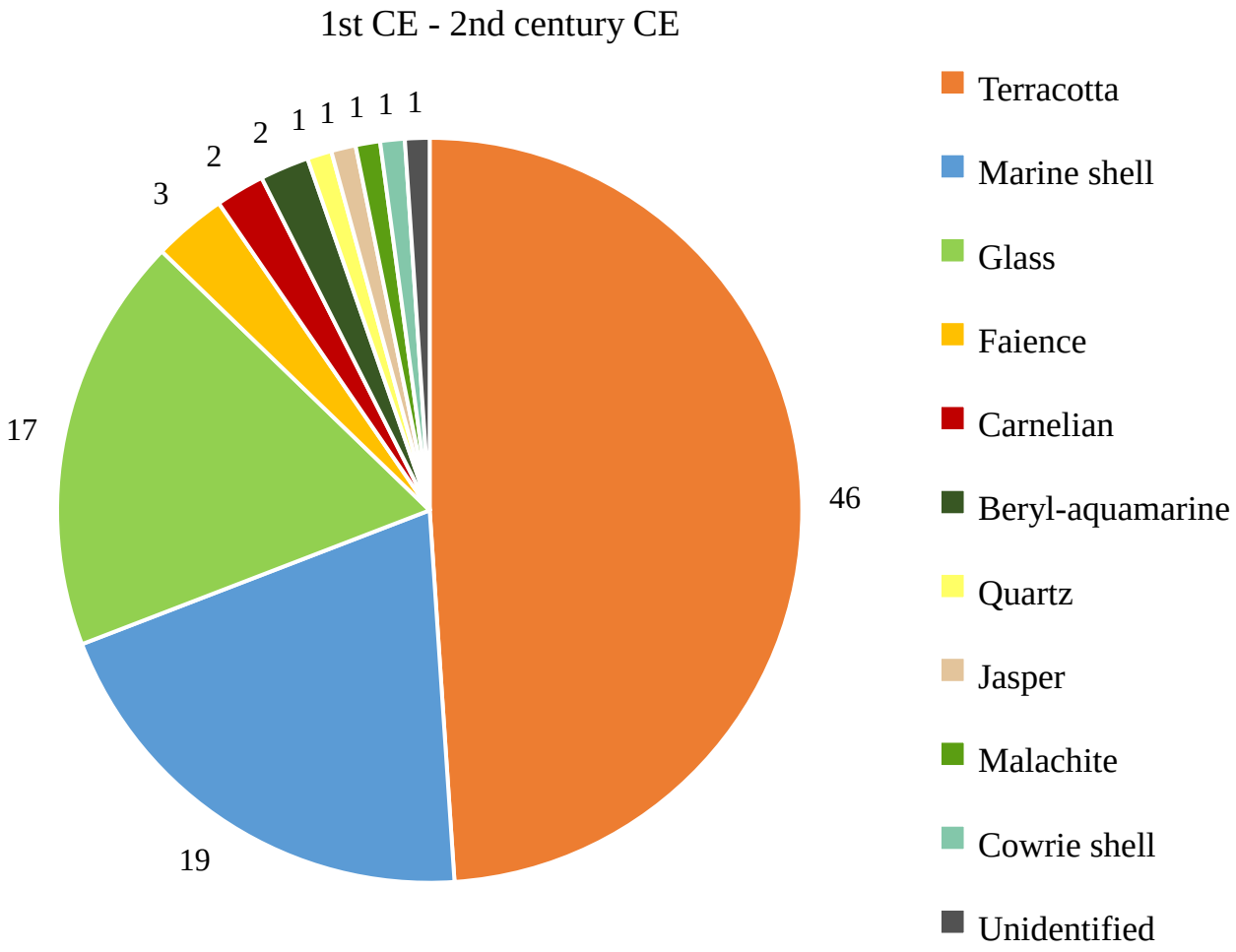


Figure 89: Raw materials of beads from the Early Kushana period of Barikot (N=94)

A great range of bead shapes have been identified from the study of the bead assemblage from Macrophase 4a including barrel followed by the areca nut, biconical, ghata-shaped, disc-shaped, irregular spherical/globular, cowrie shell, cylindrical, rectangular long rectangular, rectangular barrel, lenticular-biconical, double axe and short asymmetrical truncated biconical forms. One additional bead was studied, but the identification of the shape is not possible as the specimen is broken (Figure 90). Besides, the raw material and shape of 26 additional beads could not be verified by the author, which were originally documented by the excavators. 120 beads have been recovered from the excavations at Barikot thus far, deriving from the Ealy Kushana period (Table 12).

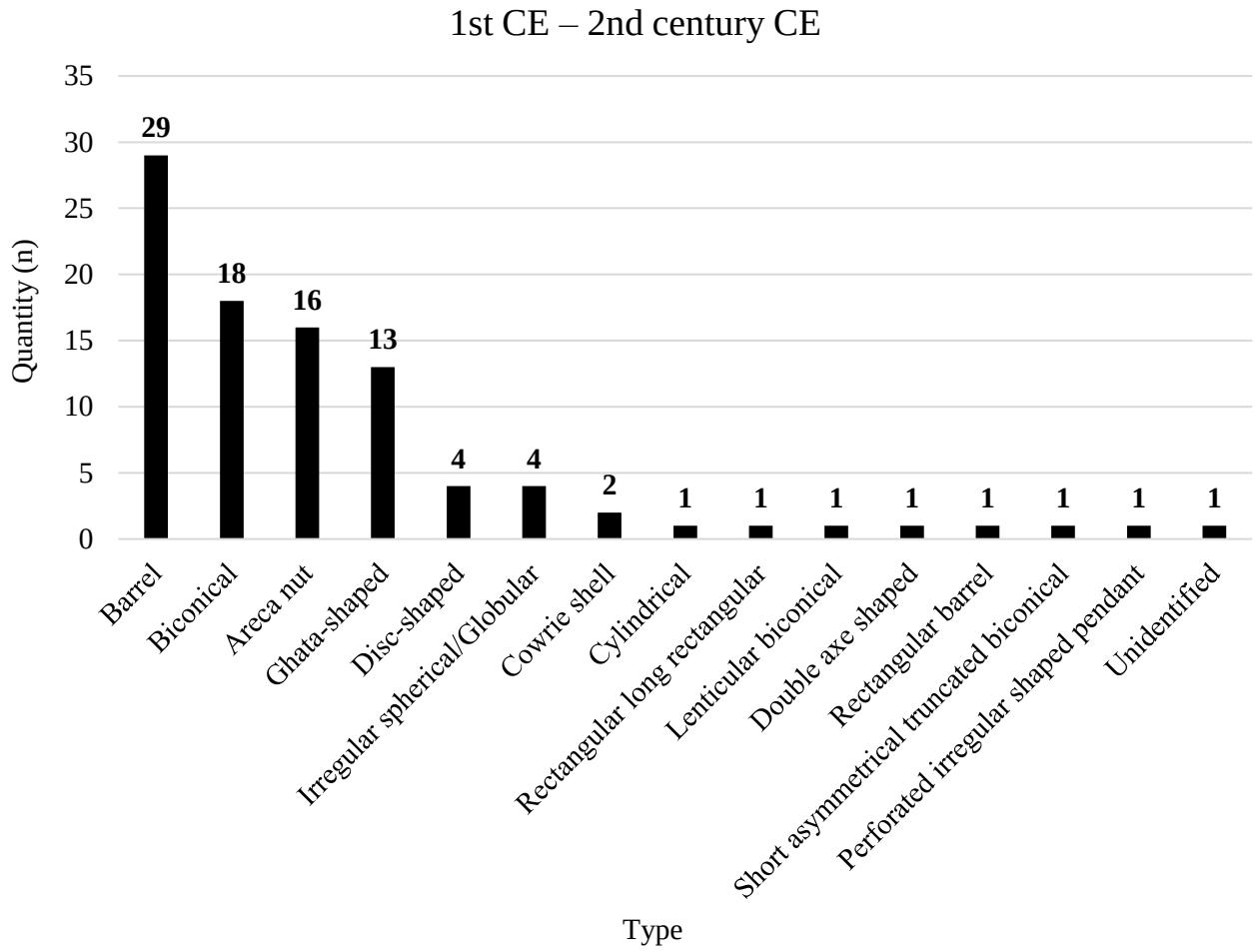


Figure 90: Bead shapes from the Early Kushana period of Barikot (N=94)

Material	Type														
	Barrel	***Areca nut***	***Biconical***	***Ghata-shaped***	***Disc-shaped***	***Cowrie shell***	***Irregular spherical/ Globular***	***Cylindrical***	***Rectangular (barrel/rectangular)***	***Double axe shaped***	***Lenticular biconical***	***Short asymmetrical truncated biconical***	***Perforated irregular shaped pendant***	***Unidentified***	***Total***
Terracotta	1 (0.83%)	16 (13.33%)	15 (12.50%)	13 (10.83%)								1 (0.83%)			46 (38.33%)
Marine shell	13 (10.83%)		1 (0.83%)		1 (0.83%)				1 (0.83%)	1 (0.83%)	1 (0.83%)			1 (0.83%)	19 (15.83%)
Glass	10 (8.33%)		2 (1.66%)		3 (2.50%)		2 (1.66%)								17 (14.16%)
Faience	2 (1.66%)						1 (0.83%)								3 (2.50%)
Carnelian	1 (0.83%)								1 (0.83%)						2 (1.66%)
Beryl	1 (0.83%)							1 (0.83%)							2 (1.66%)
Quartz							1 (0.83%)								1 (0.83%)
Malachite													1 (0.83%)		1 (0.83%)
Jasper						1 (0.83%)									1 (0.83%)
Cowrie shell						1 (0.83%)									1 (0.83%)
Unidentified	1 (0.83%)													26 (21.66%)	27 (22.50%)
Total	29 (24.16%)	16 (13.33%)	18 (15%)	13 (10.83%)	4 (3.30%)	2 (1.66%)	4 (3.30%)	1 (0.83%)	2 (1.66%)	1 (0.83%)	1 (0.83%)	1 (0.83%)	1 (0.83%)	27 (22.50%)	**120 (100%)**

Table 12: Numbers and percentage of bead materials and shapes during the Early Kushana period of Barikot

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For every cubic metre of earth excavated, 3.58 beads were found from trench BKG 11 K-105 corresponding to Macrophase 3b of Barikot. In comparison, 1.29 beads were found in the succeeding Macrophase 4a for every cubic metre of earth excavated. Although the volume of excavated earth of Macrophase 4a is larger (23.97m^3), the bead frequency is smaller compared to Macrophase 3b as the latter has a much smaller volume of excavated earth (7.25m^3). This example indicates that the total number of bead ornaments circulating at Barikot was probably higher in Macrophase 3b as opposed to the current Macrophase 4a (Table 3). This interpretation stands in contrast to the current number of beads recovered from the excavations at trench K-105, which seems to suggest that the number of beads at the site increased from 26 beads in Macrophase 3b to 31 beads in Macrophase 4a. It should be remembered, however, that this interpretation is only based on the documentation of beads from trench BKG 11 K-105, which may need to be revised as new data becomes available from the other trenches of the site in the future.

The bead assemblage deriving from the Early Kushana period of Barikot (Macrophase 4a) shows several typological continuities with the beads from the previous Saka-Parthian period of the site (Macrophase 3b). The dominant and most popular raw material continues to be terracotta with 46 beads made, most prominently, in the biconical and areca nut shape. Also, the popular tradition of decorating the biconical terracotta beads with various decorative motifs, particularly during the earlier Graeco-Bactrian and Indo-Greek periods of Barikot, seems to have declined in Macrophase 4a. Another group of beads that appear to have been popular in Macrophase 4a are the ghata-shaped terracotta beads, which are produced in various forms and styles. Ser. 4370, for example, represents a modified ghata-shaped terracotta bead, which is a beautifully moulded specimen decorated with grooves and 14 floral motifs (Ser. 4370: Figure 91). There are, however, several ghata-shaped beads in the assemblage from Macrophase 4a that are left undecorated and appear to have been made from poorer clay quality (BKG 3077: Figure 92). In general, the ghata-shaped beads of Macrophase 4a are, in many respects, stylistically similar to the ghata-shaped beads of the previous Macrophase 3b, possibly being produced by the same workshop tradition.



Figure 91: Modified ghata-shaped bead of terracotta with decorative designs (Ser. 4370) (Photograph: author's own)



Figure 92: Ghata-shaped bead of terracotta (BKG 3077) (Photograph: author's own)

With regards to marine shell, it appears to be the second most dominant material that was favoured by the people of Barikot in Macrophase 4a as was possibly the case in the earlier Saka-Parthian period of the site (Macrophase 3b). New types of shell beads get introduced at Barikot in Macrophase 4a (Figure 93a-c), which include a double-axe shaped two hole spacer bead (BKG 2917), a lenticular short biconical bead (BKG 2902) and even a short biconical bead (BKG 3081).

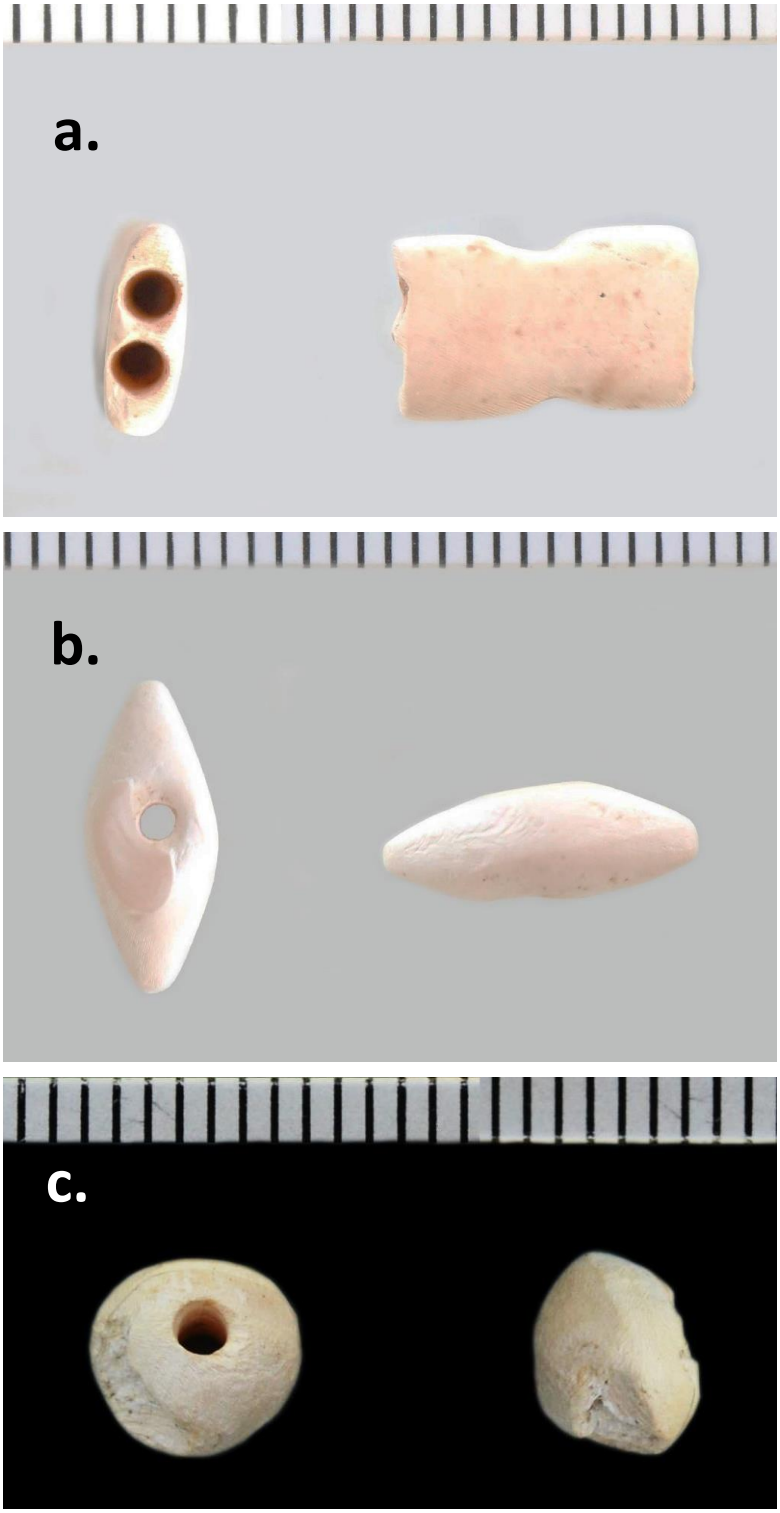


Figure 93: a) Double-axe shaped bead of marine shell (BKG 2917) (Photograph: author's own) b) Lenticular short biconical bead of marine shell (BKG 2902) (Photograph: author's own) c) Short biconical bead of marine shell (BKG 3081) (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

With regards to cowrie shells, a single perforated specimen has been found from trench BKG 5 of Barikot. In addition, a remarkable pendant made from red jasper has been found imitating the shape of a cowrie shell, which raises new research questions about the precise role played by cowrie shells in the past (Ser. 4294: Figure 94). The imitation of cowrie shells was, in fact, by no means limited to Barikot but can be evidenced from the material record of other contemporary sites including Sirkap in Taxila (Beck 1941: Pl. VIII no. 13). In general, the significance and value attached to shell and marine resources seem to have increased during the Kushana period at Barikot in a manner never experienced or perceived at the site before as the forthcoming discussions will further highlight. Geological source areas of jasper can be found in many parts of South Asia, including in Baluchistan and Northern Waziristan (present-day Pakistan) as well as in Gujarat (present-day India) (Law 2008; 2013; Durrani et al. 1995: 26; Malkani et al. 2017), but it is currently difficult to determine the precise source that would have been accessed to produce Ser. 4294.



Figure 94: Red jasper pendant imitating a cowrie shell (Ser. 4294) (Photograph: author's own)

With regards to the stone beads, several varieties are represented in the assemblage from Macrophase 4a, although in very small numbers. They include, for example, carnelian, beryl-aquamarine, quartz and red jasper. Apart from the red jasper pendant (Ser. 4294), the assemblage includes a notable bleached carnelian bead made in the rectangular barrel shape (BKG 2905: Figure 95). The motif of the bleaching is that of a double axe. This carnelian bead is affected by post-depositional damage in the form of burning, which has caused the colour of the stone to turn white while carbon has poured into the bleached pattern causing it turn black. This bead shows no evidence of continuity with the bleached carnelian beads from the earlier cultural periods of Barikot. There is, however, potential evidence for

cultural connections between Barikot and Taxila as indicated by the recovery of a bleached carnelian bead found from Bhir Mound (Dikshit 1949: 56-57: Pl. VIII no. 6), which is also decorated with the double axe motif comparable to BKG 2905. Furthermore, other new varieties of stone include a hexagonal-faceted barrel bead of beryl-aquamarine (BKG 3181) (see Chapter 8).



Figure 95: Rectangular barrel-shaped bead of bleached carnelian (BKG 2905) (Photograph: author's own)

In terms of the prevailing typological characteristics, barrel-shaped beads appear to represent the most popular type of beads that were favoured by the people of Barikot in Macrophase 4a. Barrel-shaped beads were especially found in abundance at Barikot during the earlier pre-Achaemenid, Achaemenid and Mauryan periods (Macrophase 2a1, 2a2 and 2b). Marine shell and glass, as a material, seem to have been produced mainly in a barrel shape as indicated, for example, by a short barrel-shaped glass bead that has a distinct, opaque yellowish-brown colour (BKG 2889: Figure 96a). This distinct group of glass beads was, according to the archaeological evidence, first introduced during the Indo-Greek period at Barikot (Macrophase 3a2-3a4: end-2nd century BCE) and is found widely distributed across South-and South-east Asia (Carter 2013). Other notable varieties in the glass repertoire include an 'eye' glass bead (BKG 3056: Figure 96b) as well as a long barrel-shaped bead made from faience (BKG 751: Figure 97) decorated with grooves and a weathered motif (cross hatchings?). Numerous 'eye' beads of glass and other materials were recovered from Bhir Mound and Sirkap, Taxila (Beck 1941: Pl. I no. 12-20) whereas the barrel-shaped beads of glazed quartz and carnelian from Sirkap (Beck 1941: Pl. IV no. 33;

Pl. V no. 1-2) are stylistically similar to the faience bead from Barikot (BKG 751). This comparative analysis and discussion, hence, allow us to provide further evidence for cultural links and potential commerce occurring between the sites in Taxila and Barikot during the Early Kushana period (Macrophase 4a). Besides, since there is currently no evidence for on-site production of the glass, faience and carnelian beads in Macrophase 4a, it is likely that they arrived in a finished state at Barikot from one of the larger urban settlements probably located in the Taxila Valley.



Figure 96: a) Short barrel-shaped bead of glass (BKG 2889) b) Short barrel-shaped 'eye' bead of glass (BKG 3056) (Photographs: IsMEO Italian Archaeological Mission in Pakistan)

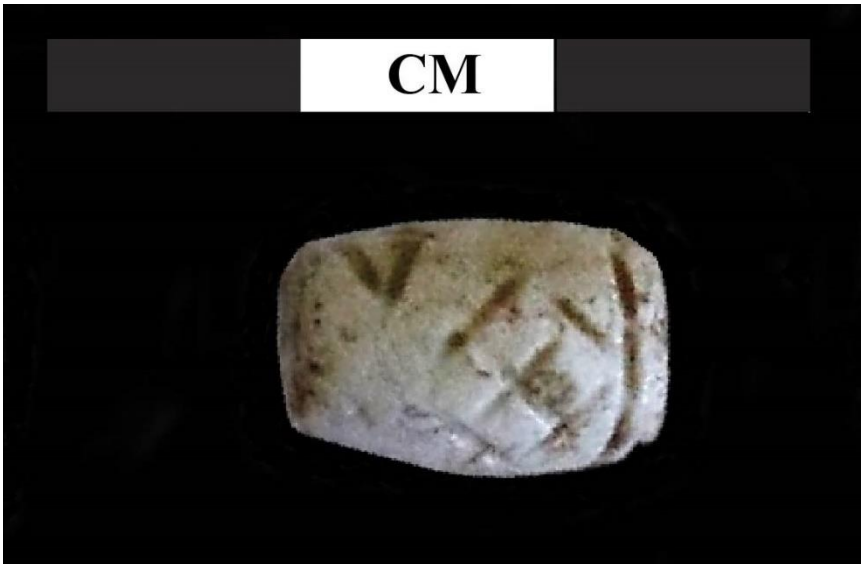


Figure 97: Long barrel-shaped bead of faience with decorative pattern (BKG 751) (Photograph: author's own)

6.1.9 Mature Kushana period (Macrophase 4b: 2nd century CE)

The types of raw material that characterise the bead assemblage from Macrophase 4b include terracotta followed by marine shell, glass, pearl, malachite, coral, garnet, faience, cowrie shell, quartz/rock crystal, lapis lazuli, carnelian, agate, glazed quartz and bone. Three additional beads were studied by the author, but the identification of the raw material was not possible (Figure 98).

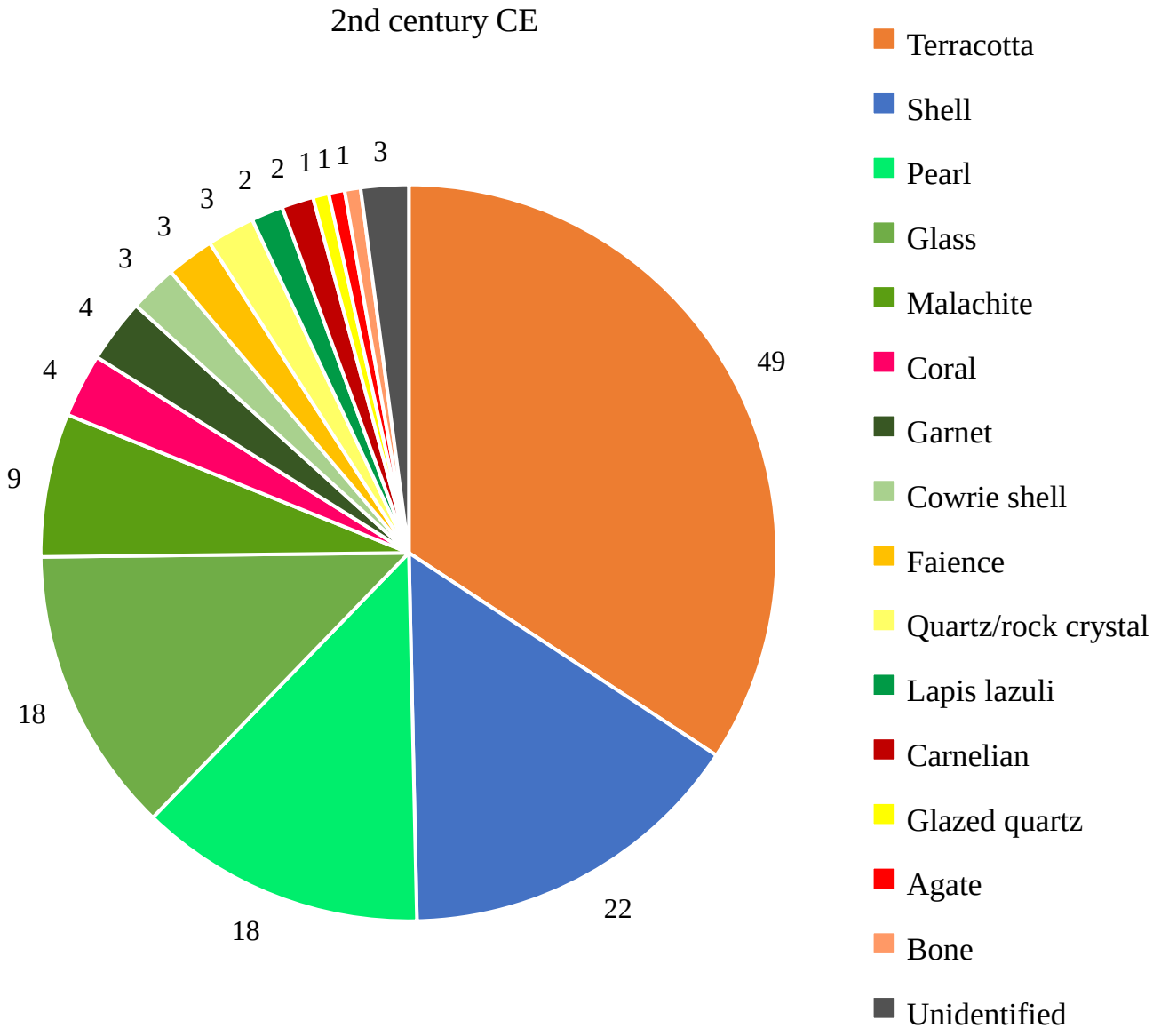


Figure 98: Raw materials of beads from the Mature Kushana period of Barikot (N=143)

A great range of bead shapes have been identified from the study of the bead assemblage from Macrophase 4b including barrel, areca nut, disc-shaped, ghata-shaped, biconical, irregular spherical/globular, spherical, cylindrical, cowrie shell, square short cylindrical, butterfly nut, double comb and cornerless cube forms (Figure 99). 143 beads out of a total of 180 beads were studied,

attributed to Macrophase 4b of the Mature Kushana period of Barikot (Table 13). The material and shape of the remaining 37 beads could not be studied and verified by the author due to time constraints.

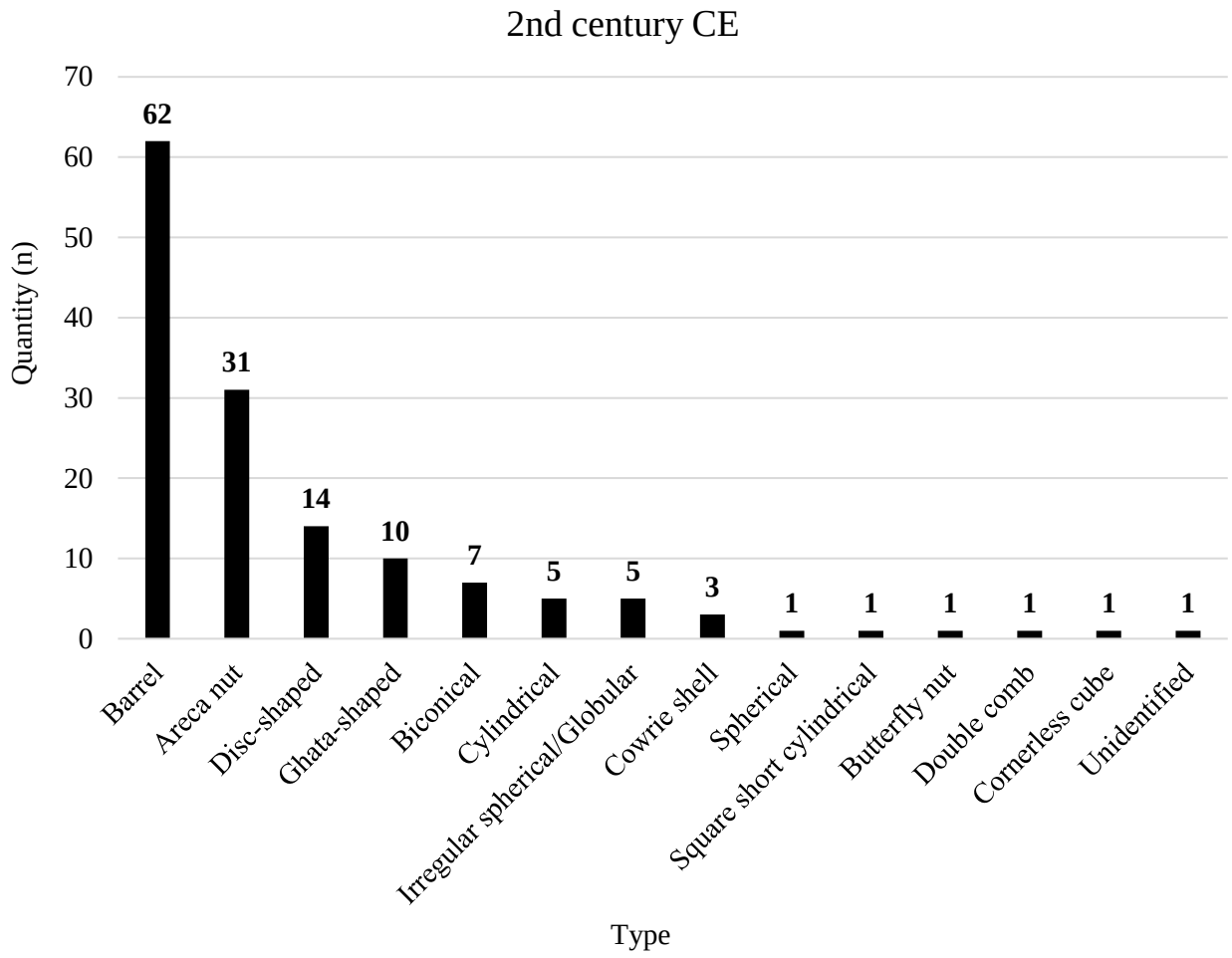


Figure 99: Bead shapes from the Mature Kushana period of Barikot (N=143)

Material	Type														
	Barrel	***Areca nut***	***Biconical***	***Ghata-shaped***	***Disc-shaped***	***Cowrie shell***	***Irregular spherical/ Globular***	***Cylindrical***	***Square short cylindrical***	***Spherical***	***Butterfly nut***	***Cornerless cube***	***Double comb***	***Unidentified***	***Total***
Terracotta		31 (17.22%)	7 (3.88%)	9 (5.0%)			1 (0.55%)							1 (0.55%)	49 (27.22%)
Marine shell	13 (7.22%)				3 (1.66%)		1 (0.55%)	4 (2.22%)					1 (0.55%)		22 (12.22%)
Glass	6 (3.33%)				11 (6.11%)		1 (0.55%)								18 (10.0%)
Faience	2 (1.11%)						1 (0.55%)								3 (1.66%)
Carnelian							1 (0.55%)			1 (0.55%)					2 (1.11%)
Pearl	18 (10.0%)														18 (10.0%)
Quartz/rock crystal	3 (1.66%)														3 (1.66%)
Malachite	9 (5.0%)														9 (5.0%)
Coral	4 (2.22%)														4 (2.22%)
Cowrie shell						3 (1.66%)									3 (1.66%)
Garnet	2 (1.11%)			1 (0.55%)								1 (0.55%)			4 (2.22%)
Glazed quartz											1 (0.55%)				1 (0.55%)
Lapis Lazuli	2 (1.11%)														2 (1.11%)

Agate	1 (0.55%)														1 (0.55%)
Bone								1 (0.55%)							1 (0.55%)
Unidentified	2 (1.11%)								1 (0.55%)					37 (20.55%)	40 (22.22%)
Total	62 (34.44%)	31 (17.22%)	7 (3.88%)	10 (5.55%)	14 (7.77%)	3 (1.66%)	5 (2.77%)	5 (2.77%)	1 (0.55%)	1 (0.55%)	1 (0.55%)	1 (0.55%)	1 (0.55%)	38 (21.11%)	**180 (100%)**

Table 13: Numbers and percentage of bead materials and shapes during the Mature Kushana period of Barikot

As table 13 shows, the number of total beads seems to have increased in the sampled deposits of Barikot from 120 beads in Macrophase 4a to 180 beads in Macrophase 4b, probably related to the greater number of excavations carried out of the Mature Kushana levels. In fact, not a single bead was found from trench BKG 11 K-105, which appears to suggest a potential decrease in the bead frequency in Macrophase 4b compared to the previous Macrophase 4a (Table 3). Future research of the other trenches will eventually determine the calibrated bead frequency by soil volume at the site during this time. The beads from Macrophase 4b are also marked by several typological continuities with the beads deriving from the previous Macrophase 4a of Barikot.

In Macrophase 4b, terracotta continues to be the most dominant raw material that was favoured by the inhabitants of Barikot. The areca nut beads of terracotta are especially popular at the site during this time as they were during the previous Macrophase 4a. These beads are similar in material, design and decoration to the various areca nut beads deriving from the earlier periods of Barikot. In contrast, the number of biconical beads produced from terracotta seems to have declined in Macrophase 4b, which appear to have been quite popular during the earlier chronological periods of Barikot especially during the Indo-Greek and Saka-Parthian periods (Macrophase 3a2-3a4 – 3b). Furthermore, the bead assemblage from Macrophase 4b is characterised by various forms of ghata-shaped beads decorated with grooves and other designs. In contrast to the areca nut beads, the ghata-shaped beads are even produced from high-quality stones during this time as can be evidenced by a ghata-shaped bead made from garnet (Ser. 4175: Figure 101; see also Chapter 8). Note that the beads shown in figure 101 were not found in a strand in the order shown but were arranged as such by the excavators of Barikot.

With regards to marine shell, it appears to be the second most dominant material in Macrophase 4b. As was the case in the previous Macrophase 4a, new types of marine shell beads are used at Barikot during this time. They include, for example, a double comb shaped two hole spacer bead decorated with dovetail recesses and a row of parallel lines on its upper and lower sides (BKG 2875: Figure 100). BKG 2875 bears strong typological resemblance with a double comb bead of carnelian found at Sirkap (Taxila) reportedly dating to the 1st century CE (Beck 1941: Pl. IV no. 24). Both beads are decorated by a row of parallel lines on their upper and lower sides. The carnelian bead from Sirkap is, however, not a spacer bead while the drill hole is located in between the dovetail recesses. The discovery of a double comb bead from Barikot and Sirkap is another potential piece of evidence to propose the possibility of cross-cultural contacts and commercial exchange occurring between both urban centres in Macrophase 4b as already indicated in the earlier Macrophase 4a. In fact, the great variety observed in the shape of the recovered shell beads both from sites in Taxila (Beck 1941) and at Barikot indicates the significance of shell materials during the Saka-Parthian and Kushana periods of Gandhara.



Figure 100: Double comb shaped bead of marine shell (BKG 2875) (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

In addition, the use of barrel-shaped pearl beads appears to be popular at Barikot in Macrophase 4b (Ser. 4175: Figure 101), which, in natural state, have a globular shape. Consequently, the pearl beads from Barikot may have been modified as such by friction rather than through artificial means. The pearl beads have been found together with other precious types of beads from the same context including garnet and coral beads, shedding light on the value imbued in pearls during the Kushana periods (Figure 101). Similarly, several pearl beads have been found from the relic deposits of Taxila often together with other precious materials such as carnelian and garnet. They were almost always placed in direct contact with corporeal remains (Rienjang 2017) possibly implying their use, in addition to purposes of adornment, in ceremonial or cultic functions in Gandhara (see discussion on materials of 'value' in Chapter 8.3).

With regards to the long barrel-shaped coral beads (Ser. 4175: Figure 101), they have a deeper reddish colour compared to the pink cylindrical coral branch from the earlier Graeco-Bactrian period of Barikot (BKG 3818: Figure 75a). Based on the variations in colour and shape, it is possible that the coral that was used to make beads in Macrophase 4b may have been acquired from the Arabian Sea rather than the Mediterranean basin where branches were usually preferred and used (Vidale, personal communication). It is, therefore, possible that the coral from Macrophase 4b was, in fact, procured from the southern coastal areas of the subcontinent and imported to Barikot as finished beads.



Figure 101: Beads of coral, garnet, pearls and malachite from Barikot (Ser. 4175) (Photograph: author's own)

With regards to glass, the short barrel or disc-shaped beads that have a distinct opaque yellowish-brown colour appear to represent the most popular group of glass beads in Macrophase 4b (BKG 2880: Figure 102). This distinct type of glass beads was apparently first introduced during the Indo-Greek period at Barikot (Macrophase 3a2-3a4) and is found in large numbers in the succeeding cultural periods at Barikot, in particular, during the Saka-Parthian and Kushana periods. This group must have been imbued with some form of symbolic meaning related in some way to the distinct colour of these ornaments. Furthermore, the production of faceted beads, especially made from stones, was quite a popular ornamental tradition during the Kushana periods in Gandhara. In this regard, Macrophase 4b reveals evidence for the use of faceted glass beads possibly for the first time in the history of Barikot, which can be evidenced in the form of a hexagonal-faceted barrel bead (BKG 1493: Figure 103). The archaeological evidence from Barikot indicates that the craftspeople of this time were highly skilled and able to produce various types of beads to meet consumer demand and their own needs.



Figure 102: Disc-shaped bead of glass (BKG 2880) (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

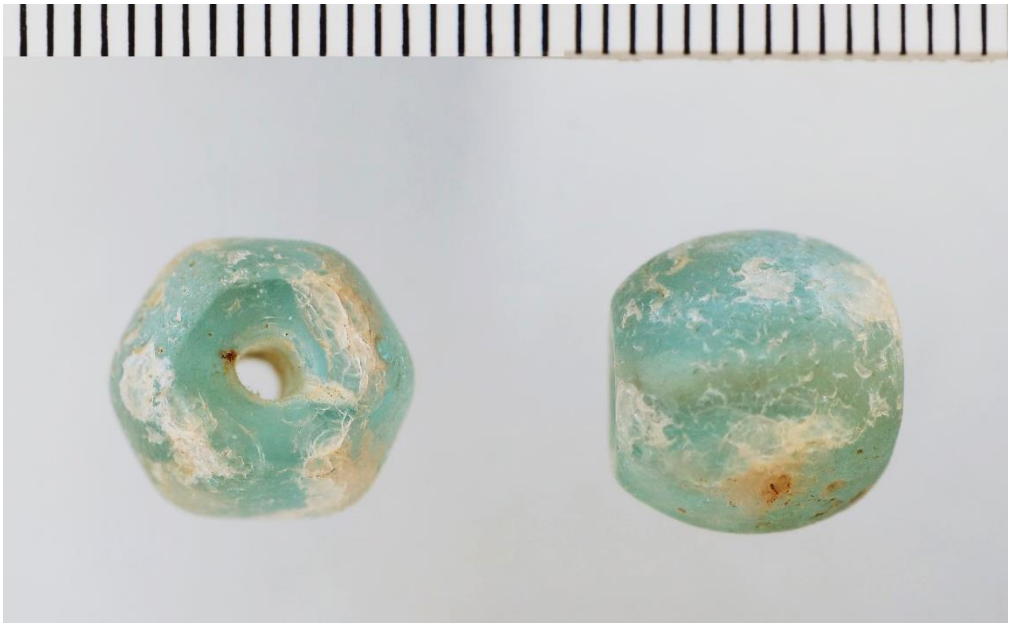


Figure 103: Hexagonal-faceted barrel bead of glass (BKG 1493) (Photograph: author's own)

In terms of quantity, few stone beads have come to light from the excavations thus far, which seems to have been a characteristic feature of the earlier periods of Barikot as well. As the Kushana layers at Barikot have been subjected to extensive vertical and horizontal excavations, it is, particularly, a noteworthy and peculiar feature (see discussions on stone beads in Chapter 8). Only two carnelian beads have been recovered from the excavations, deriving from Macrophase 4b of Barikot (BKG 2616 and BKG 1296: Figure 104a-b).

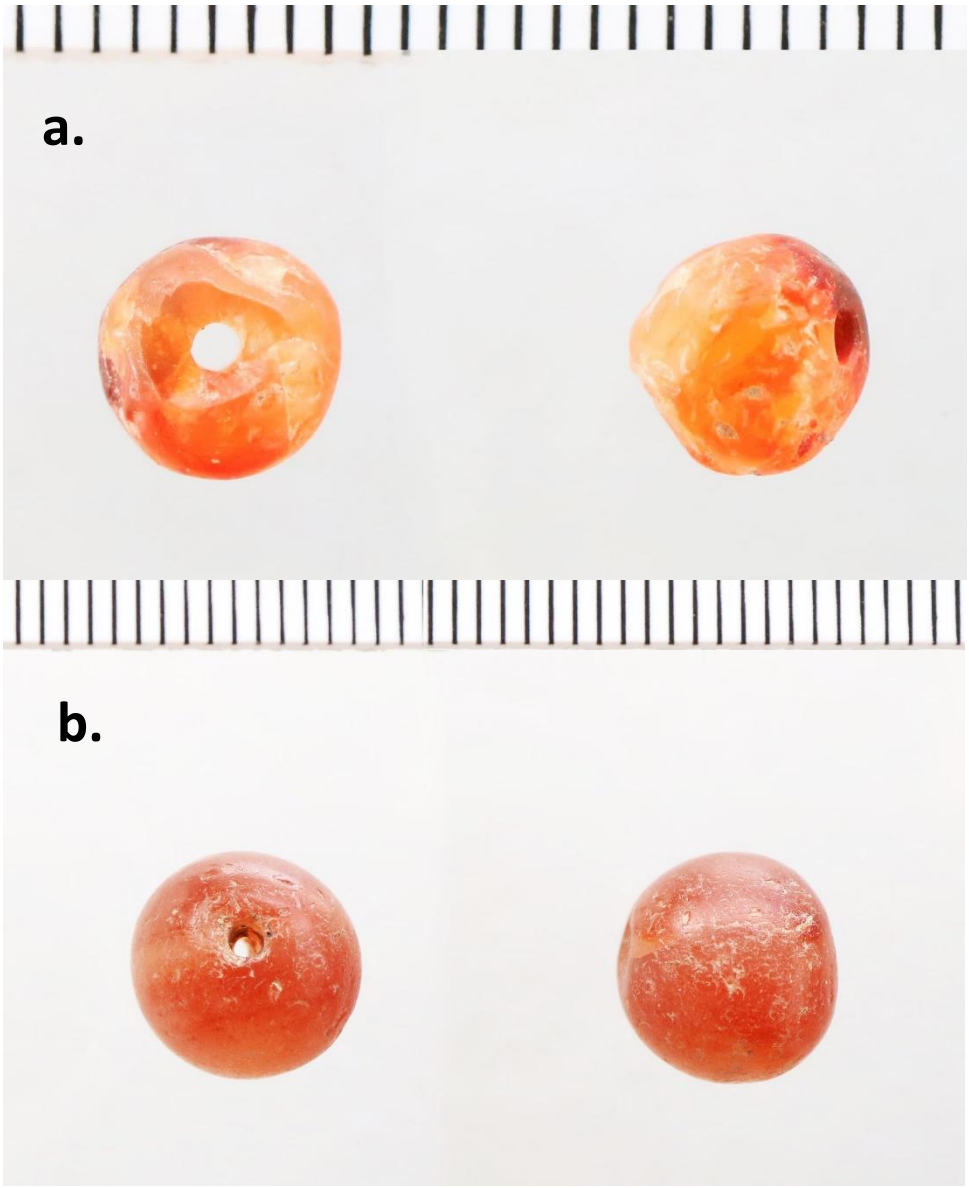


Figure 104: a) Irregular short spherical/Globular bead of carnelian (BKG 2616) b) Spherical bead of carnelian (BKG 1296) (Photographs: author's own)

Other noteworthy varieties of stone include, for instance, a pentagonal-faceted long barrel bead of rock crystal (Ser. 4146: Figure 105a), a gadrooned short barrel bead of lapis lazuli (Ser. 4333: Figure 105b),

cornerless cube and ghata-shaped beads of garnet (Ser. 4175: Figure 101). A more comprehensive discussion on the stone beads from the Kushana periods of Barikot is provided in Chapter 8.

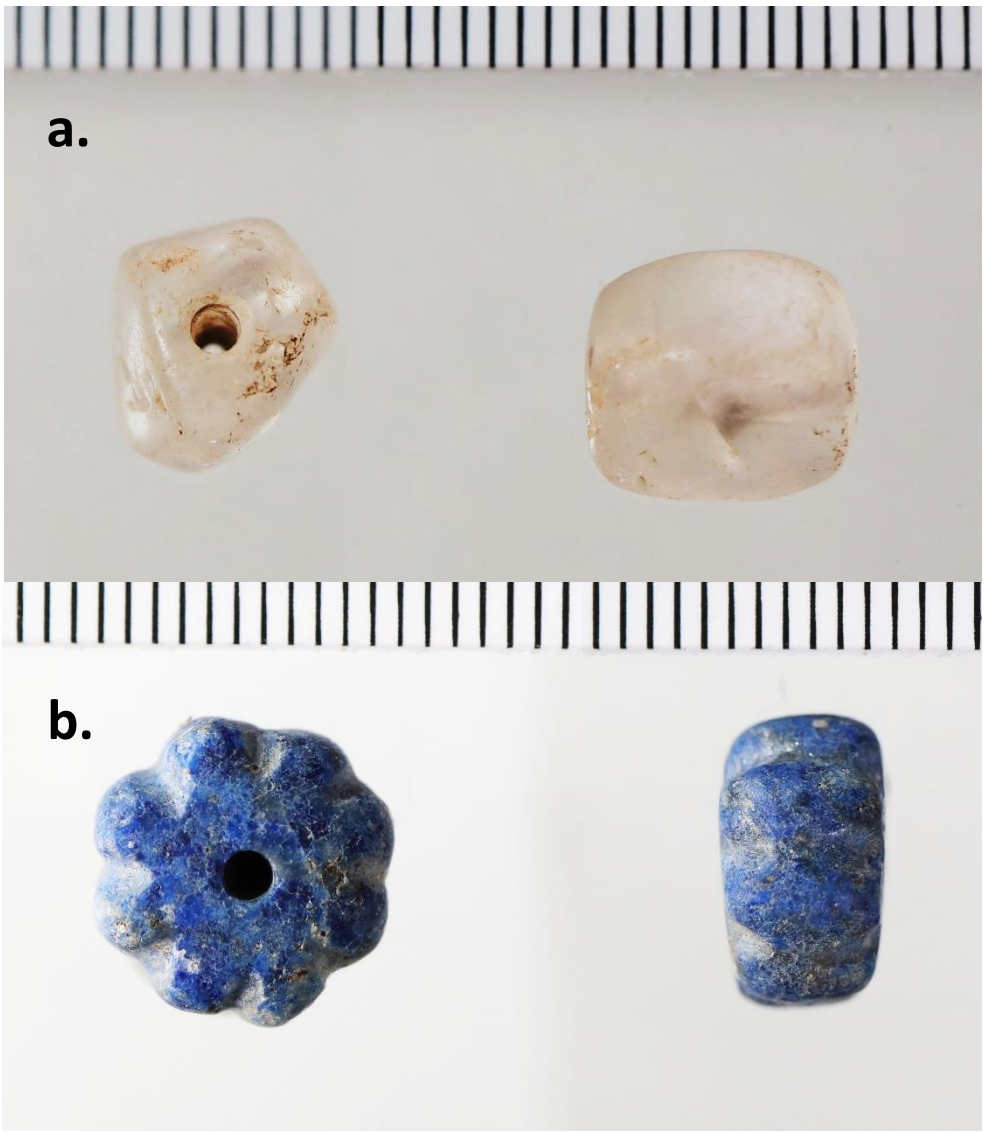


Figure 105: a) Pentagonal-faceted barrel bead of rock crystal (Ser. 4146) b) Gadrooned barrel bead of lapis lazuli (Ser. 4333) (Photographs: author's own)

Another notable bead that is represented in the assemblage from Macrophase 4b is made from glazed quartz (BKG 1534: Figure 106). BKG 1534 represents a butterfly nut bead imitating the shape of a sacred fig, *Ficus religiosa* or pipal leaf, which is native in the foothills of the Himalaya (Burkill 1946). Similar types of beads have been found from Sirkap in Taxila and are reported to date to the 1st century CE (Beck 1941: Pl. V no. 23-24). Since there is currently no conclusive evidence for the production of beads made from vitreous material at Barikot, it is possible that BKG 1534 may have been imported in a finished state from a larger urban centre such as in Taxila. Evidence of connections between Barikot

and Taxila during the Kushana period have already been indicated by the identification of several types of beads in the above-made discussions. The ancient history and significance of pipal leaves can be traced to various ceramic paintings, signs in the Indus Script and forms of artistic media including seals associated with the Indus Tradition (Mahadevan and Bhaskar 2018; Mallah and Shafiq 2017; Panjwani and Sen 2010; Srinivasan 2009).

This sacred fig is also considered to have a religious significance during the Early Historic period of the subcontinent as this is the Bodhi tree under which the historical Buddha is believed to have mediated and attained enlightenment. The Buddha is often portrayed sitting under a canopy of branches and distinct pipal leaves in the Buddhist art of the subcontinent. Pipal leaves can also be seen decorating various other Gandharan art reliefs (Tanabe 2019; Khan 2019: 78-79; Miyaji 2008; Srinivasan 2009). It is, therefore, possible that the bead maker attempted to imitate the shape of *Ficus religiosa* probably for devotional and ceremonial purposes related to Buddhism.

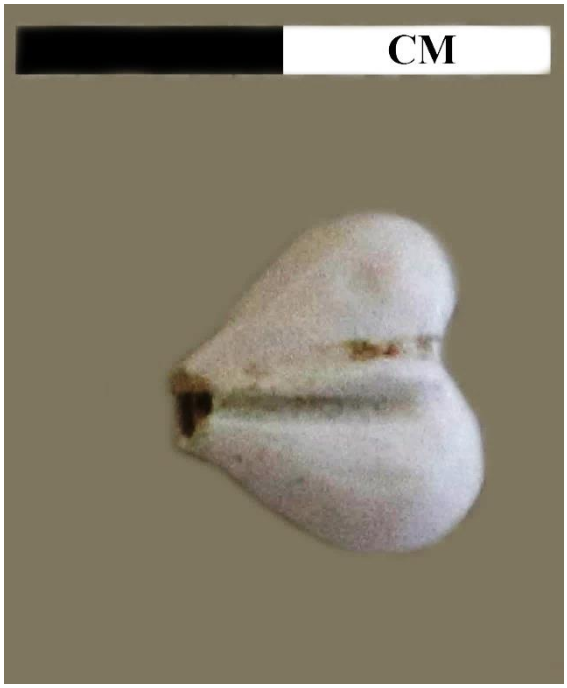


Figure 106: Butterfly nut bead of glazed quartz (BKG 1534) (Photograph: author's own)

6.1.10 Late Kushana period (Macrophase 5a: 1st half of 3rd century CE)

The types of raw material that characterise the bead assemblage from Macrophase 5a of Barikot include terracotta followed by glass, marine shell, lapis lazuli, agate, carnelian, quartz, faience, chloritic rock, jasper, schist, serpentine, malachite and cowrie shell. The raw materials of two beads could not be identified by the author (Figure 107).

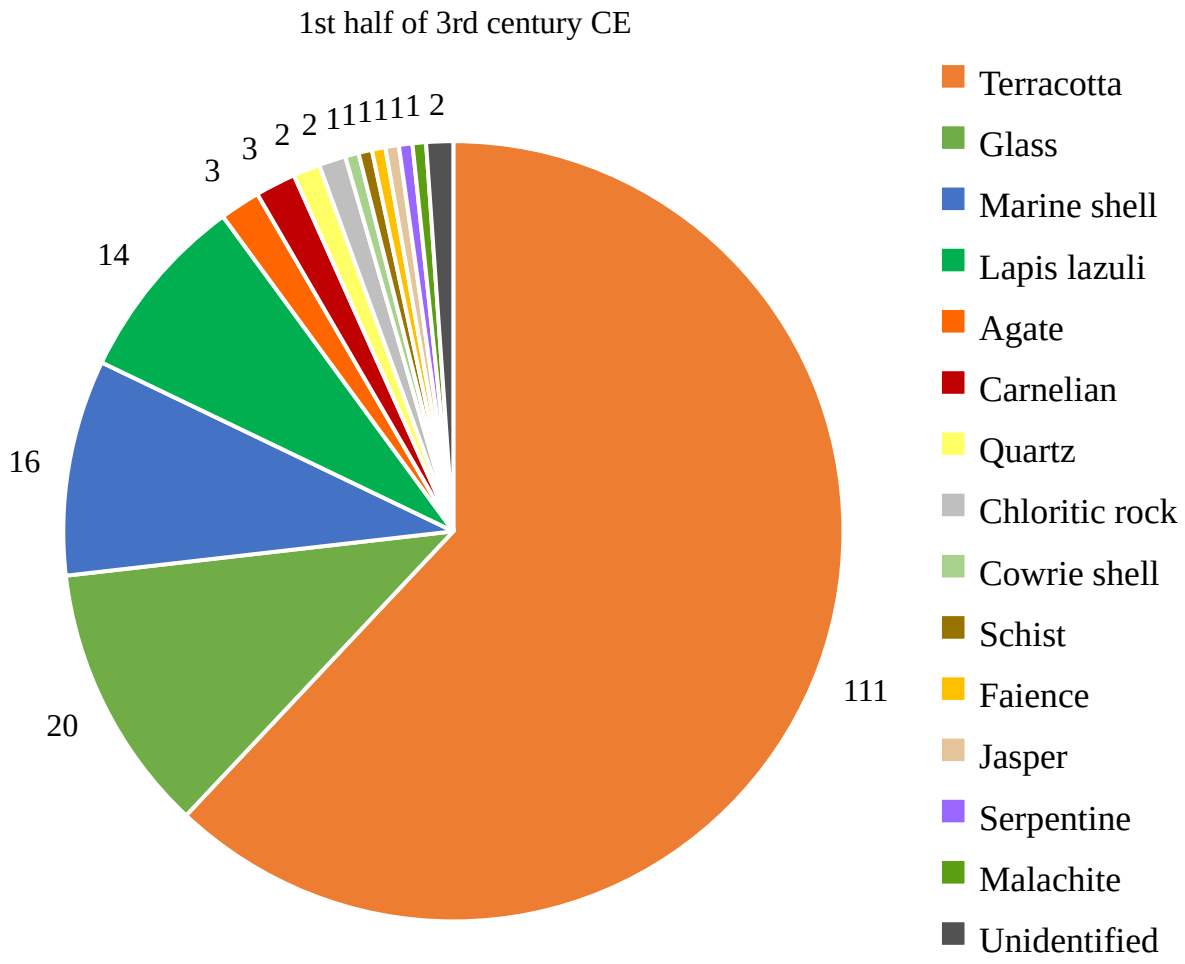


Figure 107: Raw materials of beads from the Late Kushana period of Barikot (N=179)

A great range of bead shapes is represented in the assemblage from Macrophase 5a including areca nut, ghata-shaped, biconical, barrel, disc-shaped, irregular spherical/globular, cylindrical, rectangular barrel, pear-shaped, crimped in the centre with grooves ground at the ends, flower shaped, bird shaped, couched lion shaped and cowrie shell forms (Figure 108). 179 beads were studied by the author from a total of 216 beads, attributed to Macrophase 5a of the Late Kushana period of Barikot (Table 14). The material and shape of the remaining 37 beads could not be verified by the author due to time constraints.

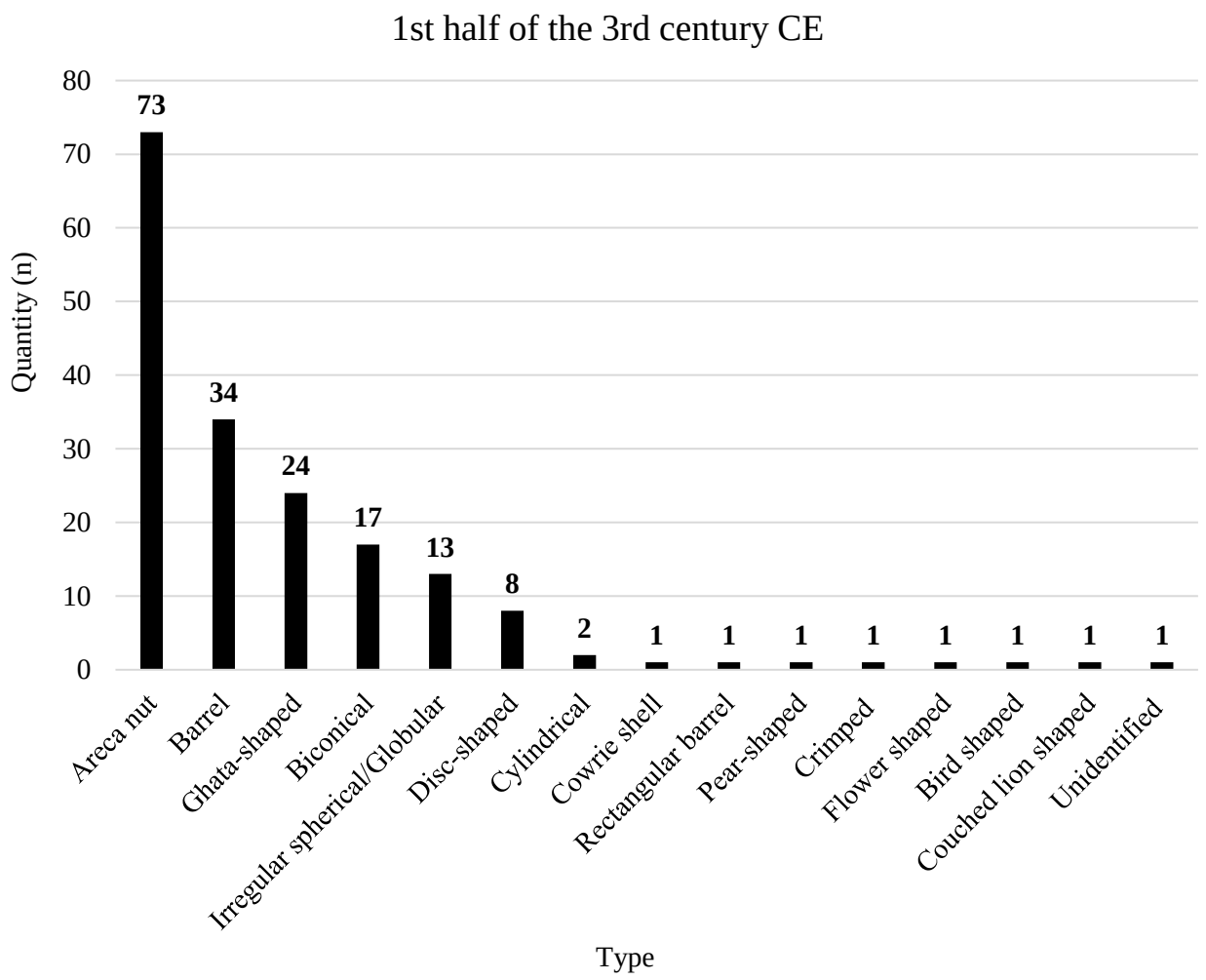


Figure 108: Bead shapes from the Late Kushana period of Barikot (N=179)

Material	Type															
	Barrel	***Areca nut***	***Biconical***	***Ghata-shaped***	***Disc-shaped***	***Cowrie shell***	***Irregular spherical/ Globular***	***Cylindrical***	***Rectangular barrel***	***Pear-shaped***	***Flower shaped***	***Bird shaped***	***Couched lion***	***Crimped***	***Unidentified***	***Total***
Terracotta	1 (0.46%)	73 (33.79%)	13 (6.01%)	24 (11.11%)												111 (51.38%)
Marine shell	12 (5.55%)				1 (0.46%)				1 (0.46%)		1 (0.46%)	1 (0.46%)				16 (7.40%)
Glass	9 (4.16%)		3 (1.38%)		6 (2.77%)									1 (0.46%)	1 (0.46%)	20 (9.25%)
Lapis lazuli	2 (0.92%)						11 (5.11%)			1 (0.46%)						14 (6.48%)
Carnelian	2 (0.92%)		1 (0.46%)													3 (1.38%)
Agate	2 (0.92%)						1 (0.46%)									3 (1.38%)
Quartz	1 (0.46%)						1 (0.46%)									2 (0.92%)
Chloritic rock	1 (0.46%)							1 (0.46%)								2 (0.92%)
Faience	1 (0.46%)															1 (0.46%)
Serpentine	1 (0.46%)															1 (0.46%)
Jasper	1 (0.46%)															1 (0.46%)
Malachite	1 (0.46%)															1 (0.46%)
Schist								1 (0.46%)								1 (0.46%)

Cowrie shell						1 (0.46%)										1 (0.46%)
Unidentified					1 (0.46%)								1 (0.46%)		37 (17.12%)	39 (18.05%)
Total	34 (15.74%)	73 (33.79%)	17 (7.87%)	24 (11.11%)	8 (3.70%)	1 (0.46%)	13 (6.01%)	2 (0.92%)	1 (0.46%)	1 (0.46%)	1 (0.46%)	1 (0.46%)	1 (0.46%)	1 (0.46%)	38 (17.59%)	**216 (100%)**

Table 14: Numbers and percentage of bead materials and shapes during the Late Kushana period of Barikot

The number of beads appears to have increased from 180 beads in Macrophase 4b to 216 beads in Macrophase 5a based on the sampled deposits of Barikot, which may, however, be related to the greater number of excavations carried out of the Late Kushana levels. In fact, following the pattern observed in Macrophase 4b, not a single bead was recovered from trench BKG 11 K-105 corresponding to Macrophase 5a, which is why the calibrated bead frequency by soil volume probably remained low at the site during this time as well. The data emerging from the neighbouring trench BKG 11 K-107 has, likewise, revealed a low bead frequency of only 0.20 per cubic metre (Table 3), supporting the data from K-105. The study of the other excavated trenches in the future has the potential to shed more light on the calibrated bead frequency by soil volume at Barikot during the Late Kushana period. The beads from Macrophase 5a show several typological continuities with the beads deriving from the previous Macrophase 4b.

In terms of raw material, terracotta appears to be the most dominant material that was used to produce beads at Barikot in Macrophase 5a. In this regard, the areca nut beads are the most popular type of beads during this time as they were in the previous Macrophase 4b. In terms of the distribution pattern, it is important to point out that most of the areca nut beads of terracotta from this time have been found from the trenches BKG 4-5 while the trenches BKG 1 and BKG 12 have revealed a few specimens only. Likewise, none have been found from trench BKG 11 of Barikot. Similarly, with the exception of one bead, most of the ghata-shaped beads of terracotta have been found from trench BKG 4-5 as well, giving the impression that they were potentially associated with a specific neighbourhood during this time (see discussion in Chapter 8.3).

With regards to the biconical terracotta beads, a unique specimen has been found from trench BKG 12 (BKG 2589: Figure 109) inscribed with letters of the Kharosthi script (two akṣaras ‘ka’ next to each other; Baums, personal communication), which was used in Gandhara between the 4th BCE – 3rd century CE. These letters may represent the owner’s marks, but it is currently difficult to determine the precise role played by BKG 2589 at Barikot in the absence of further examples. The discovery of BKG 2589 adds further significance to terracotta as a valued material that was used for multi-functional purposes at Barikot during the Late Kushana period.



Figure 109: Biconical bead of terracotta with inscribed Kharosthi (BKG 2589) (Photograph: author's own)

Furthermore, the types of glass beads that were circulating at Barikot in Macrophase 5a do not appear to be characterised, in general, by major new typological developments or trends compared to the earlier chronological periods of the site. The distinct, opaque, yellowish-brown glass beads, for instance, remain in circulation at Barikot in Macrophase 5a as they did in the earlier periods of the site. There is a unique, gadrooned barrel-shaped bead of glass (BKG 5092: Figure 110), however, which stands out among the glass repertoire of the bead assemblage from Macrophase 5a (for detailed discussion see Chapter 8).

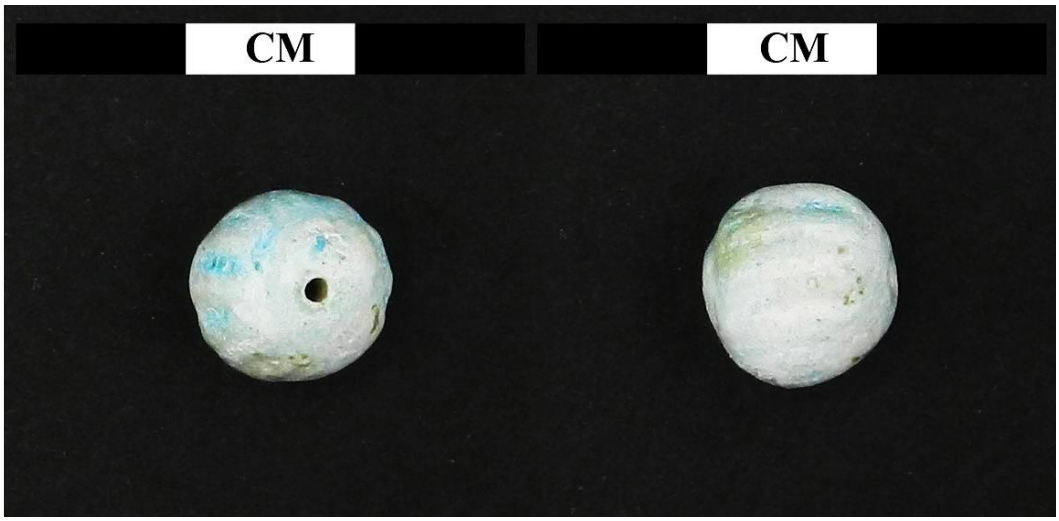


Figure 110: Gadrooned barrel-shaped bead of glass (BKG 5092) (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

With regards to marine shell, this material remains quite popular among the people of Barikot during the Late Kushana period as it did, in particular, during the earlier periods of Kushana rule at Barikot. Since no shell debitage or waste material has been found at Barikot, it is highly likely that marine shell arrived in a finished form at the site potentially as valuable and desirable long-distance commodities (see Chapter 8.3). Various types of marine shell beads have been found from Macrophase 5a including a flower shaped two hole spacer bead (Ser. 4352: Figure 111; see Chapter 8 for detailed discussion), which is stylistically similar to the several examples of flower shaped beads reported from the Taxila Valley (Beck 1941: 19-20).

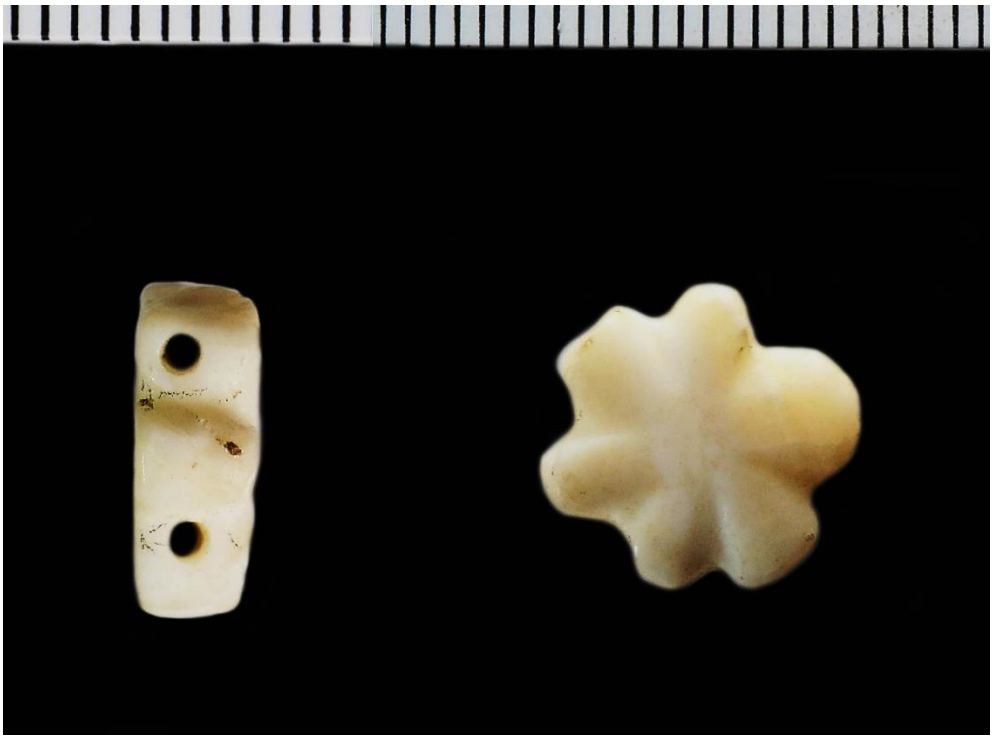


Figure 111: Flower shaped two hole spacer bead of marine shell (Ser. 4352) (Photograph: author's own)

Marine shell was not only produced in the imitation of floral designs during the Late Kushana period but was also used to imitate the shape of various animals such as birds (BKG 2428: Figure 112a). Other notable animals that were imitated in the production of beads include an unperforated couched lion from Barikot, but it was not possible to identify the raw material that was used to make it (Ser. 4323: Figure 112b). In fact, various types of animal forms were imitated to produce beads during the Kushana period of Gandhara as evidenced by the diverse collection of beads recovered from Taxila ranging from lions, birds, tortoises, frogs, elephants, monkeys among others (Beck 1941: Pl. VII). Different animals including birds were also featured in the visual art of Gandhara from this time (Brancaccio and Olivieri 2019: 136). Animal shaped beads probably had some amuletic or religious significance (Beck 1941: 17; Marshall 1951: 748).

Although it is currently difficult to determine the precise importance of animal shaped beads, they were probably imbued with symbolic meaning specifically in relation to Buddhism, which has consistently been sympathetic towards non-human living beings (Cowell 1895; Singh 2015: 61). Among other possible reasons, animals have been used as symbols for human beings in the Buddhist literary sources. The lion, for example, is one of the most frequently used animals for the beads of Taxila probably representing a symbol of the Buddha 'Śākyasiṁha' or 'Lion of the Śākya race' (Beck 1941: 17; Marshall 1951: 748). In fact, animals are frequently mentioned as main or peripheral characters in Buddhist literature including the tales narrated in the Jātaka Commentary - the previous births of the Buddha (Cowell 1895), which form an integral part in the art image and text repertoire of Gandhara (Neelis 2019). The Jātaka tales contain numerous references to various groups of animals (Cowell 1895) while the archaeological record reveals beads produced in the shape of the same groups of animals that are mentioned in the texts including lions, monkeys, birds, elephants and tortoises. The production of animal shaped beads, therefore, may just reflect the veneration of specific characters or episodes in the Buddha's previous lifetimes.

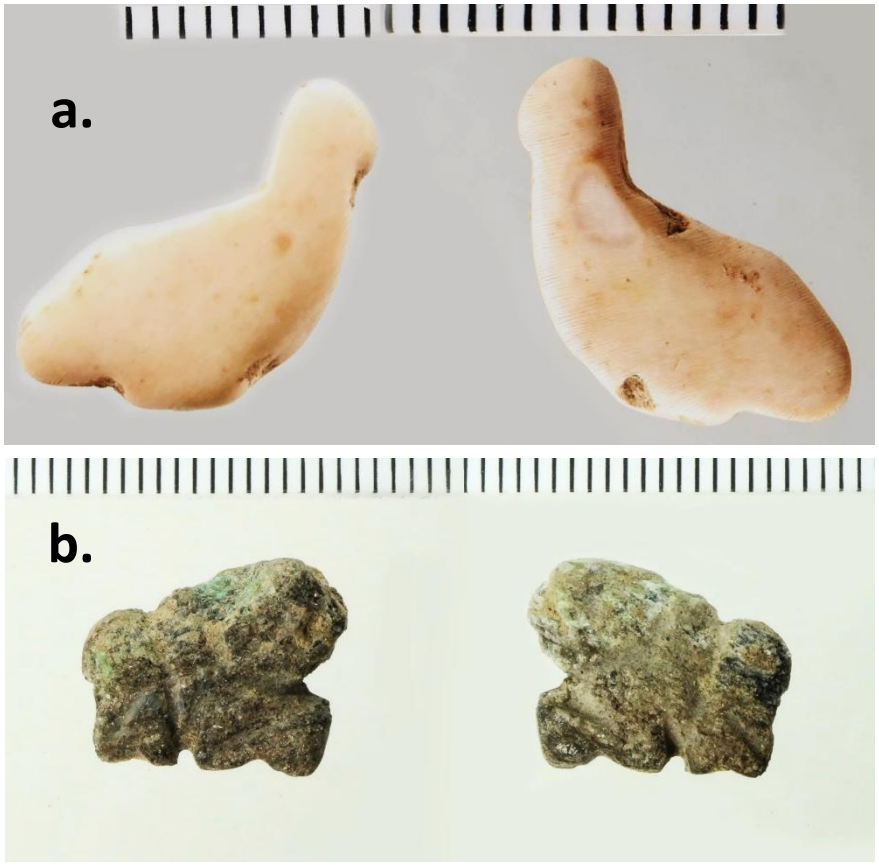


Figure 112: a) Bird shaped bead of marine shell (BKG 2428) b) Couched lion shaped unperforated bead (Ser. 4323) (Photographs: author's own)

With regards to the stone beads, various varieties are represented in the assemblage from Macrophase 5a including lapis lazuli, quartz, carnelian, agate, jasper and serpentine. Geological source areas of serpentine can be found in Baluchistan, North Waziristan, the Dargai area and the Gilgit-Skardu region of northern Pakistan (Awan 1987; Kazmi 1995: 286; Law 2008: 155), so serpentine could have been accessed by craftspeople of the Kushana territories relatively easily (see Chapter 7.2.4 for detailed discussion). It is important to point out that long barrel beads made from various types of stone appear to represent a characteristic feature in the ornamental traditions of the people of the Kushana periods at Barikot as evidenced by a green serpentine bead (BKG 2630), an agate bead (Ser. 4426) and a brown jasper bead (Ser. 4384) (Figure 113; see Chapter 8 for detailed discussion).



Figure 113: a) Long barrel bead of agate (Ser.4426) b) Long barrel bead of brown jasper (Ser. 4384) c) Long barrel bead of serpentine (BKG 2630) (Photographs: author's own)

Another popular raw material of Macrophases 5a that was used to manufacture beads is lapis lazuli. This precious stone seems to have played a minor role in the ornamental traditions of the people at

Barikot during the pre-Kushana periods as already stated above. The archaeological evidence from Macrophase 4b and 5a of Barikot indicates, however, that lapis lazuli played an important role in the lives of the people at Barikot during the Kushana period (see Chapter 8.3). As many as 14 beads of lapis lazuli have been found in the excavations at the site thus far (Ser. 4325: Figure 114a). Although no conclusive evidence is available yet, the recovery of several fragments of lapis lazuli from Barikot possibly suggests that the stone was processed in some form at the site during the Kushana period (BKG 5184: Figure 114c).

In fact, a few glass beads have been recovered from the site, which have a dark bluish colour that is reminiscent of lapis lazuli (Ser. 4350: Figure 114b). In this regard, the evidence, presented in the above-made discussions, already indicates that there was a cultural tradition at Barikot to imitate high-quality materials and/or forms of beads especially during the Kushana period (see, for example, red jasper pendant produced in the shape of a cowrie shell, figure 94). The potential imitation of lapis lazuli may, therefore, signal the inaccessibility of the stone to the lower status groups at Barikot during this time, prompting them to create imitations of the original material through the medium of glass.

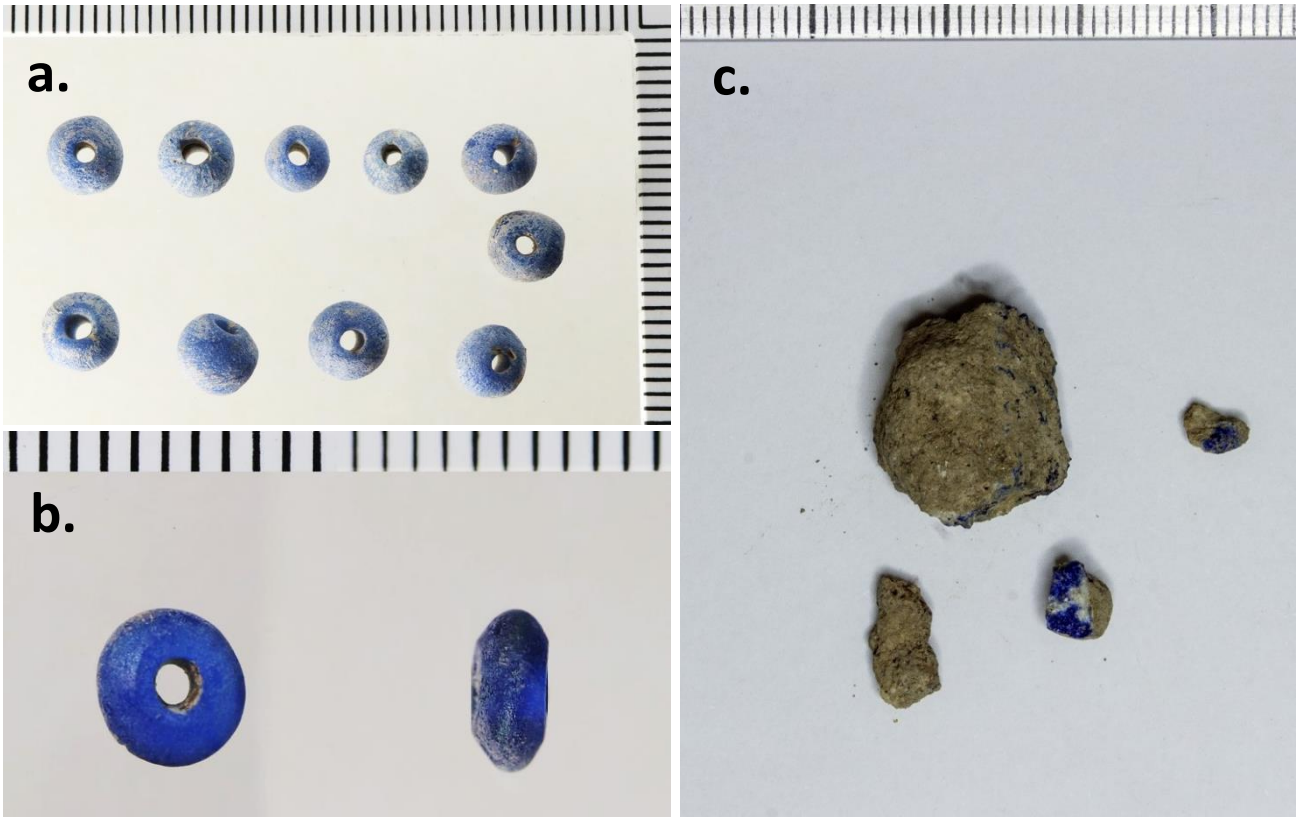


Figure 114: a) Irregular spherical/Globular and pear-shaped beads of lapis lazuli (Ser. 4325) (Photograph: author's own) b) Short biconical bead of blue glass (Ser. 4350) (Photograph: author's own) c) Raw material debitage of lapis lazuli (BKG 5184) (Photograph: ISMEO Italian Archaeological Mission in Pakistan)

6.1.11 Kushano-Sasanian period (Macrophase 5b: 2nd half of 3rd century CE)

The types of raw material that characterise the bead assemblage from Macrophase 5b include terracotta followed by glass, marine shell, carnelian, faience, lapis lazuli, quartz, cowrie shells and a sea snail *Engina Mendicaria* (Figure 115). Although the author was able to identify the raw materials of the beads, the shape of one faience bead could not be precisely determined due to post-depositional damage.

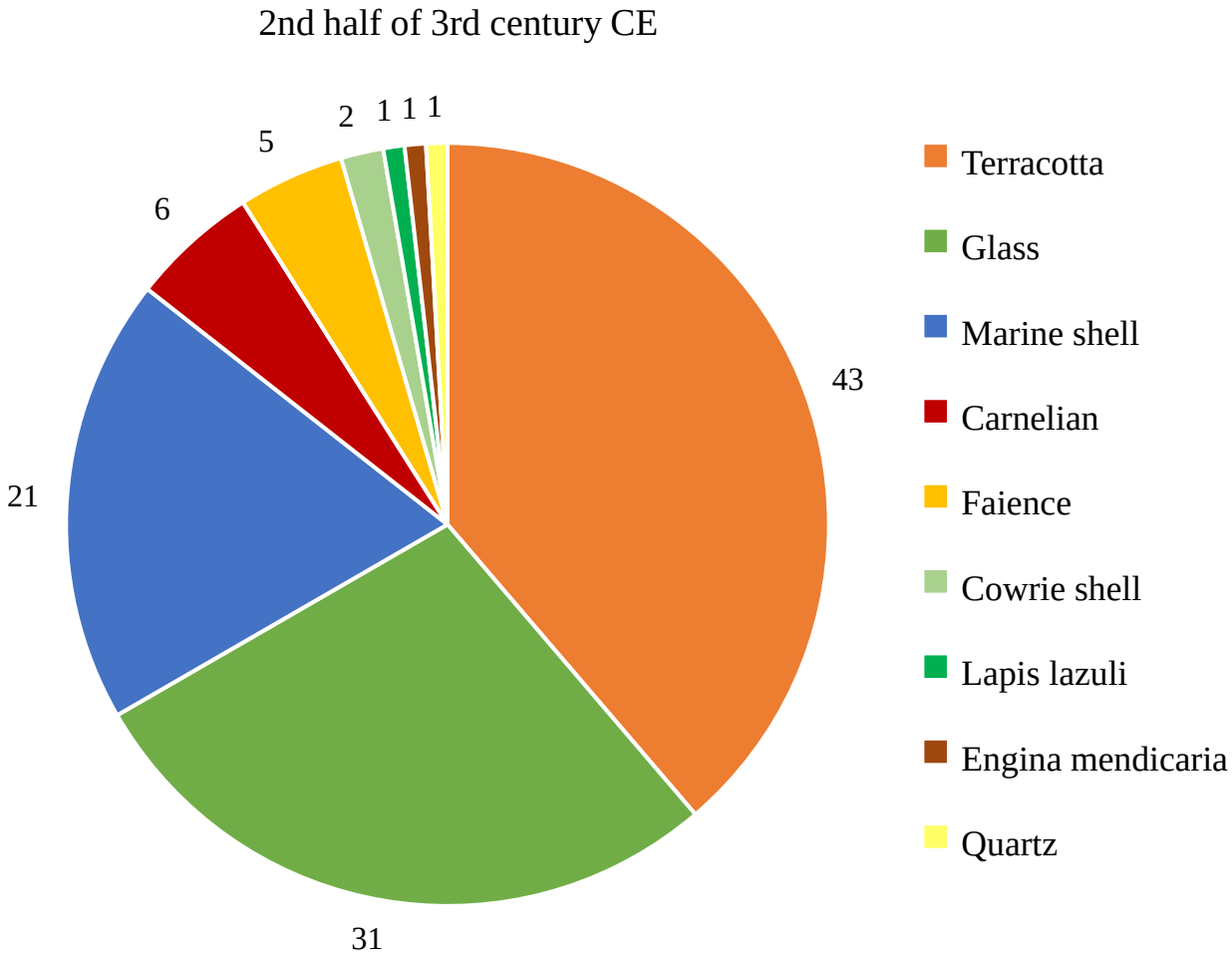


Figure 115: Raw materials of beads from the Kushano-Sasanian period of Barikot (N=111)

A range of bead shapes is represented in the bead assemblage from Macrophase 5b including areca nut, barrel, cylindrical, disc-shaped, rectangular circular/rectangular, ghata-shaped, irregular spherical/globular, spherical, lenticular biconical/barrel, tortoise shaped, flower shaped, conical, cowrie shell and *Engina Mendicaria* forms (Figure 116). 111 beads were studied and verified by the author from a total of 124 beads, attributed to Macrophase 5b of the Kushano-Sasanian period of Barikot (Table 15). The material and shape of the remaining 14 beads could not be verified by the author due to time constraints.

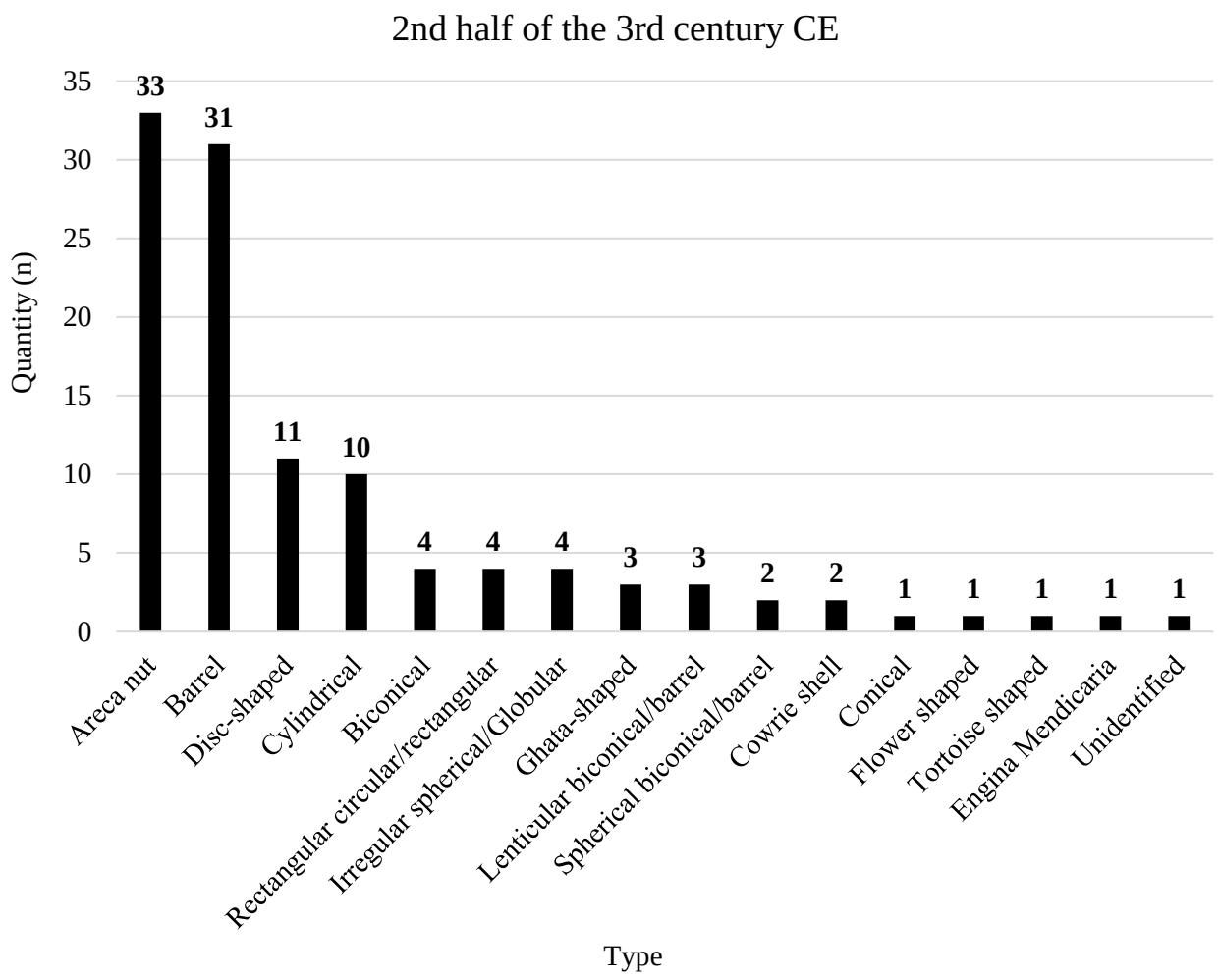


Figure 116: Bead shapes from the Kushano-Sasanian period of Barikot (N=112)

Material	Type																
	Barrel	***Areca nut***	***Biconical***	***Ghata-shaped***	***Disc-shaped***	***Cowrie shell***	***Irregular spherical/ Globular***	***Cylindrical***	***Rectangular circular/ rectangular***	***Spherical***	***Conical***	***Lenticular biconical/ barrel***	***Flower shaped***	***Tortoise shaped***	***Engina Mendicaria***	***Unidentified***	***Total***
Terracotta	3 (2.41%)	33 (26.61%)	3 (2.41%)	3 (2.41%)			1 (0.80%)										43 (34.67%)
Marine shell	8 (6.45%)				4 (3.22%)		1 (0.80%)	3 (2.41%)	1 (0.80%)			3 (2.41%)	1 (0.80%)				21 (16.93%)
Glass	17 (13.70%)				6 (4.83%)			5 (4.03%)	1 (0.81%)	1 (0.80%)	1 (0.80%)						31 (25%)
Lapis lazuli	1 (0.80%)																1 (0.80%)
Carnelian	2 (1.61%)		1 (0.80%)				2 (0.80%)		1 (0.80%)								6 (4.83%)
Engina Mendicaria															1 (0.80%)		1 (0.80%)
Quartz										1 (0.80%)							1 (0.80%)
Cowrie shell						2 (1.61%)											2 (1.61%)
Faience					1 (0.80%)			2 (1.61%)						1 (0.80%)		1 (0.80%)	5 (4.03%)
Unidentified																13 (10.48%)	13 (10.48%)
Total	31 (25%)	33 (26.61%)	4 (3.22%)	3 (2.41%)	11 (8.87%)	2 (1.61%)	4 (3.22%)	10 (8.06%)	3 (2.41%)	2 (1.61%)	1 (0.80%)	3 (2.41%)	1 (0.80%)	1 (0.80%)	1 (0.80%)	14 (11.29%)	**124 (100%)**

Table 15: Numbers and percentage of bead materials and shapes during the Kushano-Sasanian period of Barikot

It appears that the number of beads has decreased from 215 beads in Macrophase 5a to 124 beads in Macrophase 5b based on the sampled deposits of Barikot. Only 0.11 beads were found from trench BKG 11 K-105 for every cubic metre of earth excavated indicating a slight increase in the bead frequency since the previous Macrophase 5a. Similar results have been obtained from trench BKG 11 K-107 with a bead frequency of 0.14 only (Table 3). It is likely that beads remained popular commodities at Barikot during the Late Kushana and Kushano-Sasanian periods, deriving from across the excavated parts of the city. Future studies will determine if the current results can be corroborated by the data from the other trenches of the site or if this apparent decrease in the quantity of beads represents an isolated phenomenon limited to BKG 11 K-105 and K-107.

The study of the bead assemblage from Macrophase 5b reveals evidence of several typological continuities with the beads deriving from the earlier periods of the site. Although terracotta appears to be the most dominant material, used to produce beads during the Kushano-Sasanian period, the number of terracotta beads seems to have fallen from 111 in Macrophase 5a to only 43 specimens in Macrophase 5b. The areca nut beads appear to be still popular at the site during this time compared to the ghata-shaped and biconical beads of terracotta. This apparent, marked decline in the number of terracotta beads may be indicative of a shift occurring in the local taste for ornaments at Barikot in which these distinct types of beads are possibly no longer favoured en masse by the people of the site in Macrophase 5b.

Regarding the glass beads, they appear to remain quite popular among the people of Barikot in Macrophase 5b. Some types of glass beads that were in circulation during the earlier Kushana periods of Barikot are still favoured in Macrophase 5b including the distinct, opaque yellowish-brown glass beads (BKG 2880: Figure 102). The discovery of a short barrel-shaped bead of glass coated with gold foil (BKG 2459: Figure 117), most notably, represents another piece of evidence not only indicating the excellent level of craftsmanship involved in the manufacturing process but possibly also the circulation of wealth items at the site during this time. It is, however, difficult to determine if this bead was imported in a finished state from a distant geographic region or was produced at a local workshop in Gandhara.



Figure 117: Short barrel-shaped bead of glass coated with gold foil (BKG 2459) (Photograph: author's own)

Furthermore, new variants of the Indo-Pacific glass bead group are represented in the assemblage from Macrophase 5b that have distinct yellow and bluish colours. They are also found in the bead assemblages of the succeeding chronological periods of Barikot (see forthcoming discussions). Similar types of beads have been found in large numbers from the excavations of other historical sites especially in South India (Abraham 2016), potentially representing evidence for cross-cultural and commercial connections between Barikot and peninsular India during the Kushano-Sasanian period. Animal-shaped beads, likewise, continue to circulate at Barikot during the Kushano-Sasanian period as evidenced by a notable bead made from faience in the shape of a tortoise (BKG 2213: Figure 118), probably imbued with symbolic-ideological meaning related to Buddhism (Cowell 1895: Vol. II 55-56, 106-107, 123-124; see discussions on animal-shaped beads above). A direct link with the Buddhist world and traditions, however, can only be established through the critical examination of the Buddhist literary sources and the study of the archaeological contexts of the finds in the future. The wider importance of these beads is indicated by the recovery of several tortoise shaped beads of faience and other materials from sites in Taxila (Beck 1941: Pl. VII no. 23-24), potentially representing another piece of evidence of connections between Barikot and Taxila in which ideas and/or goods were exchanged and shared.



Figure 118: Tortoise shaped bead of faience (BKG 2213) (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

Moreover, the recovery of beads made from marine shell represents an additional source of evidence to argue for long-distance connections between the southern coastal areas of the subcontinent and Barikot. Shell, as a material, continues to be favoured by the people of Barikot as evidenced by the use of two hole spacer beads, which were also popular during the earlier Kushana periods of the site. In this regard, the assemblage from Macrophase 5b includes, for example, a two hole spacer bead of marine shell, produced in the shape of a flower (BKG 4082: Figure 119). BKG 4082 is, in fact, typologically comparable to the spacer bead discussed in the previous Macrophase 5a (Ser. 4352: Figure 111), possibly suggesting that the control over the manufacture of these beads may have been maintained by the craftspeople rather than by the ruling elite groups or the state.



Figure 119: Flower shaped two hole spacer bead of marine shell (BKG 4082) (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

Furthermore, another notable two hole spacer bead of marine shell has been identified in the assemblage from Macrophase 5b (BKG 2490: Figure 120a). The shape of this bead echoes the form of the double-domed Gumbat Balo-Kale *vihāra* near the site of Barikot in Swat (Figure 120b), although there is no conclusive evidence to verify this assessment (Meister et al. 2016: 553-566; Olivieri 2014: 255-320). The recovery of more beads of this type in the future will determine if an attempt was made by the bead maker to copy the design of this unique *vihāra* in Swat. The presence of two holes, indicates that the strings must have carried additional items possibly beads as well.

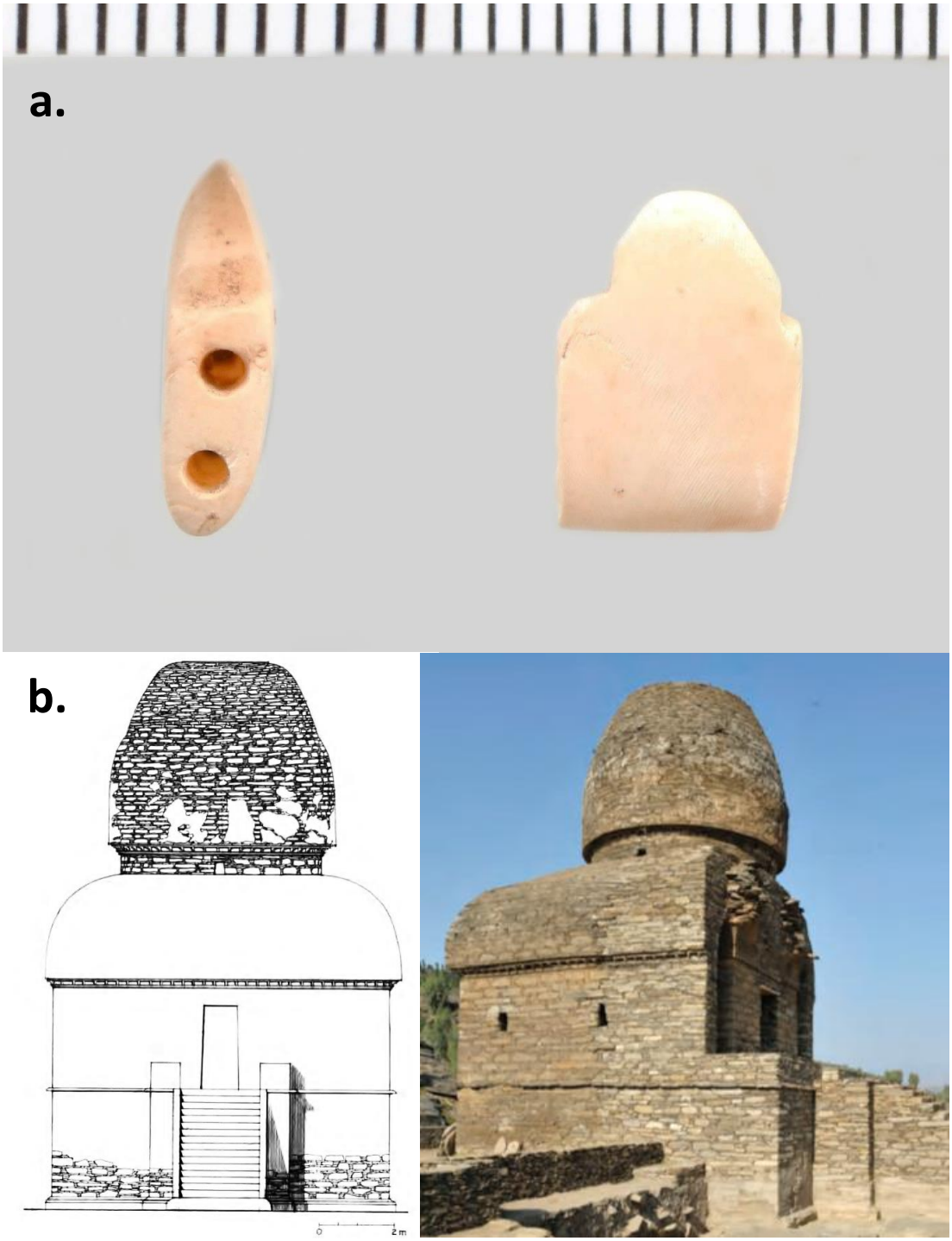


Figure 120: a) Two hole spacer bead of marine shell (BKG 2490) (Photograph: author's own) b) Gumbat Balo-Kale *vihāra* near Barikot, Swat (Olivieri 2014: 278, 282)

In addition, a unique sea snail, *Engina Mendicaria* (Ser. 4107: Figure 121), has been identified in the assemblage from Macrophase 5b, which would have been acquired from the Indian Ocean and probably imported to Barikot as a long-distance product. The demand for shell materials at the site during this

time that include the bangles of *Turbinella pyrum* (Micheli 2014; 2020) indicates that a considerable effort was probably invested to acquire and use them.

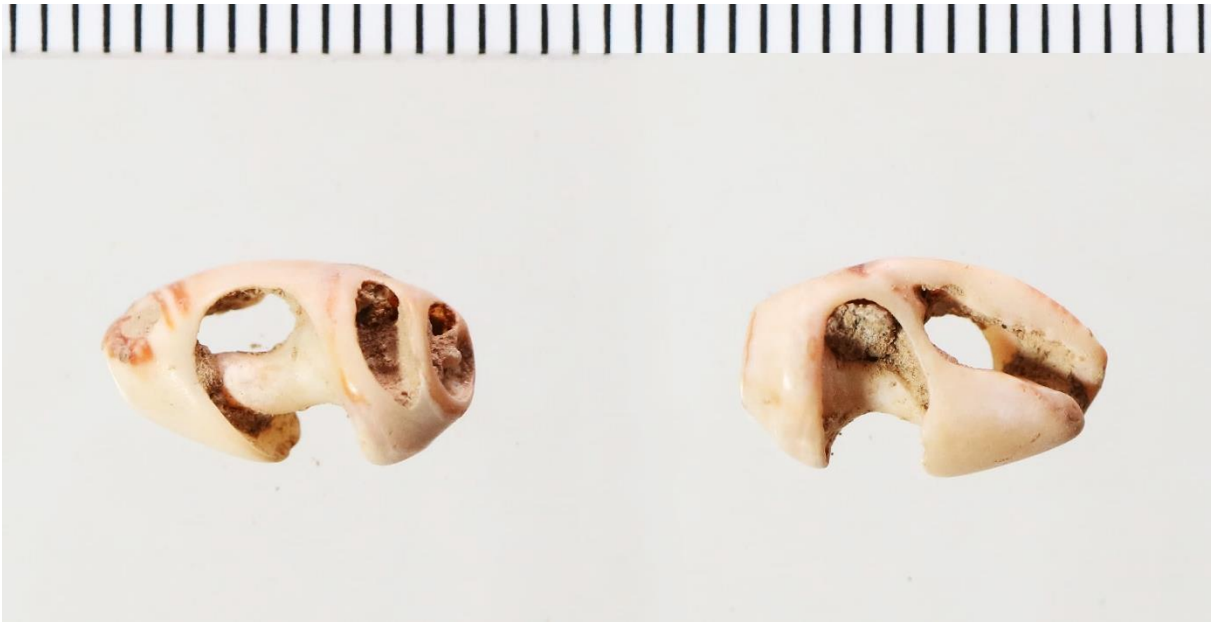


Figure 121: Perforated Sea snail, *Engina Mendicaria* (Ser. 4107) (Photograph: author's own)

With regards to the stone varieties, few beads have been found in the excavation at Barikot thus far, but the recovered collection is characterised by notable variations. One particular example is that of an irregular short spherical/globular carnelian bead (BKG 1157: Figure 122), which reveals evidence of a concavity edge. If this bead had been hand-polished by the bead maker, it would have had a proper, rounded edge as opposed to having a concavity edge. The presence of a concavity edge indicates that BKG 1157 went through a specific mass-polish process (Kenoyer, personal communication). There is evidence that garnet beads, dating to around the 4th century CE, were mass polished after drilling at Taxila, which was possibly done by putting the beads into a leather bag with fine abrasives followed by shaking or rolling the bag for up to two weeks (Kenoyer 2017c: 133; Kenoyer et al. 1993). The discovery of BKG 1157, therefore, indicates the mass-production of numerous stone beads during the Kushano-Sasanian period probably at larger urban centres located in Taxila or the interior regions of India. Since there is currently no evidence for the manufacture of carnelian beads at Barikot, it is possible that BKG 1157 was imported to the site in a finished form, providing further evidence of long-distance interactions during this time.

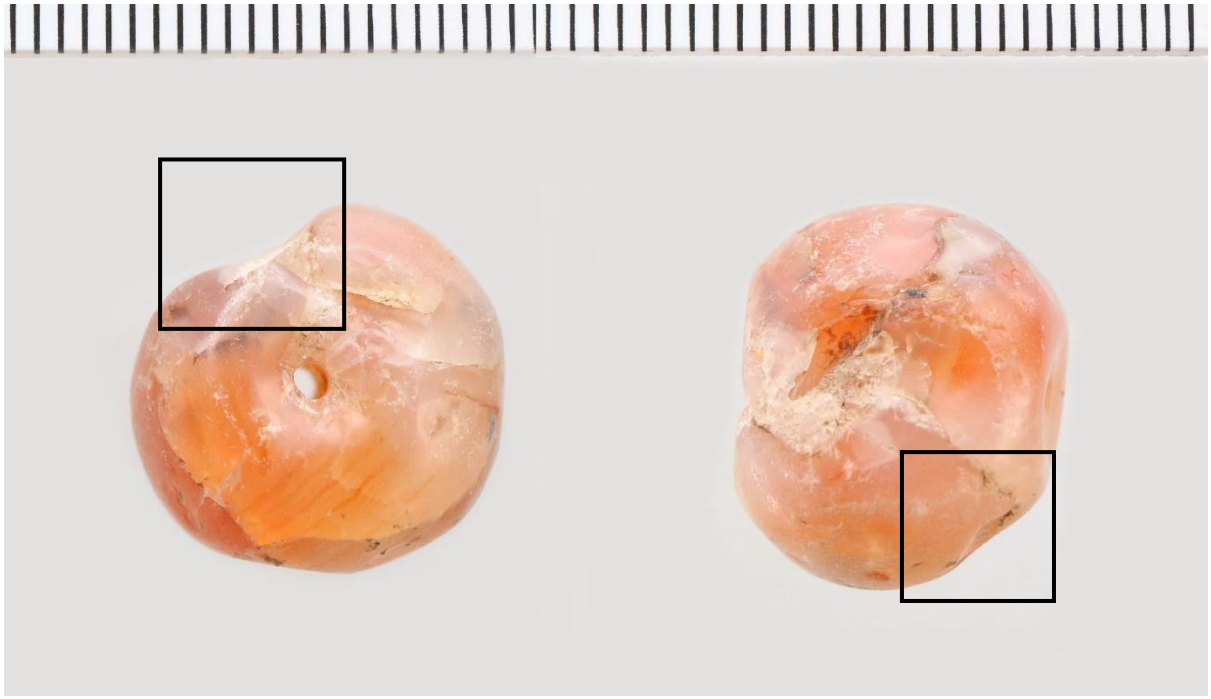


Figure 122: Irregular short spherical/Globular bead of carnelian with a concavity edge (BKG 1157) (Photograph: author's own)

6.1.12 Kushano-Sasanian period (post-urban period) (Macrophase 6: 4th century CE)

The types of raw material that characterise the bead assemblage from Macrophase 6 are marine shell followed by glass, carnelian, terracotta, faience, quartz and cowrie shell. The raw material of one barrel bead could not be identfied by the author (Figure 123).

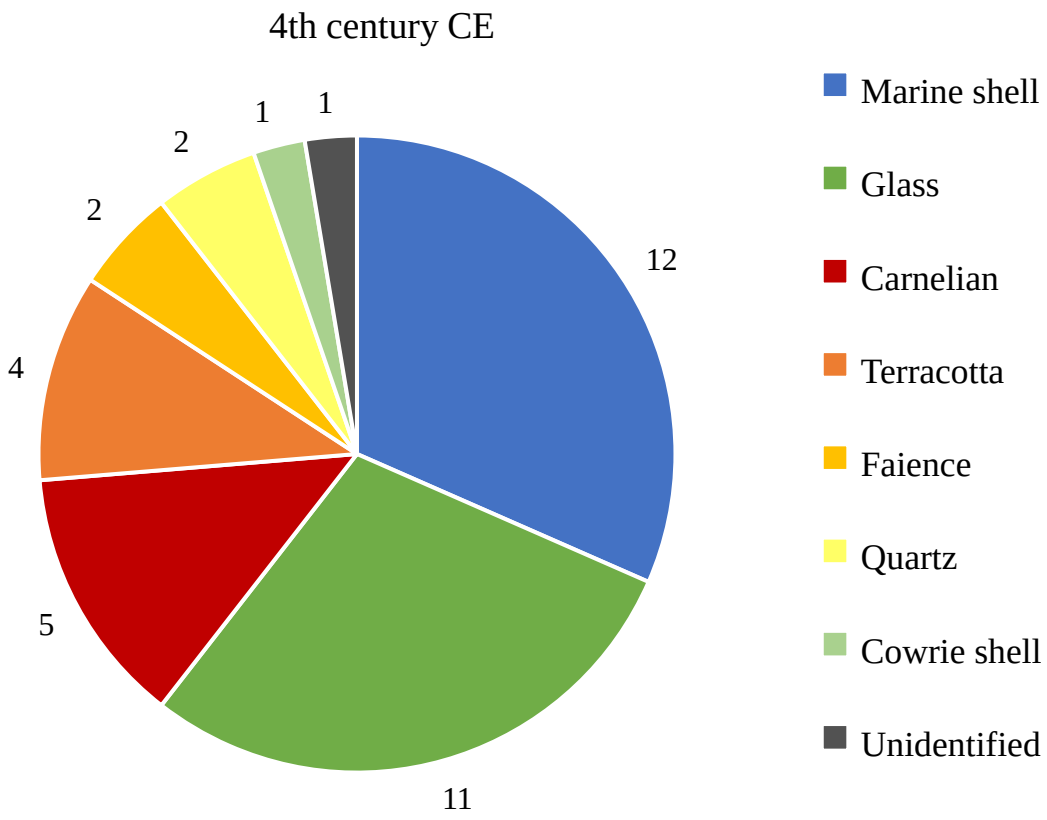


Figure 123: Raw materials of beads from the Kushano-Sasanian period (post-urban period) of Barikot (N=38)

A range of bead shapes is represented in the bead assemblage from Macrophase 6 including barrel, cylindrical, areca nut, ghata-shaped, disc-shaped, irregular spherical/globular, double axe shaped, flower shaped, drop-shaped and cowrie shell forms (Figure 124). 38 beads were studied and verified by the author from a total of 42 beads, attributed to Macrophase 6 of the Kushano-Sasanian period of Barikot (post-urban period) (Table 16). The material and shape of the remaining four beads could not be verified by the author.

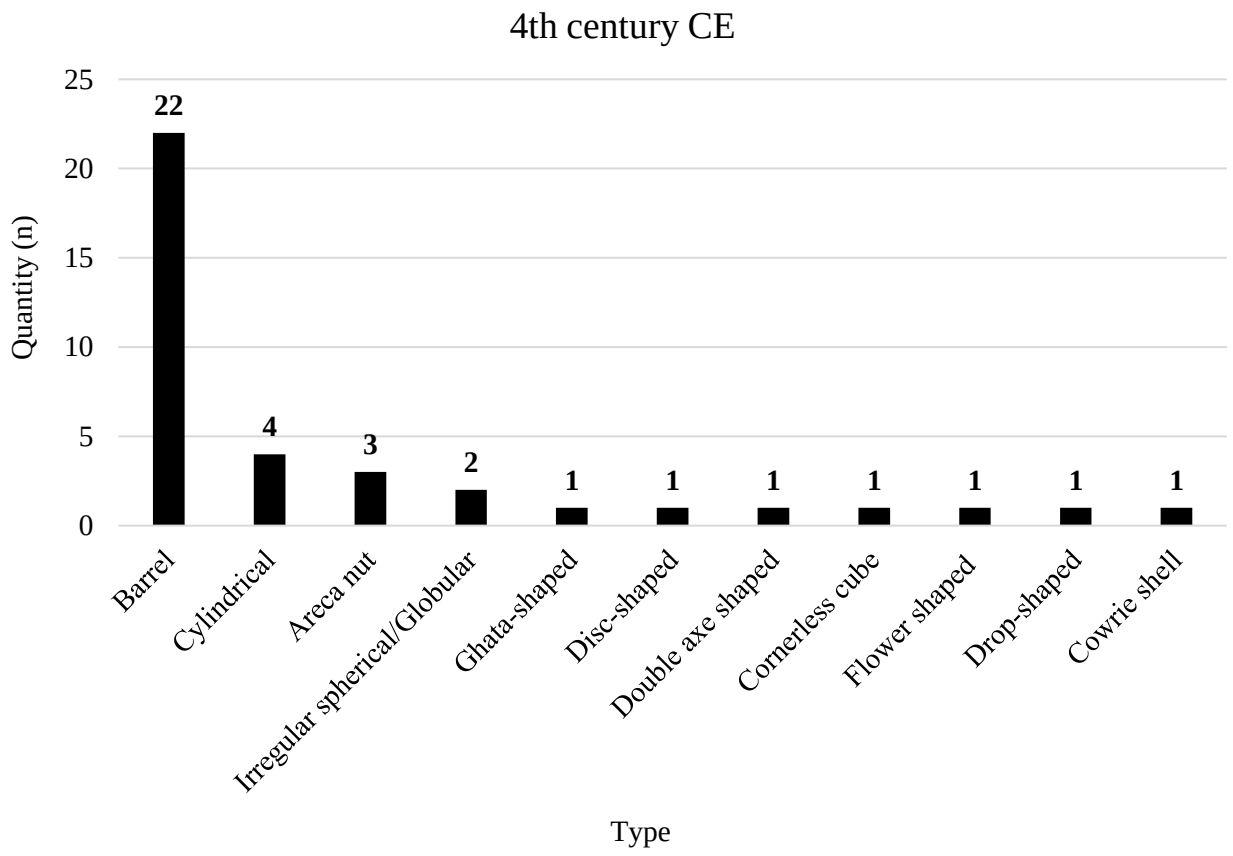


Figure 124: Bead shapes from the Kushano-Sasanian period (post-urban period) of Barikot (N=38)

Material	Type												
	Barrel	***Cylindrical***	***Areca nut***	***Ghata-shaped***	***Disc-shaped***	***Double axe shaped***	***Flower shaped***	***Drop-shaped***	***Cowrie shell***	***Irregular spherical /globular***	***Cornerless cube***	***Unidentified***	***Total***
Marine shell	8 (19.04%)	2 (4.76%)				1 (2.38%)	1 (2.38%)						12 (28.57%)
Glass	7 (16.66%)	2 (4.76%)			1 (2.38%)						1 (2.38%)		11 (26.19%)
Carnelian	3 (7.14%)							1 (2.38%)		1 (2.38%)			5 (11.90%)
Terracotta			3 (7.14%)	1 (2.38%)									4 (9.52%)
Faience	2 (4.76%)												2 (4.76%)
Quartz	1 (2.38%)									1 (2.38%)			2 (4.76%)
Cowrie shell									1 (2.38%)				1 (2.38%)
Unidentified	1 (2.38%)											4 (9.52%)	5 (11.90%)
Total	22 (52.38%)	4 (9.52%)	3 (7.14%)	1 (2.38%)	1 (2.38%)	1 (2.38%)	1 (2.38%)	1 (2.38%)	1 (2.38%)	2 (4.76%)	1 (2.38%)	4 (9.52%)	**42 (100%)**

Table 16: Numbers and percentage bead materials and shapes during the Kushano-Sasanian period (post-urban period) of Barikot

It appears that the number of beads has decreased in the sampled deposits of Barikot from 122 beads in Macrophase 5b to 42 beads in Macrophase 6, which is, however, currently difficult to verify in the absence of data on the calibrated bead frequency by soil volume from Macrophase 6. The available data on the beads, which has been revealed from the study of the bead assemblage from Macrophase 6, appears to indicate several typological continuities with the beads deriving from the earlier chronological periods of the site. The areca nut and ghata-shaped beads of terracotta, for example, were used by the inhabitants of Barikot in Macrophase 6 as well, although they seem to have declined in numbers compared to the earlier chronological periods of Barikot. The archaeological evidence from Macrophase 6 indicates the abandonment of the lower city, leaving the settlement reduced to the foot of the acropolis (central and eastern quarters), where the occupation sequence continues uninterrupted.

Bearing the decrease in settlement size in mind, population levels must have declined significantly during the 4th century CE, which is possibly also reflected by the low number of beads retrieved from the excavations at the site. It is likely that the manufacture and import of beads continued during this time, although possibly on a more reduced level. In fact, the rich display of beaded jewellery adorning various figures in coins, seals, and paintings testifies to the continuation in bead adornment practises during the Kushano-Sasanian periods of Gandhara (Callieri 1997; Faccenna 1981: Pl. I: Figure 125; Lerner 2010).



Figure 125: Painting of a male figure adorned with a beaded necklace from Butkara I, Swat (Faccenna 1981, inv. 4335)

Furthermore, beads made from marine shell appear to represent the most dominant group of materials in the assemblage and are typologically comparable to the beads from the earlier chronological periods of Barikot. Flower shaped spacer beads (BKG 2328: Figure 126a) and double-axe shaped beads (BKG 2224: Figure 126b), for instance, have been identified in the assemblage. Similar types of shell beads were also found from the Dharmarajika *stupa* in Taxila (Beck 1941: Pl. VIII no. 26 and 31), not only indicating the potential continuation in Buddhist ceremonial activities but also the maintenance of connections between Barikot and Taxila. In fact, the high quantity of shell bangles discovered from Barikot (Micheli 2014; 2020) provides evidence for long-distance interactions between Barikot and the southern coastal areas of the subcontinent during the Kushano-Sasanian periods.

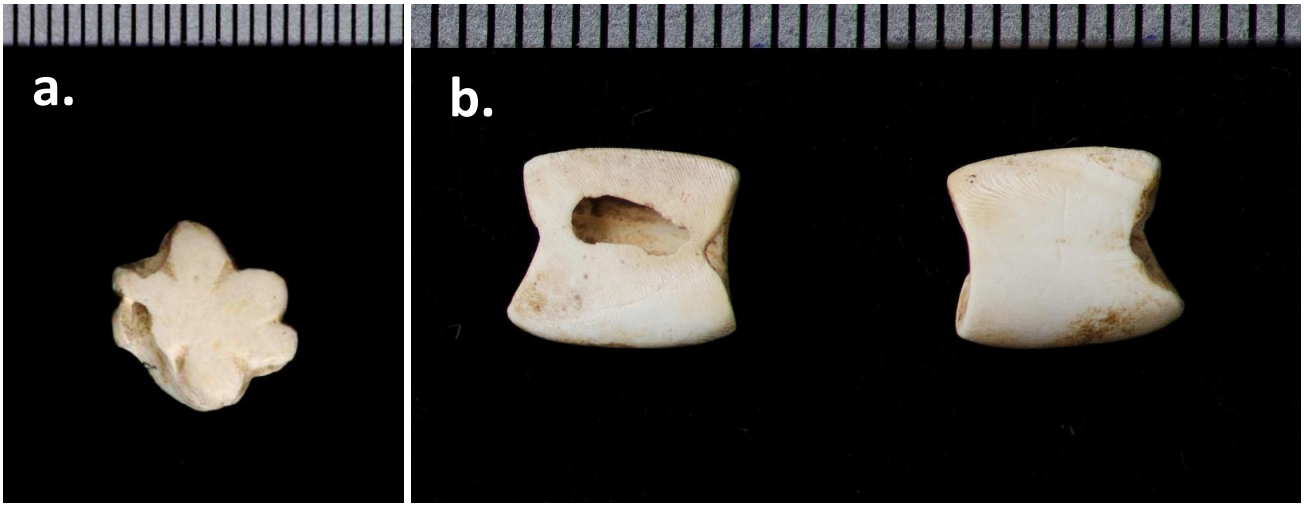


Figure 126: a) Flower shaped bead of marine shell (BKG 2328) b) Double axe shaped bead of marine shell (BKG 2224) (Photographs: IsMEO Italian Archaeological Mission in Pakistan)

With regards to the glass beads, they also show clear typological links with the beads found from the earlier Kushana and Kushano-Sasanian periods of Barikot. The discovery of a cornerless cube glass bead with a blue-and-white colour (BKG 2228: Figure 127), for example, is reminiscent of the cornerless cube garnet bead from the Mature Kushana period (Macrophase 4b: Figure 101). Typologically similar beads have also been found from the site of Sirkap in Taxila (Beck 1941: Pl. no. 21). In other words, both the shell and glass beads from Barikot have not only revealed evidence of continuity with the ornamental traditions of the earlier periods of the site but potentially also further evidence for interactions occurring between Barikot and the major urban sites in Taxila.

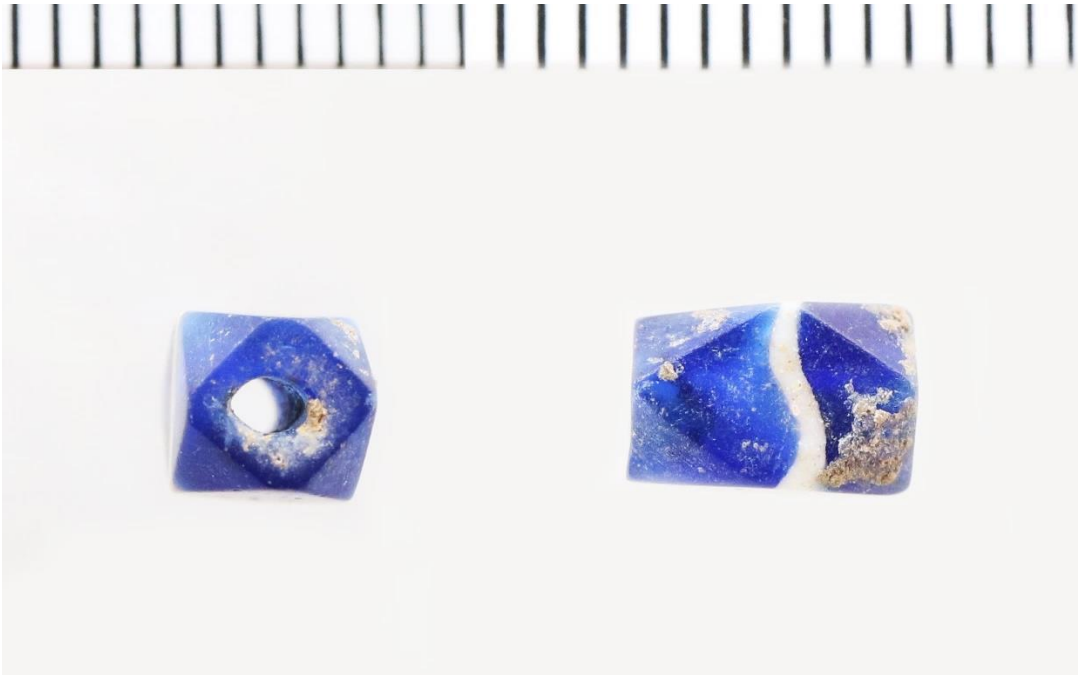


Figure 127: Cornerless cube bead of glass (BKG 2228) (Photograph: author's own)

In reference to the stone beads, the dominant variety that is represented in the assemblage of Macrophase 6 is carnelian. A particular noteworthy specimen that has been identified is a drop- shaped pendant of banded carnelian (BKG 1158: Figure 128a). BKG 1158 is, however, not the first carnelian pendant that was used at the site as evidenced by a cylindrical pendant of red carnelian found from the Indo-Greek period of Barikot (BKG 3822: Figure 128b) - the former may represent the next developmental stage in the manufacture of carnelian pendants. Drop-shaped pendants of banded agate have, in fact, been found from the Dharmarajika stupa (Taxila), from Bhir Mound (Taxila) as well as from the site of Rang Mahal (Beck 1941: Pl. III no. 12, 13, 36; Rydh 1959: Pl. 82 no. 17; Uesugi and Rienjang 2018), which are typologically comparable to BKG 1158. The recovery of drop-shaped pendants from several archaeological sites sheds light on their wider distribution pattern and popularity among the people in different parts of the subcontinent. Besides, the recovery of BKG 1158 provides evidence not only of the excellent level of craftsmanship employed in the manufacture but probably also the circulation of wealth items at the site during this time. Besides, the discovery of BKG 1158 provides additional evidence of ongoing interactions and links between Barikot and other major urban settlements probably of Taxila during Macrophase 6.

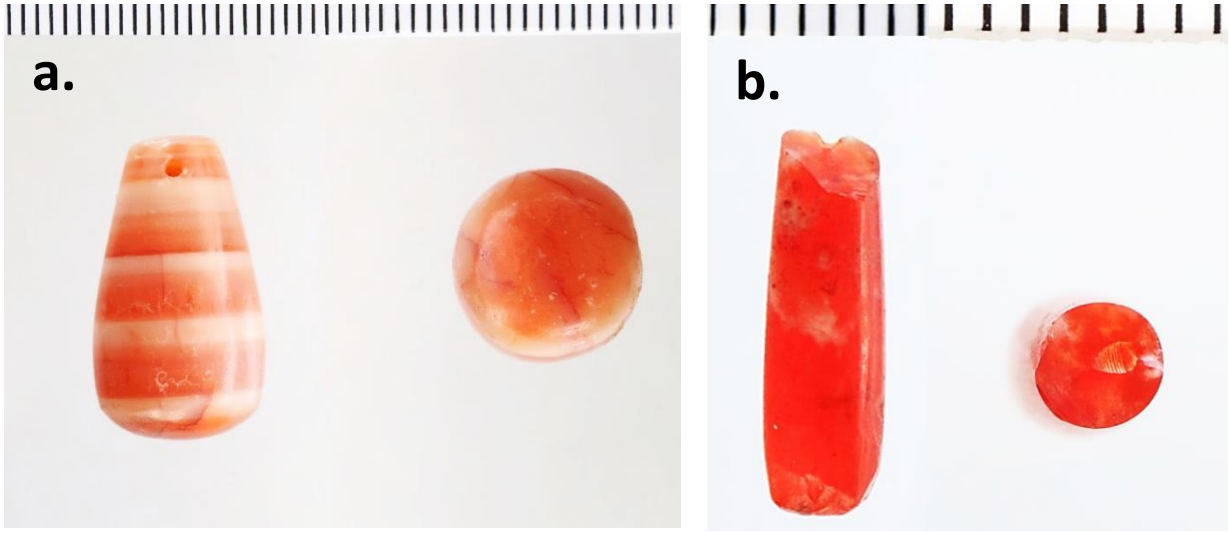


Figure 128: a) Drop-shaped pendant of banded carnelian (BKG 1158) b) Cylindrical pendant of red carnelian (BKG 3822: Macrophase 3a2-3a4) (Photographs: author's own)

Another important find is an irregular spherical/globular bead made from quartz, which is unlike any other bead of quartz or rock crystal encountered in the earlier chronological periods of Barikot (BKG 2429: Figure 129). BKG 2429 may have been imported from another site such as Pattanam in South India where similar types of quartz beads have been found (Cherian et al. 2016: Pl. 7; Kelly 2016: Figure 22). At Pattanam, there is evidence that the site participated in commercial exchange in partially finished rough-outs and working them to finished form (Kelly 2016). The occurrence of quite frequent outcrops of quartz in the region of Gandhara (Kazmi 1995) does, however, not allow us to rule out a potential local source of BKG 2429. Only a scientific, compositional analysis will determine the precise geographic provenance of BKG 2429 in the future.

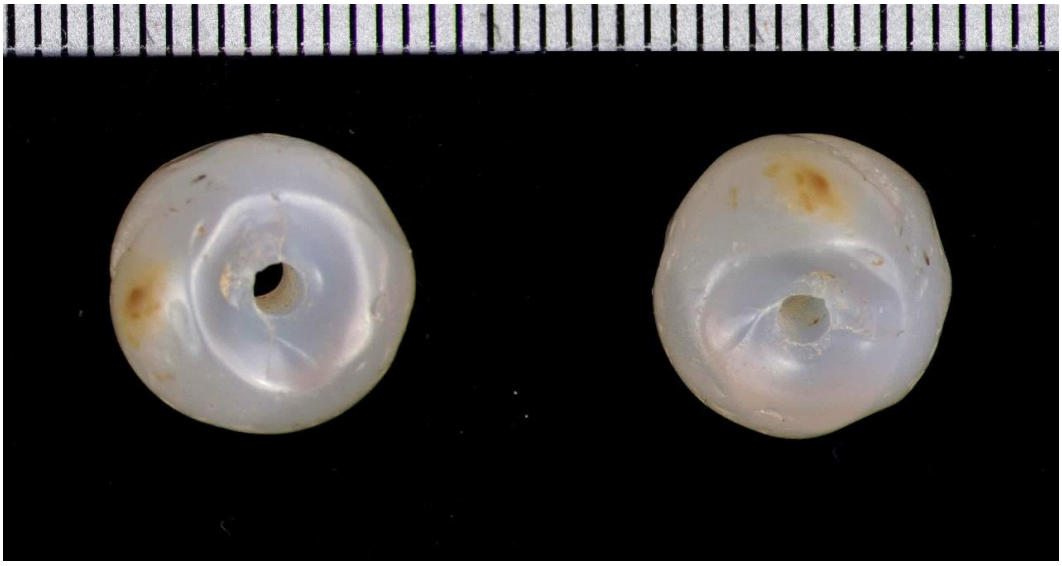


Figure 129: Irregular short spherical/Globular bead of quartz (BKG 2429) (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

In addition, a unique bead grinding stone slab has been found among the various material culture items of this time, providing the first solid evidence for the manufacture of beads at Barikot. The slab is marked by eight grooves on the surface and six grooves on the reverse (BKG 2272: Figure 130). The discovery of this important stone slab indicates the desire and attempt by the people of Barikot to become practically involved in the manufacture of beads at the site. It is possible that the production and use of BKG 2272 started originally in the previous Macrophase 5b as the slab was unearthed in the contexts associated with the abandonment phase of the lower city.

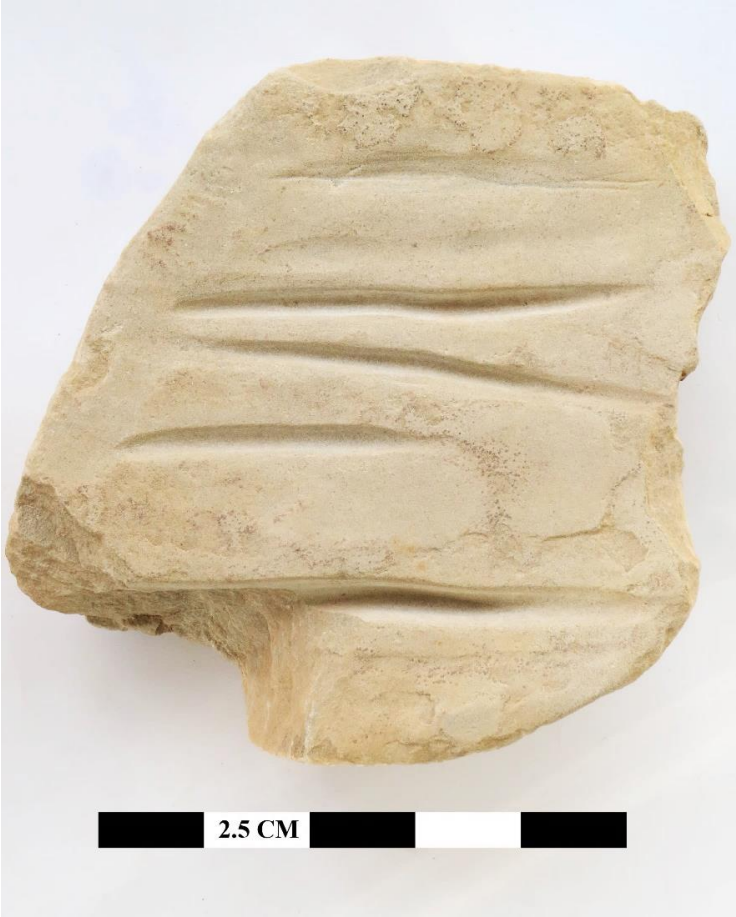


Figure 130: Bead grinding stone slab with 14 grooves (BKG 2272) (Photograph: author's own)

6.1.13 Post-urban period (Macrophase 7: ca. 400 – 600 CE)

The types of raw material that characterise the bead assemblage from Macrophase 7 are terracotta followed by glass, marine shell, carnelian, cowrie shell, quartz/rock crystal, marble, garnet, agate and lapis lazuli. The raw material of one barrel bead could not be identfied by the author (Figure 131).

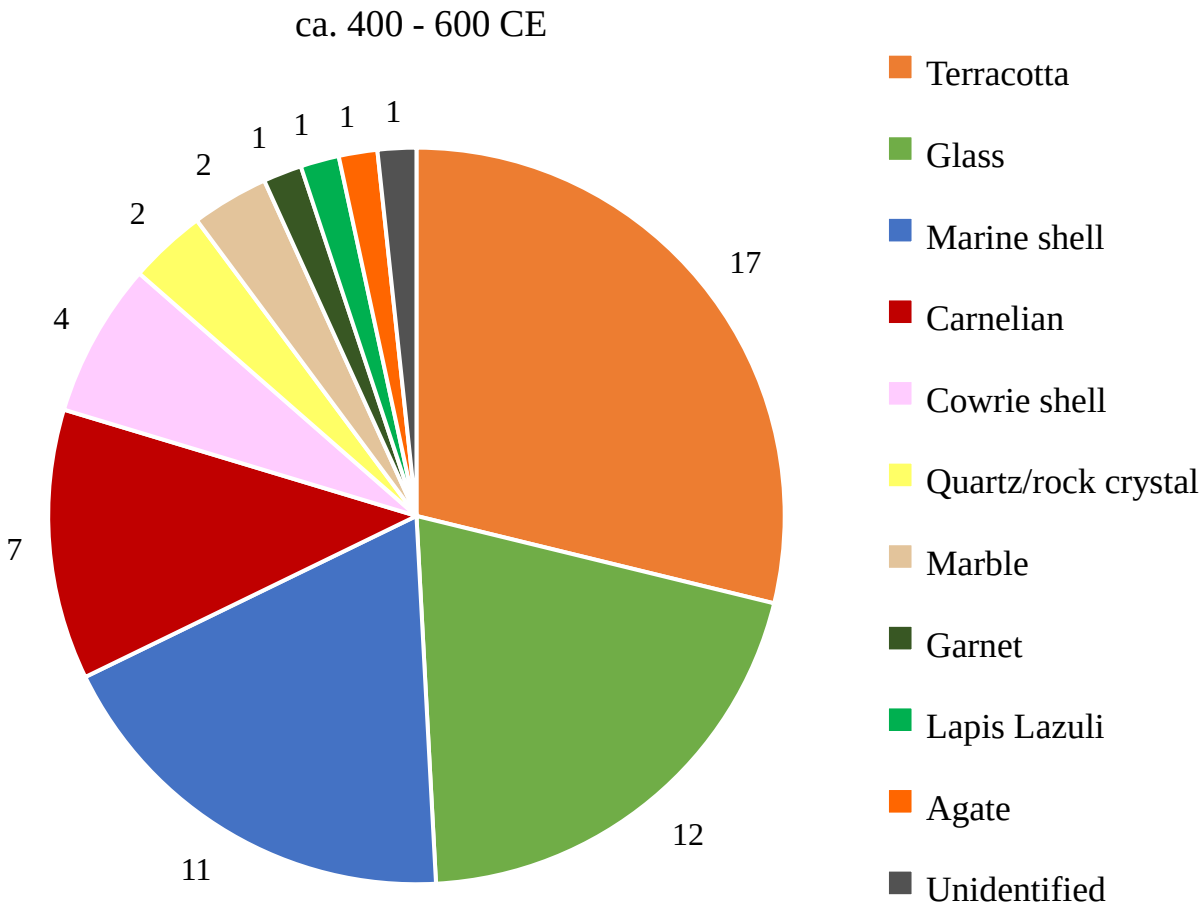


Figure 131: Raw materials of beads from the post-urban period of Barikot (N=59)

A range of bead shapes is represented in the bead assemblage from Macrophase 7 including barrel, areca nut, cylindrical, disc-shaped, biconical, ghata-shaped, flower shaped, irregular spherical/globular, spherical, rectangular circular, cornerless cube and cowrie shell forms (Figure 132). 59 beads were studied and verified by the author from a total of 64 beads, attributed to Macrophase 7 of the post-urban period of Barikot. The material and shape of the remaining six beads could not be verified (Table 17).

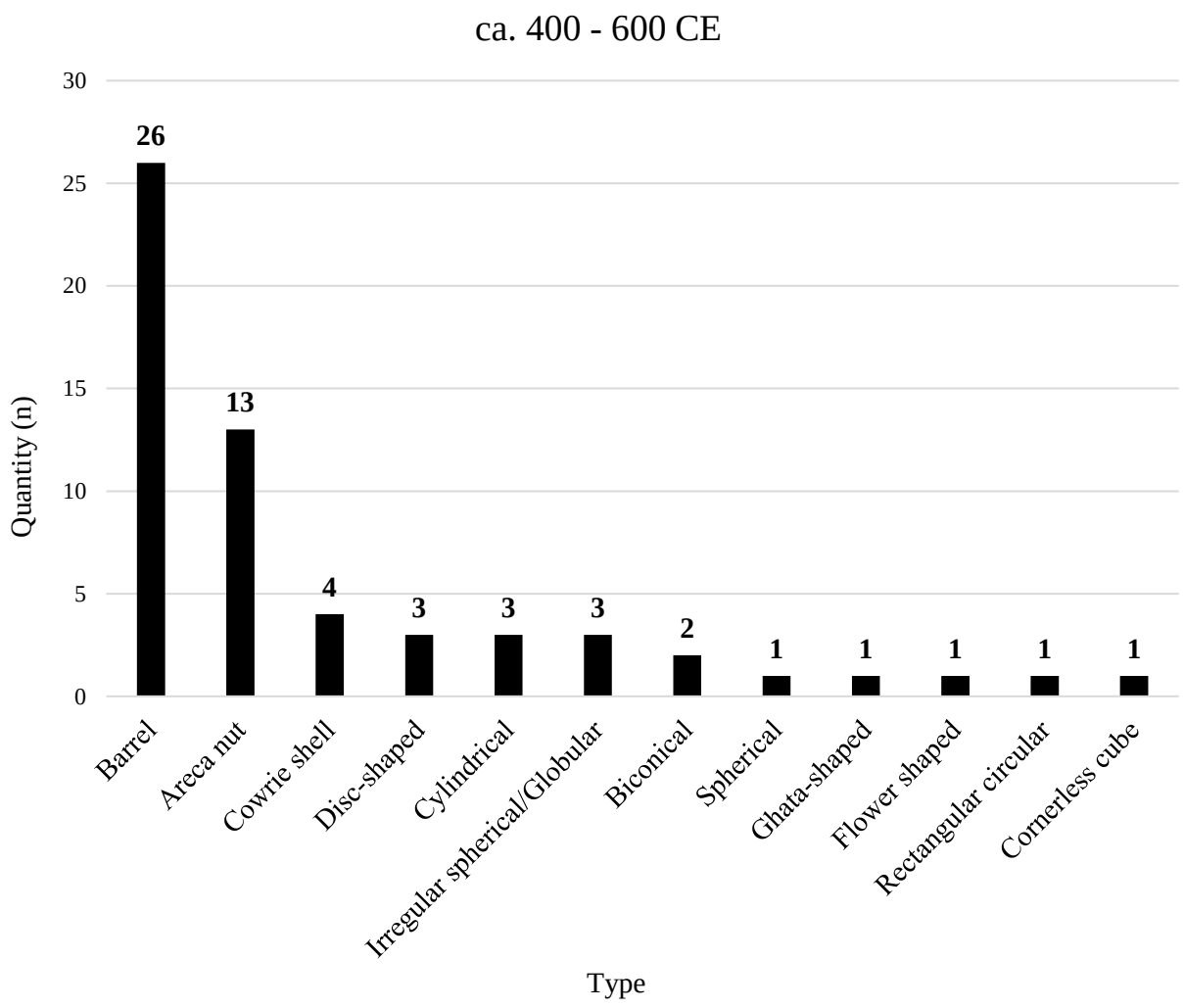


Figure 132: Bead shapes from the post-urban period of Barikot (N=59)

Material	Type													
	Barrel	***Areca nut***	***Irregular spherical /Globular***	***Cowrie shape***	***Disc-shaped***	***Cylindrical***	***Biconical***	***Ghata-shaped***	***Flower shaped***	***Rectangular circular***	***Cornerless cube***	***Spherical***	***Unidentified***	***Total***
Terracotta	1 (1.56%)	13 (20.31%)					2 (3.12%)	1 (1.56%)						17 (26.56%)
Glass	9 (14.06%)					2 (3.12%)					1 (1.56%)			12 (18.75%)
Marine shell	6 (9.36%)		1 (1.56%)		1 (1.56%)	1 (1.56%)			1 (1.56%)			1 (1.56%)		11 (17.18%)
Carnelian	6 (9.36%)		1 (1.56%)											7 (10.93%)
Cowrie shell				4 (6.25%)										4 (6.25%)
Quartz/rock crystal	1 (1.56%)									1 (1.56%)				2 (3.12%)
Marble					2 (3.12%)									2 (3.12%)
Garnet	1 (1.56%)													1 (1.56%)
Lapis Lazuli			1 (1.56%)											1 (1.56%)
Agate	1 (1.56%)													1 (1.56%)
Unidentified	1 (1.56%)												5 (7.81%)	6 (9.36%)
Total	26 (40.62%)	13 (20.31%)	3 (4.68%)	4 (6.25%)	3 (4.68%)	3 (4.68%)	2 (3.12%)	1 (1.56%)	1 (1.56%)	1 (1.56%)	1 (1.56%)	1 (1.56%)	5 (7.81%)	**64 (100%)**

Table 17: Numbers and percentage of bead materials and shapes during the post-urban period of Barikot

The number of beads appears to have increased in the sampled deposits of Barikot from 42 beads in Macrophase 6 to 64 beads in Macrophase 7. This apparent increase may, however, not reflect the calibrated bead frequency by soil volume at the site considering the lack of data that is needed to calculate it. The beads from Macrophase 7 are, in several cases, typologically reminiscent of the beads encountered in the earlier Kushana and Kushano-Sasanian periods of Barikot, providing evidence for continuity in the prevailing ornamental traditions. These include, for example, the areca nut and the ghata-shaped beads made from terracotta, which appear to have been introduced at Barikot during the Indo-Greek period first.

Furthermore, the recovery of carnelian beads provides additional evidence of continuity in the demand for semi-precious stone materials and that the site remained connected to other distant geographic locations of the subcontinent in Macrophase 7. The documentation and study of the carnelian beads has, however, revealed at the same time potential evidence of discontinuities with the types of carnelian beads found from the earlier chronological periods of the settlement. As such, the carnelian beads from Macrophase 7 are mostly found produced in the form of rough and irregular short spherical/globular and barrels that are comparatively of inferior and low-quality. Various traces of manufacture, mottling and weathering are also visible on their exterior surfaces (BKG 2257: Figure 133), which, in many cases, do not appear to match the exquisite level of craftsmanship employed in the production of carnelian beads during the Early Historic period (Figures 171-172).

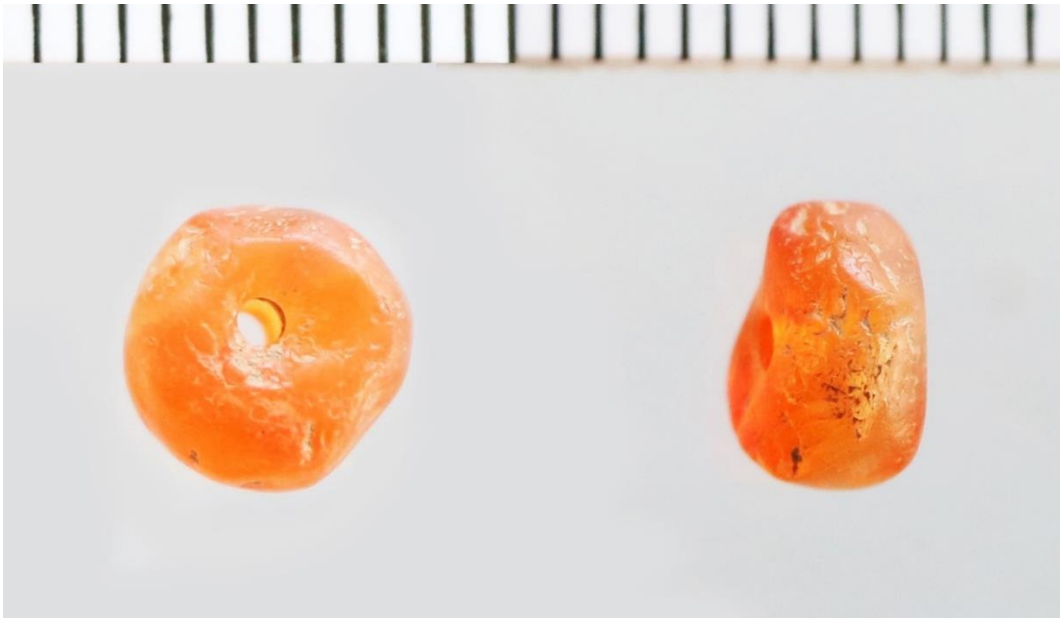


Figure 133: Irregular short barrel-shaped bead of carnelian (BKG 2257) (Photograph: author's own)

In addition, the assemblage from Macrophase 7 is characterised by the presence of several notable types of beads that were not encountered in the collections of beads deriving from the earlier periods of Barikot. A long barrel-shaped bead of cloudy quartz, for instance, has been identified (BKG 2204: Figure 134) of which there are no comparable parallels among the quartz beads of the earlier periods of Barikot. BKG 2204 may have been imported to Barikot from a distant geological source area. Stylistically similar quartz beads have been found, for example, at Pattanam (Cherian et al. 2016: Pl. 8; Kelly 2013: 121) while a potential connection with South India has already been suggested in the above-made discussions relating to Macrophase 6 (BKG 2429: Figure 129). Nevertheless, it is currently not possible to rule out a potential local source of the material given the presence of quite frequent outcrops of quartz across Gandhara (Kazmi 1995).



Figure 134: Long barrel bead of cloudy quartz (BKG 2204) (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

Furthermore, another notable bead in the assemblage from Macrophase 7 is a long barrel-shaped bead of banded agate (BKG 5043: Figure 135). Although the use of agate is well-documented from the bead assemblages of the earlier chronological periods of Barikot, an agate bead stylistically similar to BKG 5043 has not been found yet and, as such, may have been acquired from a different geological source area. It should be noted, however, that the extent and diversity of agate sources in Gujarat of north-west India is unparalleled, although occurrences of agate are quite common in many parts of Asia (Law et al. 2012).

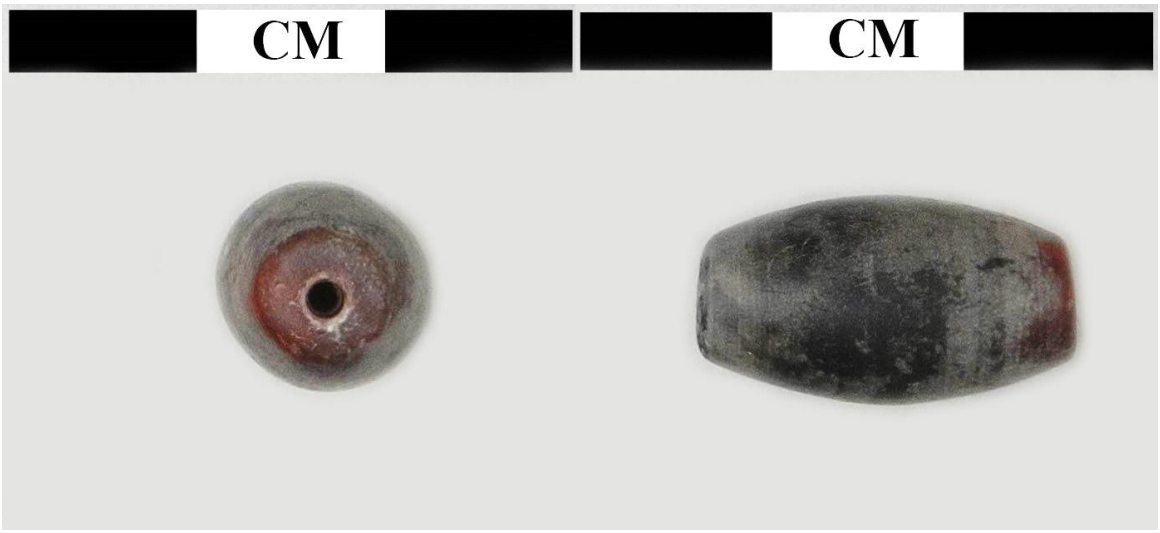


Figure 135: Long barrel bead of banded agate (BKG 5043) (Photograph: ISMEO Italian Archaeological Mission in Pakistan)

Similarly, another important discovery has been made through a rectangular circular bead of rock crystal, which is unlike other types of rock crystal beads that derive from the earlier periods of Barikot (BKG 2225: Figure 136). These important examples of beads, therefore, indicate not only continuity in pre-existing ornamental traditions but probably also the adoption of new, wider regional ornamental practices in Macrophase 7.

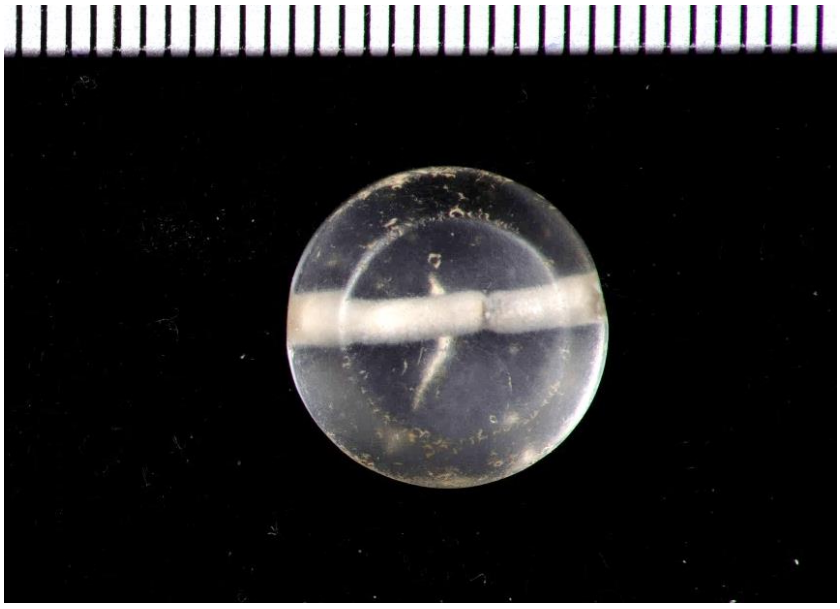


Figure 136: Rectangular circular bead of rock crystal (BKG 2225) (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

Besides, further evidence of continuity in the pre-existing ornamental traditions is found in the shell bead repertoire from Macrophase 7. A bead of marine shell produced in the form of a flower, for example, has been identified in the assemblage (BKG 2205: Figure 137), which is stylistically similar to the many flower shaped beads found in the earlier Kushana and Kushano-Sasanian periods of Barikot. Together with the recovery of several cowrie shells from Macrophase 7, the study of the shell assemblage from Barikot provides additional evidence that the site remained connected to the distant, southern coastal areas of the subcontinent during this time as it was during the earlier chronological periods.



Figure 137: Flower shaped bead of marine shell (BKG 2205) (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

With regards to the glass beads from Macrophase 7, they are typologically similar to the glass beads deriving from the earlier periods of Barikot as can be evidenced by the recovery of the distinct, yellowish-brown glass beads (see, for example, figure 102). New types of glass beads are also present in the assemblage including a very long cylindrical glass bead (BKG 4109: Figure 138). BKG 4109 probably represents a new evolutionary stylistic development of the distinct, yellowish-brown glass beads that are usually found in the form of disc or short barrel shapes at Barikot. Apart from the difference in the shape, this bead has a distinct red colour, which is not found among the glass beads originating from the earlier periods of Barikot. Both groups of glass beads are, however, found widely distributed across South-and Southeast Asia (Carter 2013), indicating their widespread inter-regional demand and popularity among the people of the time, possibly representing imported items through long-distance, cross-cultural trade and exchange.

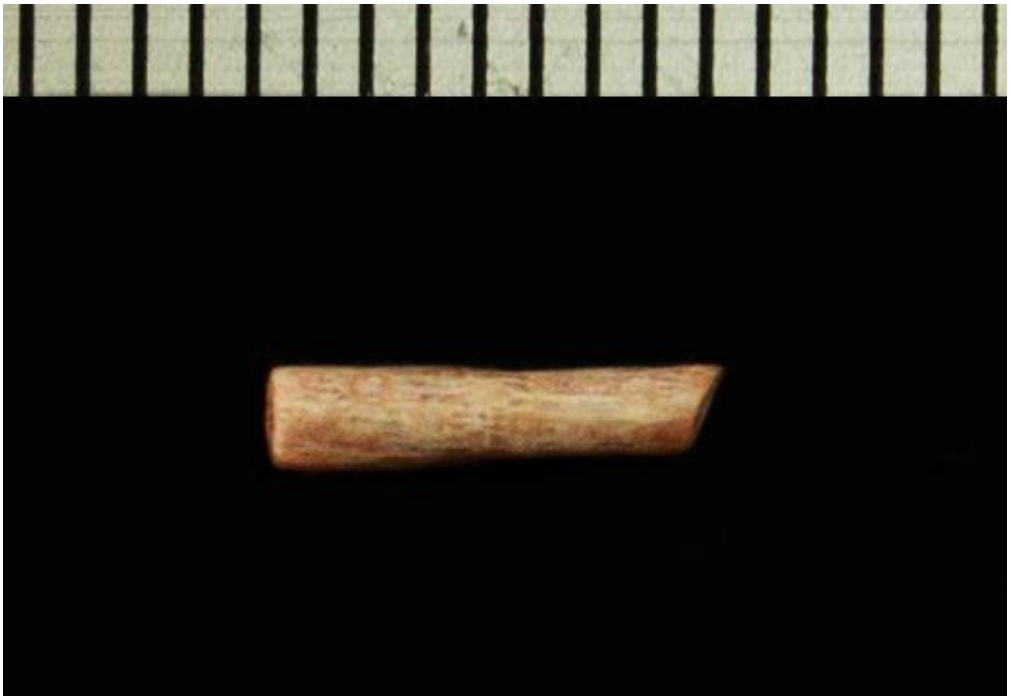


Figure 138: Long cylindrical bead of red glass (BKG 4109) (Photograph: ISMEO Italian Archaeological Mission in Pakistan)

Another interesting example is a potential irregular shaped pendant of grey marble (BKG 4994: Figure 139) - the surface of which has been artistically engraved with a bird and two leaves motif. It is possible that the depicted design and its meaning are related to the Buddhist faith where birds are considered sacred as has already been outlined above. On the other hand, it may express a completely different ideology or may simply reflect a decorative scheme. At present, there is simply not enough comparative material available to allow us to draw parallels and, in the process, determine the precise function and narrative behind this exceptional piece of ornament from Barikot. When worn, the decorated surface of BKG 4994 must have faced outwards towards the public to become noticeable.



Figure 139: Irregular disc-shaped pendant of marble stone (BKG 4994) (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

6.1.14 Macrophase 7-8 (ca. 400 – 1000 CE)

The types of raw material that characterise the bead assemblage from Macrophase 7-8 include glass followed by terracotta, lapis lazuli, agate, marine shell, carnelian, faience and a sea snail, *Engina Mendicaria* (Figure 140). The shape of five beads could not be verified by the author due to post-depostional damage (Figure 141).

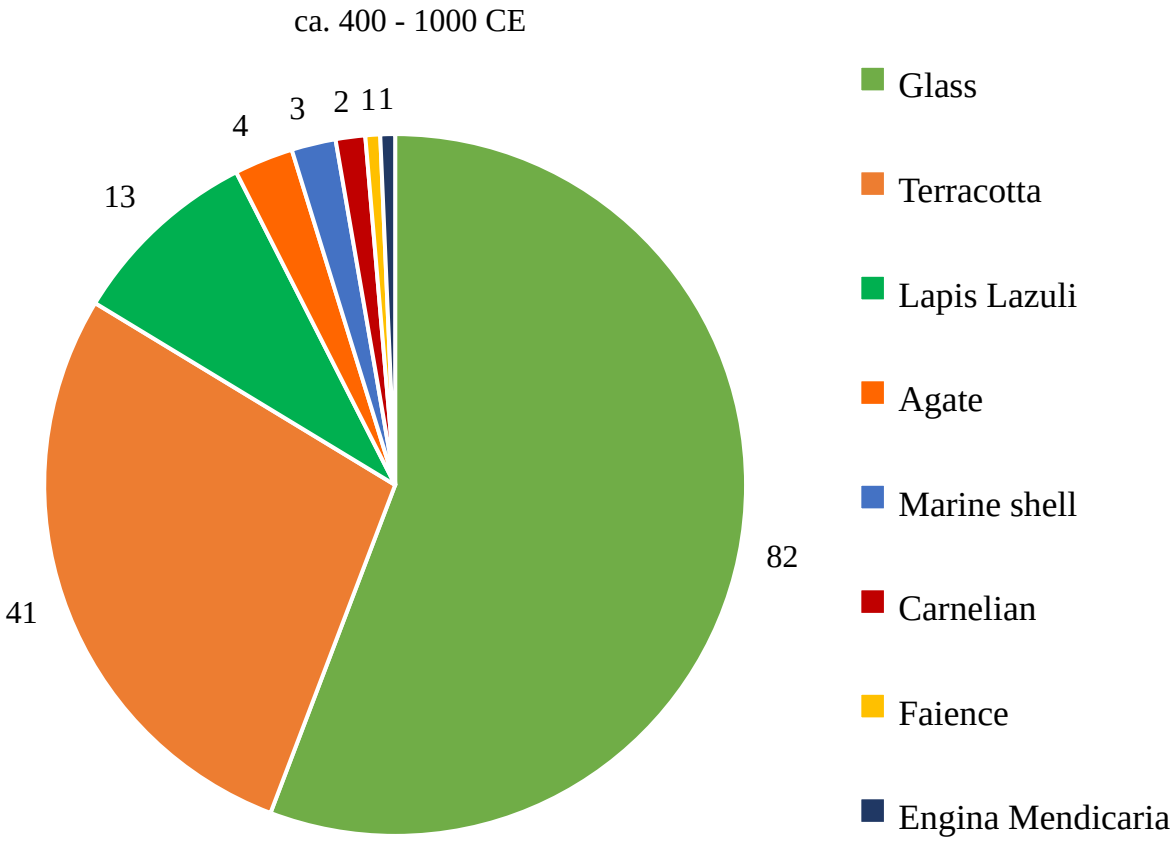


Figure 140: Raw materials of beads from Macrophase 7-8 of Barikot (N=147)

A range of bead shapes is represented in the bead assemblage from Macrophase 7-8 including barrel, cylindrical, areca nut, ghata-shaped, biconical, irregular spherical/globular, spherical, disc-shaped, drop-shaped, double axe shaped and *Engina Mendicaria* forms (Figure 141). 147 beads were studied and verified by the author from a total of 238 beads, attributed to Macrophase 7-8 of Barikot (Table 18). The material and shape of the remaining 91 beads could not be verified by the author. Unfortunately, modern agricultural levelling, scattered spoliation pits and the limited material record encountered during the excavations, do not allow a more precise periodisation or dating for the beads from Macrophase 7-8.

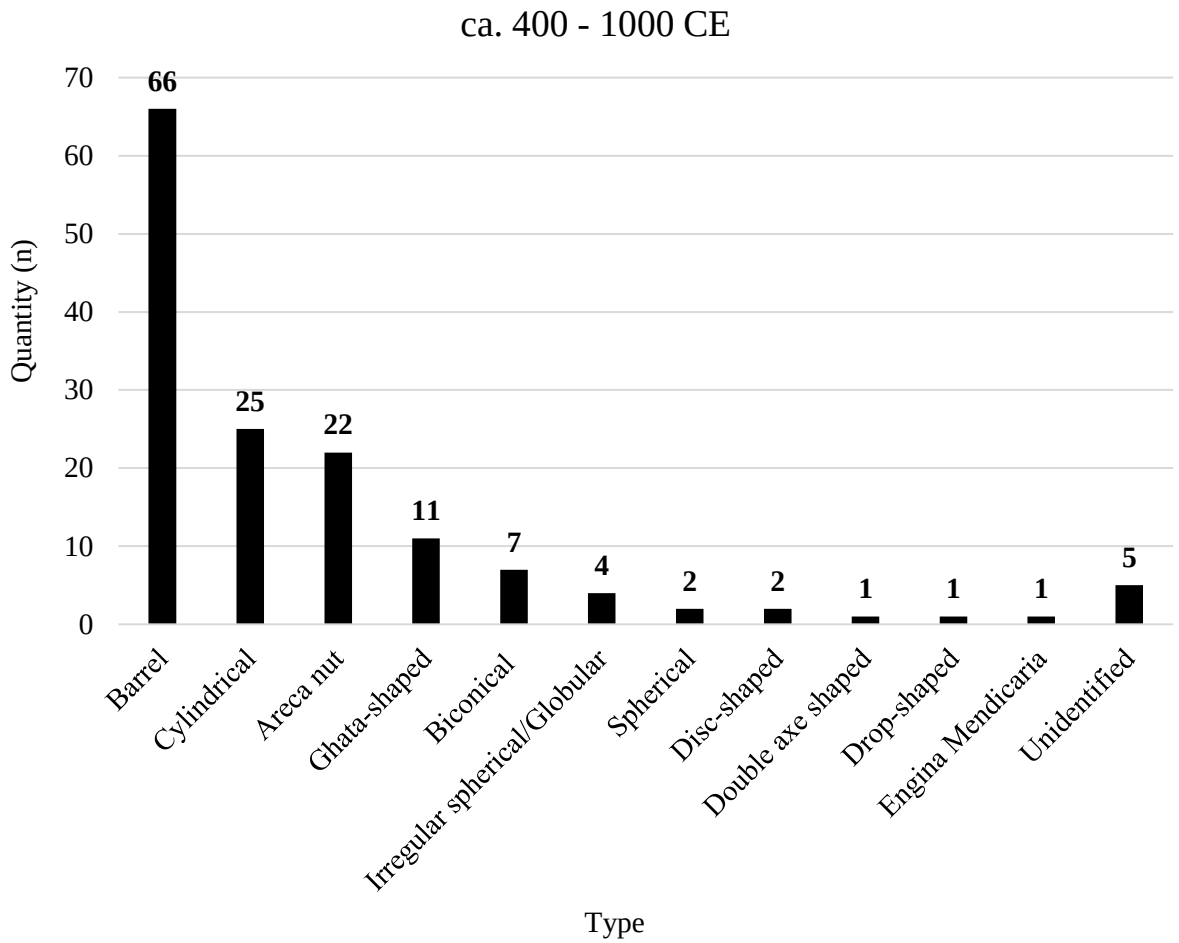


Figure 141: Bead shapes from Macrophase 7-8 of Barikot (N=147)

Material	Type												
	Barrel	***Cylindrical***	***Areca nut***	***Ghata-shaped***	***Biconical***	***Irregular spherical/ Globular***	***Spherical***	***Disc-shaped***	***Double axe shaped***	***Drop shaped***	***Engina Mendicaria***	***Unidentified***	***Total***
Glass	51 (21.42%)	22 (9.24%)		1 (0.42%)		4 (1.68%)		2 (0.84%)				2 (0.84%)	82 (34.45%)
Terracotta	1 (0.42%)		22 (9.24%)	10 (4.20%)	7 (2.94%)							1 (0.42%)	41 (17.22%)
Lapis Lazuli	9 (3.78%)	2 (0.84%)										2 (0.84%)	13 (5.46%)
Agate	2 (0.84%)						2 (0.84%)						4 (1.68%)
Marine shell	1 (0.42%)	1 (0.42%)								1 (0.42%)			3 (1.26%)
Carnelian	2 (0.84%)												2 (0.84%)
Faience									1 (0.42%)				1 (0.42%)
Engina Mendicaria											1 (0.42%)		1 (0.42%)
Unidentified												91 (38.23%)	91 (38.23%)
Total	66 (27.73%)	25 (10.50%)	22 (9.24%)	11 (4.62%)	7 (2.94%)	4 (1.68%)	2 (0.84%)	2 (0.84%)	1 (0.42%)	1 (0.42%)	1 (0.42%)	96 (40.33%)	**238 (100%)**

Table 18: Numbers and percentage of bead materials and shapes in Macrophase 7-8 of Barikot

Like any other period in the long occupation history of Barikot, Macrophase 7-8 represents an important chronological time interval, which reveals various types of bead ornaments. Although the bead assemblage shows several typological continuities with the beads deriving from the earlier chronological periods of the site, there is enough evidence at our disposal to argue for major transformations occurring in the ornamental traditions at Barikot probably reflecting the marked expansion in trans-regional trade and exchange when the Indian Ocean emerged as a major, international trading zone in the late first millennium CE and second millennium CE. With regards to terracotta, various types of beads have been identified including the familiar areca nut, ghata-shaped, and biconical beads.

Rather than terracotta, however, it appears that glass is the most dominant material that was favoured by the people of Barikot during this time, probably reflecting a shift in the popular taste for certain raw materials at the site. Terracotta, as a material, appears to have remained quite popular among the inhabitants of Barikot between Macrophase 3b and Macrophase 7. Glass is, in fact, not only the most dominant material in Macrophase 7-8, but was used to produce various types of beads as evidenced by the following examples. The study of the glass beads from Macrophase 7-8 indicates that the shape and colour of the ornaments played an important role in the lives of the people of Barikot. The Indo-Pacific group of glass beads, for example, are a major characteristic feature of Macrophase 7-8, most notably, coming in the yellow colour and produced with the drawn method (BKG 1206: Figure 142).

A single, yellow-coloured, short barrel-shaped bead of glass first appeared in Macrophase 5b at Barikot (BKG 4065), which indicates that this specific variety of the Indo-Pacific glass beads was circulating at Barikot already in the second half of the 3rd century CE. The widespread use of these beads at Barikot becomes, however, only significant in Macrophase 7-8. Indo-Pacific glass beads have, in fact, been found in large numbers at many sites in South India, South-east Asia and other parts of the world (Abraham 2013; 2016; Bellina and Glover 2004; Carter 2013; 2016; Cherian et al. 2016; Francis 1989; 1990; 2002; Heo 2018), which possibly arrived at Barikot in a finished state, although their precise provenance and mode of transport remain debatable.



Figure 142: Short barrel-shaped Indo-Pacific glass bead (BKG 1206) (Photograph: author's own)

Other Indo-Pacific glass beads come in green, bluish-greenish and greenish-bluish colours (Ser. 4109: Figure 143). It is possible that the desired glass bead necklaces of the people of Barikot were arranged according to material homogeneity and colour especially during this time. This possibility is indicated by the fact that several yellow-coloured glass beads were found together from the same archaeological context of the site as were some of the green-coloured glass beads. Constituting a bead necklace with the same material and colour would have visually created an aesthetic effect, which is a reasonable possibility that requires further research in the future.



Figure 143: Short barrel-shaped Indo-Pacific glass beads (Ser. 4109) (Photograph: author's own)

Another notable development in the glass bead repertoire of Barikot is represented in the form of a unique glass bead, which has been produced in the ghata-shape (Ser. 4065: Figure 144), which are mainly known to have been produced from terracotta at Barikot during the Early Historic period.



Figure 144: Ghata-shaped bead of glass (Ser. 4065) (Photograph: author's own)

With regards to the stone beads from Macrophase 7-8, lapis lazuli is the most popular raw material in the assemblage with 13 beads found in the excavations at Barikot thus far. Besides, a few pieces of debitage have been found from the site together with a complete bead of lapis lazuli (Ser. 4080: Figure 145). Based on this evidence, it is fairly reasonable to propose the possibility of some form of on-site bead manufacture and processing that was taking place at Barikot during this time. It should be noted, however, that no specialised facilities for the production of lapis lazuli beads have been discovered at Barikot yet, although they may come to light in the course of future fieldwork.

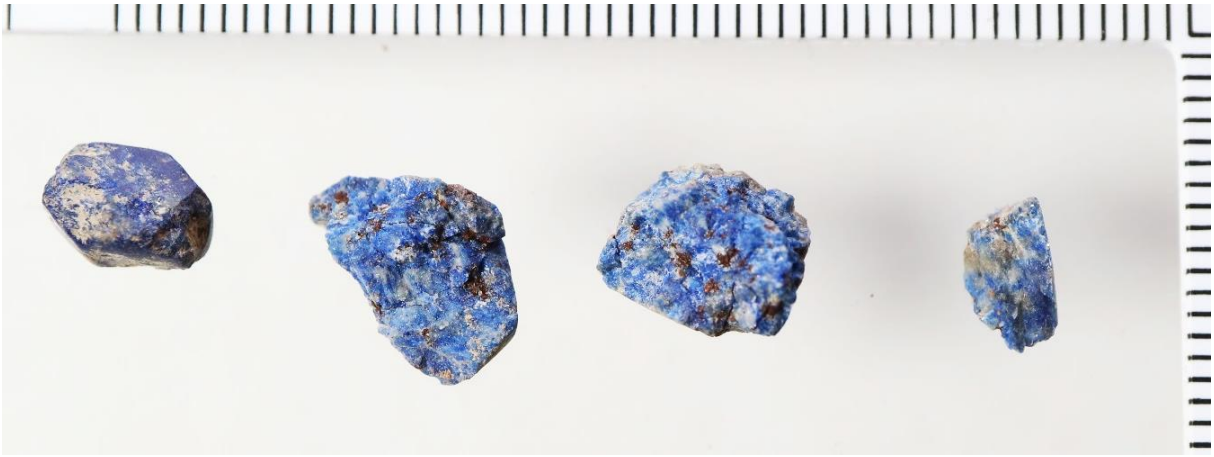


Figure 145: Hexagonal-faceted cylindrical bead of lapis lazuli with pieces of debitage (Ser. 4080) (Photograph: author's own)

In addition, other semi-precious stone varieties of carnelian and agate are represented in the bead assemblage from Macrophase 7-8 as evidenced by the recovery of a long barrel bead of carnelian (Ser. 4075: Figure 146) as well as a short barrel-shaped bead of agate (Ser. 4139: Figure 147). The identification of these stone beads provides further evidence that Barikot remained connected to various distant parts of South-and-South-west Asia in Macrophase 7-8.

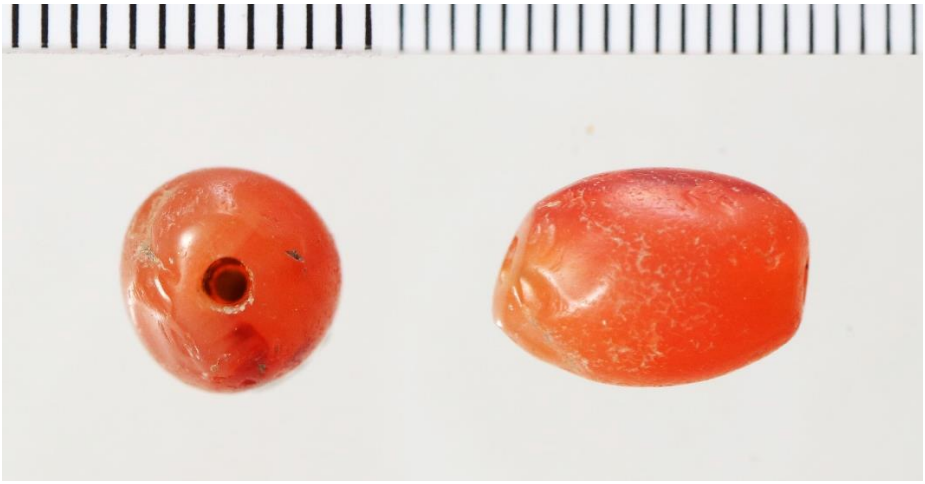


Figure 146: Long barrel bead of carnelian (Ser. 4075) (Photograph: author's own)



Figure 147: Short barrel-shaped bead of banded agate (Ser. 4139) (Photograph: author's own)

With regards to the beads of marine shell from Macrophase 7-8, surprisingly, very few beads have been recovered thus far from the excavations, which, we know, were quite popular among the people of Barikot during the earlier chronological periods especially during the Kushana periods. As outlined above, a drop-shaped pendant of carnelian first appeared in Macrophase 6 of Barikot (BKG 1158: Figure 128a). Interestingly, a typologically similar pendant has been found from Macrophase 7-8 (Ser.

4196: Figure 148) made from marine shell, which reflects the approximate time frame of use of these types of beads at Barikot (4th – 10th century CE). Shell, as a material, no doubt remained in use at Barikot in Macrophase 7-8, although probably on a very limited scale compared to the earlier periods of the site (see Chapter 7.2 for detailed discussion).



Figure 148: Drop-shaped pendant of marine shell (Ser. 4196) (Photograph: author's own)

Evidence of long-distance connections is documented not only through the recovery of semi-precious stones and marine shell but also by a perforated sea snail (*Engina Mendicaria*) (Ser. 4201: Figure 149).



Figure 149: A sea snail, *Engina Mendicaria* (Ser. 4201) (Photograph: author's own)

6.1.15 Turki-Shahi period (Macrophase 8a: 7th – 9th century CE)

The types of raw material that characterise the bead assemblage from Macrophase 8a include glass followed by terracotta, marine shell, carnelian, lapis lazuli, amber, coral, perforated sea snail and cowrie shell (Figure 150).

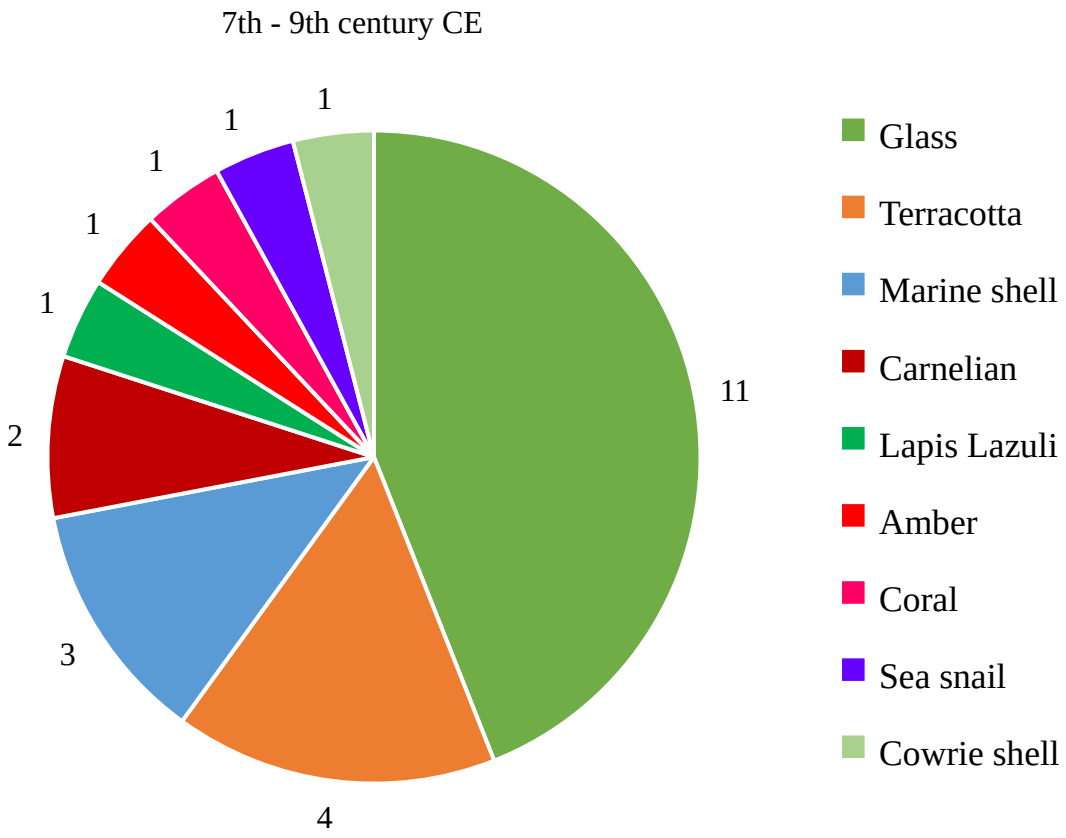


Figure 150: Raw materials of beads from the Turki-Shahi period of Barikot (N=25)

Several bead shapes are represented in the bead assemblage from Macrophase 8a including barrel, cylindrical, areca nut, spherical, irregular spherical/globular, disc-shaped, sea snail and cowrie shell forms (Figure 151). A total of 25 beads were recovered and studied by the author, attributed to Macrophase 8a of the Turki-Shahi period of Barikot (Table 19).

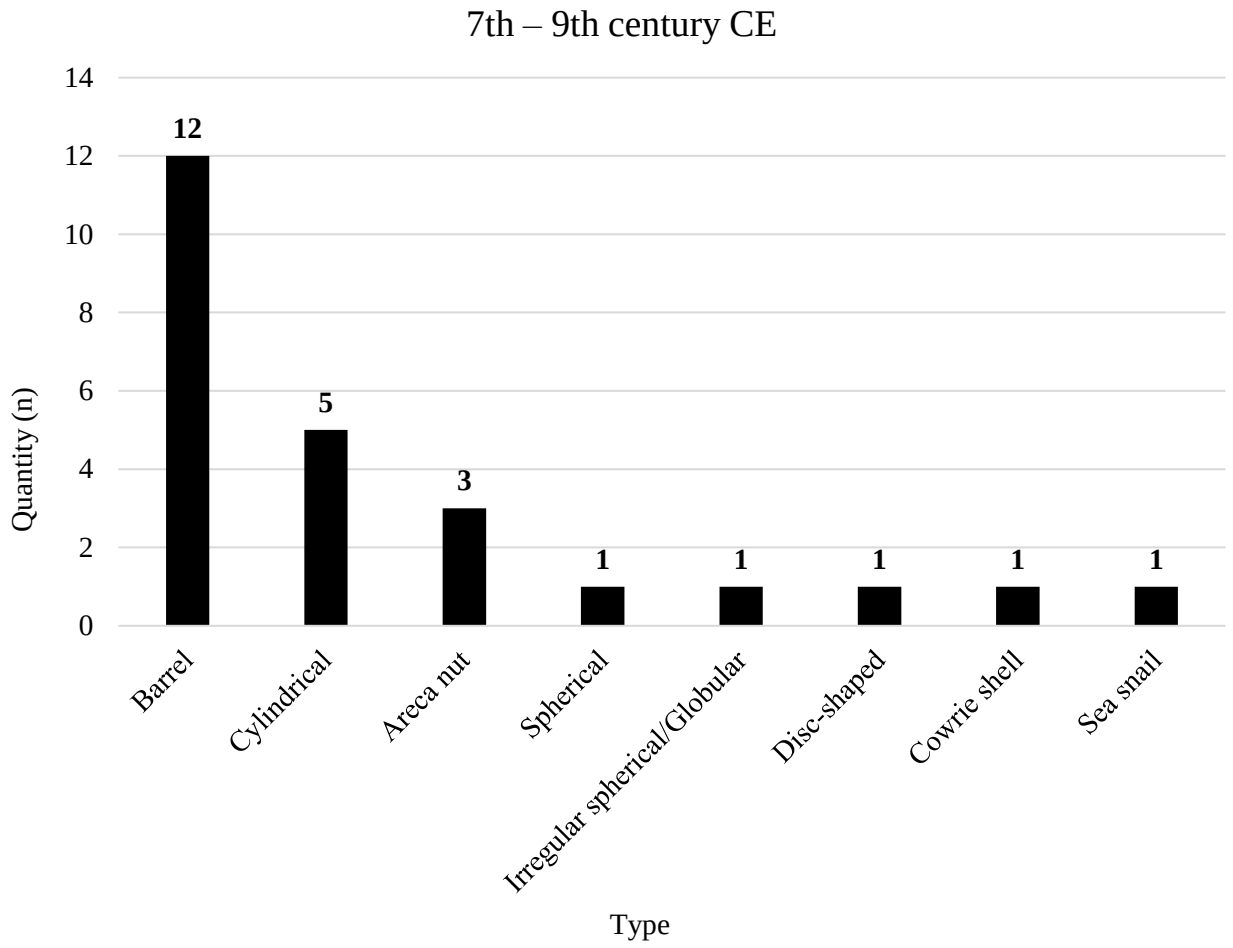


Figure 151: Bead shapes from the Turki-Shahi period of Barikot (N=25)

Material	Type								
	Barrel	***Cylindrical***	***Areca nut***	***Spherical***	***Irregular spherical/ Globular***	***Disc-shaped***	***Cowrie shell***	***Sea snail***	***Total***
Glass	6 (24%)	4 (16%)		1 (4.0%)					11 (44%)
Terracotta	1 (4.0%)		3 (12%)						4 (16%)
Marine shell	2 (8.0%)	1 (4.0%)							3 (12%)
Carnelian	2 (8.0%)								2 (8.0%)
Lapis Lazuli					1 (4.0%)				1 (4.0%)
Amber						1 (4.0%)			1 (4.0%)
Coral	1 (4.0%)								1 (4.0%)
Sea snail								1 (4.0%)	1 (4.0%)
Cowrie shell							1 (4.0%)		1 (4.0%)
Total	12 (48%)	5 (20%)	3 (12%)	1 (4.0%)	1 (4.0%)	1 (4.0%)	1 (4.0%)	1 (4.0%)	**25 (100%)**

Table 19: Numbers and percentage of bead materials and shapes during the Turki-Shahi period of Barikot

Although the number of recovered beads is currently small, it appears that glass is the most dominant material that was favoured by the people of Barikot in Macrophase 8a. 11 glass beads have been found in the excavations at Barikot, but it is highly likely that the true number of glass beads circulating at the site during this time was much higher. It is also likely that many of the glass beads currently attributed to Macrophase 7-8, were, in fact, in circulation at Barikot in Macrophase 8a. The glass beads from Macrophase 8a are made in various shapes - some of which bear clear typological links with the glass beads found from the earlier periods of Barikot. These include, for example, the Indo-Pacific group of glass beads that come in yellow, green and blue colours (Ser. 4464: Figure 152). The recovery of Indo-Pacific glass beads from Macrophase 8a provides evidence that Barikot probably participated in the activities of the expanding trans-regional trading network zones, which were thriving on an international scale during the Late Historic period.



Figure 152: Long cylindrical Indo-Pacific glass bead (Ser. 4464) (Photograph: author's own)

With regards to the terracotta beads from Macrophase 8a, the recovery of areca nut beads provides more evidence for typological continuities with the beads from the earlier chronological periods of Barikot. Although no ghata-shaped beads have been found from the excavations yet, it is likely they were produced and used at Barikot in Macrophase 8a, which is supported by the study of the bead assemblage from the succeeding Macrophase 8b that reveals ghata shaped beads of terracotta. Regarding the stone beads from Macrophase 8a, two heavily chipped and irregular shaped beads of carnelian have been found in the excavation at Barikot (BKG 4808: Figure 153), which are stylistically similar to the carnelian beads from Macrophase 7 and 7-8. In general, both carnelian beads from Macrophase 8a are of low-quality, representing a contrast to the many well-manufactured carnelian beads of the Early Historic period of Barikot (Figures 171-172).



Figure 153: Irregular short barrel-shaped bead of carnelian (BKG 4808) (Photograph: ISMEO Italian Archaeological Mission in Pakistan)

Furthermore, additional evidence of long-distance interactions is provided by the discovery of a unique disc-shaped bead of amber (BKG 2055: Figure 154), probably representing a new addition to the stone bead material repertoire of Barikot. Notable occurrences of amber can be found along the Baltic and North Sea coasts as well as the eastern African coast while no sources are known from the subcontinent (Ahuja 2018: 117; Kashani et al. 2011).



Figure 154: Disc-shaped bead of amber (BKG 2055) (Photograph: author's own)

Despite their small numbers, the discovery of beads made from marine shell, cowrie shell, sea snail and coral from Macrophase 8a (BKG 4794: Figure 155) allows us to consider the maintenance of potential connections and/or commercial exchange occurring between Barikot and the southern coastal areas of the subcontinent during this time.

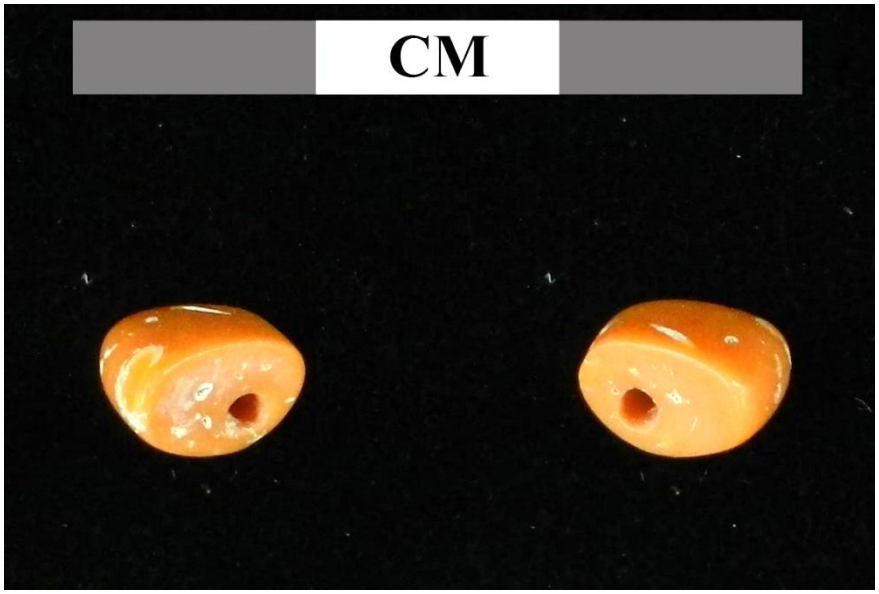


Figure 155: Oval barrel-shaped bead of coral (BKG 4794) (Photograph: ISMEO Italian Archaeological Mission in Pakistan)

6.1.16 Hindu-Shahi period (Macrophase 8b: 9th – 11th century CE)

The types of raw material that characterise the bead assemblage from Macrophase 8b include glass followed by terracotta, marine shell, lapis lazuli, cowrie shell, carnelian, dentalium shell, coix seed, quartz/rock crystal, chloritic-schist and a sea snail. The raw material of two cylindrical beads could not be identfied by the author (Figure 156).

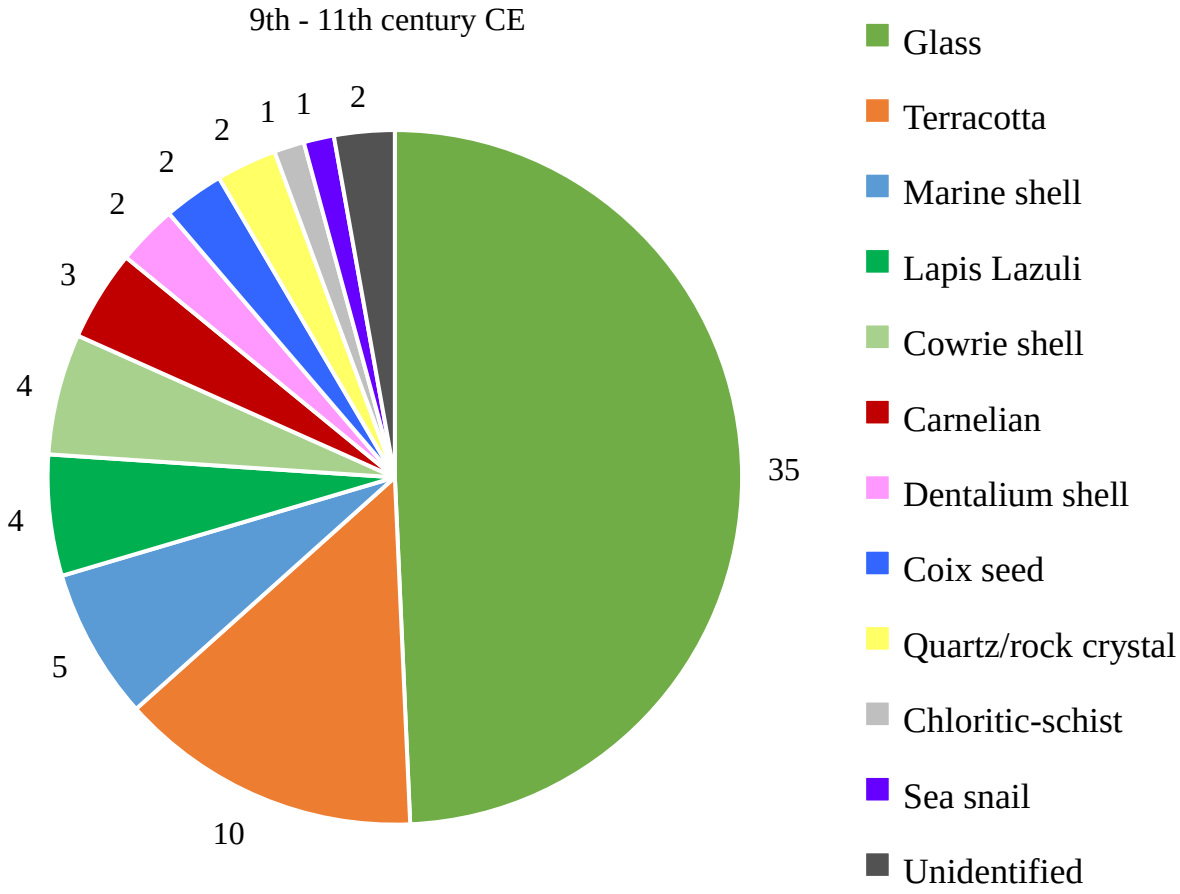


Figure 156: Raw materials of beads from the Hindu-Shahi period of Barikot (N=71)

A range of bead shapes are represented in the bead assemblage from Macrophase 8b including barrel, cylindrical, areca nut, ghata-shaped, spherical, biconical, irregular spherical/globular, lenticular biconical, segmented, cornerless cube, rectangular long rectangular, coix seed, cowrie shell and sea snail forms (Figure 157). 71 beads were studied and verified by the author from a total of 76 beads, attributed to Macrophase 8b of the Hindu-Shahi period of Barikot (Table 20). The raw material and shape of the remaining five beads could not be verified by the author.

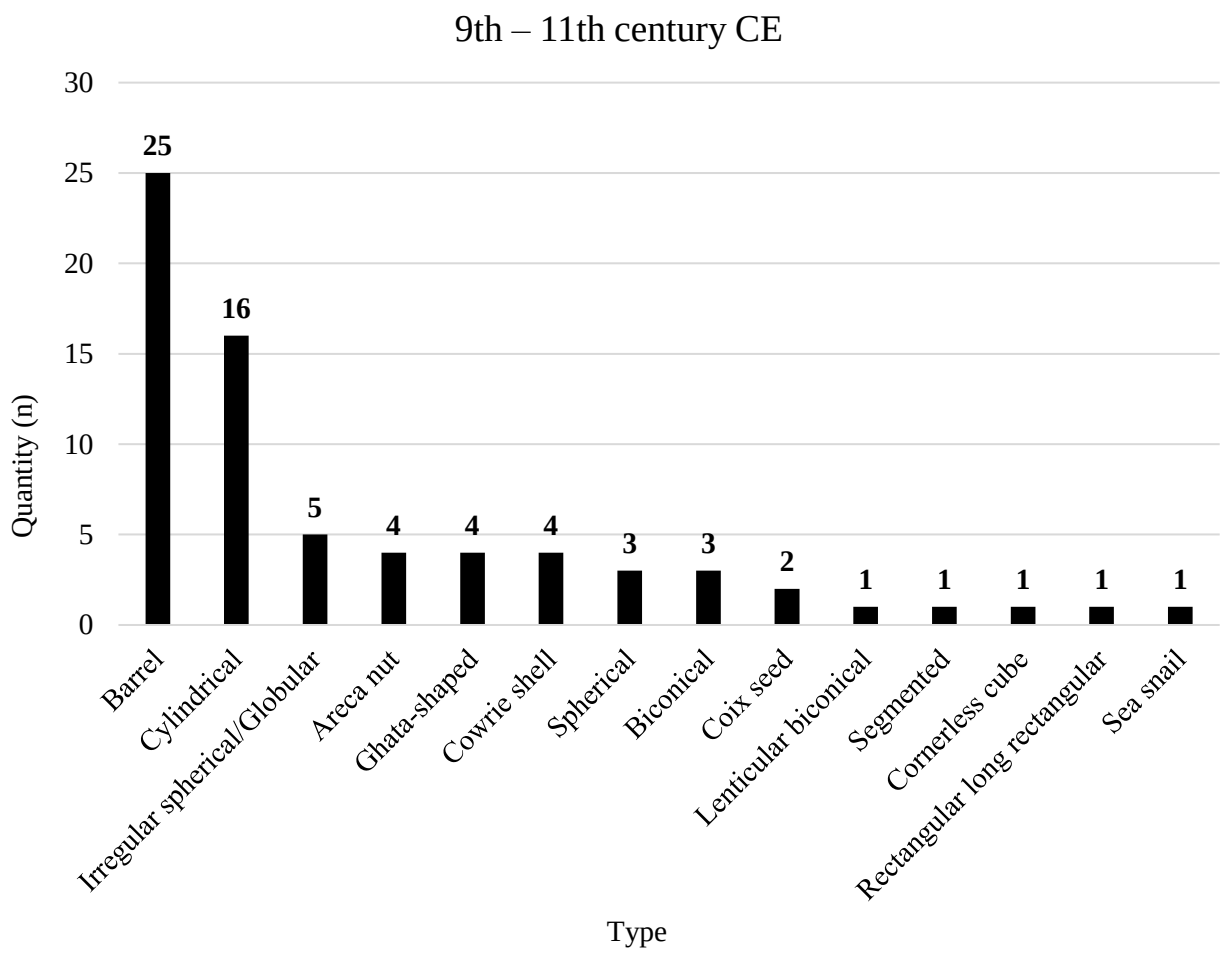


Figure 157: Bead shapes from the Hindu-Shahi period of Barikot (N=71)

Material	Type															
	Barrel	***Cylindrical***	***Areca nut***	***Ghata-shaped***	***Spherical***	***Cowrie shell***	***Biconical***	***Irreg. spheri./ Globular***	***Coix seed***	***Lenticular biconical***	***Segmented***	***Cornerless cube***	***Rectangular long rectangular***	***Sea snail***	***Unidentified***	***Total***
Glass	19 (24.99%)	10 (13.15%)			2 (2.6%)			2 (2.6%)		1 (1.31%)	1 (1.31%)					35 (40.05%)
Terracotta			4 (5.26%)	4 (5.26%)			2 (2.6%)									10 (13.15%)
Marine shell	2 (2.6%)	2 (2.6%)						1 (1.31%)								5 (6.58%)
Lapis lazuli	2 (2.6%)						1 (1.31%)					1 (1.31%)				4 (5.26%)
Cowrie shell						4 (5.26%)										4 (5.26%)
Carnelian					1 (1.31%)			2 (2.6%)								3 (3.94%)
Dentalium shell		2 (2.6%)														2 (2.6%)
Coix seed									2 (2.6%)							2 (2.6%)
Quartz/rock crystal	2 (2.6%)															2 (2.6%)
Chloritic-schist													1 (1.31%)			1 (1.31%)
Sea snail														1 (1.31%)		1 (1.31%)
Unidentified		2 (2.6%)													5 (6.58%)	7 (9.21%)
Total	25 (32.89%	16 (21.05%)	4 (5.26%)	4 (5.26%)	3 (3.94%)	4 (5.26%)	3 (3.94%)	5 (6.58%)	2 (2.6%)	1 (1.31%)	1 (1.31%)	1 (1.31%)	1 (1.31%)	1 (1.31%)	5 (6.58%)	**76 (100%)**

Table 20: Numbers and percentage of bead materials and shapes during the Hindu-Shahi period of Barikot

Glass appears to have been the most popular bead raw material in Macrophase 8b of Barikot as evidenced by the study of the bead assemblage of this time. Various types of glass beads are found in the assemblage - some of which bear strong typological connections with the glass beads from the earlier periods of Barikot. Barrel and cylindrical glass beads are the most common bead shapes in the assemblage from Macrophase 8b as was the case in the earlier Macrophase 7-8 and 8a of Barikot. Likewise, Indo-Pacific glass beads are found in large numbers, coming, most notably, in yellow, green, green-blue and blue colours. In addition, several new types of glass beads appear at the site during this time including a short barrel-shaped bead with a purple-and-white colour (BKG 5389: Figure 158a) and a long barrel-shaped wound bead with a black-and-white colour (BKG 4653: 158b).

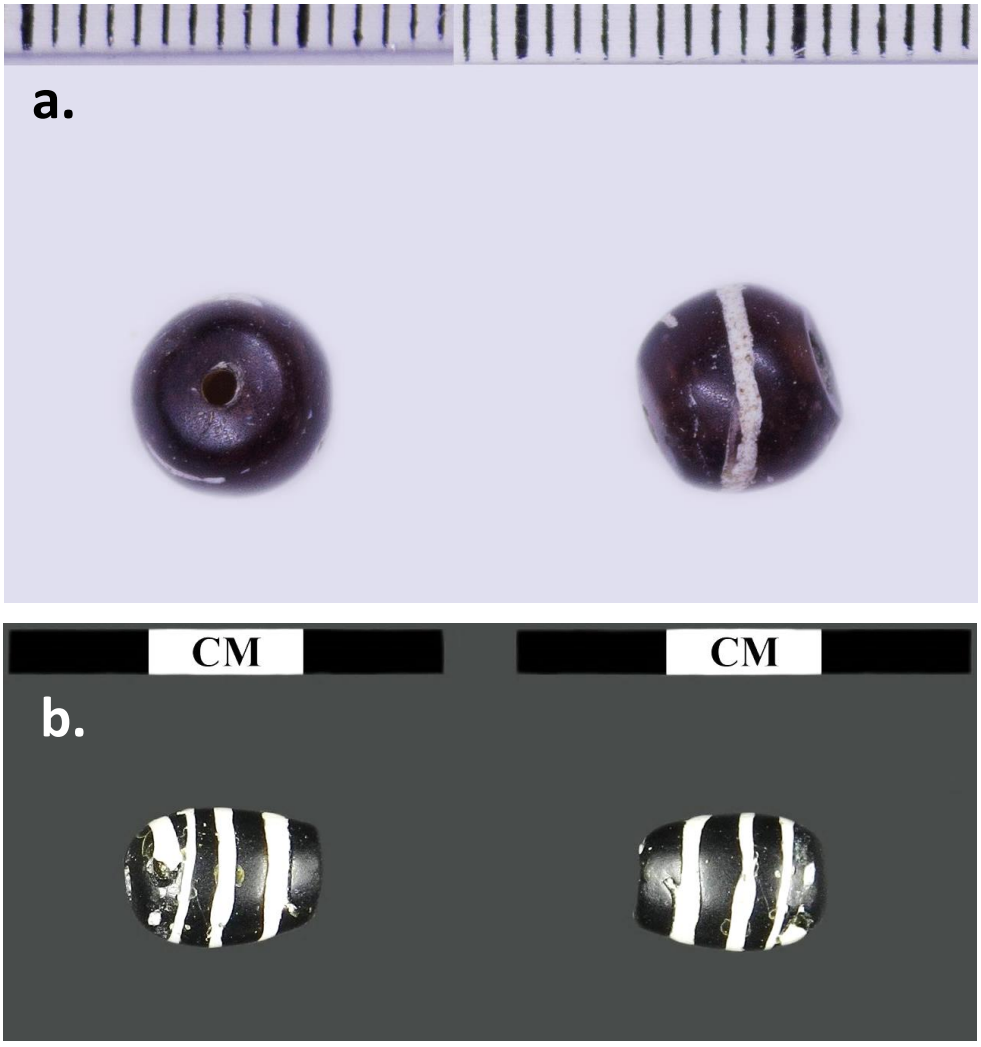


Figure 158: a) Short barrel-shaped glass bead with a purple-and-white colour (BKG 5389) b) Long barrel-shaped wound glass bead with a black-and-white colour (BKG 4653) (Photographs: ISMEO Italian Archaeological Mission in Pakistan)

Other notable types of beads include a lenticular short biconical glass bead with a bright green colour (BKG 4656: Figure 159a). Lenticular short biconical beads of carnelian and marine shell were produced during the Early Historic period of Barikot, but the recovery of a lenticular short biconical glass bead from the Late Historic period of Barikot may potentially represent a new development in the ornamental traditions at the site. Another unique glass bead has also been identified in the assemblage from Macrophase 8b, produced in the segmented form (BKG 4760: Figure 159b) with the same distinct green colour as BKG 4656.

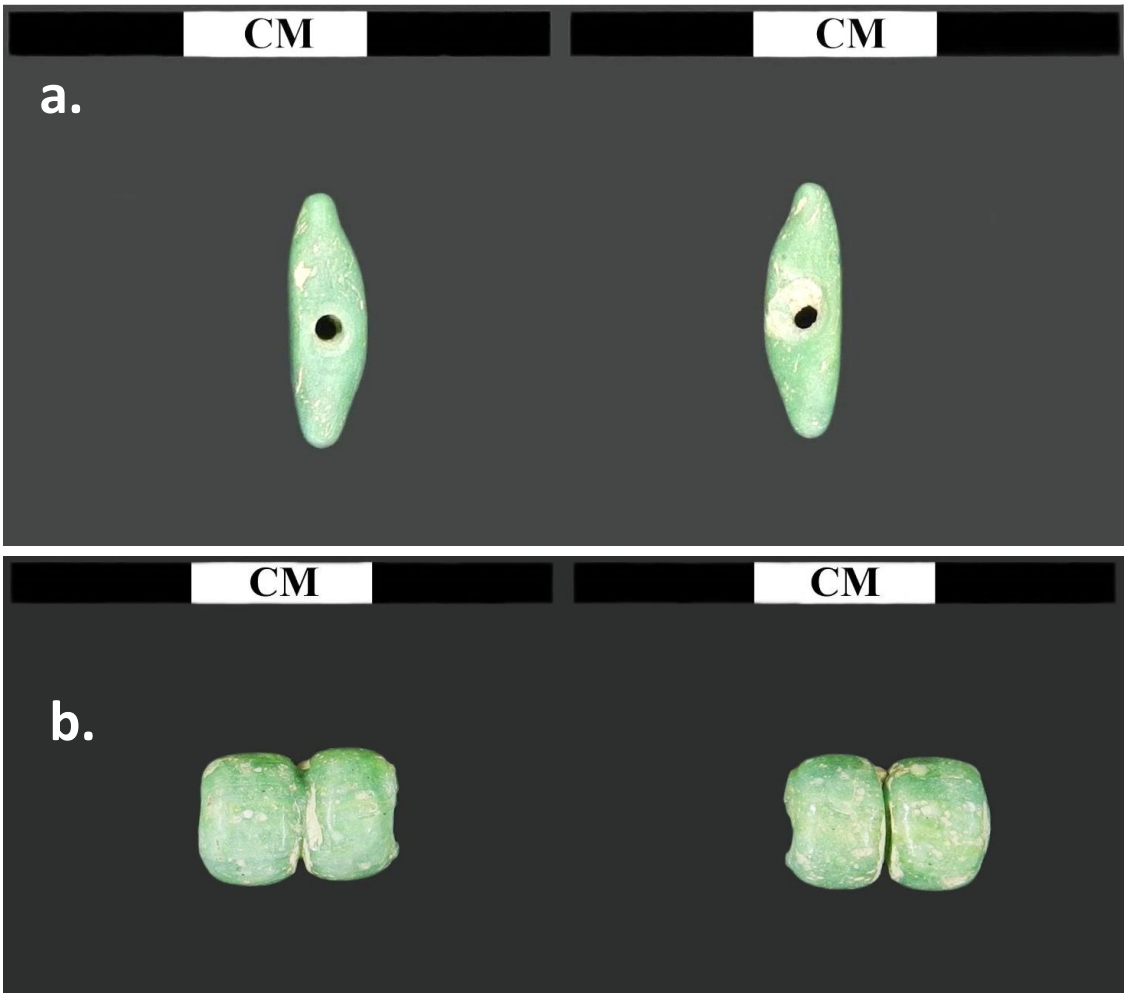


Figure 159: a) Lenticular short biconical glass bead (BKG 4656) b) Segmented bead of glass (BKG 4760) (Photographs: ISMEO Italian Archaeological Mission in Pakistan)

BKG 4760 currently represents the first example of a segmented bead that has come to light from the excavations at Barikot. Segmented beads were a key-product of the Near Eastern and Egyptian glass bead industry and are found widely distributed in various parts of West Asia, South-and South-east Asia, Europe and Africa. Their manufacture is documented at the site of Fustat in Egypt from the Early Islamic period (Francis 1989; 1990; 2002; Rodziewicz 1984; Spaer 1993). Several segmented beads

have been recovered from the excavations at Taxila and Arikamedu (Beck 1941: Pl. IX no. 17, 33-34, 41; Francis 2002). Within the current context, it is, therefore, possible that BKG 4760 may have been imported to Barikot through long-distance interactions with the Islamic territories to the west or south (see Chapter 7.2.5 for detailed discussion). The precise provenance of BKG 4760 can only be determined through the application of scientific compositional analysis in the future.

Although terracotta beads are also present in the assemblage from Macrophase 8b, their number currently remains fairly low with only ten beads recovered from excavations thus far. Here too, it is worth pointing out again that the types of beads that have been proposed to be related to Buddhism in the earlier discussions are either absent or have significantly declined in numbers, which were quite abundant at Barikot especially during the earlier Saka-Parthian, Kushana and Kushano-Sasanian periods (Macrophases 3b – Macrophase 6). It appears, for example, that the beads that were found to be imitating various forms of the natural fauna and flora are no longer represented in the bead assemblages of the post-Kushano-Sasanian periods while the areca nut and ghata-shaped beads have also declined in numbers at Barikot. The recovery of areca nut and ghata-shaped beads in Macrophase 8 may potentially suggest for the presence of a small Buddhist community at the site, although the use of these distinct beads by non-Buddhist groups cannot be ruled out.

Additional evidence of typological continuity is provided by the recovery of a hexagonal-faceted long barrel bead of rock crystal (BKG 4683: Figure 160), which, as we know, were quite popular types of ornaments during the earlier Kushana and Kushano-Sasanian periods of Barikot. In the absence of direct evidence, it is currently problematic to relate the faceted beads of the Late Historic period from Barikot exclusively with a Buddhist affiliation. 60 hexagonal faceted beads of rock crystal, for instance, were found inside a Muslim tomb (11th – 12th century CE) at the site of Udegram in Swat (Bagnera 2006; 2015). This discovery reminds us to re-evaluate the archaeological evidence from this time and adopt a cautious approach in the study and interpretation of bead ornaments, which derive from the complex cultural continuum of Barikot. Faceted beads were, however, no doubt important during the earlier Kushana and Kushano-Sasanian periods of Barikot, probably imbued with Buddhist symbolism and meanings (see Chapter 8).

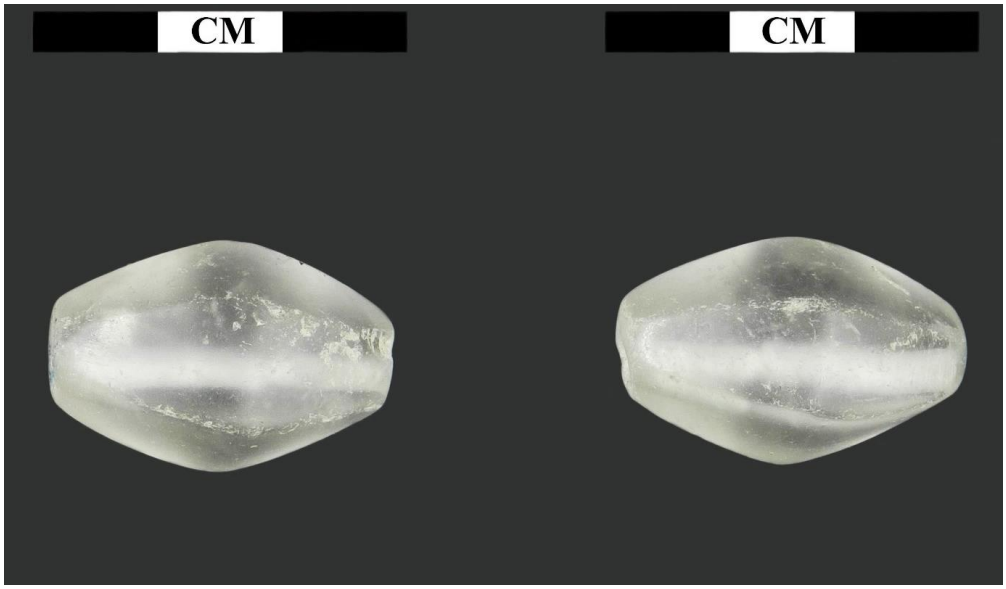


Figure 160: a) Hexagonal-faceted long barrel bead of rock crystal (BKG 4683) (Photograph: ISMEO Italian Archaeological Mission in Pakistan)

In terms of the carnelian beads from Macrophase 8b, their number is fairly small as it is in all the earlier chronological periods of Barikot. The carnelian beads from Macrophase 8b are, again, chipped and irregular in shape (BKG 2056: Figure 161) similar to the carnelian beads from the earlier periods of the site especially from Macrophase 7, 7-8 and 8a. In general, most of the carnelian beads from Macrophase 7, 7-8 and 8 are of low quality, irregular in shape and shorter in size compared to the carnelian beads from the Early Historic period of Barikot that we see produced in various forms, degrees of quality and size (Figures 171-172).

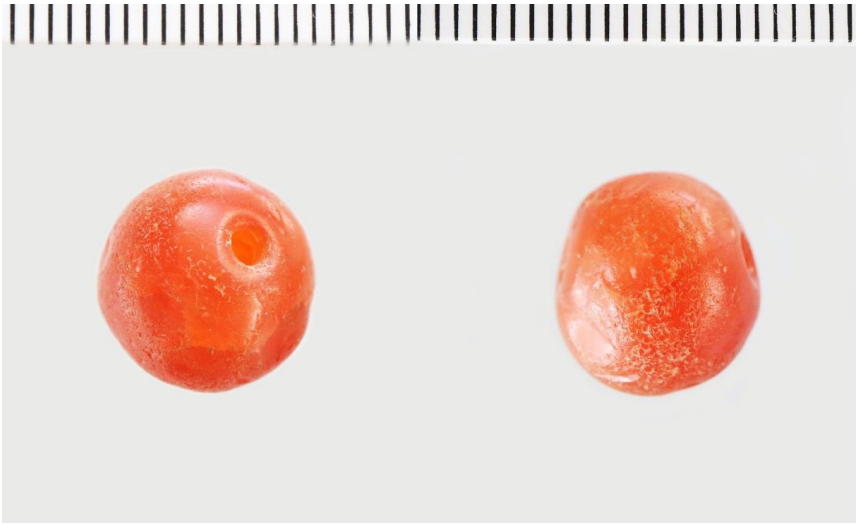


Figure 161: Irregular short spherical/Globular bead of carnelian (BKG 2056) (Photograph: author's own)

With regards to the shell bead repertoire from Macrophase 8b, only five beads of marine shell have been found in the excavations at Barikot in addition to various types of other marine materials. Apart from cowrie shells, a unique perforated sea snail (BKG 4774: Figure 162a) and two long cylindrical dentalium shells (BKG 4696: Figure 162b) are represented in the assemblage from Macrophase 8b. Preliminary observations suggest that, as with the specimens of the earlier chronological periods of Barikot, the dentalium shells from Macrophase 8b were not artificially modified but are found in the assemblage in their natural shape form. The bead assemblage from Macrophase 8b, therefore, indicates that Barikot remained well-connected to various local and distant geographic locations including the southern coastal areas of the subcontinent, although probably on a reduced scale compared to the Early Historic period of the site (see Chapter 7.2.5 for detailed discussion).

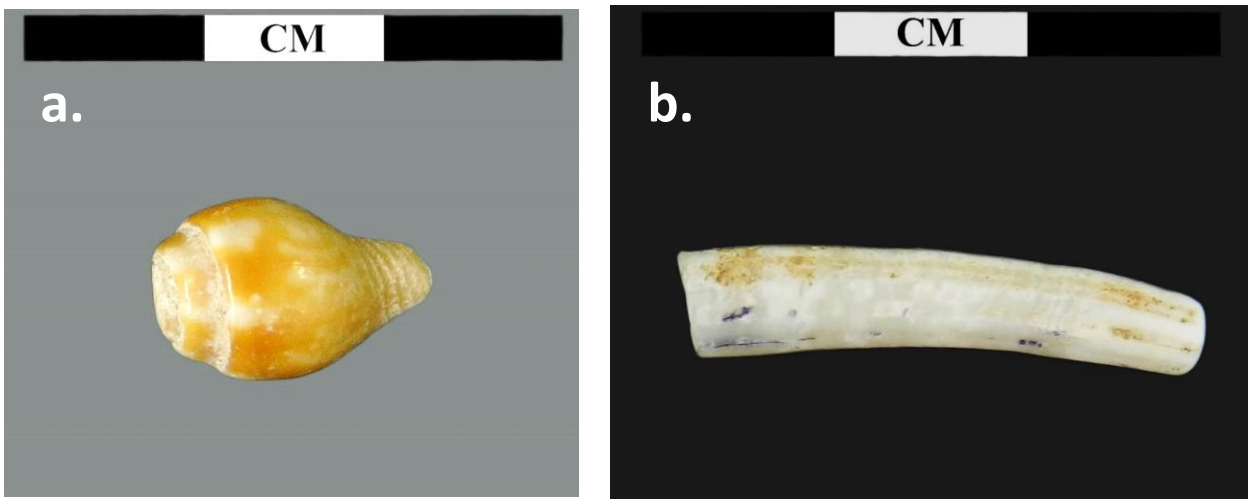


Figure 162: a) Perforated sea snail (BKG 4774) b) Long cylindrical dentalium shell (BKG 4696) (Photographs: ISMEO Italian Archaeological Mission in Pakistan)

In addition, the bead assemblage from Macrophase 8b is marked by another important development in the ornamental traditions of the site. The most frequently used plant ornament in South Asia is a bead made from a fruit called Job's tears or *Coix lacryma-jobi* (Arora 1977; Francis 1984). There are two main varieties of the species with one being wild and the other cultivated. The wild variety (*Coix lacryma-jobi*) has hard-shelled pseudocarps that are pearly white, oval structures, suitable to be modified into beads (Arora 1977). Beads of Job's tears have been recovered from major archaeological sites such as Ahichchhatra in the Gangetic region and Anuradhapura in Sri Lanka, reportedly dating to the last centuries BCE (Deraniyagala 1972; Dikshit 1952: 50: Figure 4 no. 82). They are still widely used for ornamental purposes in South Asia, growing in many parts of the subcontinent (Francis 1984; Mehra et al. 1975; Stewart 1972: 115). In the context of the current study, two perforated coix seeds have been found seemingly for the first time at Barikot (BKG 4670: Figure 163). This important discovery provides new perspectives on the use of plants for making beads during the Hindu-Shahi

period of Barikot. BKG 4670 may have been possibly used as amulets or could have been imbued with magical functions as they are today among various female groups of the subcontinent (Arora 1977; Francis 1984).



Figure 163: Two perforated coix seeds (BKG 4670) (Photograph: ISMEO Italian Archaeological Mission in Pakistan)

6.1.17 Ghaznavid period (Macrophase 9a: 11th – 12th century CE)

The types of raw material that characterise the bead assemblage from Macrophase 9a include terracotta followed by glass, marine shell, carnelian, lapis lazuli, rock crystal, quartz and cowrie shell (Figure 164).

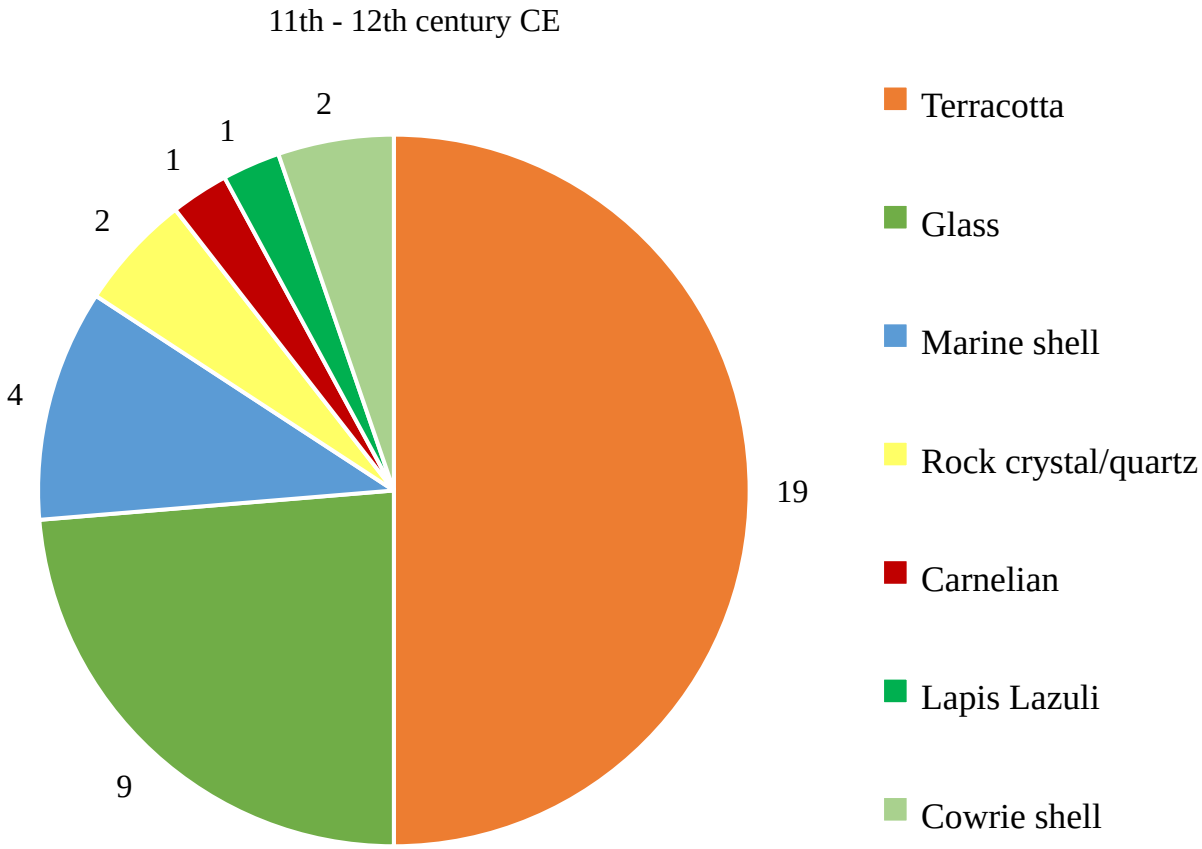


Figure 164: Raw materials of beads from the Ghaznavid period of Barikot (N=38)

Several bead shapes are represented in the bead assemblage from Macrophase 9a including barrel, areca nut, spherical, cylindrical, biconical, ghata-shaped, irregular spherical/globular, triangular barrel, segmented and cowrie shell forms (Figure 165). 38 beads were studied and verified by the author from a total of 44 beads, attributed to Macrophase 9a of the Ghaznavid period of Barikot (Table 21). The raw material and shape of the remaining seven beads could not be verified by the author.

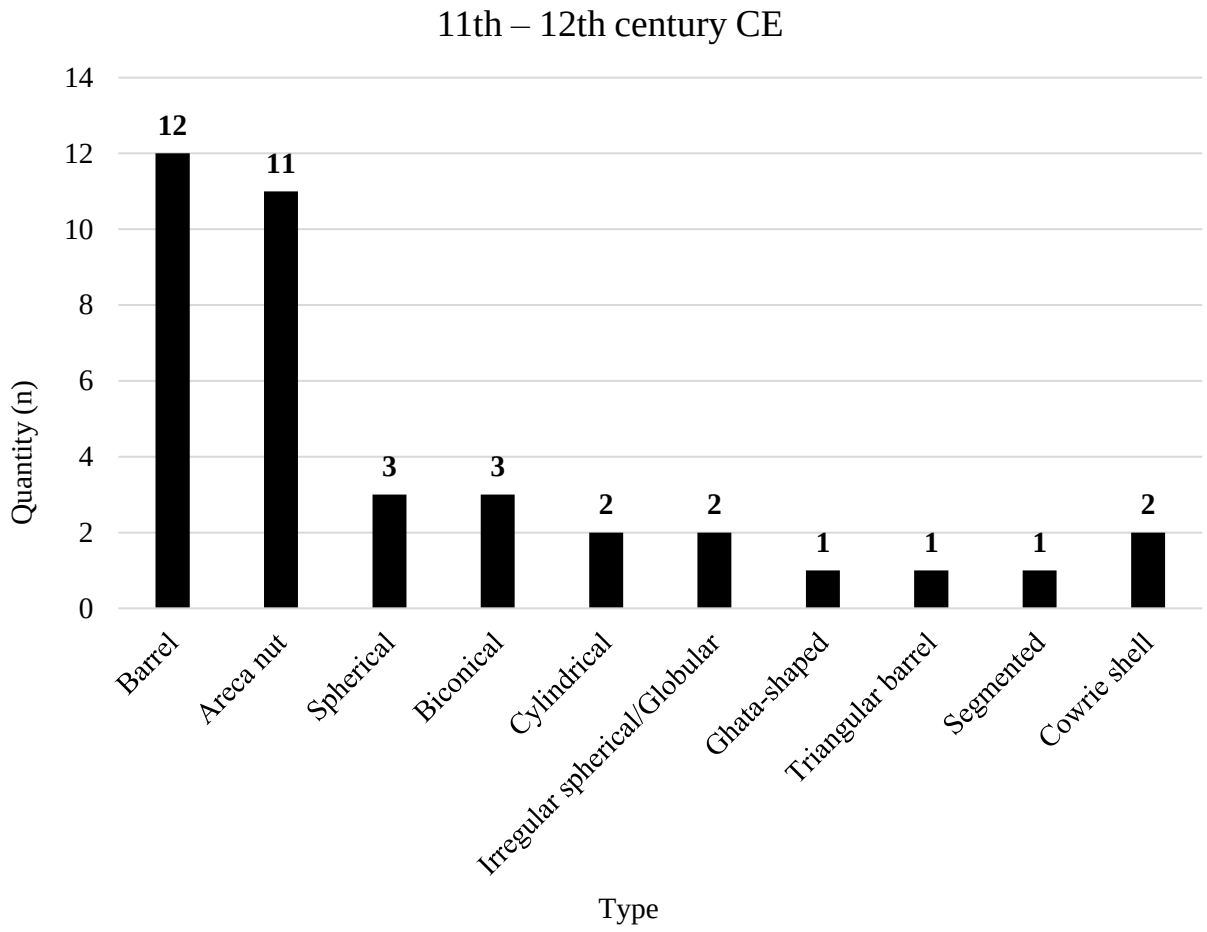


Figure 165: Bead shapes from the Ghaznavid period of Barikot (N=38)

Material	Type											
	Areca nut	***Ghata-shaped***	***Barrel***	***Spherical***	***Irregular spherical/ Globular***	***Biconical***	***Cylindrical***	***Segmented***	***Triangular barrel***	***Cowrie shell***	***Unidentified***	***Total***
Terracotta	11 (24.44%)	1 (2.22%)	4 (8.88%)			3 (6.66%)						19 (42.22%)
Glass			4 (8.88%)	2 (4.44%)			2 (4.44%)	1 (2.22%)				9 (20%)
Marine shell			2 (4.44%)		1 (2.22%)				1 (2.22%)			4 (8.88%)
Rock crystal/quartz			1 (2.22%)		1 (2.22%)							2 (4.44%)
Carnelian				1 (2.22%)								1 (2.22%)
Lapis Lazuli			1 (2.22%)									1 (2.22%)
Cowrie shell										2 (4.44%)		2 (4.44%)
Unidentified											7 (15.55%)	7 (15.55%)
Total	11 (24.44%)	1 (2.22%)	12 (26.66%)	3 (6.66%)	2 (4.44%)	3 (6.66%)	2 (4.44%)	1 (2.22%)	1 (2.22%)	2 (4.44%)	7 (15.55%)	**45 (100%)**

Table 21: Numbers and percentage of bead materials and shapes during the Ghaznavid period of Barikot

At a first glance, the number of beads appears to have decreased in the sampled deposits of Barikot from 76 in Macrophase 8b to 45 in Macrophase 9a. This apparent decline should, however, not be accepted for granted as it probably reflects the limited number of excavations carried out of the Ghaznavid contexts at Barikot. Although the sample size is currently small, the study of the beads from Macrophase 9a has already revealed several typological continuities with the beads deriving from the preceding cultural periods of Barikot. Terracotta is the most dominant raw material in the bead assemblage with 19 beads recovered from the excavations at Barikot thus far, apparently replacing glass as the most dominant bead raw material at the site. The areca nut beads of terracotta, in particular, remain popular forms of ornaments during the Ghaznavid period of Barikot, indicating the longevity of these distinct beads in the cultural sequence of the site.

Regarding the vitreous material from Macrophase 9a, nine beads of glass have been found from the excavations thus far. The glass beads also show several typological connections with the types of beads that were in circulation in the earlier chronological periods at Barikot including the distinct, yellow-coloured Indo-Pacific glass beads. In addition, another segmented bead of glass has been found at Barikot (BKG 5354: Figure 166a) probably revealing further evidence of long-distance connections with the lands governed by Muslim rulers in the west. A compositional analysis will determine the precise geographic provenance of BKG 5354 and, in the process, shed light on potential regional interactions occurring between Barikot and other distant sites in the early second millennium CE.

Also, the identification of several familiar raw materials including lapis lazuli, carnelian, rock crystal, marine shell and cowrie shells indicates that Barikot remained well-connected to local and wider regional influences during this time (BKG 5321: Figure 166b). The identification of these materials also suggests that the Ghaznavid rulers did not interfere to bring about a change in the pre-existing ornamental traditions of the inhabitants of the site - a well-established practise at Barikot, which seems to have been followed by the ruling polities of Barikot across various points in time in the long chronological sequence of the site. As more data becomes available through the recovery of more beads in the future, it will allow us to detect more precise local and regional patterns in the use of beads during the Ghaznavid period of Barikot.

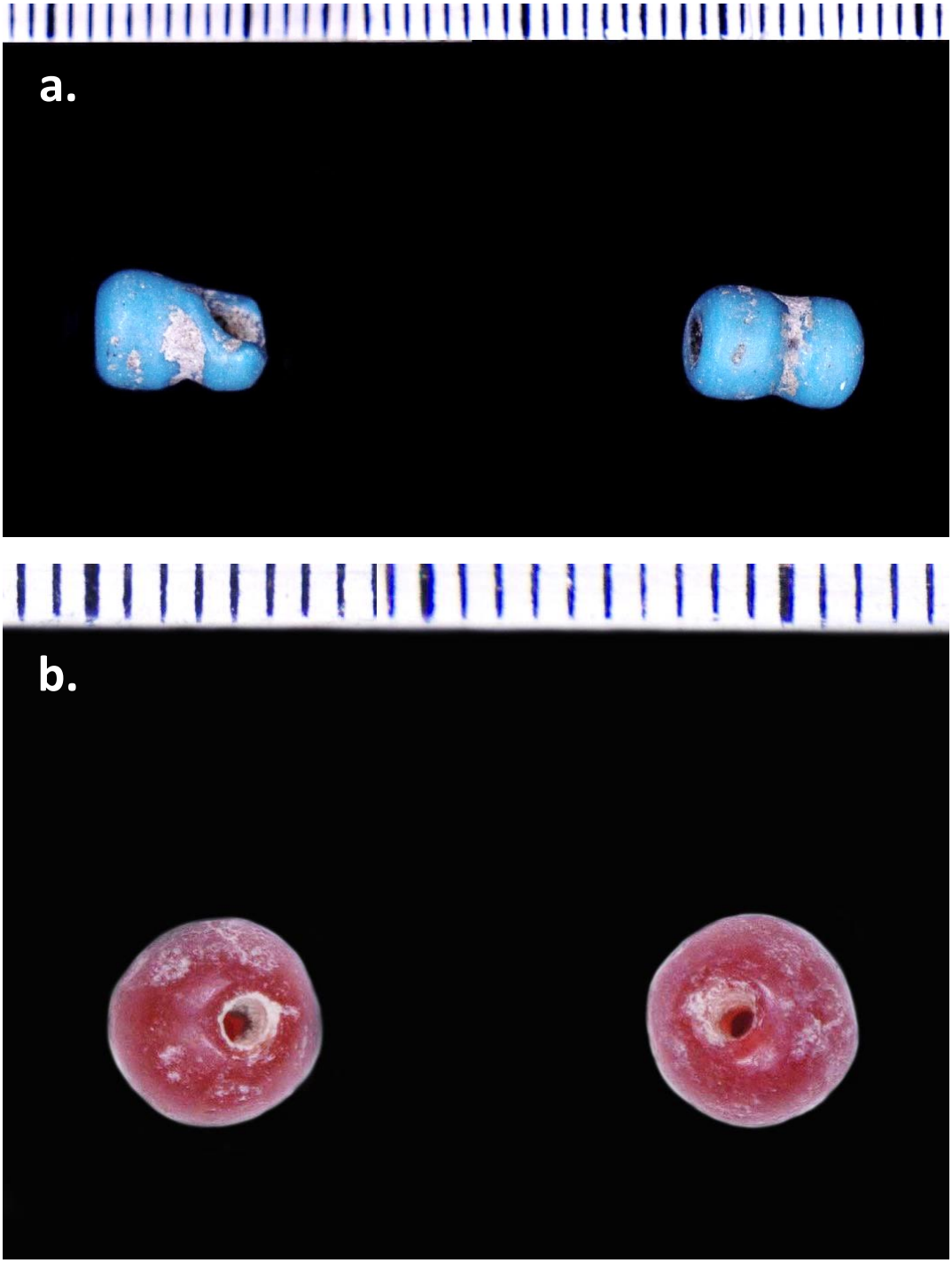


Figure 166: a) Segmented bead of blue glass (BKG 5354) b) Short spherical bead of red carnelian (BKG 5321) (Photograph: ISMEO Italian Archaeological Mission in Pakistan)

6.1.18 Timurid-Dardic period (Macrophase 9b: 13th – 15th century CE)

The types of raw material that characterise the bead assemblage from Macrophase 9b include terracotta followed by glass, lapis lazuli, marine shell, quartz/rock crystal, cowrie shell, chloritic-schist, peridot, carnelian and gold. The raw material of a single cylindrical bead could not be identified by the author (Figure 167).

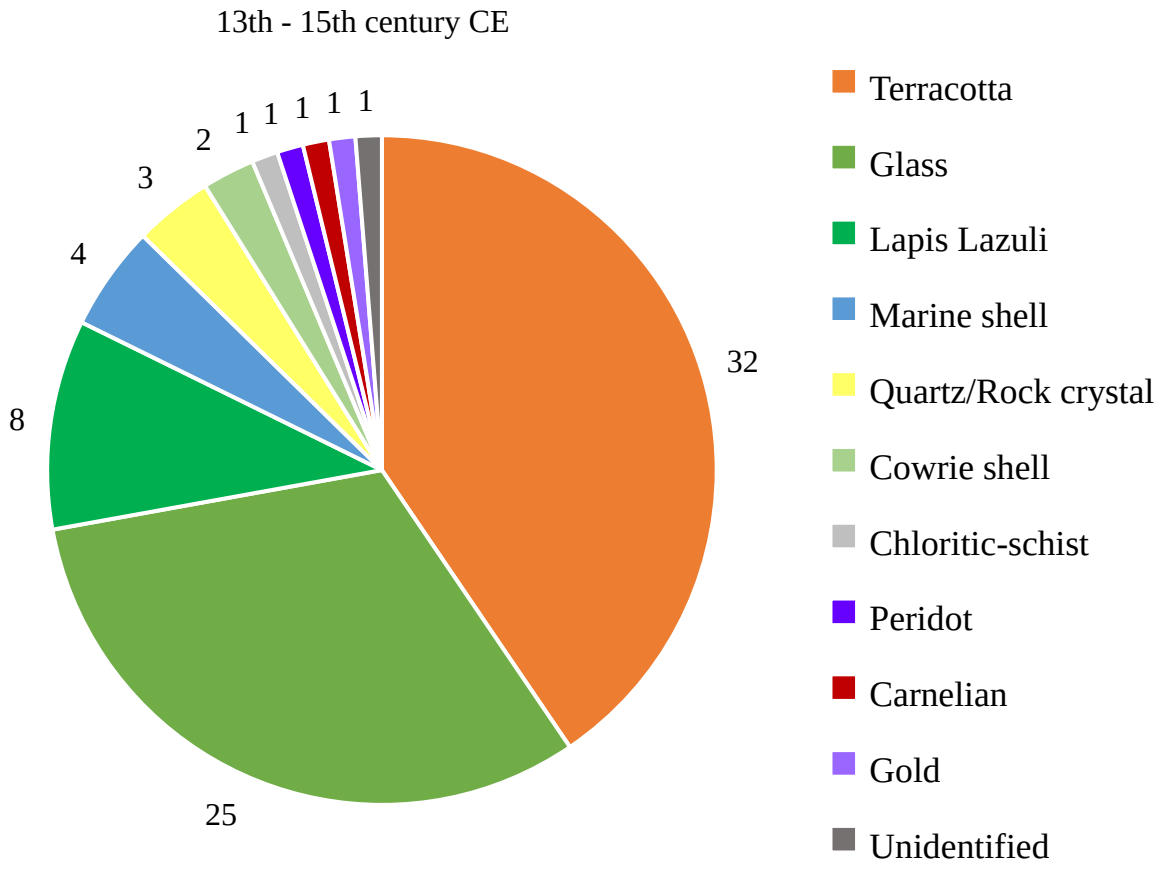


Figure 167: Raw materials of beads from the Timurid-Dardic period of Barikot (N=79)

Various types of bead shapes are represented in the bead assemblage from Macrophase 9b including barrel, areca nut, cylindrical, ghata-shaped, irregular spherical/globular, disc-shaped, rectangular long rectangular, cowrie shell, biconical, spherical, lenticular barrel and conical shapes (Figure 168). 79 beads were studied and verified by the author from a total of 105 beads, attributed to Macrophase 9b of the Timurid-Dardic period of Barikot (Table 22). The raw material and shape of the remaining 26 beads could not be verified by the author.

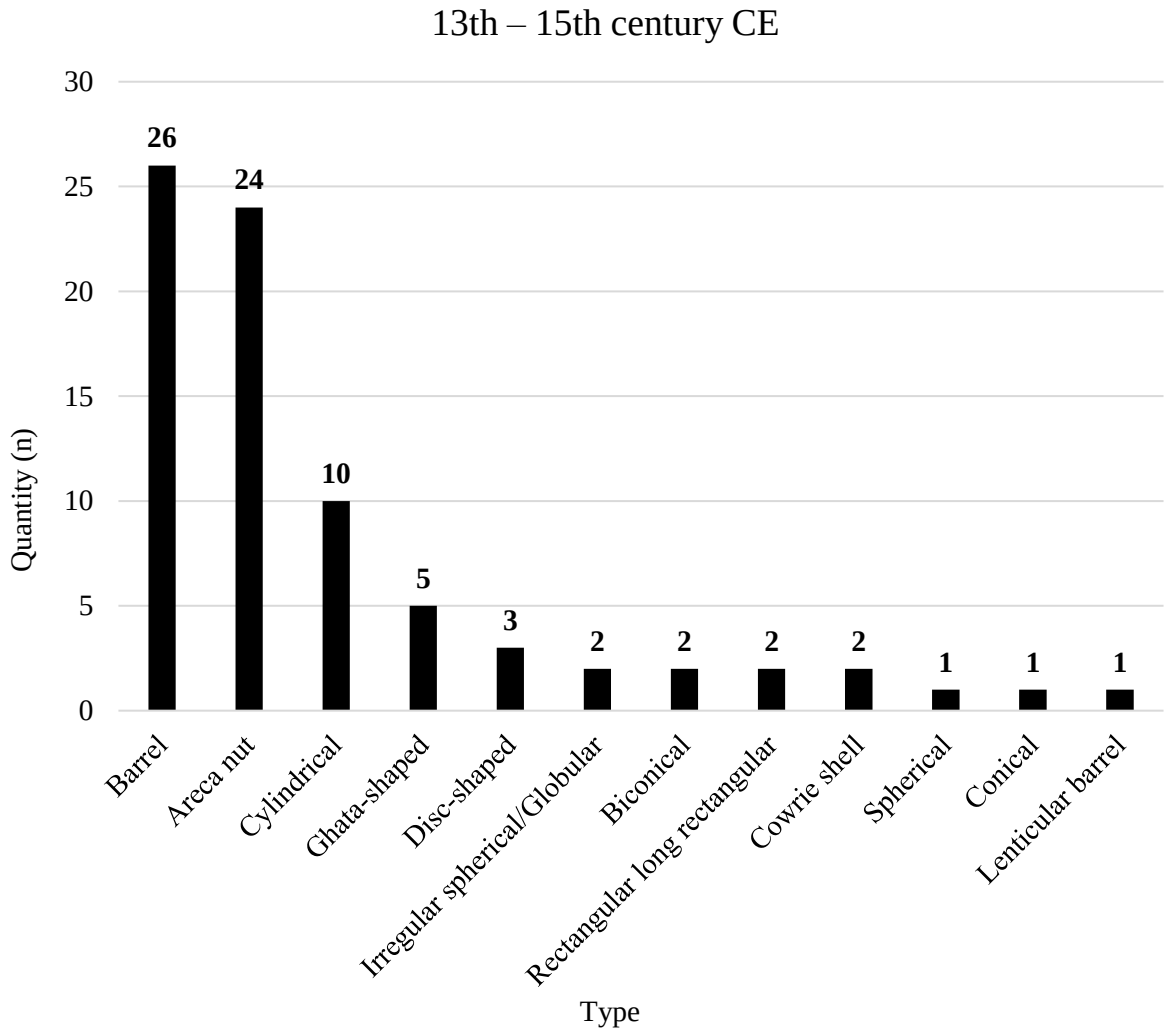


Figure 168: Bead shapes from the Timurid-Dardic period of Barikot (N=79)

Material	Type													
	Barrel	***Areca nut***	***Cylindrical***	***Ghata-shaped***	***Irregular spherical /Globular***	***Disc-shaped***	***Biconical***	***Rectangular long rectangular***	***Cowrie shell***	***Spherical***	***Conical***	***Lenticular barrel***	***Unidentified***	***Total***
Terracotta	1 (0.95%)	24 (22.85%)	1 (0.95%)	4 (3.81%)			1 (0.95%)				1 (0.95%)			32 (30.47%)
Glass	13 (12.38%)		6 (6.66%)		2 (1.90%)	3 (2.85%)						1 (0.95%)		25 (23.81%)
Lapis Lazuli	6 (5.71%)		1 (0.95%)					1 (0.95%)						8 (7.62%)
Marine shell	2 (1.90%)		2 (1.90%)											4 (3.81%)
Quartz/rock crystal	1 (0.95%)						1 (0.95%)			1 (0.95%)				3 (2.85%)
Cowrie shell									2 (1.90%)					2 (1.90%)
Chloritic-schist				1 (0.95%)										1 (0.95%)
Peridot								1 (0.95%)						1 (0.95%)
Carnelian	1 (0.95%)													1 (0.95%)
Gold	1 (0.95%)													1 (0.95%)
Unidentified	1 (0.95%)												26 (24.76%)	27 (25.71%)
Total	26 (24.76%)	24 (22.85%)	10 (9.52%)	5 (4.76%)	2 (1.90%)	3 (2.85%)	2 (1.90%)	2 (1.90%)	2 (1.90%)	1 (0.95%)	1 (0.95%)	1 (0.95%)	26 (24.76%)	**105 (100%)**

Table 22: Numbers and percentage of bead materials and shapes during the Timurid-Dardic period of Barikot

The beads deriving from Macrophase 9b of Barikot indicate several typological continuities with the beads deriving from the earlier periods of Barikot. As in Macrophase 9a, terracotta appears to be the most dominant bead raw material that was favoured by the people of Barikot in Macrophase 9b. It is interesting to note a marked decline in the number of terracotta beads in Macrophase 7-8 and 8, which was compensated by a marked increase in the number of glass beads circulating at the site during those periods. Particularly popular are the areca nut terracotta beads in Macrophase 9b, remaining in circulation at Barikot since they were first introduced in Macrophase 3a2-3a4 of the Indo-Greek period. These distinct beads were probably used by various communities for a variety of purposes. Future studies on the calibrated bead frequency by soil volume, composition and the archaeological contexts of the finds may provide us with more information about the precise role of these distinct ornaments during the Early Historic and Late Historic periods.

Regarding the glass beads from Macrophase 9b, many are typologically comparable to the glass beads that were in circulation during the earlier periods of Barikot. These include, for example, the yellow-coloured Indo-Pacific glass beads (Ser. 4469: Figure 169) as well as the disc-shaped or short barrel-shaped beads that come in a distinct, yellowish-brown colour, probably intended to cater to the needs of various groups of people at the site. The discovery of these glass beads also provides further evidence that the site of Barikot remained well-connected to other geographic locations including possibly peninsular India during the Late Historic period.

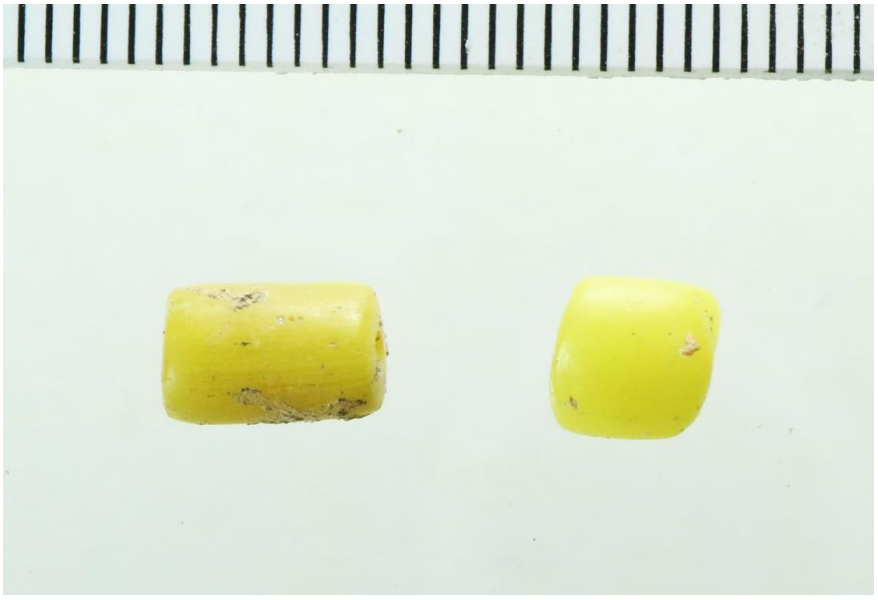


Figure 169: Two cylindrical Indo-Pacific glass beads (Ser. 4469) (Photograph: author's own)

With regards to the stone beads from Macrophase 8b, it appears that lapis lazuli is the most dominant bead raw material that was favoured by the people of Barikot during this time followed by several other stone varieties including quartz/rock crystal, carnelian, peridot and chloritic-schist. An important

addition to the ornamental traditions of Barikot is provided by the discovery of a unique bead made from green peridot (BKG 4124: Figure 170). This gemstone would have come to Barikot probably from the region of Kohistan of northern Pakistan, which is reported to harbour sources of peridot (Jan and Khan 1996).

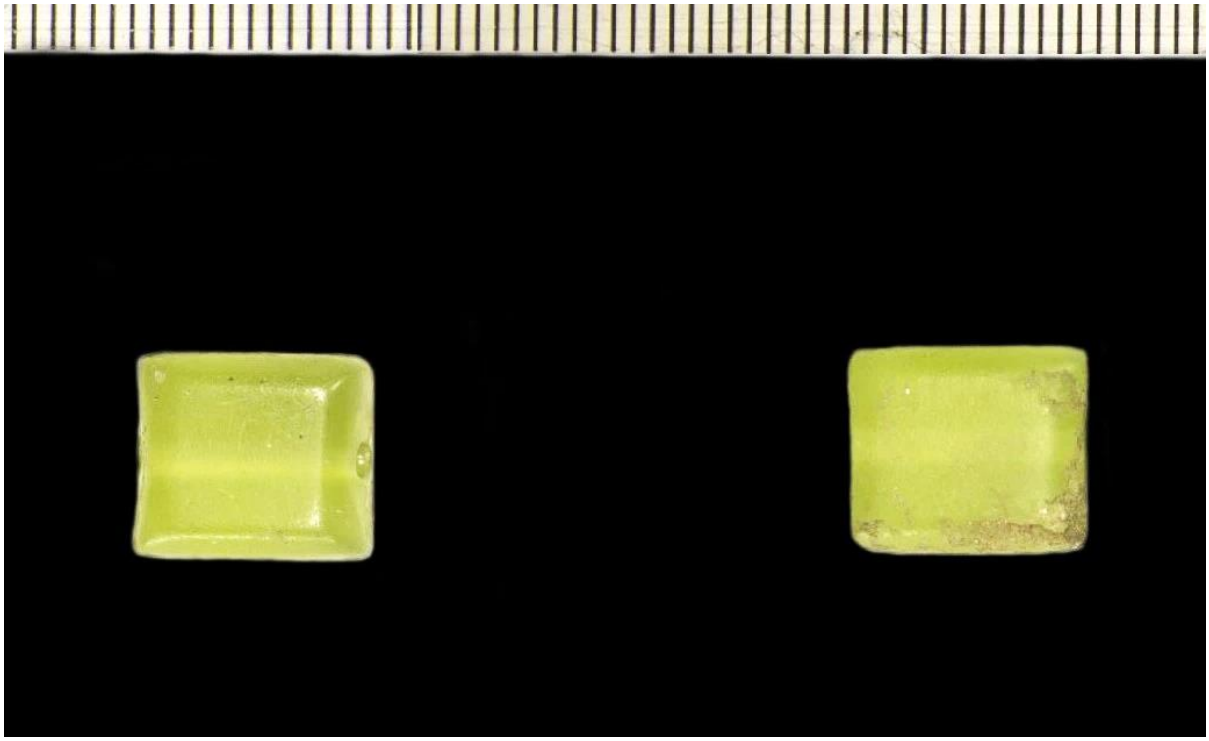


Figure 170: A rectangular long rectangular bead of peridot (BKG 4124) (Photograph: ISMEO Italian Archaeological Mission in Pakistan)

The number of beads produced from shell materials remains low in Macrophase 9b, which seems to be in agreement with the current trend and evidence coming from the Late Historic period of Barikot. In general, it appears that no attempt was made to bring about a transformation in the pre-existing ornamental traditions of the inhabitants of Barikot since the types of beads that are in circulation in Macrophase 9b are, in many instances, typologically comparable to the beads found in the preceding cultural periods of the site.

6.2 Summary

There is no doubt that the archaeology of the protohistoric period of Swat is still under construction remaining largely under-explored and minimally published (Vidale and Micheli 2017; Vidale and Olivieri 2019: 188). The various types of beads that have come to light from the excavations of the protohistoric levels of Barikot provide not only evidence for cultural ties with the preceding Indus Tradition, but also evidence for changing patterns. The motif of double concentric circles with a central dot engraved on the fired steatite bead from Barikot (BKG 2719: Figure 46), for example, is well-documented on numerous fired steatite seals from several Indus sites (Kenoyer 2009; Parpola 2013: 40-41). Other examples of continuity include a long barrel bead of bleached carnelian (BKG 3978: Figure 53) while the recovery of a rectangular circular bead of carnelian (BKG 3976: Figure 52) is reminiscent of typologically similar beads from the succeeding Early Historic period of Barikot. The identification of semi-precious stones and other long-distance materials such as marine shell that occur in several complex forms challenges the long-held interpretation that the Swat Valley was a 'marginal' territory during the protohistoric period (Stacul 1987; Tusa 1979).

In fact, the archaeological data obtained from the excavations at Barikot and the new insight gained through the study of the recovered bead assemblages, challenges Wheeler's interpretation that the succeeding Achaemenid Empire was responsible for introducing iron technology, security and order to this part of the subcontinent in the first millennium BCE (Banerjee 1965; Gordon 1950; Wheeler 1959; 1962: 5). Another avenue that requires further research concerns the low bead frequency recorded from trench BKG 11 K-105 of Barikot. Does the recorded low frequency reflect a similar picture at the other trenches of the site? Bearing this uncertainty in mind, it becomes clear that there are still many questions open to further investigation in order to try to determine the precise role of beads in the lives of the people of protohistoric Swat, which can only be addressed through large-scale horizontal excavations of the concerned occupation phases.

With regards to the beads deriving from the succeeding Achaemenid and Mauryan cultural periods, they are, in many instances, characterised by the appearance of new types of beads while the number of beads circulating at Barikot most probably increased as indicated by the calibrated bead frequencies for these two periods. The production of short barrel-shaped beads produced mostly from glass is noteworthy (see, for example, BKG 3905 and BKG 3817) and may have been possibly mass-produced, remaining in circulation in large numbers at Barikot, in particular, during the Achaemenid and Mauryan periods. An atmosphere of willingness to adopt new ideas, styles and customs prevailed in the Achaemenid lands (Frankopan 2016). The control over large territories by the Achaemenid and Mauryan rulers must have encouraged the formation of new identities, increased international commerce, skill growth, and diversity. It may have potentially stimulated the mass-production of various types of cultural artefacts including glass beads at various workshops, indicating the significance attached to glass at the time.

These distinct glass beads could have been produced on a local level, although there is currently no evidence of on-site manufacture to substantiate this argument. The high bead frequency calculated from trench BKG 11 K-105 especially with regards to the Mauryan period finds support from a study on Mauryan beads by B. Deo who notes, 'The Mauryan data is extensive and instructive, and is at the same time very rich in its material contact. We have but to admire the technical skill attained during this period which was perhaps never surpassed in India. Whether this achievement was due to the Achaemenid contacts, or was the result of favourable conditions at home we cannot say for certain' (Deo 2000: 119). The marked abundance in the number of beads at Barikot may have generated a surplus during the Achaemenid and Mauryan periods, which, in turn, would have stimulated economic growth and possibly led to increased trade and exchange with other sites at the time.

Besides, the degree of craftsmanship and wealth that becomes notable from the study of the beads from the Achaemenid and Mauryan periods is further supported by other contemporary finds from the site, which include luxury ceramic forms, rings, coins, terracotta figurines, shell, and glass bangles. On the other hand, it is also important to consider the depositional history of the beads in mind and, as such, the abundance of short barrel-shaped glass beads may simply reflect the discovery of one or two entire necklaces or string of similar beads. The fact that these beads are found in abundance in the same context (BKG 11 K-105) in several time periods (most notably Macrophases 2a2, 2b and 3a1) makes it, however, unlikely though that they were lost as entire necklaces several times at the same place by coincidence.

There is evidence of further variation in raw materials and shapes as evidenced by the study on the beads from the Graeco-Bactrian and Indo-Greek periods of Barikot, which may be indicative of increased economic complexity, affluence and the emergence of social or political hierarchies within the settlement. It was during the Indo-Greek period that the city of Barikot underwent a re-urbanisation and re-fortification process, highlighting the abundance in financial resources and strong control over this fertile area (Olivieri et al. 2019). The Indo-Greek period, in particular, forms an important chapter in the history of Barikot because it is marked by the appearance of several new types of beads such as the distinct ghata-shaped beads and the Indo-Pacific glass beads, which are found in vast numbers at different sites across the subcontinent - the latter revealing evidence of manufacture in South India (Abraham 2013; 2016; Bellina and Glover 2004; Carter 2013; 2016; Cherian et al. 2016; Francis 1989; 1990; 2002; Heo 2018).

According to the available evidence, it appears that only ghata-shaped beads of terracotta were produced at Barikot during the Hellenistic and Saka-Parthian periods while ghata-shaped beads of stones such as garnet are introduced during the Kushana periods of the site. Such first contacts in the typology are, therefore, important chronological or cultural markers, speaking in favour of new ideas emerging in the urban environment of Barikot at a particular point in time. It should, however, be taken into account

that the excavations at Barikot have reached the Graeco-Bactrian layers only in one trench (BKG 11 K-105), hence, it is highly likely that a greater quantity and variety of beads will be revealed from this dynamic time period in the course of future fieldwork. Various types of beads are also documented from the succeeding Saka-Parthian period of Barikot, although the local taste for some types of beads clearly changed. The available evidence suggests for the emergence of a new complex consciousness and spirit at the site as evidenced by the recovery of shell and faceted stone beads. In general, the selection of the bead raw materials and shapes in the Saka-Parthian period entails many parallels with the types of beads of the succeeding Kushana periods of Barikot as the above-made discussions have shown.

The study of the beads from Barikot that derive from the Kushana and Kushano-Sasanian periods have also provided a coherent and well-stratified set of archaeological data, providing new perspectives on the use of bead ornaments during these complex and dynamic periods. Various types of beads with both geometric and figurative forms have been identified, indicating the cultural, economic and artistic blooming of the Swat Valley at a time when the city is, in fact, known to have reached the pinnacle of its development (Olivieri 1996; 2018b). The study of the bead assemblage reveals strong evidence for connections with Buddhism as indicated, most notably, by the distinct areca nut and ghata-shaped beads. The various faunal and floral shaped beads are probably also imbued with Buddhist symbolic meanings, but more intensive research is required in this regard (see Chapter 8 for further discussions).

Also, beads made from terracotta, marine shell and lapis lazuli represent some of the most meaningful materials in the lives of the people of Barikot during the Kushana and Kushano-Sasanian periods. Likewise, various types of faceted beads and spacer beads were equally important for the people of Barikot during this time (see Chapter 6 and 8 for further discussions). The examination of the beads has also revealed strong evidence of typological connections with the beads discovered from the major urban centres located in the Taxila Valley, probably reflecting an increase in the exchange of ideas, goods, and the movement of people between the two sites during this time. Evidence of connections include, for example, a long barrel bead of faience (BKG 751: Figure 97) and a butterfly nut bead of glazed quartz (BKG 1534: Figure 106), which are found at both Barikot and Taxila.

Both Barikot and Taxila probably enjoyed closer ties with each other during the Kushana and Kushano-Sasanian periods as compared to the preceding chronological periods. The close contacts that have been noted, through the study of beads, between Barikot and Taxila as well as various regions of India during the Kushana and succeeding periods probably reflect a complex, multi-faceted phenomenon that is well-known from the study of other material culture items in the literature that is the ‘Indianisation’ process. It refers to the broad adoption of ‘Indianised’ customs including a common script, iconography, religions, material culture items and a set of political terms derived from Indian models at least by the local elites (see, for example, Bellina 2003; Bellina and Glover 2004; Smith 1999; Micheli 2007; 2020; Olivieri 2014: 220, 241; Olivieri and Callieri 2020; Olivieri et al. 2006: 135-136). Furthermore, the

current data on the bead frequency potentially indicates a lower number of beads in circulation at Barikot during the Kushana periods compared to the earlier chronological periods of the site (Table 3). This assessment is, however, currently based on the data coming from only two trenches of the site (BKG 11 K-105 and K-107) and, hence, may need to be revised as more information becomes available from the study of the other trenches of the site in the future. The investigation of the calibrated bead frequency by soil volume from the other trenches will, in fact, determine if the number of beads circulating at the site actually declined in the Kushano-Sasanian and post-urban periods when the settlement was reduced to the foot of the acropolis.

The examination of the bead assemblage from the post-urban period of Barikot (Macrophase 7) challenges the widespread accusation of charging the Huna people with the systematic destruction of Buddhist sites across Gandhara during the mid-first millennium CE (Stein 1905: 73-87; Foucher 1918: 586; Marshall 1936: 52). There are several examples that can be cited in favour of complexity and stability at Barikot in Macrophase 7. Evidence of long-distance interactions is provided, for example, by the recovery of beads made from carnelian, marine and cowrie shells. The distinct areca nut and ghata-shaped beads remained in circulation at Barikot as well while several new types appear at the site during this time including a rare, engraved disc-shaped pendant of marble stone (BKG 4994: Figure 139). The recovery of familiar types of beads may, on the other hand, be argued to reflect evidence of residual material from the earlier periods but the fact that the concerned types of beads keep appearing in the archaeological record in the later chronological periods (including the ghata-shaped and areca nut beads) makes it unlikely that we are dealing with residual material.

Although there is evidence of continuity in Macrophase 7, there are also signs that indicate the onset of transformations in the local taste for bead ornaments at the site, which become more pronounced during the course of the Late Historic period. This assessment is, for example, demonstrated by the widespread appearance of distinct, short, irregular and low-quality carnelian beads that appear to stand in contrast to the diverse examples of well-manufactured carnelian beads from the Early Historic period of Barikot (Figures 171-172). The future investigation of the calibrated bead frequency by soil volume from Macrophase 7 has the potential to provide us with further answers to the complex question related to the instability and conflict model proposed by earlier scholars.

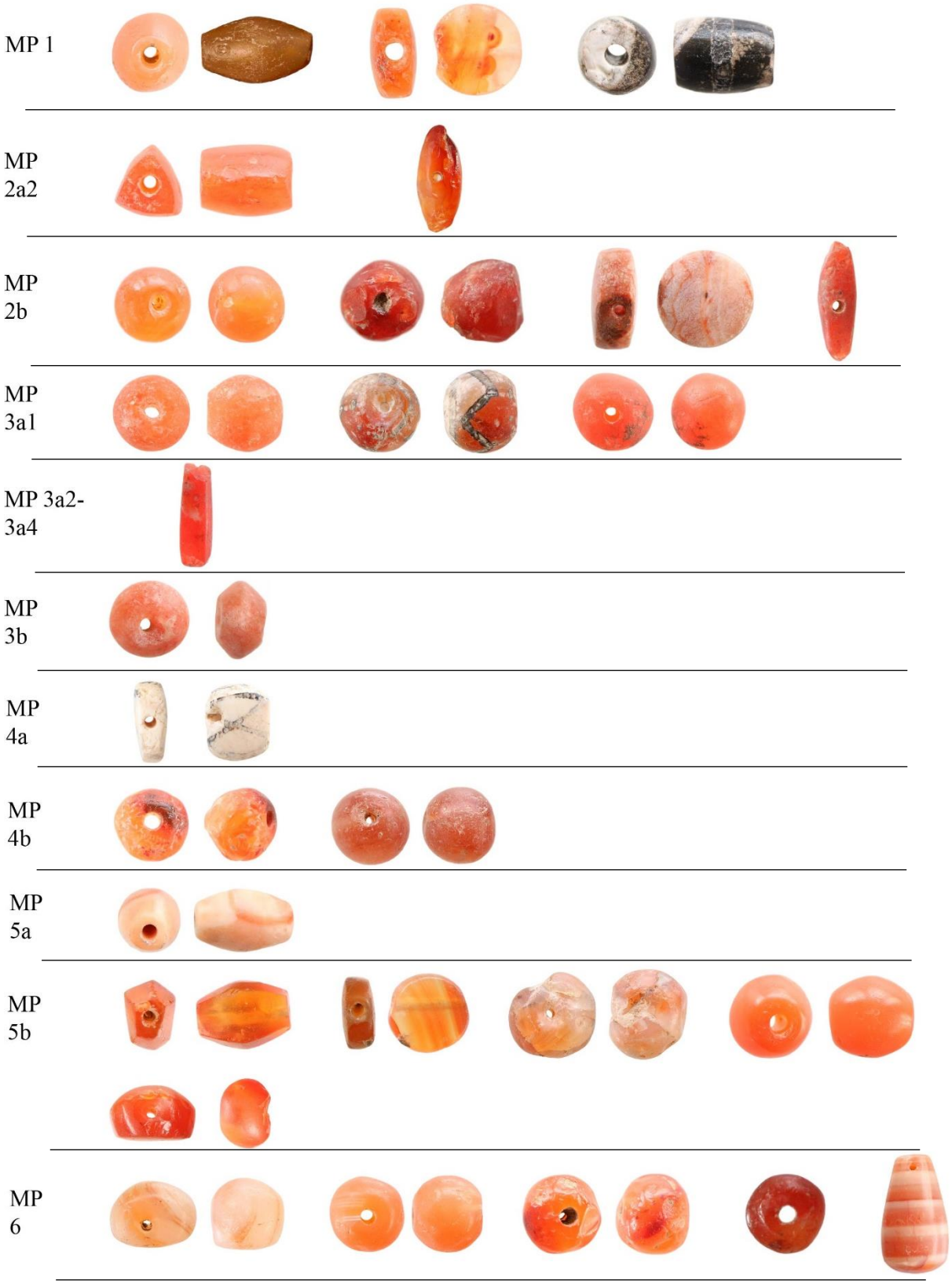


Figure 171: Illustration of carnelian beads from Barikot through Macrophases 1-6

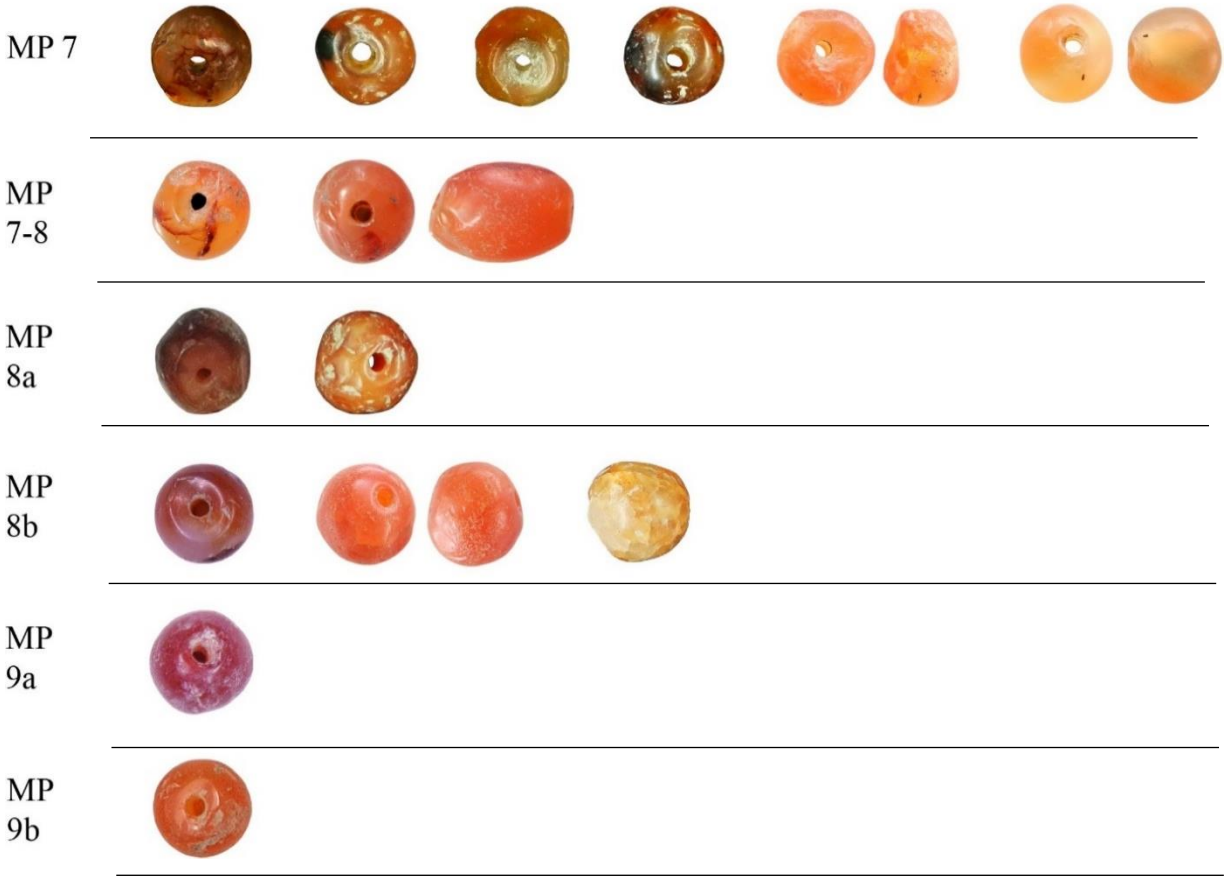


Figure 172: Illustration of carnelian beads from Barikot through Macrophases 7-9

With regards to the beads deriving from sites of the subcontinent, which date to the second half of the 1st millennium CE, B. Deo noted 21 years ago, 'The general picture which emerges is that of countless varieties in the manipulation of glass' (Deo 2000: 120). The study of the Barikot beads from Macrophase 7-8 and 8 has not only provided new important perspectives on the use of bead ornaments but also supports Deo's observation about the significance of glass materials during this time. The majority of beads that derive from Macrophase 7-8 and 8 are made from various types of glass, most notably, the Indo-Pacific glass group, replacing terracotta as the dominant raw material at the site.

The beads are, in fact, made from a large variety of materials and occur in many different shapes, representing another distinct period of socio-economic growth and complexity. There is even evidence for the use of new raw materials including amber and coix seed (BKG 2055: Figure 154; BKG 4670: Figure 163). The rich material record of beads from Barikot finds further support from the many diverse representations of beads on contemporary art figurines, statues, paintings, coins and seals (Figure 173), which indicates the significance of beads as objects of adornment during this dynamic time of increased international connectivity.



Figure 173: Marble male figure from Barikot adorned with a necklace of numerous spherical beads (BKG 5429: Macrophase 8b)

The study of the archaeological beads from the Ghaznavid period of Barikot also challenges the prevailing assumptions that the arrival of Islam in South Asia led to a marked period of insularity, economic decline and widespread instability in the late 1st millennium CE and early 2nd millennium CE (Chakravarti 2002; Dhavalikar 1999: 111-112; Fogelin 2015: 218-224; Verma 1978: 244-248). The examination of the beads from the Islamic periods of Barikot (Macrophase 9a-b) reveals not only evidence of complex, inter-regional and intra-regional interactions but also continuity in pre-existing ornamental practises at the site. The evidence includes, for example, the recovery of Indo-Pacific glass beads, indicating that Barikot remained a participating player within the vast Indian Ocean trading zone in the late 1st millennium CE and early 2nd millennium CE.

The zone's western termini were Siraf, Basra and Baghdad in the Persian Gulf zone and Alexandria and Fustat in the Red Sea area while the eastern terminus extended up to the ports of China. The subcontinent was situated almost at the very centre of the Indian Ocean (Chakravarti 2019: 128; Rougeulle 1996). A connection with the African continent during this time cannot be ruled out as evidenced by the recovery of two unique segmented glass beads at Barikot (BKG 4760: Figure 159b; BKG 5354: Figure 166a) while a series of complex interaction processes are well-documented between the north-western part of the subcontinent and Africa in the form of artisans and commodities moving in both directions (Horton 2004).

In terms of indigenous developments, the beads recovered from the excavations at Barikot provide an image of an 'Islamised cultural horizon' characterised by continuities in pre-existing local practises as evidenced by the examination of the burial customs, ceramic materials and ornaments identified from the key-site of Udegram, Swat. In fact, the study carried out on the beads from Barikot seems to favour an interpretation that has been proposed for Udegram by Bagnera and Olivieri who note, 'Whether this persistence of practises has to be read as the evident sign of an incomplete Islamization of the area, as it has generally been claimed so far or instead reflects the peculiar way in which the integration between local and newly introduced elements defines the Islamization process in this region, this is the question that must be carefully evaluated in the light of further evidence' (Bagnera 2015: 140; Bagnera and Olivieri 2016: 145-146).

The study on the beads from Barikot seems to favour the latter scenario as the sheer number of available examples from Macrophase 9 (note, for example, the recovery of areca nut and ghata-shaped beads) point to a model characterised by the integration of local and newly introduced elements. This model would, in other words, reflect an Islamisation process at Barikot that was characterised by a less rigid and imposing rule, which, in fact, appears to have been a characteristic feature of the various ruling dynasties who controlled Barikot throughout its long chronological sequence of occupation. As Deo also correctly summarises, 'It must be admitted that the data we get for the Muslim period is abundant and varied. It is, as a matter of fact, a new experience of perfection of old methods' (Deo 2000: 120). Interestingly, the argument of continuity in existing practises during the Ghaznavid period appears to find support from the Bannu region where we see evidence of specialised ceramic production and the apparent lack of impact on the utilitarian ceramic assemblage, possibly indicating that economic factors and concerns were more important than cultural controls (Petrie 2020a: 480).

6.3 A note on the variable of 'time'

The importance and benefits of calculating the calibrated bead frequency by soil volume of a time period has already been exemplified in the above-made discussions. The variable of the relative length of each hypothetical time period is an additional type of control, which can be used to enable us to better determine the role and impact of bead frequencies in the past as outlined in Chapter 4. The data obtained on the number of beads per unit time has, in fact, proven meaningful and appears to be mostly in agreement with the data on the calibrated bead frequencies by soil volume (Tables 3-4). It should be noted, however, that the number of years listed in table 4 (column two from left) represents an approximate number as the precise number of ruling years of the various dynasties of Gandhara is still under debate as already stated in Chapters 2-4.

With regards to Macrophase 2a and 2b (Achaemenid and Mauryan periods of Barikot), the data on the number of beads per unit time is among the highest in the entire set with 0.56 and 0.72 yr^{-1} respectively,

which seems to support the high bead frequencies calculated for these cultural periods. These results indicate that it is highly likely that the calibrated bead frequency by soil volume was peaking at Barikot during the Achaemenid and Mauryan periods. With the exception of Macrophase 4a (Early Kushana period), all the other concerned Macrophases of Barikot have a comparatively low number of beads per unit time, which appears to support the low bead frequencies from their corresponding levels. It appears that Macrophase 4a may represent a potential anomaly that has, for some reason, the highest number of beads per unit time (0.77 yr-1) while the bead frequency is fairly low comparatively ($1.29m^{-3}$).

The data from Macrophase 4a seems to suggest that the shorter the time period (in terms of years), the higher the number of beads per unit time. Yet if we attempt to evaluate the data from Macrophases 4a in its own right rather than cross-compare it with the other cultural periods of Barikot, it may be possible to explain the high number of beads per unit time recorded for this phase. As such, the number of beads per unit time is higher here because the time period itself is small (spanning roughly 40 years) while the number of beads is fairly high for such a short time period. This reason may explain why Macrophase 4a reveals a high number of beads per unit time. However, when the bead frequency calculated for Macrophase 4a is contrasted with the frequencies coming from the other periods of Barikot, it becomes apparent that Macrophase 4a probably had a low bead frequency on comparative grounds. More data on the calibrated bead frequency and time from the study of the other trenches of Barikot will help corroborate or revise the current interpretations in the future.

Chapter 7: Drilling technology, geopolitical configurations, trade, and exchange

As already stated above, various types of beads were recovered from the excavations across the chronological sequence of Barikot while each bead (with the exception of a few finds) is characterised by a reliable and secure chronology. As outlined in Chapters 3-4, the study of the drilling features of the beads from Barikot allows us to identify various types of drilling technologies and reconstruct the manufacturing practices adopted to produce the recovered ornaments not only within a time period but across the chronological sequence of the site. Depending on the available evidence, the study of the drilling technologies can, likewise, provide unique insight into the identification of regional patterns and address broader research questions.

These include, for example, did master bead drillers from one region spread to other sites or did some regions develop their own idiosyncratic types of drills and drilling practices? Were bead-makers employed and used by the ruling elites as a way to increase their own prestige and power? (Kenoyer 2017a: 433). As the forthcoming discussions will show, the Scanning Electron Microscope (SEM) examination of the drill hole casts has also revealed information about the way beads may have been used or worn in the past. As in the case of the preceding Chapter 6, the current chapter on the drilling technology is also subdivided according to the distinct cultural phases (or Macrophases) of Barikot in order to present the findings in a clear chronological order and be able to detect potential changes in the drilling traditions across the stratigraphic sequence of the site. Silicone casts of several types of beads were taken including carnelian, agate, lapis lazuli, quartz/rock crystal, beryl-aquamarine, garnet, and marine shell materials. The main discussion will focus on the SEM data of the stone beads from Barikot, which will be supplemented by a separate note on the drilling features of the beads made from marine shell.

The stone beads discussed in this study were made from both microcrystalline rocks such as carnelian and agate as well as the macrocrystalline variety of rock crystal, both of which have a hardness rate of 7 on the Mohs Scale. The other hard stone that is discussed in this study is made from garnet, which has a hardness of Mohs 6.5-7.5. Another microcrystalline rock that was utilised to produce beads and that is discussed in this study is lapis lazuli, which has a hardness of Mohs 5-6 (Kenoyer and Glover 2019; Rabbani 2020a; Rienjang et al. 2017). During the Indus period, the most common form of drill used to perforate carnelian or quartz was a chipped stone drill made from a slightly more resilient rock such as jasper or chert, and in some cases a constricted cylindrical drill made from ‘Ernestite’ to perforate long stone beads (Kenoyer and Vidale 1992) - a technology that was only found in the Indus Valley region and dates between around 2600 BCE – 1900 BCE (Kenoyer 2008; 2017c: 138-139; Ludvik 2018: 60-61).

Another technology used for the perforation of beads was an abrasive such as fine quartz (hardness 6.5-7.5 Mohs), corundum or emery (hardness 8-9 Mohs) with the aid of a metal drill made of copper, bronze or iron (Glover and Kenoyer 2019; Kenoyer 2003; 2017c: 139-140; Kenoyer and Frenez 2018a: 67; Kenoyer and Miller 1999). During the Harappa Phase (2600 BCE – 1900 BCE), beads from sites of Harappa and Dholavira, for example, were drilled with quartz abrasive and some other harder material that could be garnet, corundum or emery (Kenoyer 2017c: 140). The use of the 'Ernestite' constricted cylindrical drills, however, ceases during the Late Harappa Phase (1900 BCE – 1300 BCE) (Kenoyer 2008; Kenoyer and Frenez 2018b: 401), but the production of stone beads continues through tapered stone drills or tiny tubular metal drills with an abrasive (Kenoyer 1997a; 2005: 2017c: 140; Kenoyer and Frenez 2018b: 401). During the first millennium BCE, the use of diamond tipped drills is first documented in South Asia, although the precise date and place of its introduction remain currently debatable (Kenoyer 1986: 23; 2003; 2017b).

The following SEM data on the beads from Barikot and Swat provides evidence for not only continuity in the drilling traditions but also transformations where, for example, the utilisation of 'Ernestite' drills was certainly suspended on a permanent basis or the technical knowledge about them was lost long before the start of the protohistoric period in Swat. The images of the drill hole casts taken by a Dinolite™ digital microscope of selected specimens have been inserted in the below made discussions as well where a need was felt to supplement some of the low-resolution SEM images produced in Rome, which do not always provide sufficient data on the profile of the bead drill holes. Although the silicone casts of the interior drill holes of various types of beads were taken, the stone beads (carnelian, agate, lapis lazuli, quartz/rock crystal, beryl-aquamarine, and garnet) form the main part of the discussions below (N=39 beads) followed by a brief discussion on the drilling features of two marine shell beads:

These include seven beads from Macrophase 1, three beads from Macrophase 2a2, two beads from Macrophase 2b, two beads from Macrophase 3a1, one bead from Macrophase 3a2-3a4, three beads from Macrophase 3b, one bead from Macrophase 4a, four beads from Macrophase 4b, three beads from Macrophase 5a, five beads from Macrophase 5b, five beads from Macrophase 6, two beads from Macrophase 7, three beads from Macrophase 7-8 and two beads from Macrophase 8. This chapter concludes with an additional section, which considers the significance of the appearance and/or disappearance of different bead raw materials, shapes and drilling technologies in terms of what they suggest in relation to changes in geopolitical borders at various times and how they fit with the evidence for trade and exchange as outlined in Chapter 1.

7.1 Drilling technology

7.1.1 Protohistoric period (Macrophase 1: 1300 BCE – 800 BCE)

In total, seven beads of stone were selected for the SEM study, which derive from the protohistoric period (Macrophase 1: 13th BCE – 8th century BCE). Three carnelian beads were recovered from the excavations at Barikot, which include a long biconical bead (BKG 2564), a rectangular circular bead (BKG 3976) and a long barrel-shaped bleached bead (BKG 3978). As already stated in Chapter 4, to complement the three beads from Barikot, four additional stone beads from a range of protohistoric sites in Swat were also studied and subjected to SEM analysis. These include a long barrel-shaped carnelian bead found from the graveyard of Katelai 1 (KI-254), a long barrel-shaped carnelian bead from the graveyard of Loebanr (LI-637), a short biconical carnelian bead from the Kalako-dherai settlement (KL-467) as well as a rectangular long rectangular bead of lapis lazuli from Aligrama (D: either deriving from its graveyard or the settlement itself).

With regards to Barikot, all three beads were drilled with a metal drill and some form of fine abrasive. For drilling hard stone, many regions of South, Southeast, Central, and East Asia used metal drills with abrasives, which is why it is currently difficult to identify specific source areas (Glover and Kenoyer 2019: Heo 2018; Kenoyer and Miller 1999; Law 2008). The drilling surface of the three beads from Barikot is characterised by traces of parallel drilling striae and high polish. With regards to BKG 2564 (Figure 174), it has been perforated from two sides to complete the drill hole and the drilling alignment is centred. Both drill sections of BKG 2564 are stepped, long, tapered cylindrical. These features are indicative of multiple drilling episodes and changes in drill diameter and alignment from each side. A long and slightly tapered drill hole usually represents a diagnostic feature for the use of metal drills with abrasives. In addition, there is evidence of string wear at the narrow point of drilling and at the drill hole edges, indicating that BKG 2564 remained in use for a long time in the past.

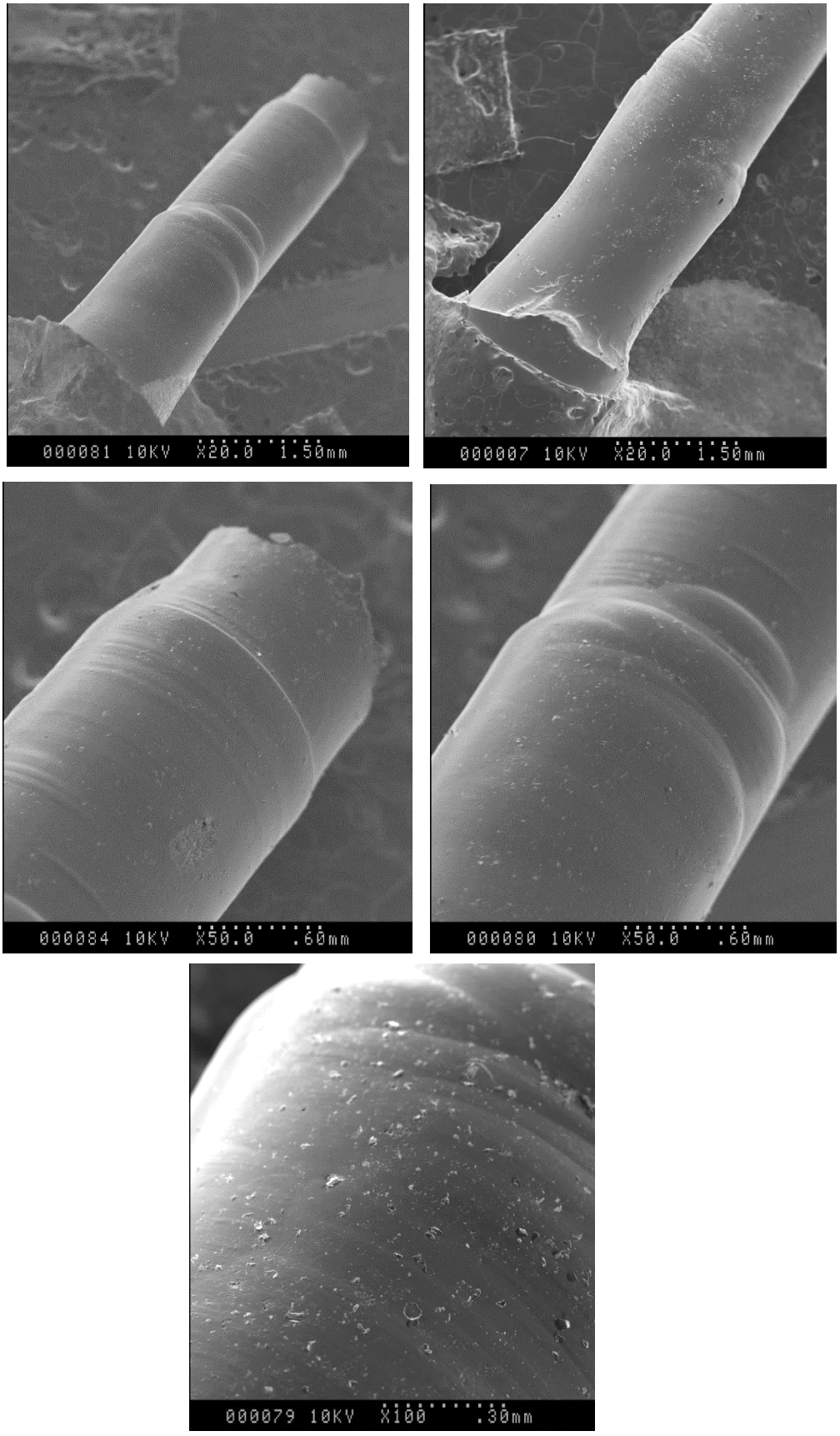


Figure 174: Long biconical carnelian bead (BKG 2564). SEM images of drill hole impression, stepped, long, tapered cylindrical drilling from two sides, metal drilling with fine abrasive, 20x, 50x and 100x

In contrast, BKG 3976 (Figure 175) and BKG 3978 (Figure 176) have been drilled from one side only. The drill section of BKG 3976 is stepped, long and tapered whereas BKG 3978 has a long, tapered cylindrical drill section. Both beads show evidence of string wear on the interior drill hole. BKG 3978 has additional evidence of string wear at one bead end, which indicates the long use of the beads in the past. Drilling from one side of the bead only as in the case of BKG 3976 and BKG 3878 represents a production process that is very different from that used when drilling from two sides as done with BKG 2564. When a bead is drilled from two sides, it has to be removed from a vice and repositioned so that the drill alignment matches the opposite drilling trajectory. This production step takes time and great skill as is apparent from the many beads discussed in the current chapter that have misaligned drill holes. In contrast, when drilling a bead from one side only, the ornament is placed in a vice once only and drilling continues until the perforation is complete. Long beads are usually drilled from two sides because it is difficult to produce long, narrow drills that can perforate longer beads by drilling only from one side (Ludvik et al. 2015: 13). Therefore, although the type of technology for drilling was the same for each of the three beads from Barikot, a variety of different production techniques or steps were adopted by craftspeople to complete the drill holes.

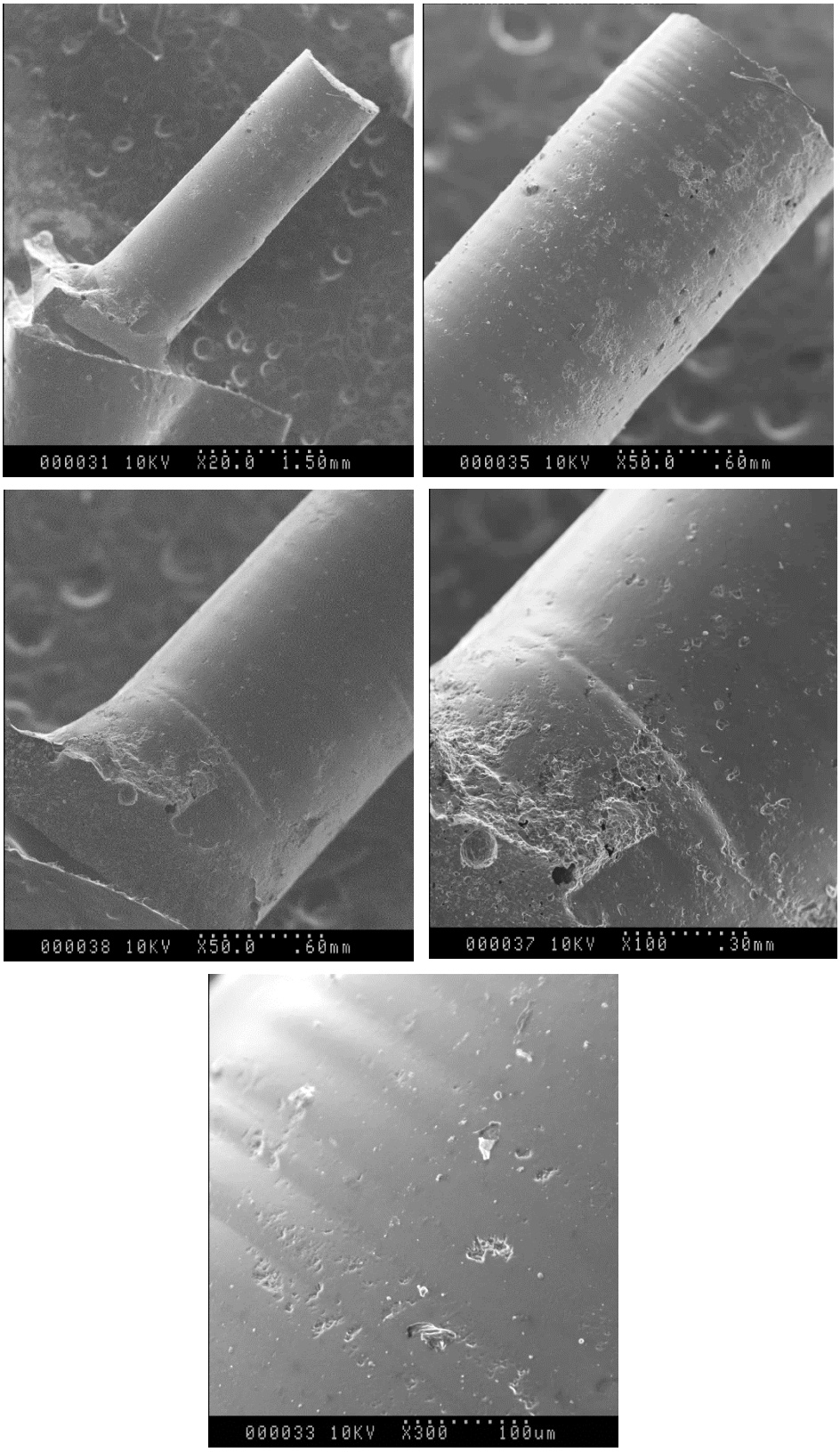


Figure 175: Rectangular circular carnelian bead (BKG 3976). SEM images of drill hole impression, stepped tapered long drilling from one side, metal drill with a fine abrasive, 20x, 50x, 100x and 300x

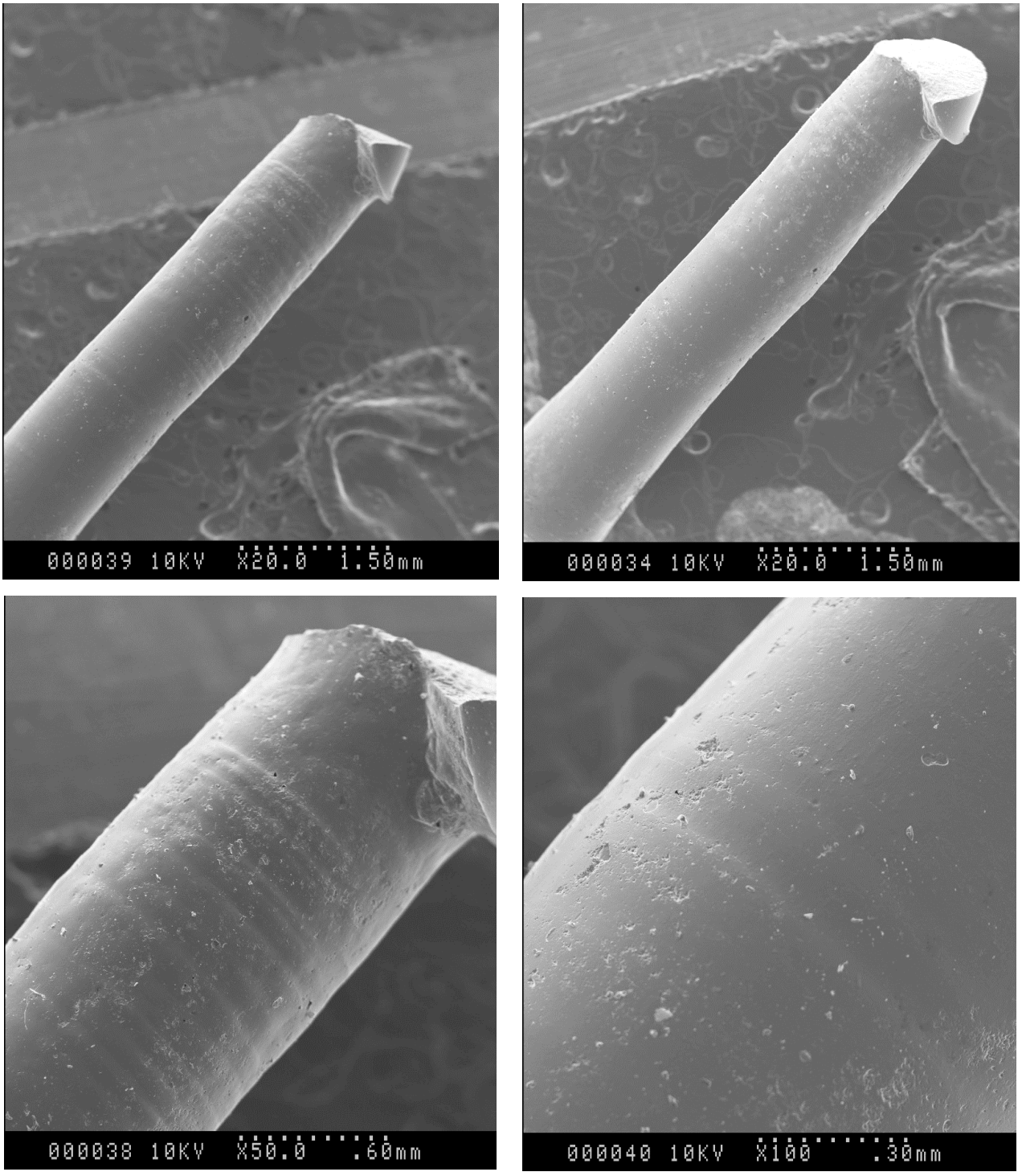


Figure 176: : Long barrel shaped bleached carnelian bead (BKG 3978). SEM images of drill hole impression, long tapered cylindrical drilling from one side, metal drill with fine abrasive, 20x, 50x and 100x

Interestingly, the three carnelian beads recovered from the other protohistoric sites in Swat were drilled with a metal drill and a coarse abrasive. The drill surface of KI-254 (Figure 177) and LI-637 (Figure 178) is characterised by evidence of parallel drilling striae and a matte surface. Both beads were drilled from two sides while the drilling alignment of LI-637 is centred only. The drill sections of both beads are typically long, tapered cylindrical. Similarly, both specimens show evidence of string wear on the interior drill hole, which indicates the long-term use of the beads in the past. In contrast, the drill surface of KL-467 is marked by irregular parallel drilling striae and a matte surface (Figure 179). This short carnelian bead was drilled from one side only. Like in the other examples, the drill section of KL-467 is typically long, tapered cylindrical. As the drill reached the opposite end, a flake popped out due to the pressure exhibited from the drilling process, leaving a jagged edge on the end of the bead. The practice of drilling a stone bead from one end and popping out the stone at the other was occasionally practiced in the Indus Tradition (Kenoyer and Frenez 2018a: 71), hence, this feature represents another piece of evidence for cultural continuity in the drilling practises. In addition, KL-467 shows evidence of string wear on the interior drill hole, which indicates that this bead remained in use for a long time in the past as well.

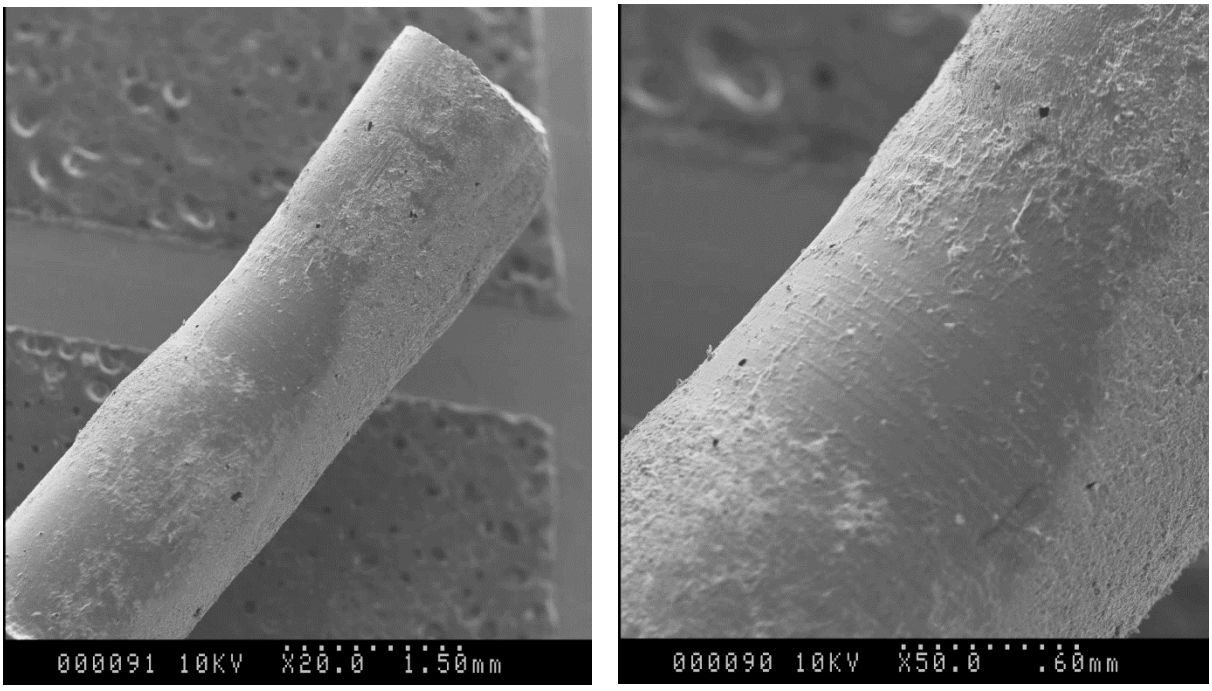


Figure 177: Long barrel-shaped carnelian bead (KI-254). SEM images of drill hole impression, tapered cylindrical long drilling from two sides, metal drill with coarse abrasive, 20x and 50x

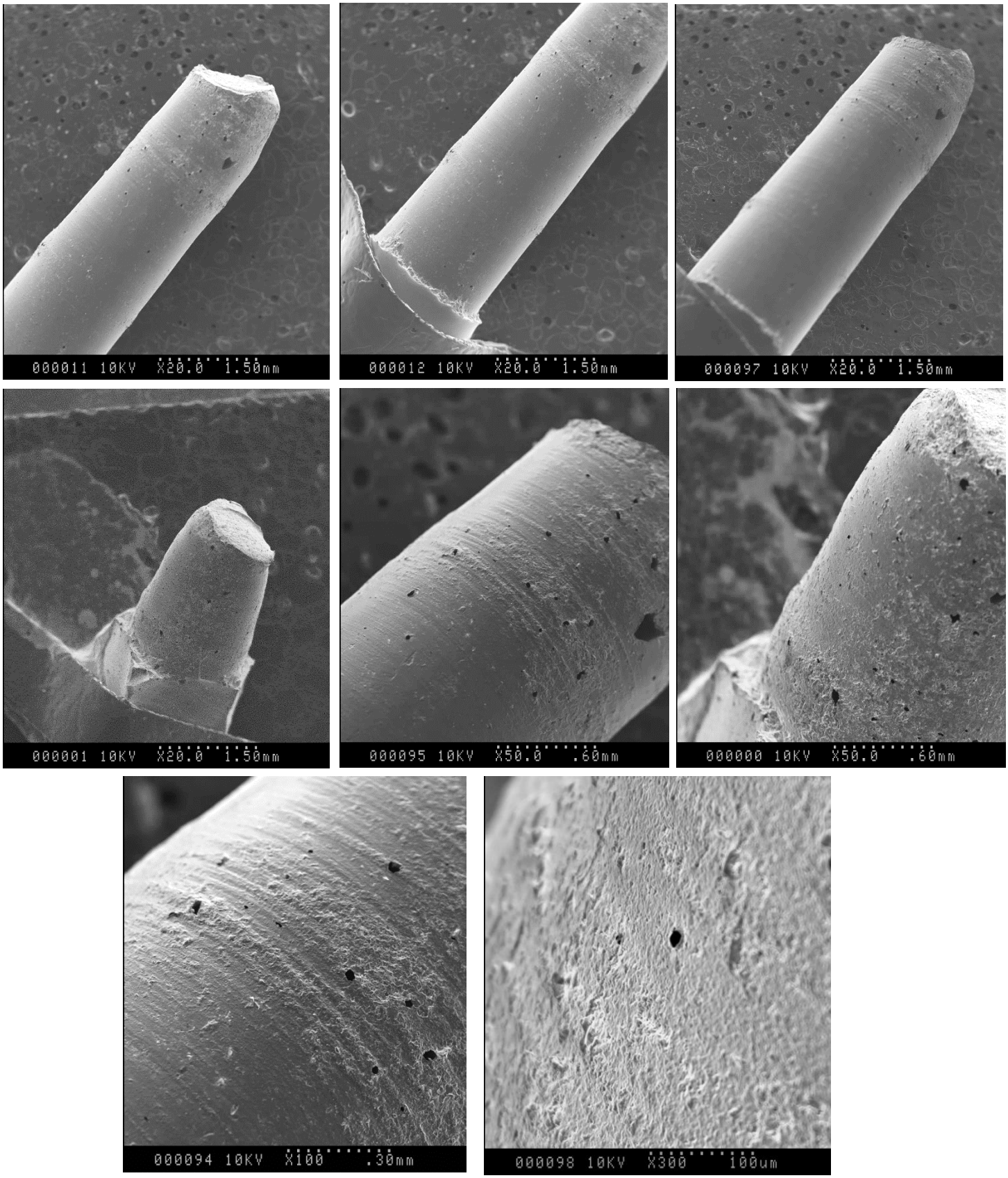


Figure 178: Long barrel-shaped carnelian bead (LI-637). SEM images of drill hole impression, tapered cylindrical long drilling from two sides, metal drill with coarse abrasive, 20x, 50x, 100x and 300x

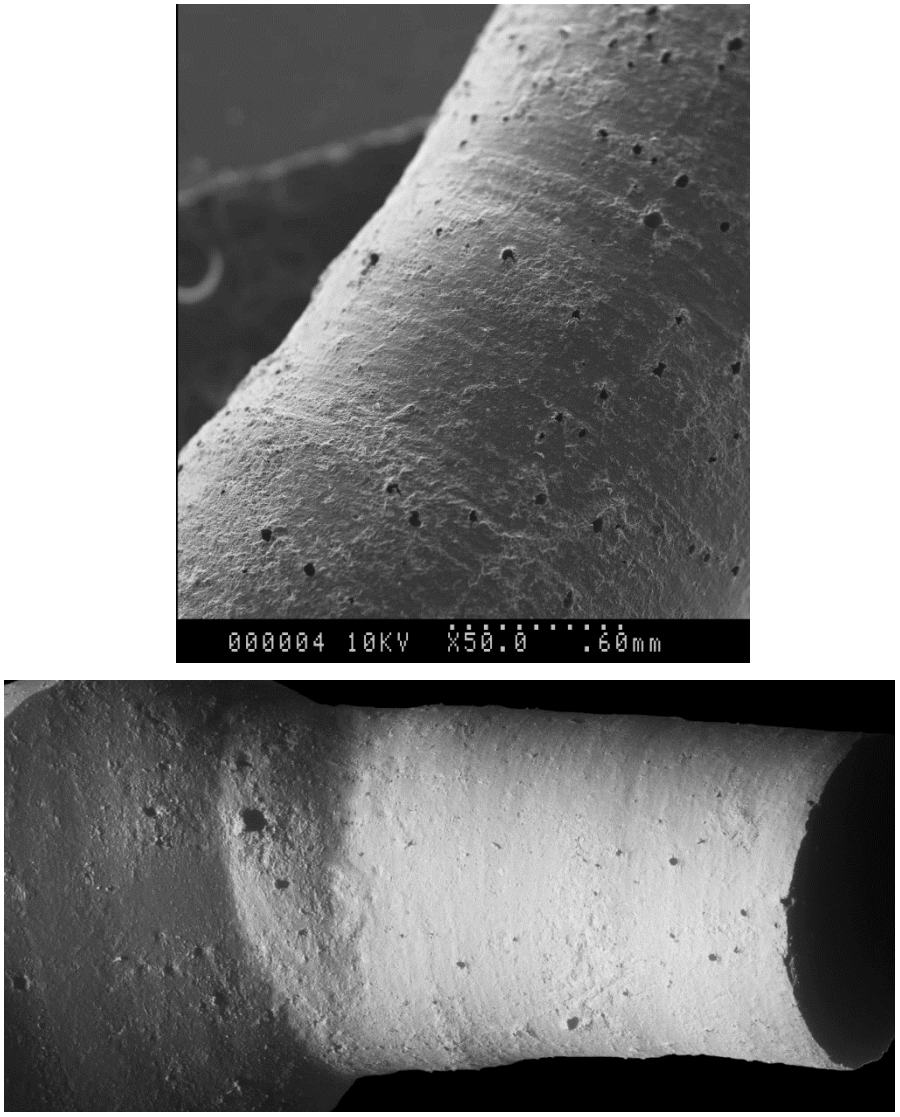


Figure 179: Short biconical carnelian bead (KL 467). SEM images of drill hole impression, tapered cylindrical drilling from one side and popped out on the opposite side, metal drill with coarse abrasive, 50x and 80x

Therefore, it appears that the use of metal drills with abrasives formed a major integral part in the bead production traditions of the protohistoric period, although the application of alternative technologies during this time cannot be entirely ruled out at present. Due to the tapered drill hole, the rectangular long rectangular bead of lapis lazuli from Aligrama (D: Figure 180) was probably also drilled with an abrasive. As lapis lazuli is a soft stone as opposed to carnelian, the drilling striae and other distinctive features are more difficult to see under the SEM. The low-resolution SEM image of this bead, however, shows a drill hole characterised by parallel drilling striae and is matte surface. Moreover, it was drilled from two sides while the drill sections are long and tapered cylindrical. The overall shape of the drill hole, hence, seems to be consistent with the use of a metal drill and an abrasive but the use of an alternative technology cannot be entirely ruled out at present.



Figure 180: Rectangular long rectangular bead of lapis lazuli (D). SEM image of drill hole impression, long tapered cylindrical drilling from two sides, metal drill with abrasive? 100x

Future SEM studies using higher magnification will determine the precise type of technology used to perforate this lapis lazuli bead. It is also clear that a range of different manufacturing steps were adopted by the drillers to produce stone beads during the protohistoric period. For example, the fact that the bead drill hole alignment is not centred in some examples indicates that there were both skilled and less skilled craftspeople at work during the protohistoric period, although it cannot be determined currently if they were based at a lapidary workshop in Gandhara or in fact outside the region. Normally beads of the Indus Tradition were, in contrast, drilled from two sides and meet precisely in the centre of the bead (Kenoyer 2017b: 160-161; Kenoyer and Frenez 2018b: 404). In addition, the beads from the various protohistoric sites of Swat show evidence of string wear on the interior holes while traces of use-wear on the exterior surfaces of the beads are visible as well (Figure 51). This evidence indicates that at least some of the stone beads were used for a long time by the protohistoric communities in Swat, possibly representing objects of high value.

7.1.2 Achaemenid period (Macrophase 2a2: 5th – mid-4th century BCE)

The pre-Achaemenid period of Barikot (Macrophase 2a1: 6th – 5th century BCE) has, thus far, not revealed any beads made from stone, which is why we have currently no data available that would shed some light on the prevailing drilling traditions of this time. In contrast, the excavations at Barikot have led to the recovery of several stone beads from the succeeding Achaemenid period (Macrophase 2a2: 5th – mid-4th century BCE), the examination of which have provided crucial evidence for major developments occurring probably during this time. In total, two beads of carnelian were selected for a high-resolution SEM study, which include a triangular long barrel-shaped bead (BKG 3887) and a lenticular short biconical bead (BKG 3906).

With regards to BKG 3906, it was drilled with a metal drill and a fine abrasive, which is a technology that had already been used to drill beads during the earlier protohistoric period of Swat. As figure 181 illustrates, the drill surface of this bead is characterised by parallel drilling striae and a matte surface. It has been drilled from one side only and the profile of the drill section is typically stepped, long, tapered cylindrical. The seemingly uninterrupted utilisation of this drilling technology and the familiar production steps taken to manufacture BKG 3906 indicate the existence of a well-established craft tradition, which was probably widespread and popular among the people of the time. It should be noted, however, that the interior drill hole surface is dirty, and the impression is not very representative.

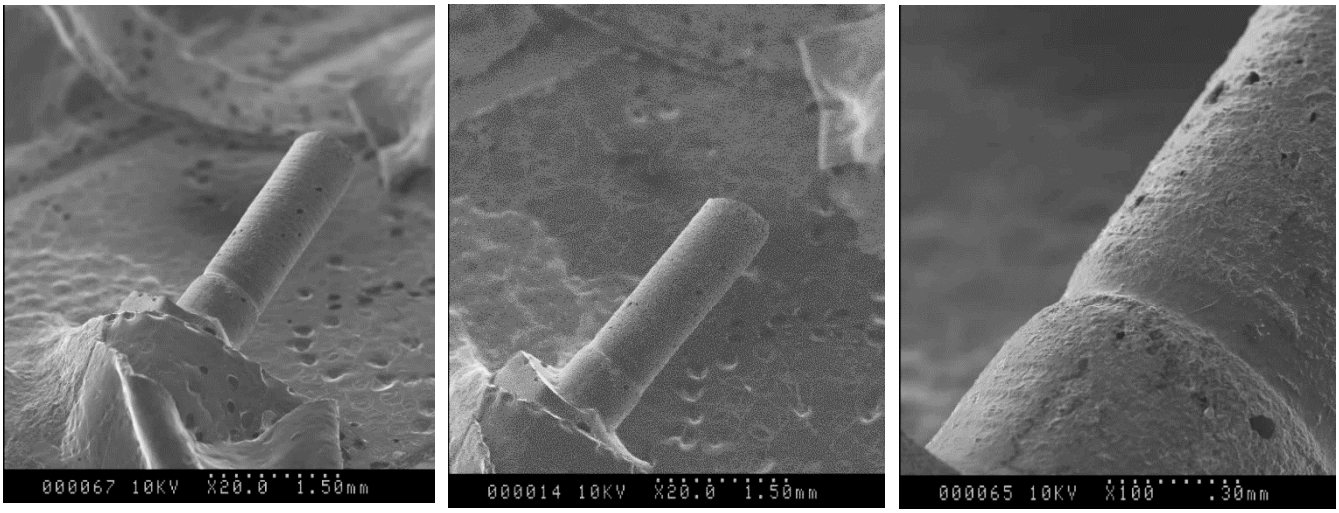


Figure 181: Lenticular short biconical carnelian bead (BKG 3906). SEM images of drill hole impression, stepped tapered cylindrical drilling from one side, metal drill with fine abrasive, 20x and 100x.

With a hardness of 10 on the Mohs scale, the use of diamonds for drilling stone beads during the first millennium BCE represents a major transformative development that is clearly linked to South Asian production centres. The use of diamond technologies made it possible to perforate beads faster and more efficiently. During the earlier Indus Tradition, a stone bead required a lot of time to perforate whereas many beads could be produced very quickly with diamond drills in the later chronological periods. The precise geographic source of the diamonds remains, however, unknown but would have been in the diamond producing regions of central and peninsular India (Kenoyer 2007; 2017c: 140; Glover and Kenoyer 2019; Kenoyer et al. 1991: 54). The earliest evidence for the drilling of stone beads using diamond drills comes from the site of Nagara (6th – 3rd centuries BCE), which is an important city in the ancient bead making region of Gujarat, India (Kenoyer 2003: 17-18; 2017c: 138–140; Glover and Kenoyer 2019: 185). Diamond drilling is, in fact, still carried out today at Khambhat in Gujarat, India (Kenoyer et al. 1991).

The available evidence indicates that diamond drilling technology may have spread to Southeast Asia through the movements of Indian craftspeople during the Early Historic Period, but more research is required to document the nature of this technological diffusion (Carter 2013; Glover 2019; Heo 2018; Kenoyer 2017c: 141-142). Some of the stone beads found in Sri Lanka were also drilled with diamond technology (Gwinnett and Gorelick 1986) probably representing another set of evidence for cross-cultural interactions occurring between Sri Lanka and India in the past (Rienjang et al. 2017: 53). Moreover, Kenoyer has documented the use of diamond drills on Achaemenid period beads and those of later periods in Iran, but more research is needed on well-dated beads to properly document the spread of this technology to the west (Kenoyer 2017c: 142). Interestingly, the study of the SEM data from Barikot has made it possible to identify the two forms of diamond drills that are known to have been used to drill beads in the past – the combined single and double diamond drilling process.

In the Achaemenid period context of Barikot, a triangular barrel-shaped carnelian bead has been found (BKG 3887), which has been drilled with a double diamond drill, currently representing the earliest confirmed evidence for the use of diamond drills at the site. The double diamond drill was made by setting two rounded diamond chips at each edge of the drill tip. This setting allows the externally projecting diamonds to cut the stone bead in a circular motion (Kenoyer 2017c: 141). As figure 182 shows, the drilling surface of BKG 3887 is characterised by parallel drilling striae and a matte surface. The bead has been drilled from one side only while the drill section is long cylindrical.

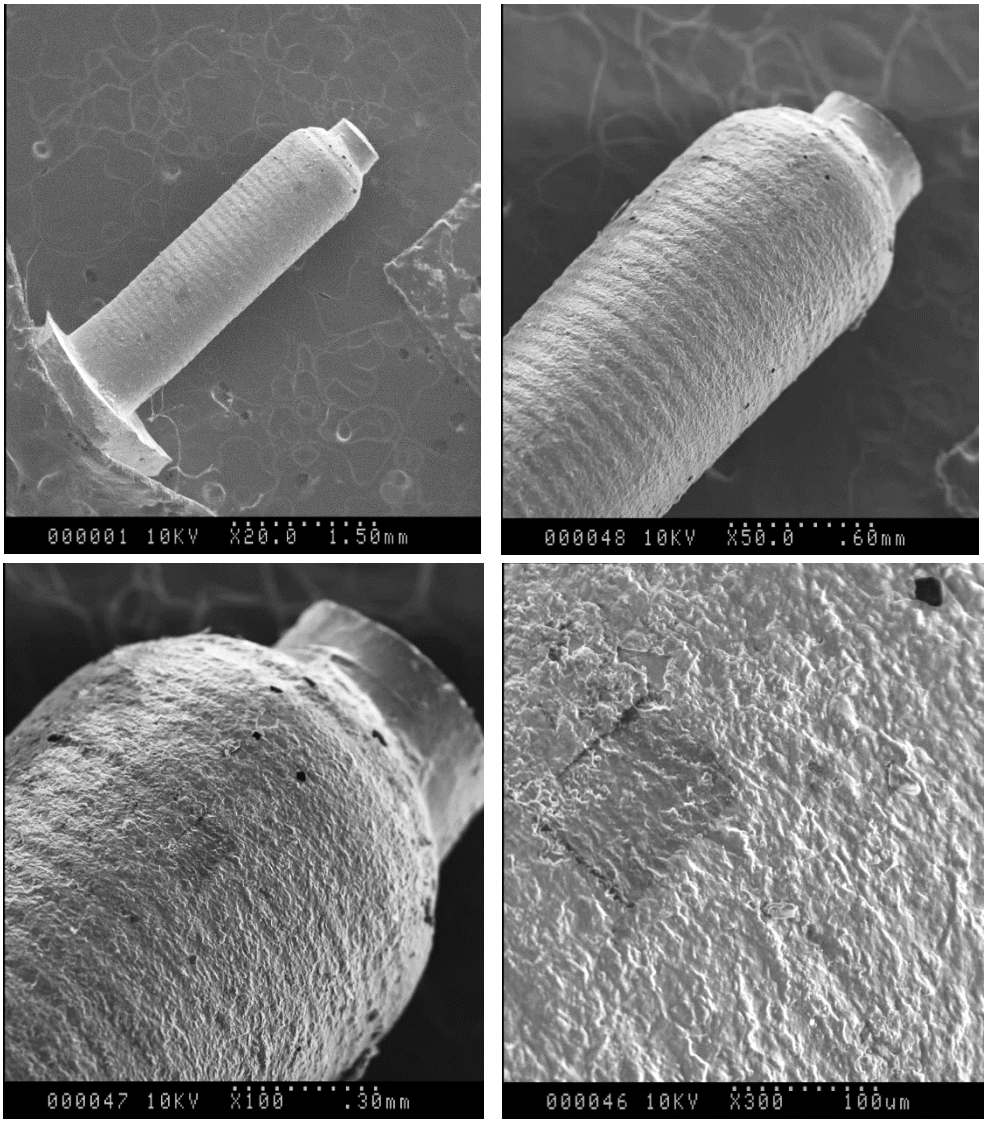


Figure 182: Triangular barrel-shaped carnelian bead (BKG 3887). SEM images of drill hole impression, long cylindrical drilling from one side, double diamond drill, 20x, 50x, 100x and 300x

Typical for a double diamond drill, the drill impression of BKG 3887 is more regular and continuous than would have been the case with a single diamond drill. The parallel drilling striae are regular and around the same size, but this can change depending on the pressure on the drill (Kenoyer 2017a: 425, 433). In addition, the narrow point of the drill hole at one end is highly polished and worn from string wear, indicating the long use of BKG 3887 in the past.

The expansion in the types of drilling technologies during the Achaemenid period could indicate that the stone beads from Barikot were possibly produced in different workshops. It also suggests that the choice made on the selection of the drilling technology may have been an important indicator of the overall time, energy and skill required to manufacture a bead (Kenoyer 2017c: 135). It should be noted, however, that it may well be possible that the diffusion of beads produced using diamond drilling

technologies occurred during the earlier pre-Achaemenid period of Barikot (Macrophase 2a1: 6th – 5th century BCE). This possibility is, however, difficult to test at present because, as already stated, no stone beads have been recovered to date from the excavations at Barikot from this time. Future studies at Barikot will, no doubt, provide new perspectives on the precise timing of the introduction of diamond drilled beads at the site.

7.1.3 Mauryan period (Macrophase 2b: end-4th – mid-3rd century BCE)

In total, one bead of carnelian was selected for a high-resolution SEM study, which is a lenticular short biconical bead (BKG 3815) while a low-resolution SEM image is available for a rectangular circular bead of carnelian (BKG 3800). As figures 183 and 184 show, both beads have been drilled using a metal drill with a fine abrasive. The drill surface of both beads is characterised by parallel drilling striae as well as high polish resulting either from string wear or the drilling process. Both specimens have also been drilled from one side only. The drill section of BKG 3815 is stepped, long, tapered cylindrical whereas BKG 3800 has a long, tapered cylindrical drill section. Besides, the examination of the SEM images reveals that the type of drilling technology and steps that were adopted for the production of BKG 3815 had also been chosen in the drilling process of BKG 3906 during the earlier Achaemenid period. Whether this technological homogeneity is related to the fact that both beads have a common form and materiality or reflect a common workshop tradition is currently difficult to verify. Only future research on a larger sample size will shed more light on this aspect. It should be noted, however, that the interior drill hole surface of BKG 3815 is dirty and the impression is not very representative.

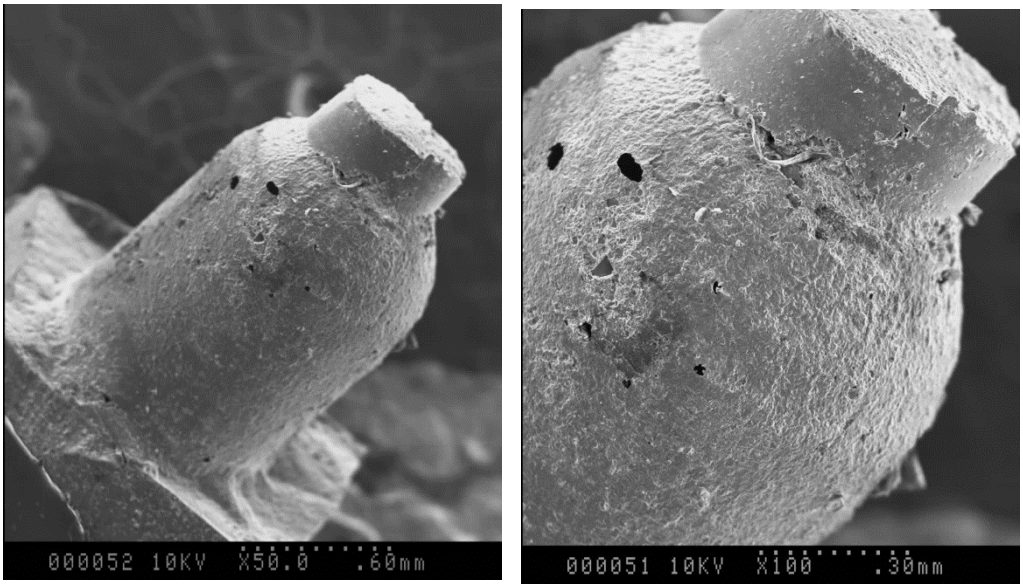


Figure 183: Lenticular short biconical bead (BKG 3815). SEM images of drill hole impression, stepped long tapered cylindrical drilling from one side, metal drill with fine abrasive, 50x and 100x

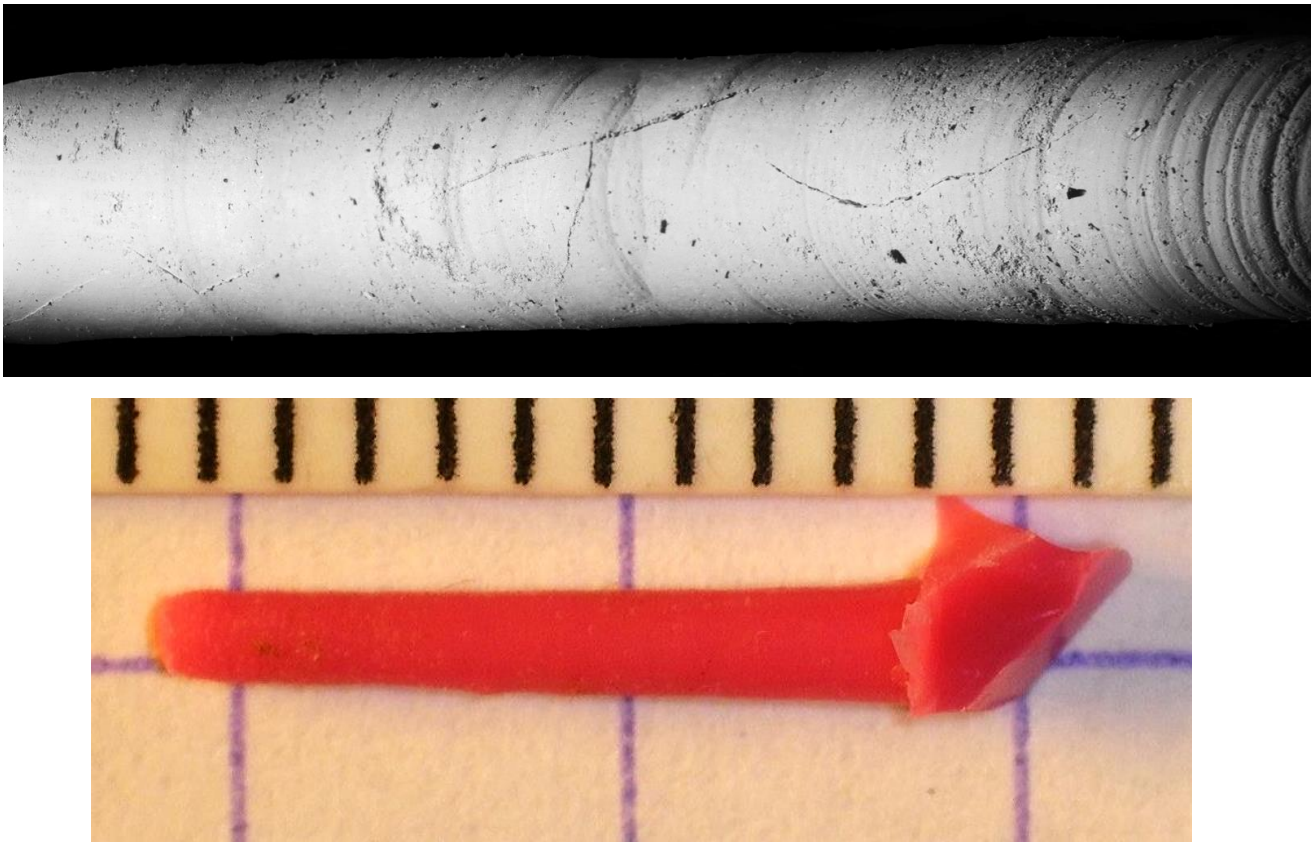


Figure 184: Rectangular circular bead of carnelian (BKG 3800). SEM images of drill hole impression, long tapered cylindrical drilling from one side, metal drill with fine abrasive, 100x

7.1.4 Graeco-Bactrian period (Macrophase 3a1: mid-3rd – early-2nd century BCE)

In total, two beads of carnelian were selected for a high-resolution SEM study, which include a short biconical bead (BKG 3781) and a short barrel bleached (or etched) bead (BKG 3799). As figures 185 and 186 illustrate, both beads have been drilled using a metal drill with a fine abrasive. The drill surface of both beads is characterised by parallel drilling striae and high polish while both specimens have been drilled from one side only. In addition, the drill section of both beads is typically long, tapered cylindrical. Likewise, both beads show evidence of string wear on the interior drill hole and at one end, which indicates the long use life of the beads in the past before they entered the archaeological record. The type of drilling technology selected, and the production steps taken to manufacture these beads are similar to the ones used to make beads during the earlier cultural periods of Barikot, seemingly following comparable sets of drilling guidelines.

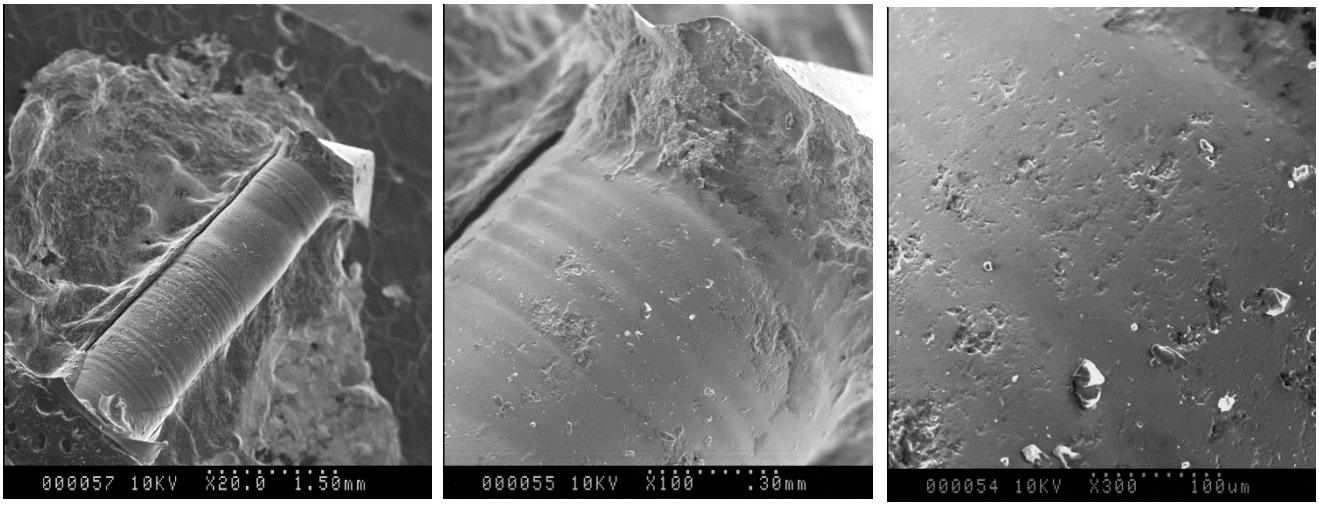


Figure 185: Short biconical bead of carnelian (BKG 3781). SEM images of drill hole impression, long tapered cylindrical drilling from one side, metal drill with fine abrasive, 20x, 100x and 300x

Since the sample size is currently small, it is not possible to discuss the use of other drilling technologies for the production of stone beads during this time. It is, however, reasonable to assume that the use of diamond drilling technologies continued during the Graeco-Bactrian period since at least the Achaemenid period side-by-side with the use of metal drills and abrasives. The study of more stone beads from Barikot in the future will determine the precise range and type of drills used to perforate the beads during both the Mauryan and Graeco-Bactrian periods.

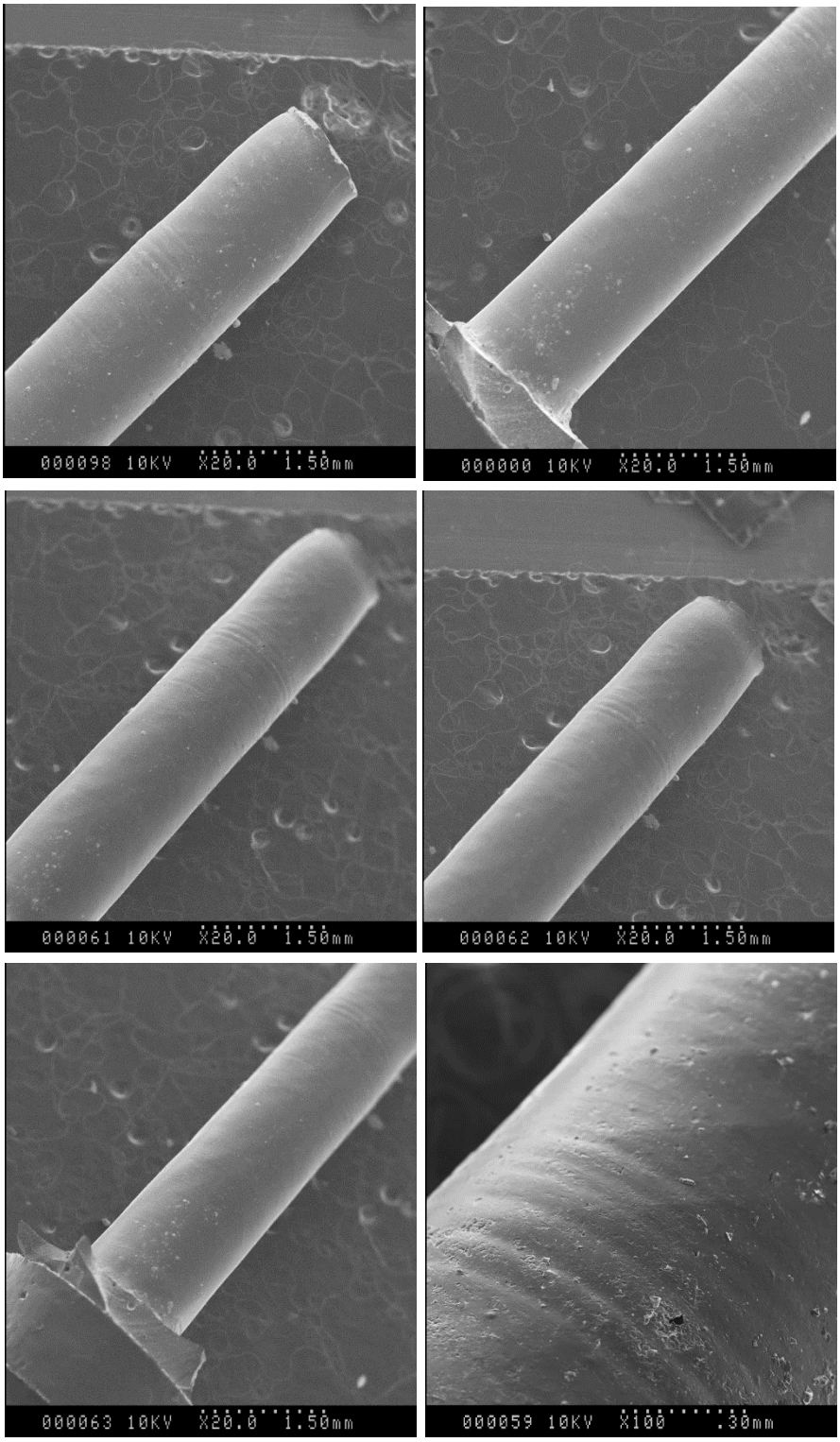


Figure 186: Short barrel bead of carnelian (BKG 3799). SEM images of drill hole impression, long tapered cylindrical drilling from one side, metal drill with fine abrasive, 20x and 100x

7.1.5 Indo-Greek period (Macrophase 3a2-3a4: End-2nd century BCE)

In total, one bead of banded black-and-white agate was selected for a low-resolution SEM study, which is a long biconical bead that has been fully dyed (BKG 4298). By soaking agate in honey or sugar water, the porous layers can take on the organic sugars, and by later heating the stone, the sugar can be carbonized to turn brown or black (Kenoyer 2017c: 143). As figure 187 shows, this bead has been drilled using single and double diamond drills. As practised in the past and in the modern bead making city of Khambhat, BKG 4298 was drilled with a larger single diamond drill first to start the drilling process and a second narrower double diamond drill has been used subsequently to complete the drilling (Glover 2019: 9-10; Glover and Kenoyer 2019: 188; Kenoyer et al. 1991: 53). The drill surface is characterised by parallel drilling striae and a matte surface. This agate bead has been drilled from two sides, but the drill holes do not meet precisely in the centre. Both drill sections of BKG 4298 are stepped and straight cylindrical.

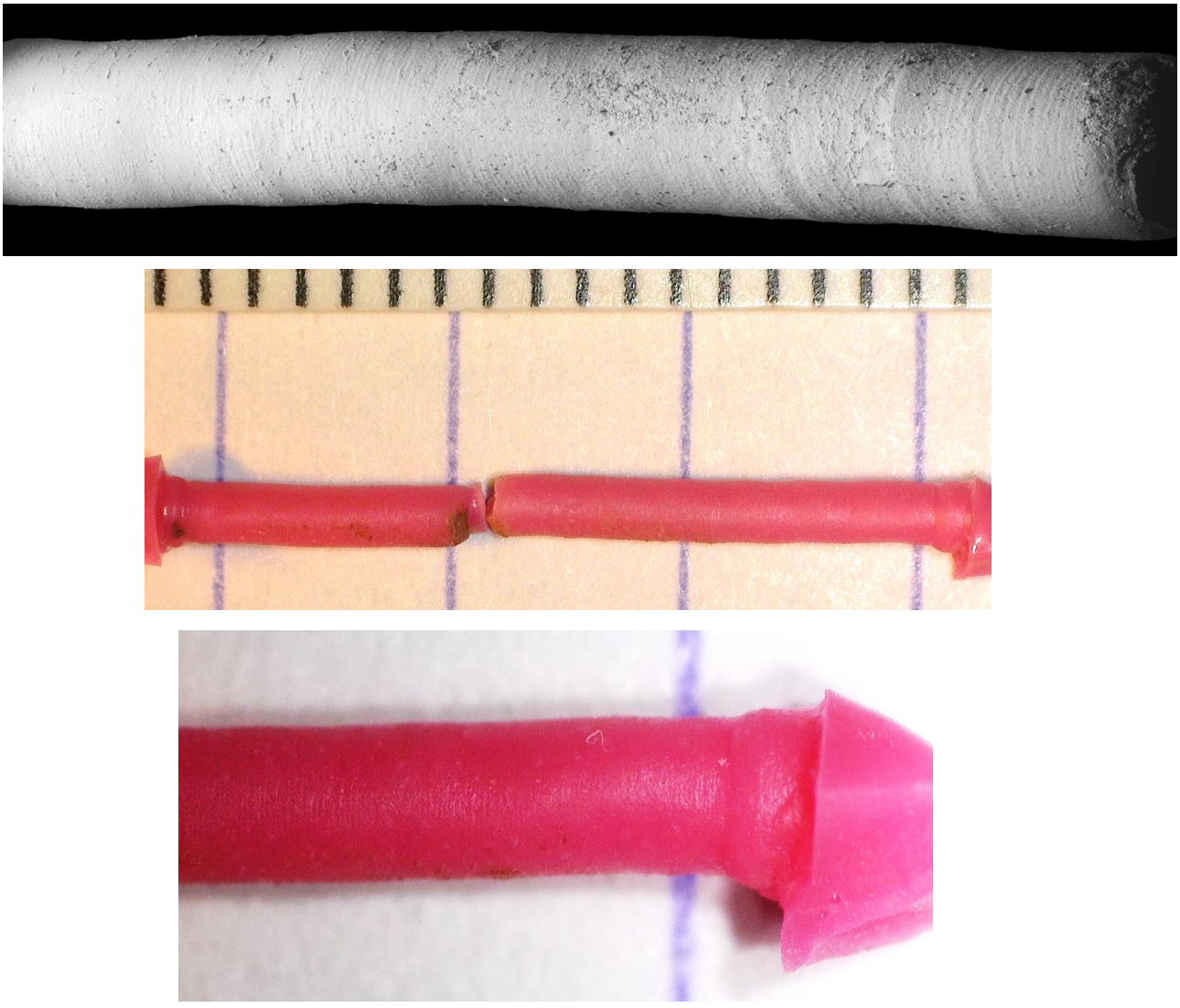


Figure 187: Long biconical agate bead (BKG 4298). SEM of drill hole impression, stepped straight cylindrical drilling from two sides, single and double diamond drills, 100×

Although no more complete stone beads were recovered from the Indo-Greek period, a broken long cylindrical pendant of red carnelian was found at Barikot (BKG 3822: Figure 188). As the drill hole has partially broken away, it was not possible to take a silicone cast of the drill hole of BKG 3822. Instead, a visual examination of the drill hole was conducted, which seems to reveal evidence for the use of a diamond drill as suggested by the drilling surface.



Figure 188: a) Cylindrical perforated carnelian pendant (BKG 3822); b) Cylindrical drilling from one side, possibly diamond drill

7.1.6 Saka-Parthian period (Macrophase 3b: 1st BCE – 1st century CE)

In total, two stone beads were selected for a high-resolution SEM study, which include a short biconical bead of carnelian (BKG 3378) and an octagonal-faceted long biconical bead of rock crystal (BKG 3618). As figure 189 shows, BKG 3378 has been drilled with a metal drill and a coarse abrasive. This identification is indicated by the representation of several characteristic features. The drill surface is characterised by parallel drilling striae and high polish. The bead has been drilled from two sides, but the drill alignment is not centred. The drill sections of BKG 3378 are also typically long, tapered cylindrical. The drilling striae are deep and irregular, which suggest that the drilling was carried out with emery abrasive. In addition, there is evidence of string wear at the narrow point in drilling, which indicates that BKG 3378 remained in use for a long time in the past.

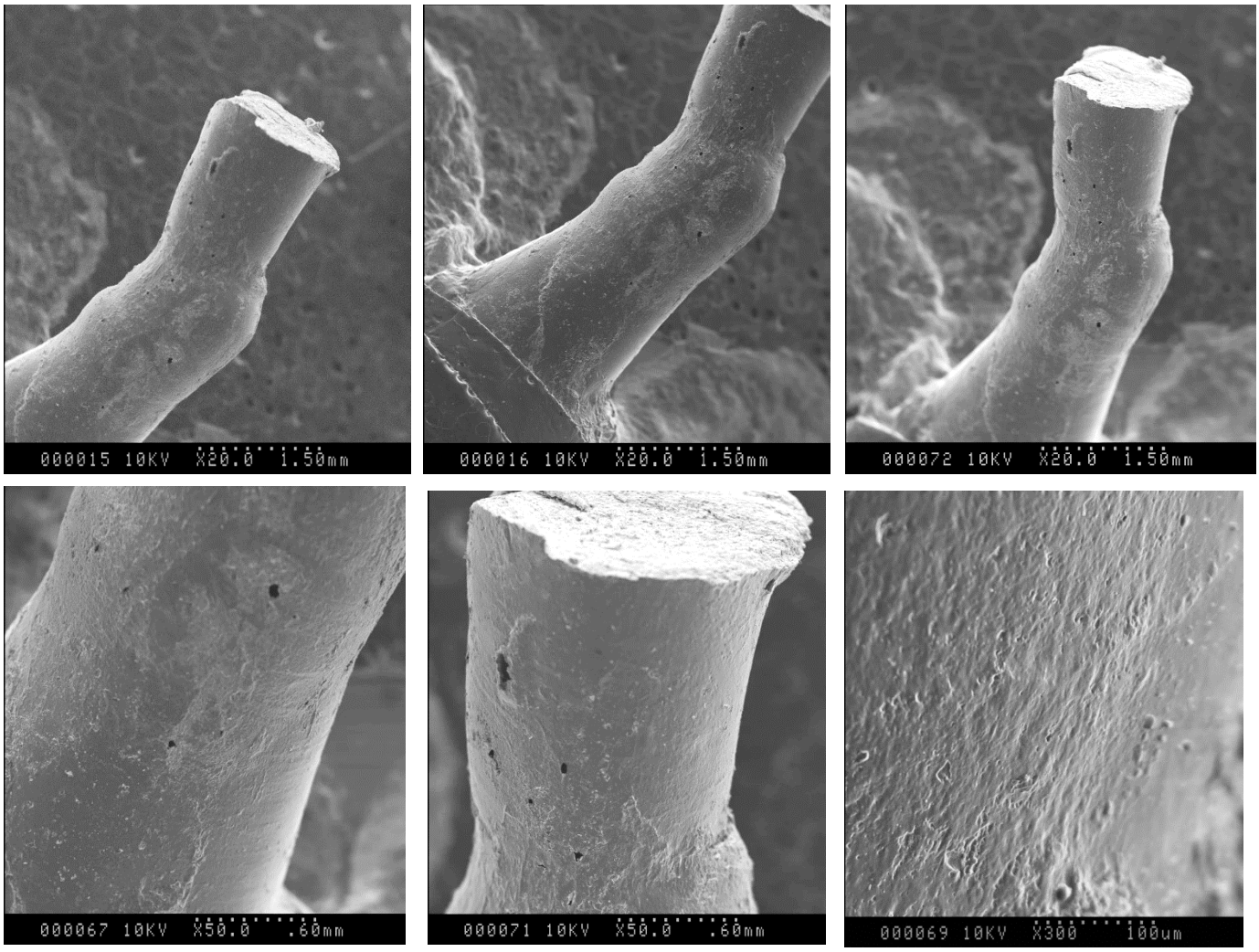


Figure 189: Short biconical bead of carnelian (BKG 3378). SEM of drill hole impression, long tapered cylindrical drilling from two sides, metal drill with coarse abrasive, 20x, 50x and 300×

As figure 190 shows, BKG 3618 has been drilled using a double diamond drill. The drill surface is characterised by parallel drilling striae and a matte surface. Like BKG 3378, this bead has been drilled from two sides and the drill alignment is not centred. Furthermore, as it is typical for a double diamond drill, the drill sections of BKG 3618 are straight cylindrical. In addition, there is evidence of string wear on the interior drill hole of the bead, indicating the long use of the bead in the past.

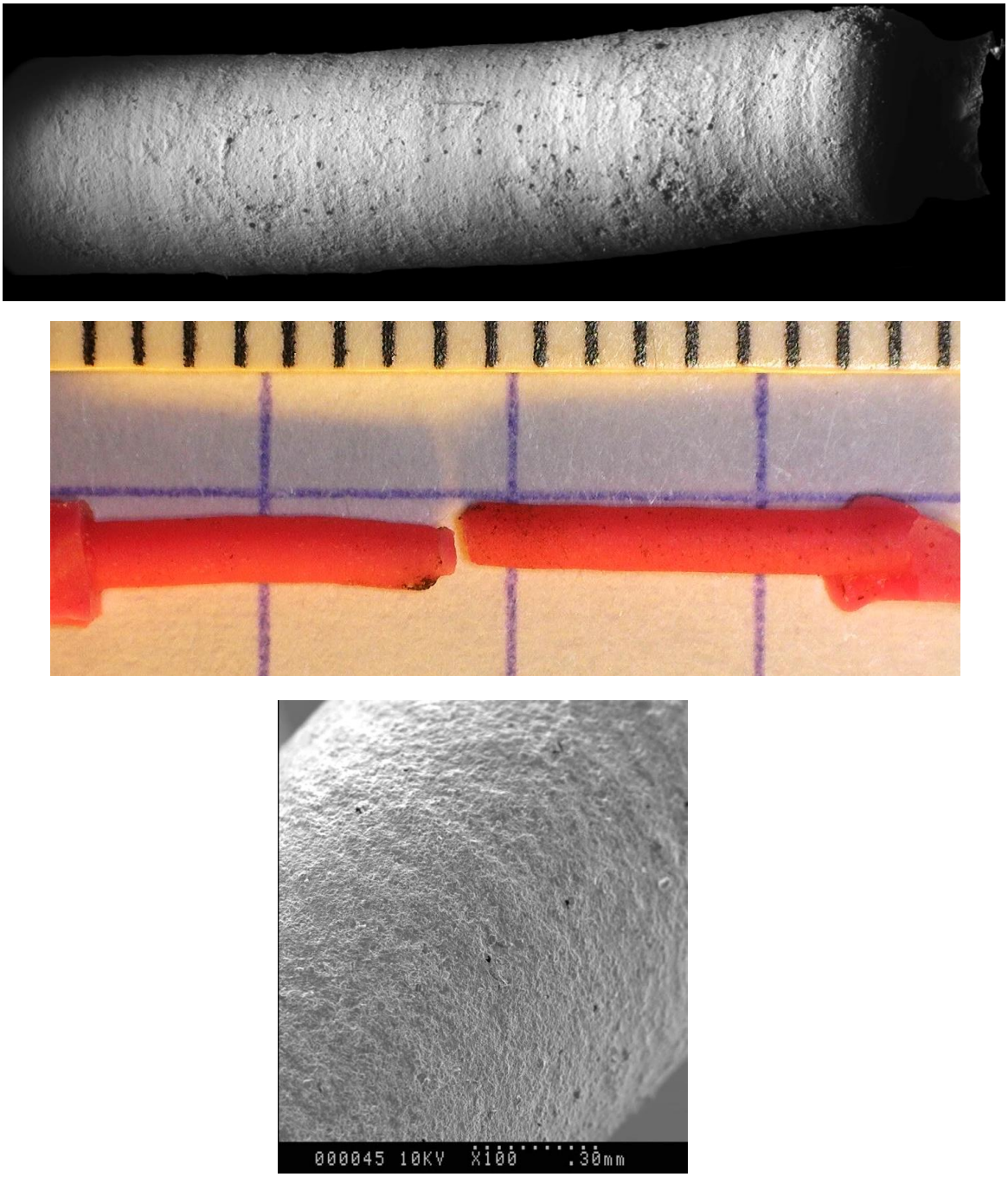


Figure 190: Octagonal-faceted long biconical bead of rock crystal (BKG 3618). SEM of drill hole impression, straight cylindrical drilling from two sides, double diamond drill, 100×

7.1.7 Early Kushana period (Macrophase 4a: 1st – 2nd century CE)

In total, one hexagonal-faceted long barrel bead of beryl-aquamarine was selected for a high-resolution SEM study (BKG 3181). As figure 191 shows, BKG 3181 has been drilled using a metal drill with a coarse abrasive. The drill surface is characterised by irregular parallel drilling striae and has a matte surface. The deep irregular striae suggest that the bead was drilled with emery abrasive. The use of emery abrasive is also supported by the rougher surface of the drill hole. Moreover, BKG 3181 has been drilled from two sides and the drill alignment is centred. The drill sections are typically long, tapered cylindrical. In addition, there is very little evidence of string wear on the interior hole, indicating that BKG 3181 remained in circulation for a fairly short period of time in the past before entering the archaeological record. Interestingly, three faceted beryl-aquamarine beads have been found as votive offerings in *stupas* located in south-eastern Afghanistan. The examination of these beads reveals evidence of wear and the use of diamond drilling technologies to manufacture them (Rienjang et al. 2017). A cross-comparative analysis with BKG 3181, hence, reveals a complete contrast to the beads found in the *stupa* deposits – the latter possibly representing a more valuable set of ornaments as supported by their extensive use-wear, the type of technology selected and the archaeological context of the finds.

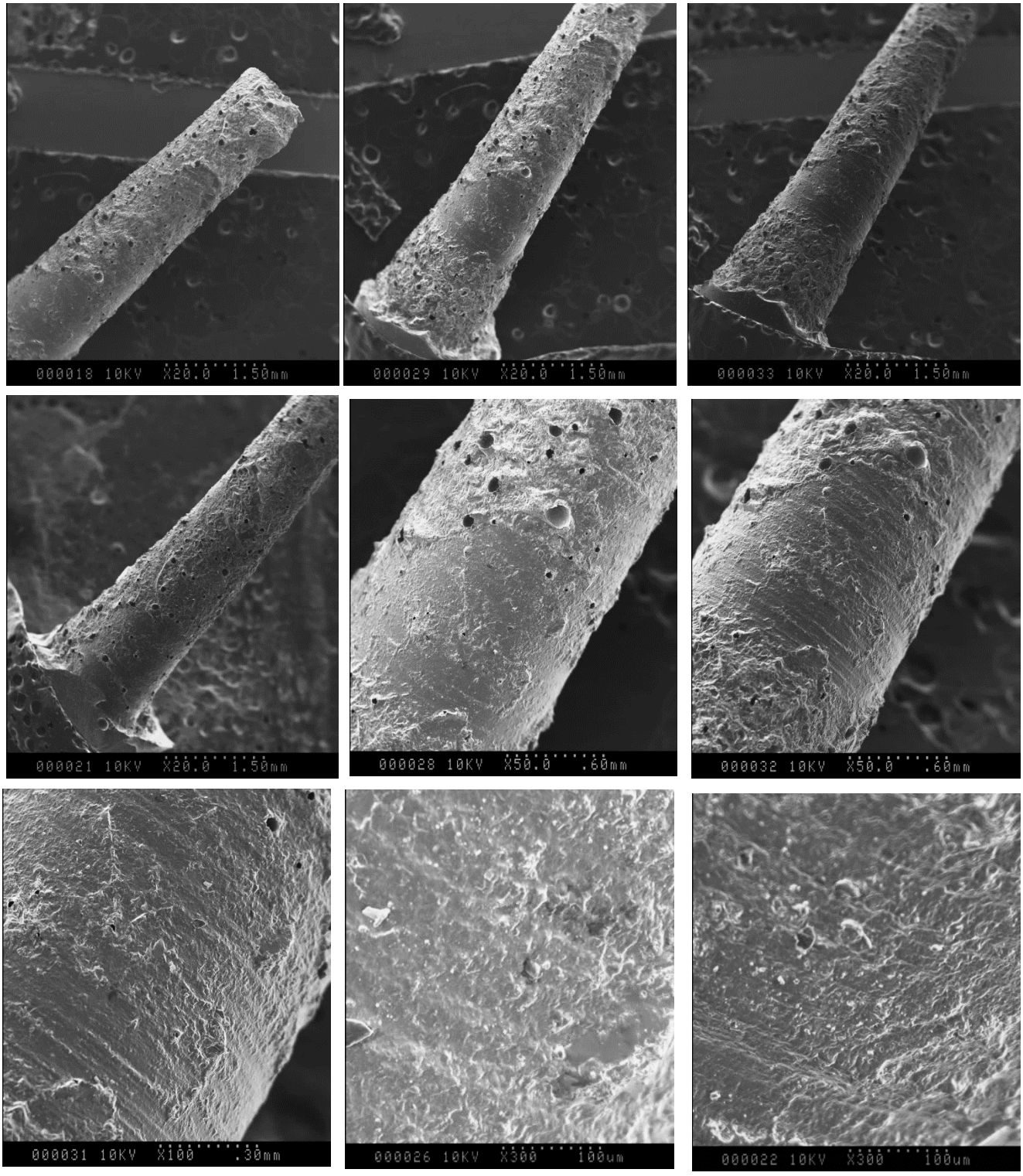


Figure 191: Hexagonal-faceted long barrel bead of beryl-aquamarine (BKG 3181). SEM of drill hole impression, long tapered cylindrical drilling from two sides, metal drill with coarse abrasive, 20x, 50x, 100x and 300×

7.1.8 Mature Kushana period (Macrophase 4b: 2nd century CE)

In total, four stone beads were selected for a low-resolution SEM study, which include a short spherical bead of carnelian (BKG 1296), an irregular short spherical/globular bead of carnelian (BKG 2616), a pentagonal-faceted long barrel bead of rock crystal (Ser. 4146) and a gadrooned short barrel bead of lapis lazuli (Ser. 4333). As figure 192 and 193 show, both BKG 1296 and BKG 2616 have been drilled with single and double diamond drills. The drill hole surface of both beads is characterised by parallel drilling striae and a matte surface. BKG 1296 has been drilled from two sides, but the drill alignment is not centred. Whereas BKG 2616 has been drilled from one side only. The drill sections of both beads are stepped, straight cylindrical. Therefore, the only difference in the drilling process between BKG 1296 and BKG 2616 appears to be the fact that one bead was drilled from two sides while the other from one side only. The fact that both beads are made from the same material and were drilled with the same type of drilling technology may imply that they were possibly manufactured in the same workshop, which can only be confirmed through the production and examination of high-resolution SEM images for these beads in the future.

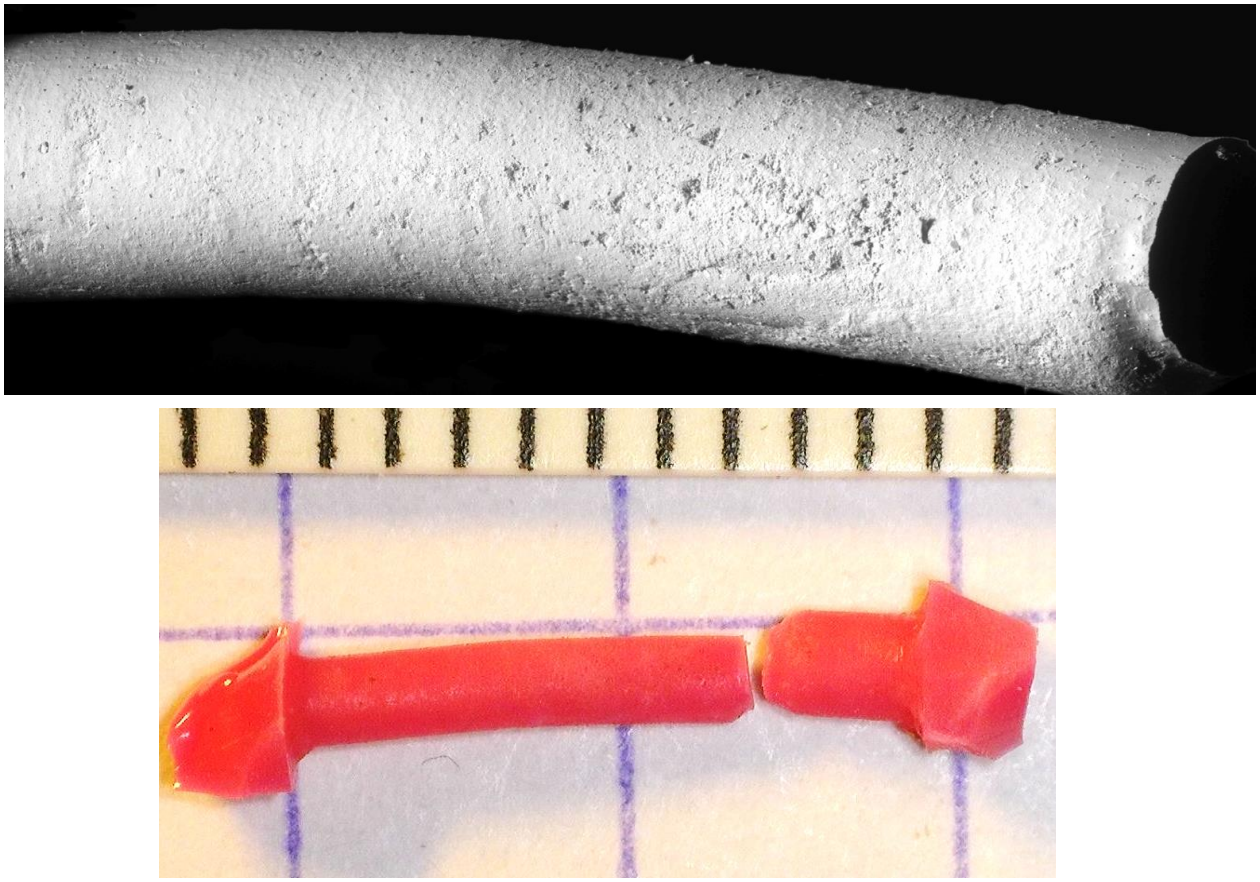


Figure 192: Short spherical bead of carnelian (BKG 1296). SEM of drill hole impression, stepped, straight cylindrical drilling from two sides, single and double diamond drills, 100×

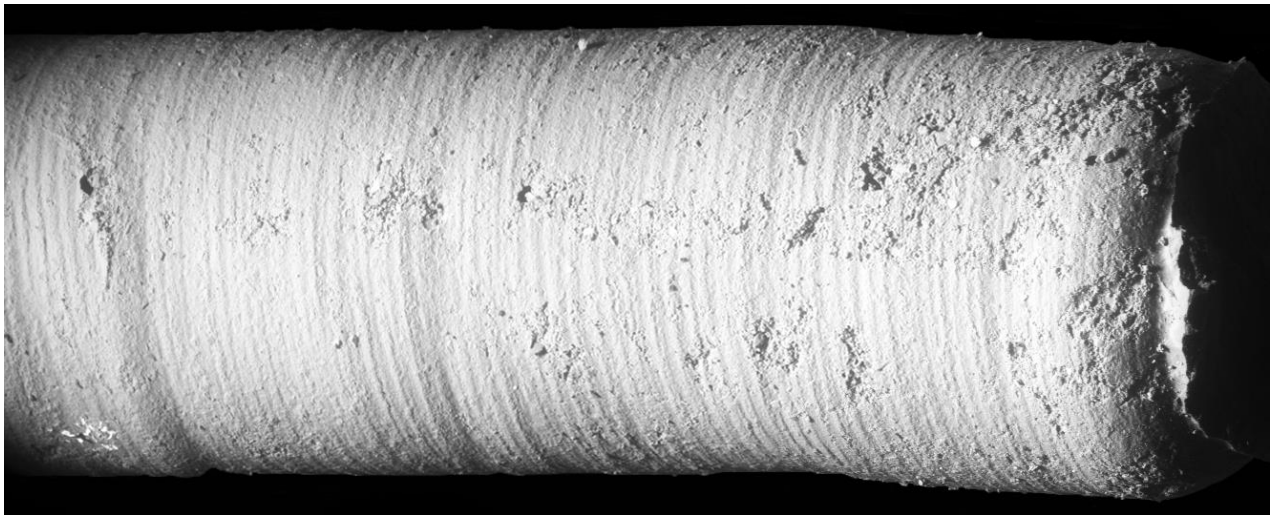


Figure 193: Irregular short spherical/Globular bead of carnelian (BKG 2616). SEM of drill hole impression, stepped, straight cylindrical drilling from one side, single and double diamond drills, 100×

In contrast, Ser. 4146 has been drilled exclusively with a double diamond drill as figure 194 illustrates. The drill surface is characterised by parallel drilling striae and has a matte surface. This rock crystal bead appears to have been drilled from two sides while the drill sections are straight cylindrical in accordance with the profile of a typical double diamond drill.



Figure 194: Pentagonal-faceted long barrel bead of rock crystal (Ser. 4146). SEM of drill hole impression, straight cylindrical drilling from two sides, double diamond drill, 100×

There is even evidence of other types of drills being used to perforate stone beads during the Mature Kushana period. Although it is difficult to clearly identify the type of technology used to drill a soft stone such as lapis lazuli, it appears that Ser. 4333 may have been drilled with a metal drill and a fine abrasive (Figure 195). The drill surface is characterised by parallel drilling striae, polish and wear. This bead has been drilled from two sides to complete the drill hole. The drill sections are typically long, tapered cylindrical while having a convex conical tip.

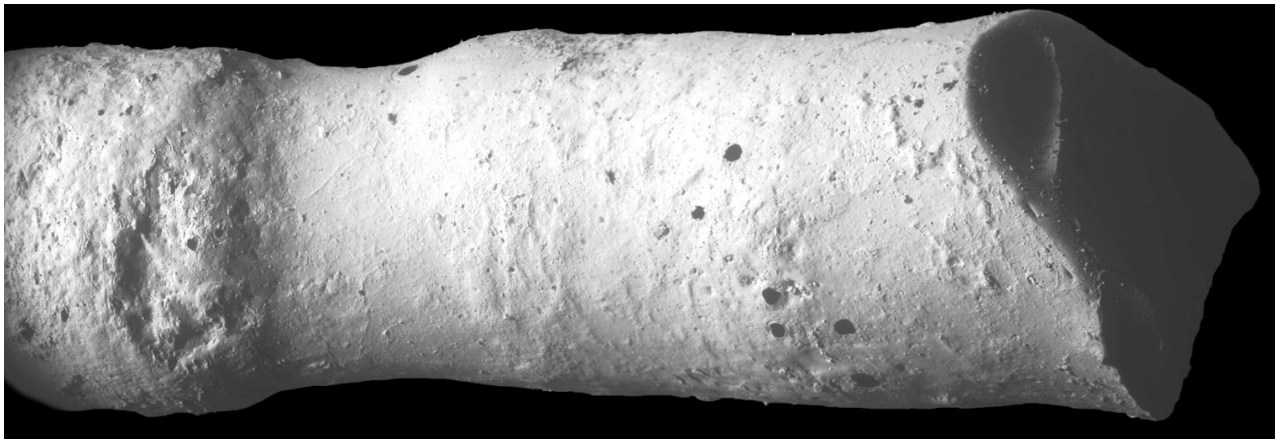


Figure 195: Gadrooned short barrel bead of lapis lazuli (Ser. 4333). SEM of drill hole impression, long tapered cylindrical and convex conical tip, drilling from two sides, metal drill with fine abrasive?, 100×

As already shown above, beads, as any other type of cultural artefacts, can be found in various state of preservation in the archaeological record. When beads are found in a broken state, there is often the possibility to examine macroscopically the exposed drill hole and other manufacturing traces of the concerned ornaments. This approach has to be adopted especially in cases where the drill hole itself is affected in some way that makes it quite difficult to take a silicone cast of the drill hole as in the case of BKG 3822 above. In this regard, a half broken octagonal-faceted long barrel bead of rock crystal has been found from Barikot (Ser. 4359), which probably represents a piece of evidence for on-site production of rock crystal beads during the Mature Kushana period (Figure 196). Although no workshops and drilling bits have been found at Barikot yet, manufacturing debitage of rock crystal has been found at the site from this time. As the preserved cross-section of Ser. 4359 illustrates, various traces of the manufacturing process are visible including pecking, chipping, grinding and drilling, but little effort was made to grind away or polish the chipped surface and finish the shaping process. Therefore, it is reasonable to suggest that Ser. 4359 may represent a preform or roughout.

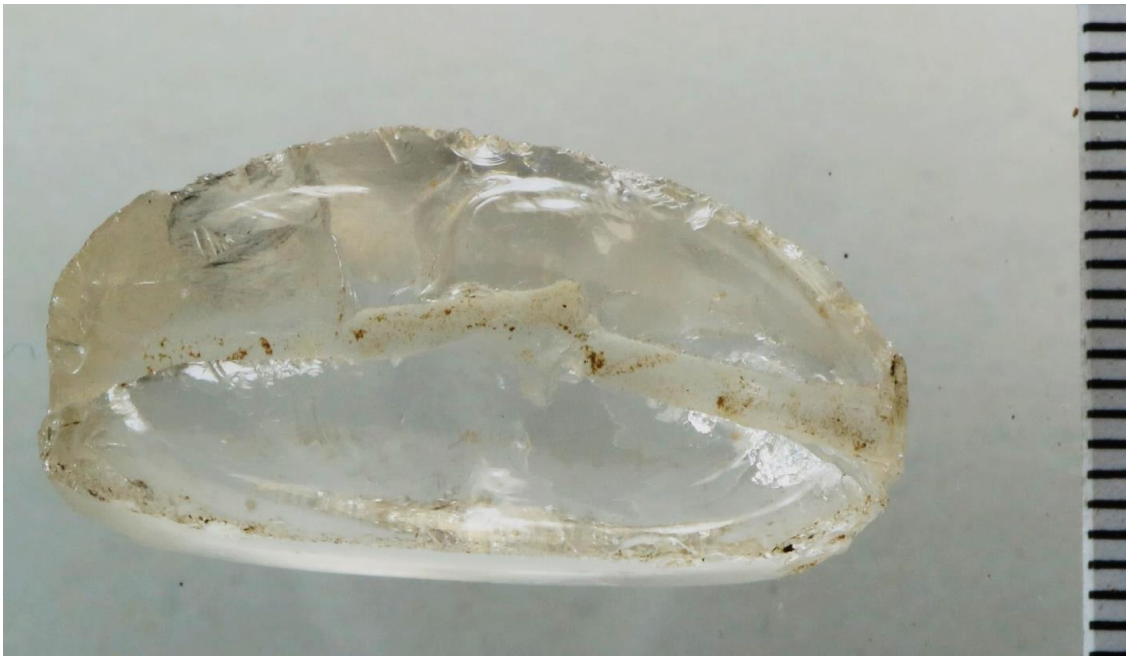


Figure 196: Octagonal-faceted long barrel bead of rock crystal (Ser. 4359). Long irregular cylindrical drilling from one side, straight cylindrical drilling from second side, single and double diamond drills?

After chipping and grinding, this bead was drilled from two sides with two different types of drills as figure 196 shows. The shorter drill hole is larger in diameter, straight cylindrical. It shows the interior hole characterised by parallel drilling striae indicating the motion of drilling in a more controlled pattern. A stabilising frame or vice could have been used to stabilise both objects during the drilling process. The second drill hole is longer in length, shorter in diameter and is also characterised by parallel drilling striae. The drill hole profile is, however, very irregular, and the manner of drilling reveals a more uncontrolled pattern. Due to the irregular nature of the drilling striae and the angles of the drilling, it is likely that the drilling was done using a hand-held bow drill without the use of a stabilising apparatus to hold the drill. Based on these features, it appears, therefore, that Sr. 4359 has been perforated with single and double diamond drills, although further research is required to confirm this tentative assessment.

If this assessment can be confirmed, it would raise new research questions about the potential existence of bead manufacturing workshops in Swat possibly even at Barikot itself. The existence of workshops in Gandhara is, anyhow, indicated by the recovery of many unfinished beads from the Taxila Valley, which has also revealed evidence for the use of diamond drilling (Kenoyer, personal communication; Coningham 1998; Kenoyer 2017c: 146; Marshall 1951; Uesugi 2019: 8). The discovery of a potential bead workshop in Swat would, by extension, provide new perspectives on the procurement of stone materials in the past and how they relate to models of cultural transmissions and interactions in the region and beyond. In addition, as figure 199 shows, the interior holes of Ser. 4359 fail to meet each

other probably because the bead broke in half due to excessive pressure exercised during the drilling process.

Because Ser. 4359 broke during the drilling process, it may have forced the driller to discard the unfinished bead. One way to try to confirm the precise type of technology used to drill Ser. 4359 would be to examine the leading edge of the drill in the future, which usually provides the clearest information about the applied drilling technology. All of these production features imply that Ser. 4359 may represent a failed attempt of on-site bead production. As a result, it is clear that Ser. 4359 represents a unique piece of evidence that allows us to reconstruct the entire operational sequence or *chaîne opératoire* of the unfinished ornament at the site.

7.1.9 Late Kushana period (Macrophase 5a: first half of the 3rd century CE)

In total, five stone beads were selected for a SEM study, which include two banded black-and-white beads of agate that have been fully dyed (BKG 2593 and BKG 2657), a long barrel bead of carnelian (BKG 2630), a short barrel bead of lapis lazuli (Ser. 2647) and a very long barrel bead of serpentine (BKG 2627). Based on the study of the low-resolution SEM images, it has not been possible to identify the type of drilling technology used to perforate Ser. 2647 and BKG 2627. As figure 197 shows, BKG 2593 is a long barrel bead that has been drilled with a double diamond drill. The drill surface is characterised by very irregular fine parallel drilling striae and a matte surface. Furthermore, the drill section is typically straight cylindrical. Since part of the bead has broken away, it is difficult to comment on the drill direction and alignment of the ornament. In addition, there is evidence of string wear on the interior drill hole, indicating the long use of the bead in the past.

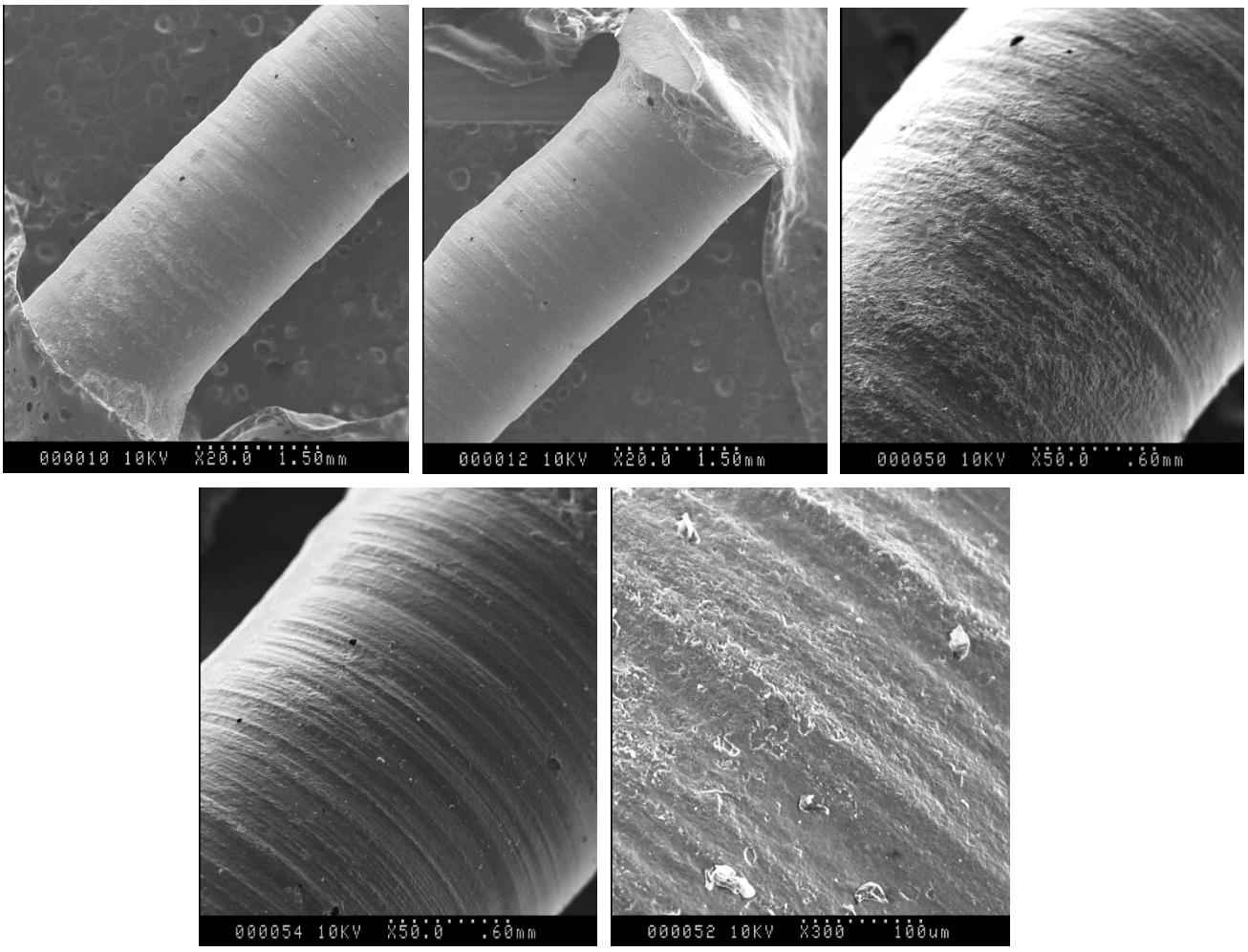


Figure 197: Long barrel bead of agate (BKG 2593). SEM of drill hole impression, straight cylindrical drilling, double diamond drill, 20x, 50x and 300x

In contrast, BKG 2657 is an irregular short spherical/globular bead that has been drilled with single and double diamond drills (Figure 198). The drill surface is characterised by parallel drilling striae and a matte surface. In the SEM image (50x), BKG 2657 can be seen clearly drilled with a wider single diamond drill first at the very edge of the drill hole before the remainder of the hole is drilled with a narrower double diamond drill. This bead has been drilled from two directions and the drill alignment is centred. Moreover, the drill sections are typically stepped, straight cylindrical. Likewise, there is evidence of string wear on the interior drill hole of BKG 2657, indicating the long use of the bead in the past.

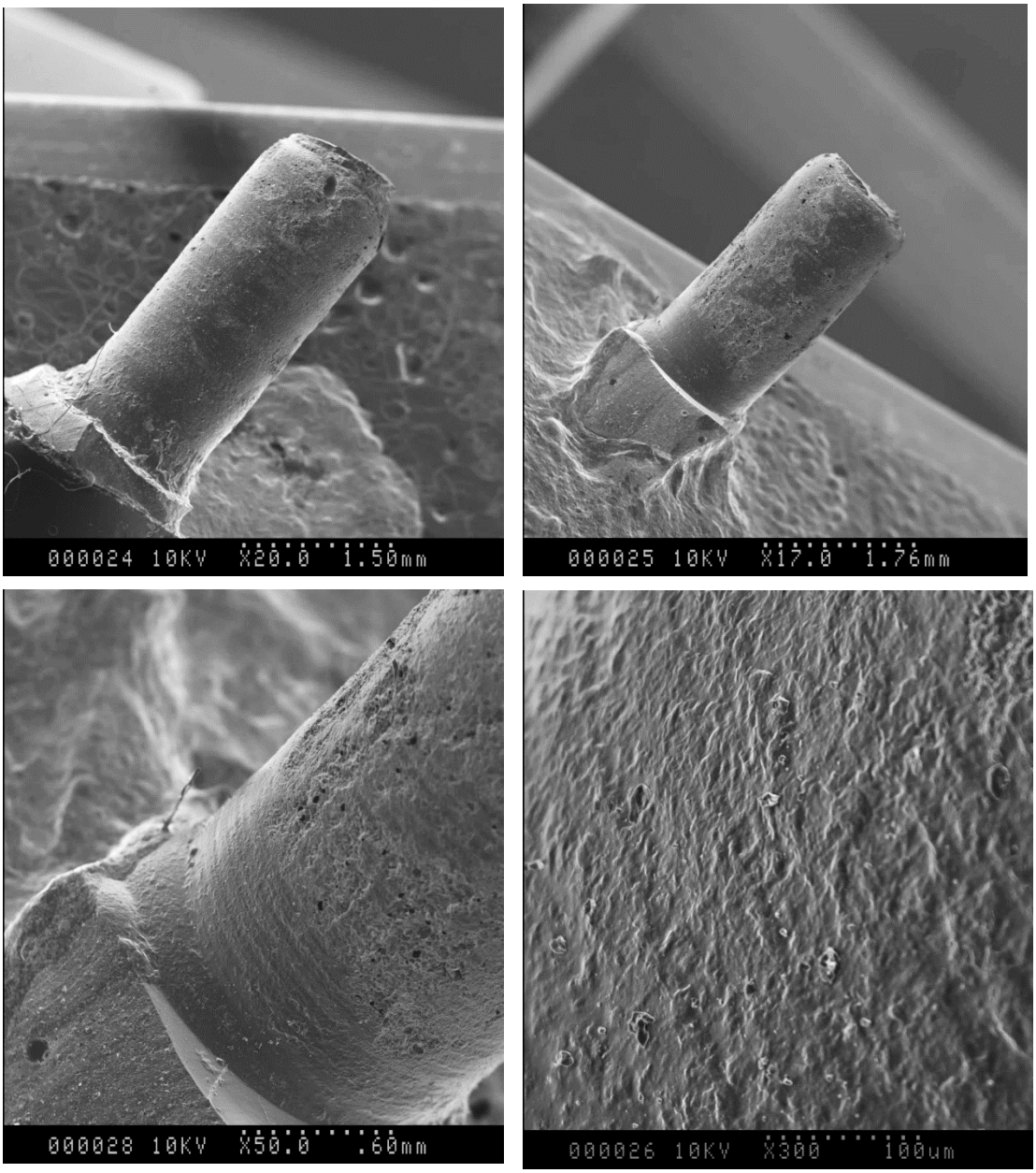


Figure 198: Irregular short spherical/Globular bead of agate (BKG 2657). SEM of drill hole impression, stepped, straight cylindrical drilling from two sides, single and double diamond drills, 17x, 20x, 50x and 300x

The use of metal drills and abrasives is also documented on a long barrel bead of carnelian (BKG 2630) that has been drilled with a metal drill and a fine abrasive (Figure 199). The drill surface is characterised by parallel drilling striae and high polish. This bead has been drilled from two sides, but the drill holes are not aligned in the centre. In addition, the drill sections are typically stepped, long, tapered cylindrical. The surface areas that are characterised by high polish on the interior hole are probably the result of wear from dirt particles penetrating the hole and the string rubbing them up against the interior hole, polishing the drilled surface in the process. Therefore, BKG 2630 is also indicative of a long use life in the past.

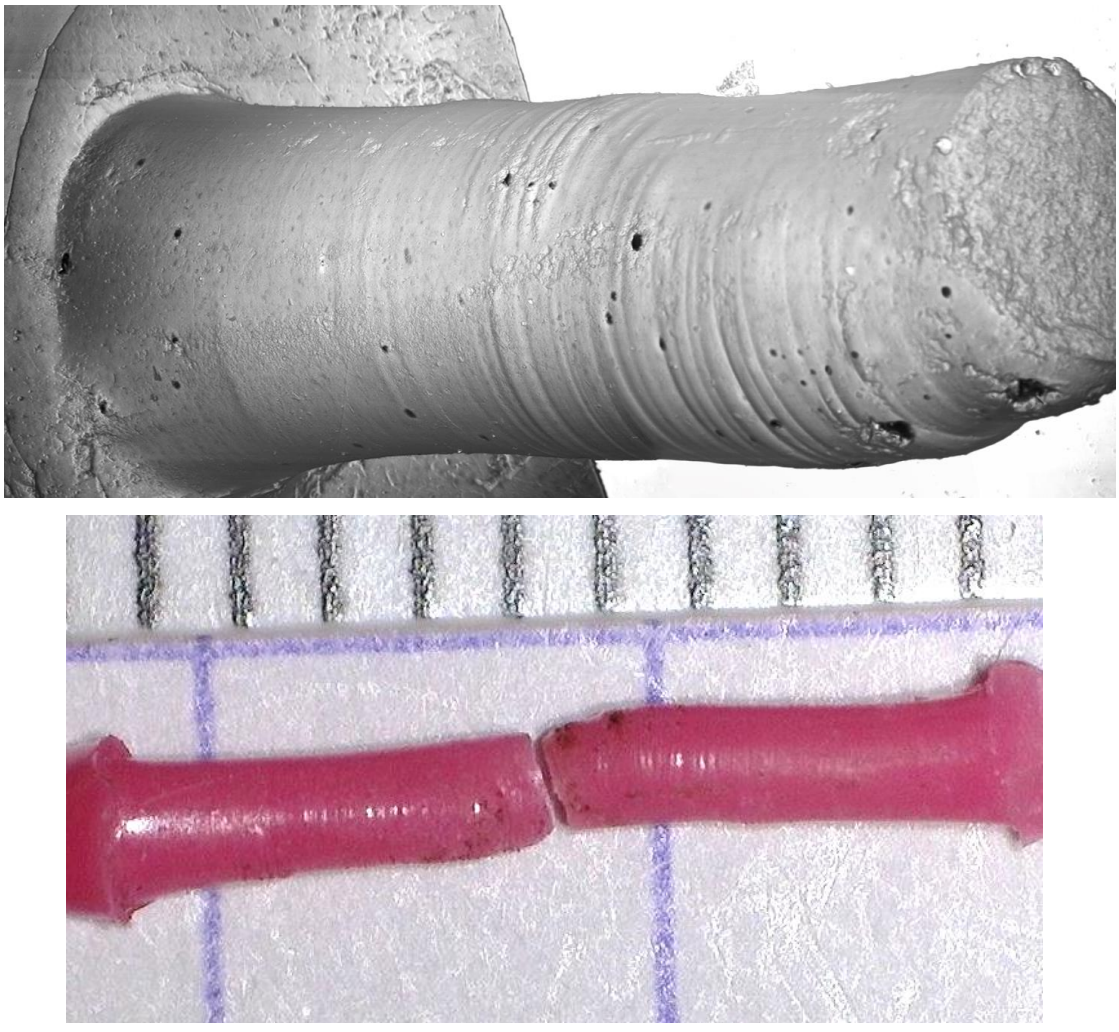


Figure 199: Long barrel bead of carnelian (BKG 2630). SEM of drill hole impression, stepped long tapered cylindrical drilling from two sides, metal drill with fine abrasive, 100×

7.1.10 Kushano-Sasanian period (Macrophase 5b: second half of the 3rd century CE)

In total, five beads of carnelian and one bead of garnet were selected for a SEM study. They include an irregular short spherical/globular bead (BKG 1157), a short biconical bead (BKG 1178), a rectangular circular bead (BKG 2451), a hexagonal-faceted long barrel bead (BKG 2453), a plano convex short barrel bead (Ser. 4279) and an irregular short barrel bead of garnet (BKG 3801). As figures 200 and 201 show, both BKG 1157 and BKG 2453 have been drilled with single and double diamond drills. The drill surface of both beads is characterised by parallel drilling striae and a matte surface. BKG 1157 has been drilled from one side only and the drill section is typically stepped, straight cylindrical. It also shows evidence of string wear on the interior hole and at one end, which indicates the long use of the bead in the past. In contrast, BKG 2453 has been drilled from two sides and the drill sections are typically stepped, long cylindrical. Likewise, there is evidence of heavy string wear at the narrow point of drilling while some wear can be seen at the edge of the drill holes indicative of the long use of the bead in antiquity.

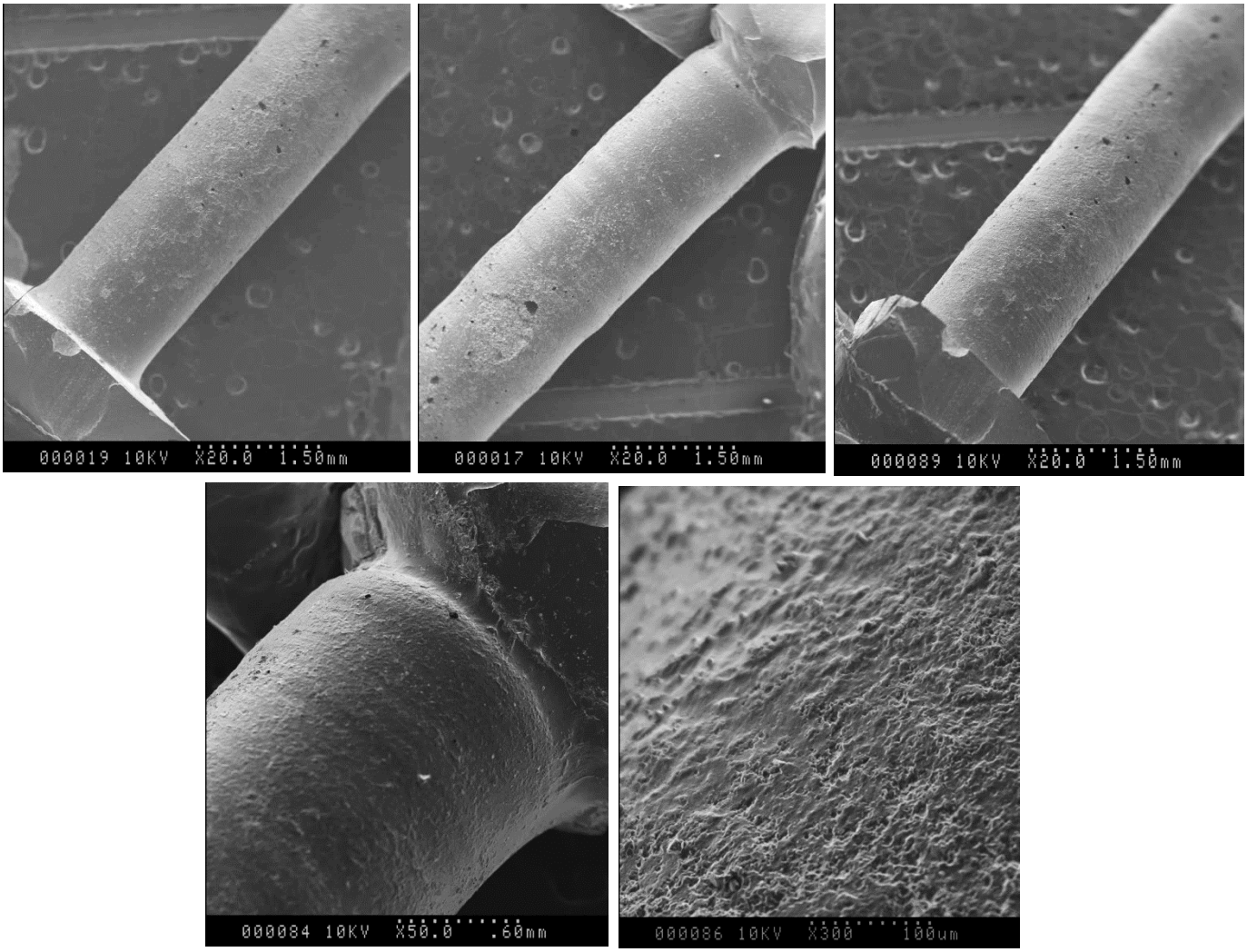


Figure 200: Irregular short spherical/Globular bead of carnelian (BKG 1157). SEM of drill hole impression, stepped straight cylindrical drilling from one side, single and double diamond drills, 20x, 50x and 300x

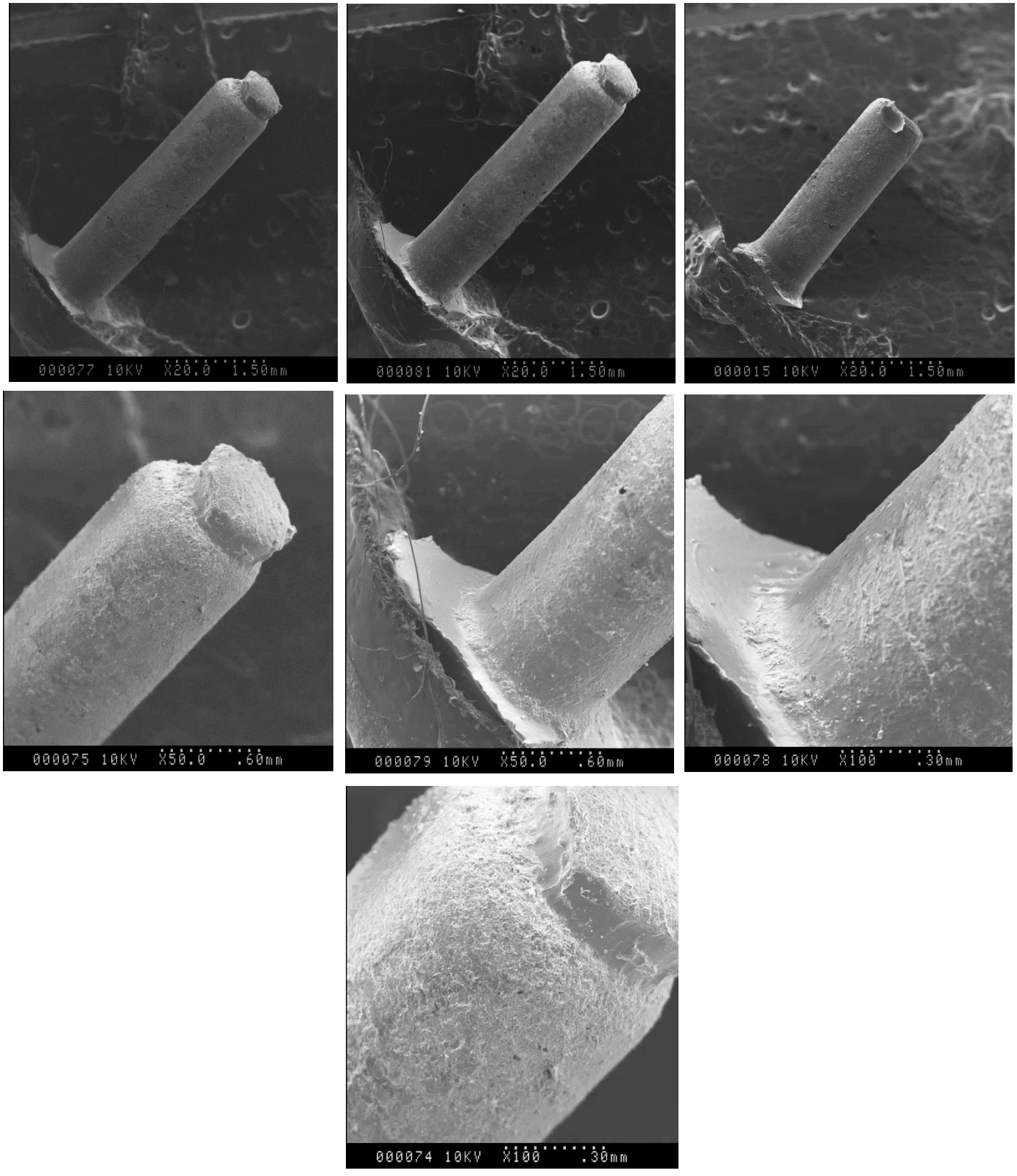


Figure 201: Hexagonal-faceted long barrel bead of carnelian (BKG 2453). SEM of drill hole impression, stepped long cylindrical drilling from two sides, single and double diamond drills, 20x, 50x and 100x

Moreover, the use of double diamond drills to produce stone beads is documented during this time as evidenced by the SEM examination of the drill hole of Ser. 4279 (Figure 202). The drill surface of this carnelian bead is characterised by parallel drilling striae and a matte surface. It has been drilled from one side only and the drill section is typically straight cylindrical.



Figure 202: Plano convex short barrel bead of carnelian (Ser. 4279). SEM of drill hole impression, straight cylindrical drilling from one side, double diamond drill, 100x

In addition, a unique irregular short barrel bead of garnet was found at Barikot (BKG 3801). Although it represents a sporadic find with no secure chronology, several lines of evidence are available that allow us to link BKG 3801 with the Kushana or Kushano-Sasanian periods. The SEM data clearly indicates that BKG 3801 has been drilled with a double diamond drill (Figure 203). The drill surface is characterised by deep parallel drilling striae and a matte surface. This garnet bead has been drilled from one side only and the drill section is typically straight cylindrical. As the drill reached the opposite end, a flake popped out because of the pressure exhibited from the drilling process. In addition, there is very little evidence of string wear on the interior drill hole. Based on the data on the use of double diamond drills at Barikot and the use of double diamond drills to perforate the garnet beads from Cambodia (Carter 2013), it seems reasonable to relate BKG 3801 with the Kushana or Kushano-Sasanian periods (2nd CE – 4th century CE).

What is reassuring is the fact that BKG 3801 was found from trench BKG 11 E 1-2 of the site, which does not show evidence of occupational continuity beyond the Kushano-Sasanian period. It is possible that this garnet bead may have been lost soon after its production during the abandonment phase of the lower city in the late 3rd century CE, which may explain the little string wear evidence on the interior drill hole of this remarkably well-preserved high-quality ornament. Since there are no typological parallels available for this bead at Barikot, it is not possible to shed some light on the chronology of BKG 3801 through a cross-comparative approach. The use of garnet by the Great Kushanas is, however,

well documented (Adams 2011: 20; Rabbani 2020b; Schmidt 1995: 33). As a result, it is likely that BKG 3801 derives from the Kushana or Kushano-Sasanian periods of Barikot.

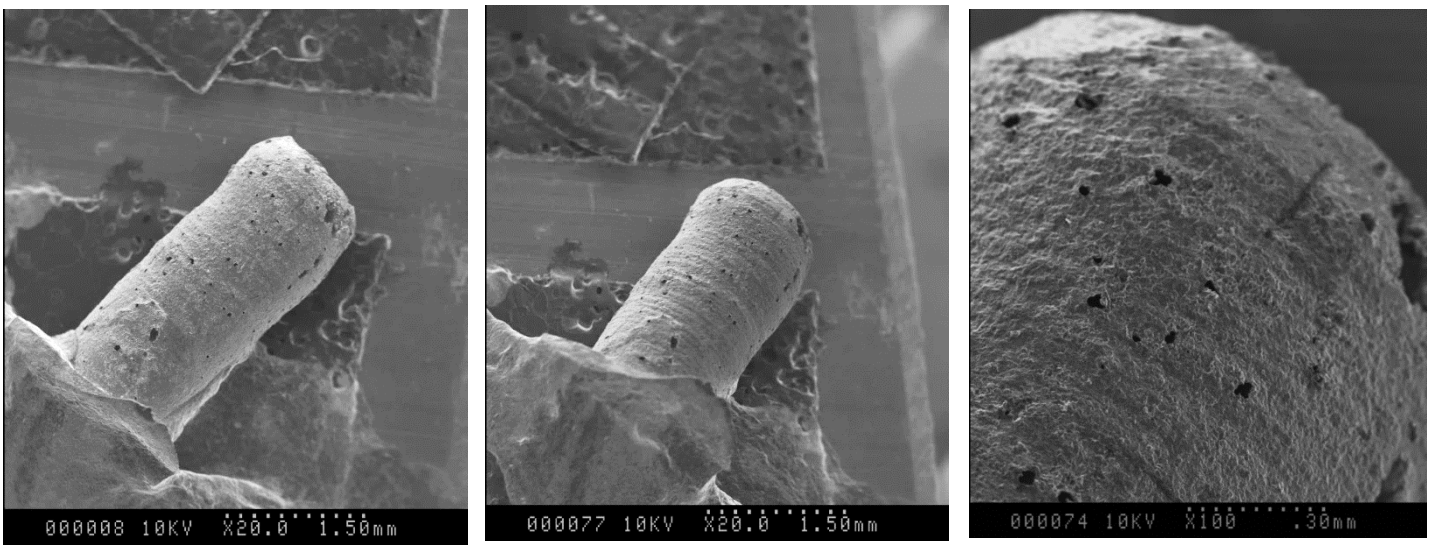


Figure 203: Irregular short barrel bead of garnet (BKG 3801). SEM of drill hole impression, straight cylindrical drilling from one side and popped out on the opposite side, double diamond drill, 20x and 100x

As in the earlier chronological periods of Barikot, the use of metal drilling technologies to drill stone beads continues in the late 3rd century CE as well. In this regard, both BKG 1178 and BKG 2451 have been drilled with a metal drill and a fine abrasive as figures 204 and 205 illustrate. The drill surface of both beads is characterised by parallel drilling striae and shows evidence of high polish. Besides, both beads have been drilled from one side only. The drill section of BKG 1178 is typically long, tapered cylindrical and shows evidence of wear at the ends of the bead. Similarly, the drill section of BKG 2451 is typically long, tapered cylindrical.

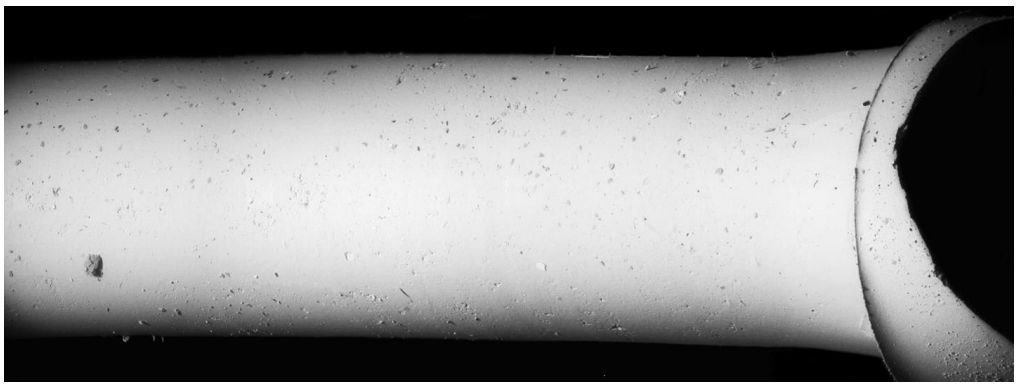


Figure 204: Short biconical bead of carnelian (BKG 1178). SEM of drill hole impression, long, tapered cylindrical drilling from one side, metal drill and fine abrasive, 100x

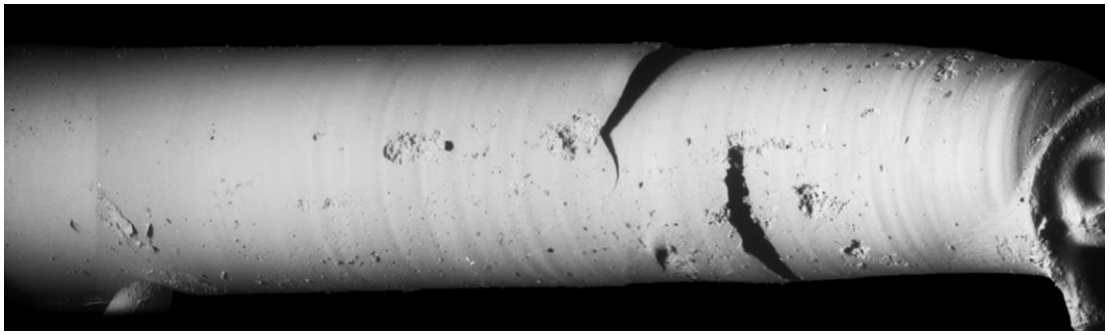
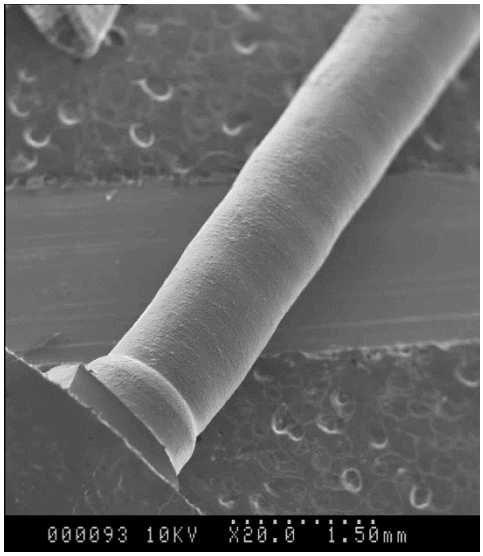


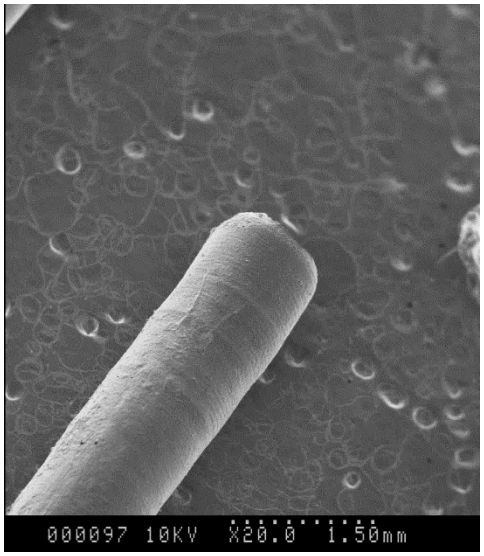
Figure 205: Rectangular circular bead of carnelian (BKG 2451). SEM of drill hole impression, long, tapered cylindrical drilling from one side, metal drill and fine abrasive, 100x

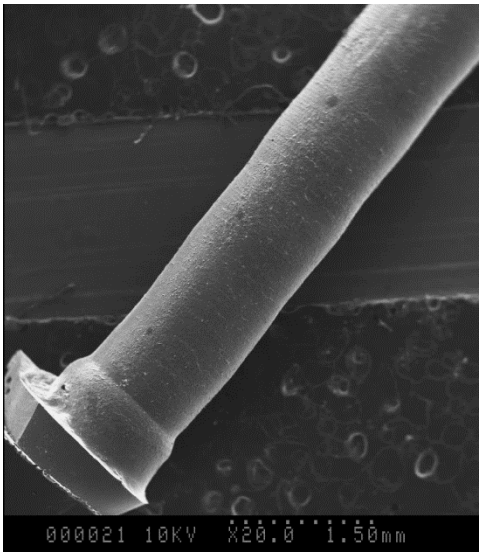
7.1.11 Kushano-Sasanian period (Macrophase 6: 4th century CE)

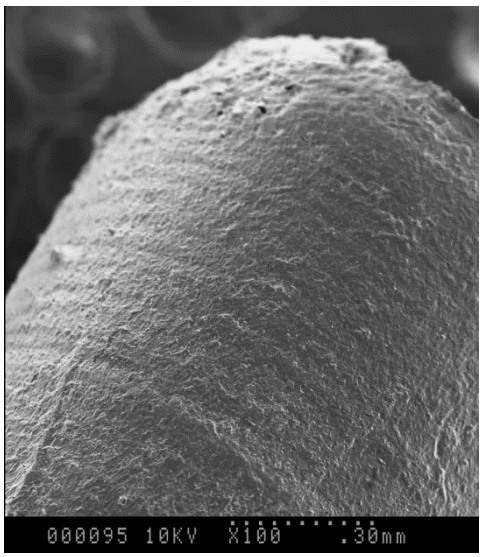
In total, five specimens were selected for a SEM study, which include a drop-shaped pendant of carnelian (BKG 1158), an irregular short spherical/globular bead of carnelian (BKG 2226), a short barrel-shaped bead of carnelian (BKG 1350), a plano convex long barrel bead of carnelian (BKG 2231) and an irregular short spherical/globular bead of quartz (BKG 2429). As figures 206 to 210 illustrate, all beads were, interestingly, perforated with a double diamond drill. The drill surface of all specimens is characterised by parallel drilling striae and a matte surface. BKG 1158, BKG 2429 and BKG 2231 have been drilled from one side only. BKG 2231 shows additional evidence of either being drilled using two differently sized drills or possibly one worn drill. In contrast, both BKG 1350 and BKG 2226 have been drilled from two sides, but the drill alignments are not centred. With regards to the drill sections, BKG 1158 has a long cylindrical drill section whereas the remaining four beads have all straight cylindrical drill sections.

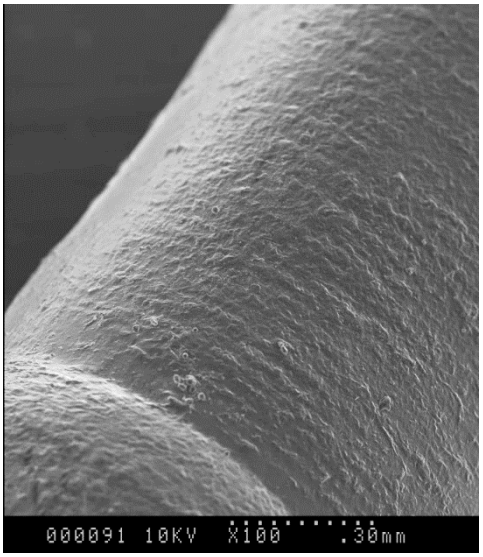
In terms of use-wear, BKG 1158 shows evidence of string wear on the interior drill hole and at one end, indicating that this unique specimen remained in use for a long time in the past. Similarly, BKG 1350 is characterised by heavy string wear on the interior hole, indicating the long use of the bead in antiquity. It is somewhat strange to note the seemingly absence of other drilling technologies during this time especially since the use of various types of drills is clearly documented in the preceding chronological periods of Barikot. The use of metal drills to perforate beads, in particular, seems to have been more favoured during the protohistoric period, which continues side-by-side with the use of diamond drills during the Early Historic period of Barikot. It appears that another potential change in the production of beads may have occurred during the course of the 4th century CE, which seems to receive support from the SEM data evidence of the following chronological periods of Barikot as well, where, for some reason(s), double diamond drills, in particular, seem to have become the most prevalent type of technology used by craftspeople to drill beads.

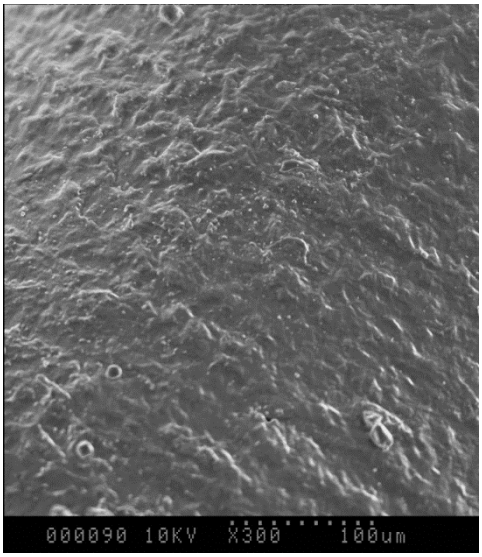

000093 10KV X20.0 1.50mm

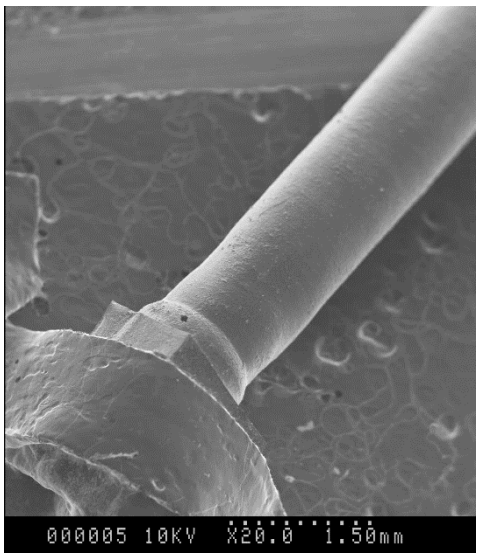

000097 10KV X20.0 1.50mm

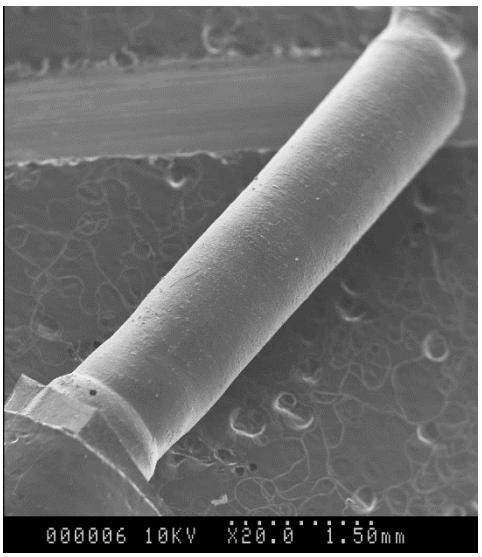

000021 10KV X20.0 1.50mm

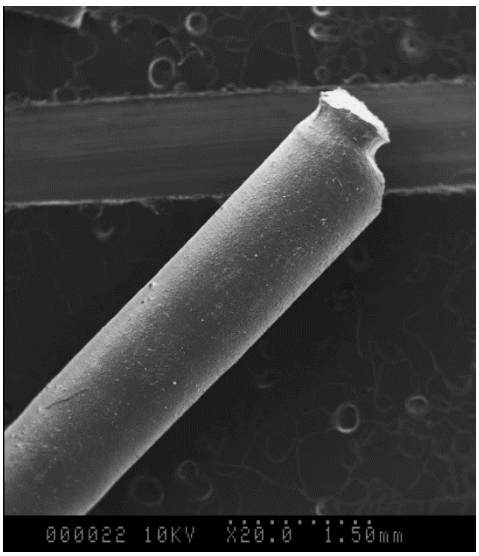

000095 10KV X100 .30mm


000091 10KV X100 .30mm


000090 10KV X300 100um


000005 10KV X20.0 1.50mm


000006 10KV X20.0 1.50mm


000022 10KV X20.0 1.50mm

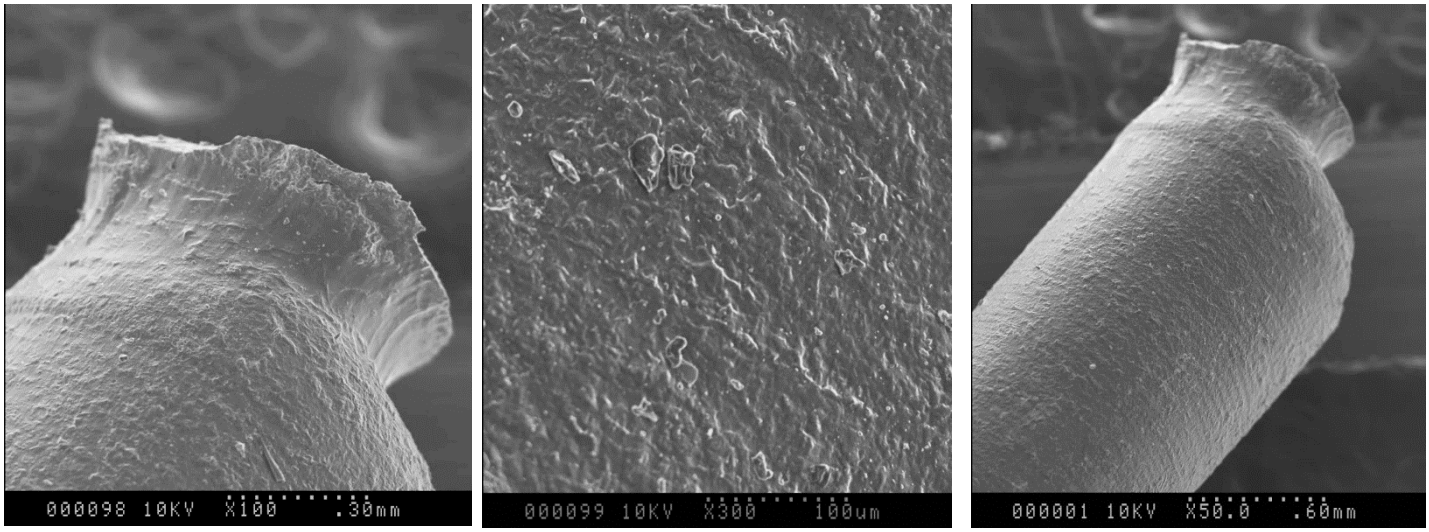


Figure 206: Drop-shaped pendant of carnelian (BKG 1158). SEM of drill hole impression, long cylindrical drilling from one side, double diamond drill, 20x, 50x, 100x and 300x

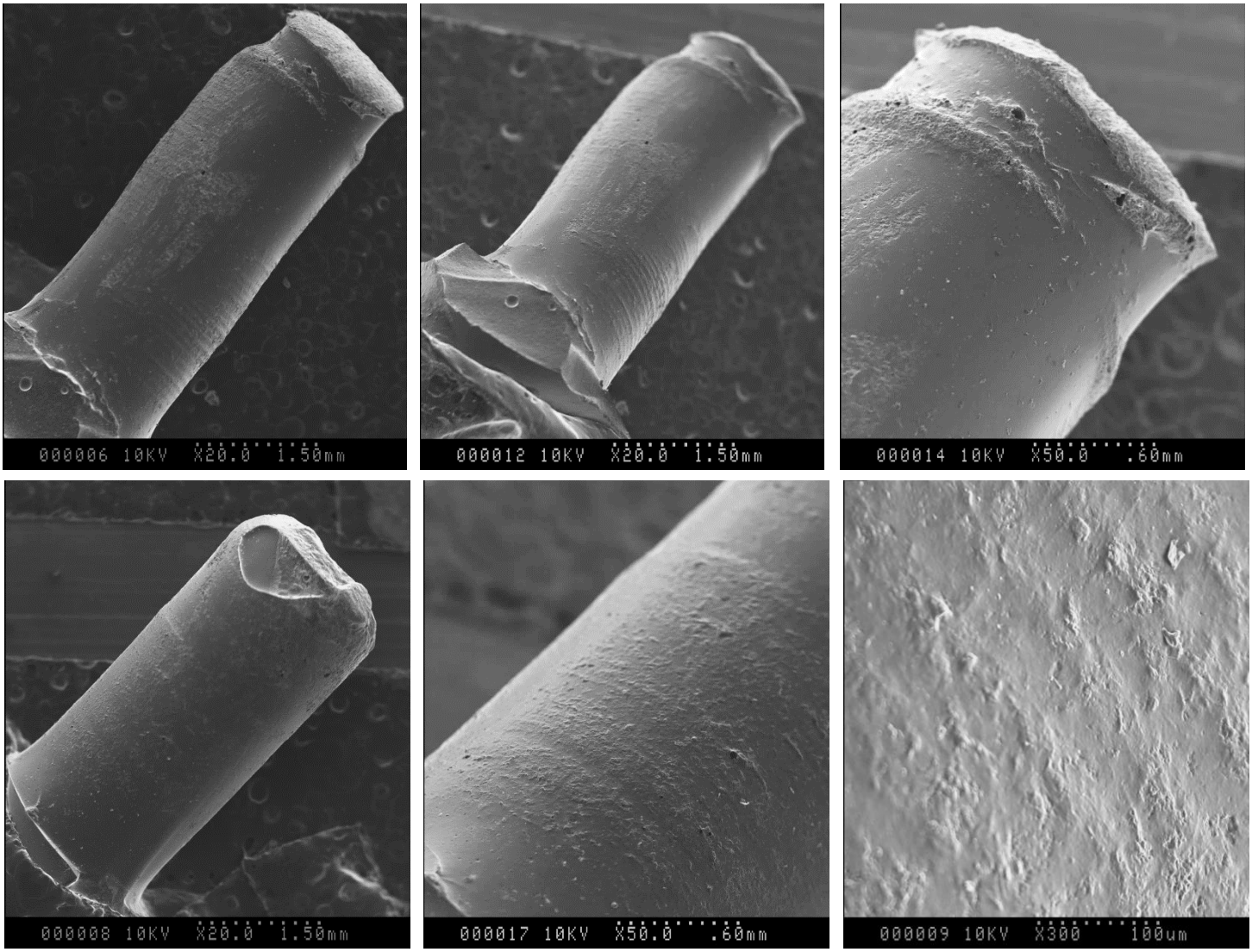


Figure 207: Short barrel bead of carnelian (BKG 1350). SEM of drill hole impression, straight cylindrical drilling from two sides, double diamond drill, 20x, 50x and 300x

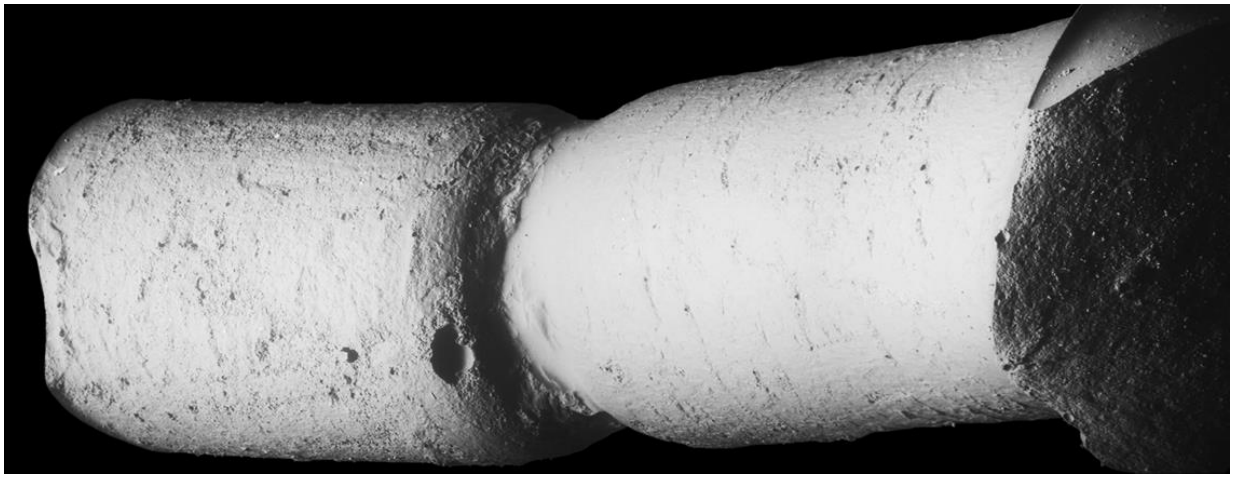


Figure 208: Irregular short spherical/Globular bead of carnelian (BKG 2226). SEM of drill hole impression, straight cylindrical drilling from two sides, double diamond drill, 100x



Figure 209: Plano convex long barrel bead of carnelian (BKG 2231). SEM of drill hole impression, straight cylindrical drilling from one side, double diamond drill, 100x



Figure 210: Irregular short spherical/Globular bead of carnelian (BKG 2429). SEM of drill hole impression, straight cylindrical drilling from one side, double diamond drill, 80x

7.1.12 Post-urban period (Macrophase 7: ca. 400 CE – 600 CE)

In total, two carnelian beads were selected for a SEM study, which include an irregular short barrel bead (BKG 2257) and a short spherical bead (BKG 2258). As figure 211 shows, BKG 2257 has been drilled with a double diamond drill. The drill surface is characterised by parallel drilling striae and a matte surface. This bead has been drilled from one side only and the drill section is typically straight cylindrical.

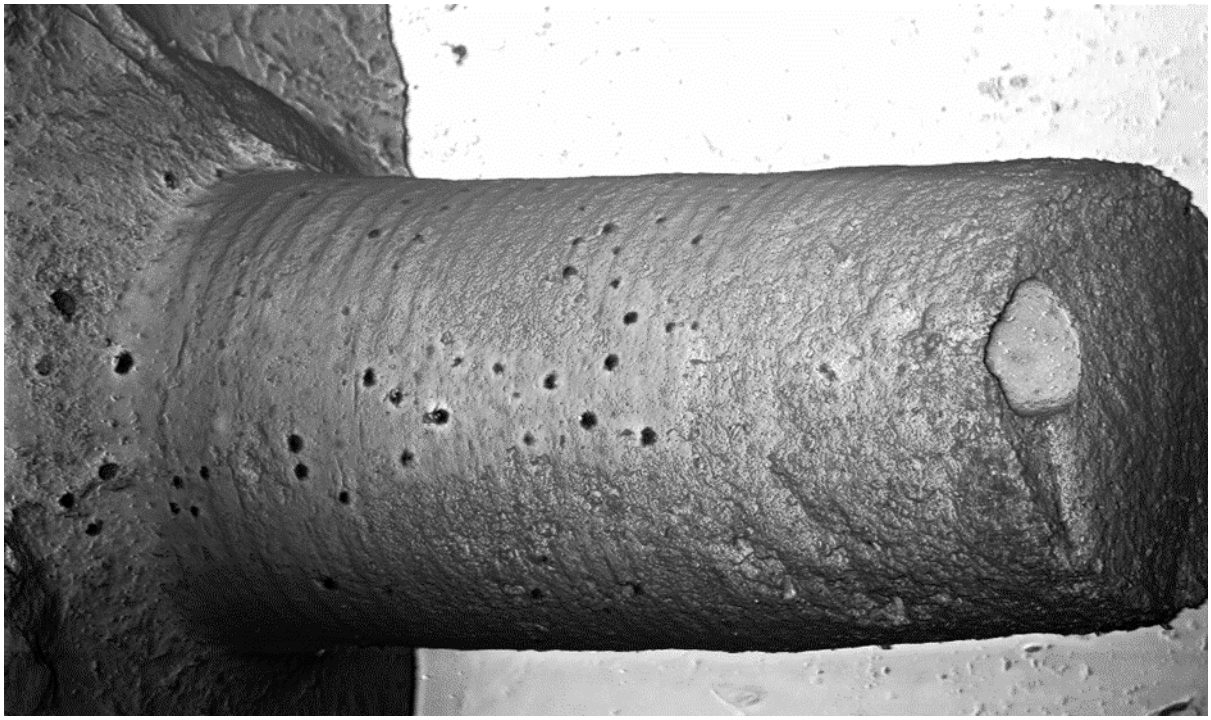


Figure 211: Short barrel bead of carnelian (BKG 2257). SEM of drill hole impression, straight cylindrical drilling from one side, double diamond drill, 100x

In contrast, BKG 2258 has been drilled with single and double diamond drills as figure 212 illustrates. The drill surface is characterised by parallel drilling striae and a matte surface. This bead has been drilled from one side only and the drill section is stepped, straight cylindrical.

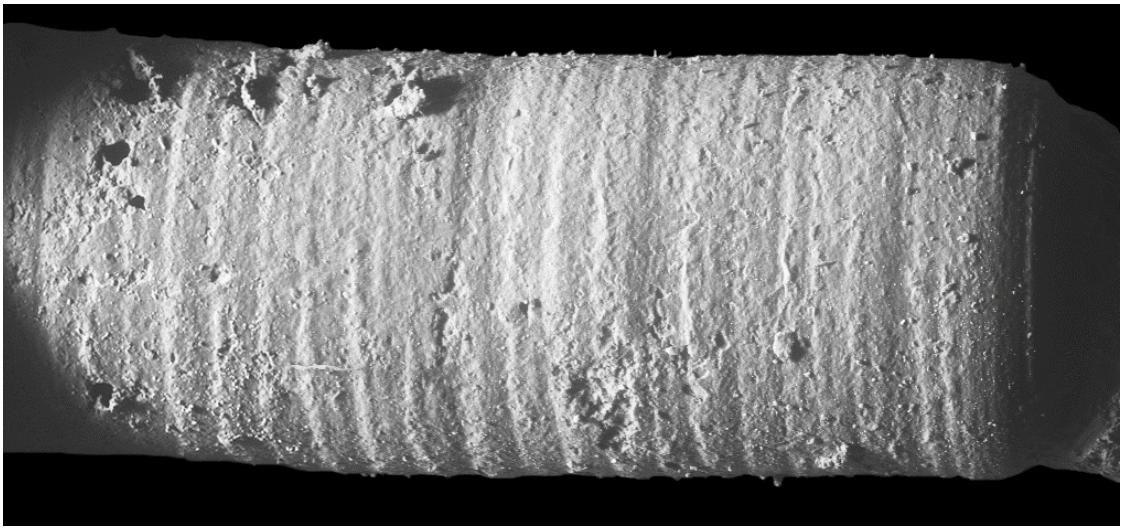


Figure 212: Short spherical bead of carnelian (BKG 2258). SEM of drill hole impression, straight cylindrical drilling from one side, single and double diamond drills, 100x

The use of double diamond drilling methods can also be seen through the examination of a rectangular circular bead made from rock crystal (BKG 2225). The profile of the drill holes is clearly visible due to the translucent nature of the material this bead is made from (Figure 213). The drilling surface is characterised by parallel drilling striae. The ornament has been drilled from two sides and the drill alignment is centred. The drill sections are, likewise, typically straight cylindrical.

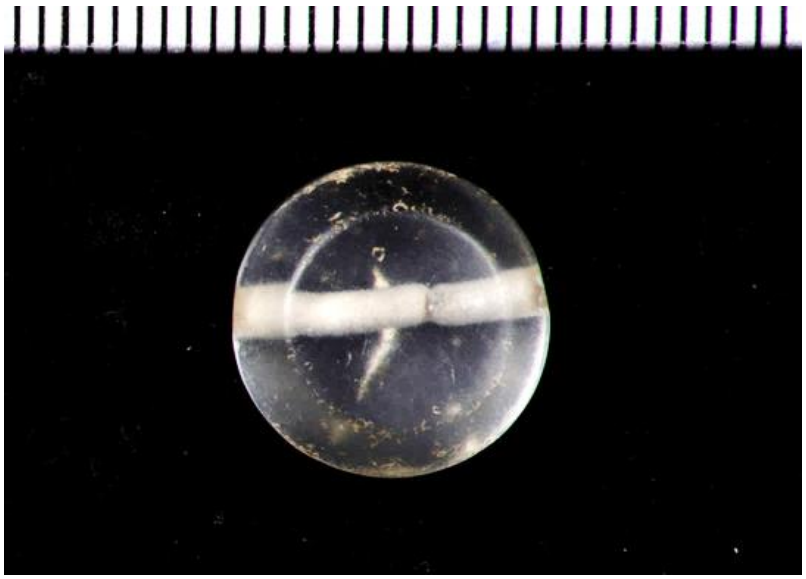


Figure 213: Rectangular circular bead of rock crystal (BKG 2225). Straight cylindrical drilling from two sides, double diamond drill (Photograph: IsMEO Italian Archaeological Mission in Pakistan)

7.1.13 Macrophase 7-8 (ca. 400 CE – 1000 CE)

In total, three stone beads were selected for a SEM study, which include a long barrel bead of lapis lazuli (BKG 1207), a short barrel bead of lapis lazuli (BKG 1498) and a long barrel bead of carnelian (BKG 4075). As figures 214-216 illustrate, BKG 1207, BKG 1498 and BKG 4075 have been drilled with a double diamond drill. The drill surface of these beads is characterised by parallel drilling striae and a matte surface. Besides, all three beads have been drilled from two sides. The drill alignment of BKG 1207 is centred while the drill alignment of BKG 4075 is not centred. The first drill section of BKG 1207 is long cylindrical whereas the second drill section is short, convex and conical. In contrast, the drill sections of BKG 1498 are both long cylindrical. Similarly, the drill sections of BKG 4075 are both straight cylindrical and twisted. In terms of string wear, BKG 1207 shows evidence of string wear on the interior drill hole, indicating that this bead remained in use for a long time in the past.

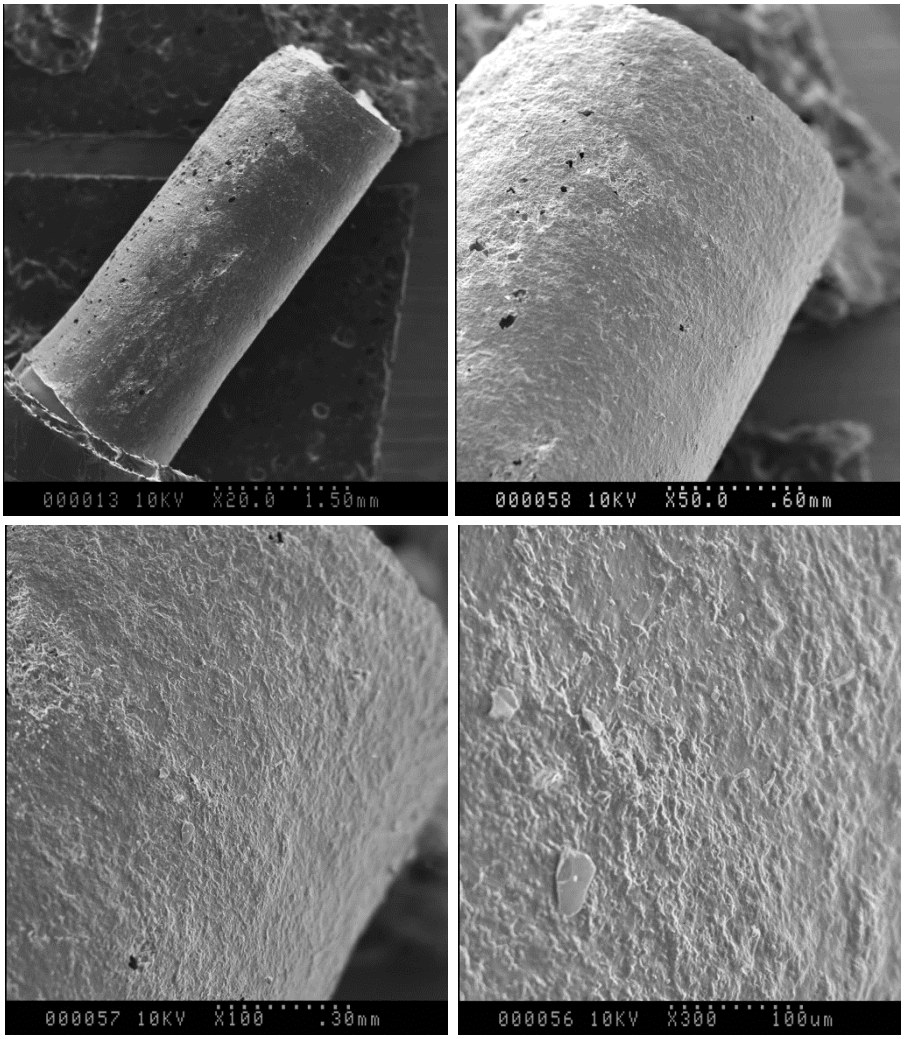


Figure 214: Long barrel bead of lapis lazuli (BKG 1207). SEM of drill hole impression. First drilling: long cylindrical. Second drilling: short convex and conical, double diamond drill, 100x

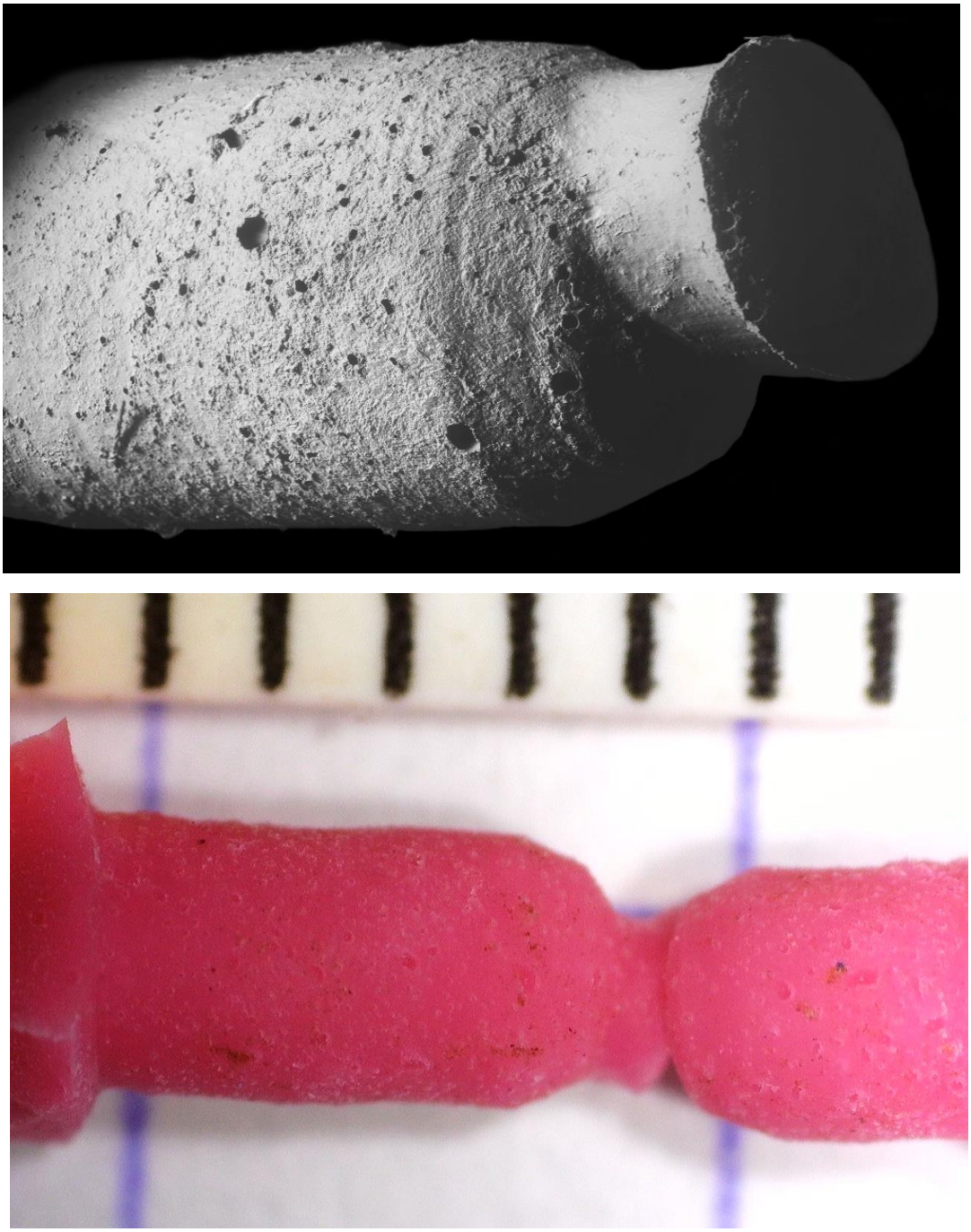


Figure 215: Short barrel bead of lapis lazuli (BKG 1498). SEM of drill hole impression, long cylindrical drilling from two sides, double diamond drill, 80x

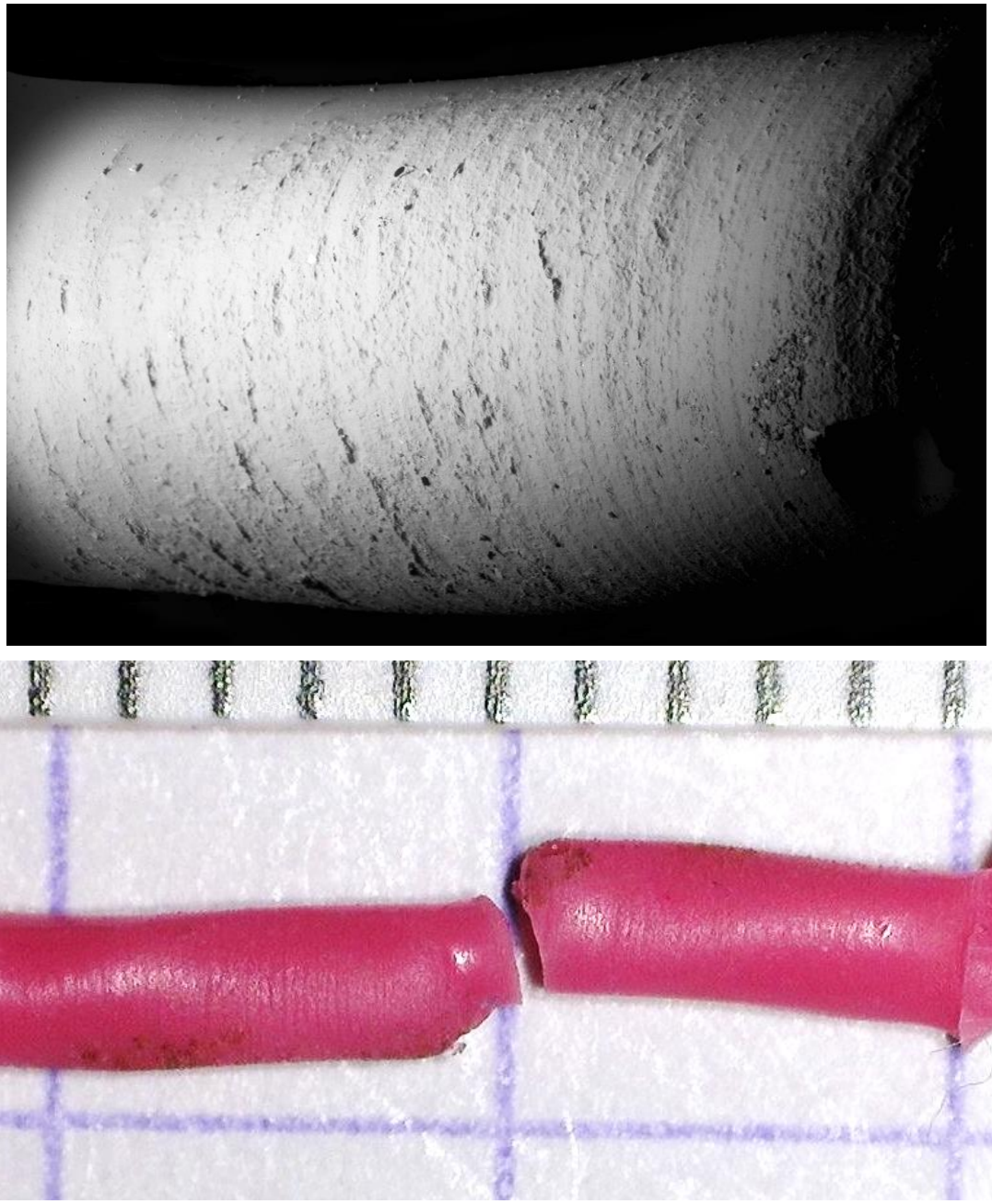


Figure 216: Long barrel bead of carnelian (BKG 4075). SEM of drill hole impression, straight cylindrical and twisted drilling from two sides, double diamond drill, 100x

7.1.14 Turki-Shahi and Hindu-Shahi period (Macrophase 8: 7th CE – 10th century CE)

In total, two stone beads were selected for a SEM study, which include an irregular short spherical/Globular bead of carnelian (BKG 2056) and an octagonal-faceted long biconical bead of lapis lazuli (BKG 2057). As figures 217 and 218 illustrate, both beads have been drilled with a double diamond drill. The drill surface is characterised by parallel drilling striae and a matte surface. BKG 2056 has been drilled from one side only and the drill section is typically straight. In contrast, BKG 2057 has been drilled from two sides and drill section is long. In addition, the exterior shape of BKG 2057 has become rounded from use-wear indicating that this bead remained in circulation for a long time in antiquity.



Figure 217: Irregular short spherical/Globular bead of carnelian (BKG 2056). SEM of drill hole impression, straight drilling from one side, double diamond drill, 90x

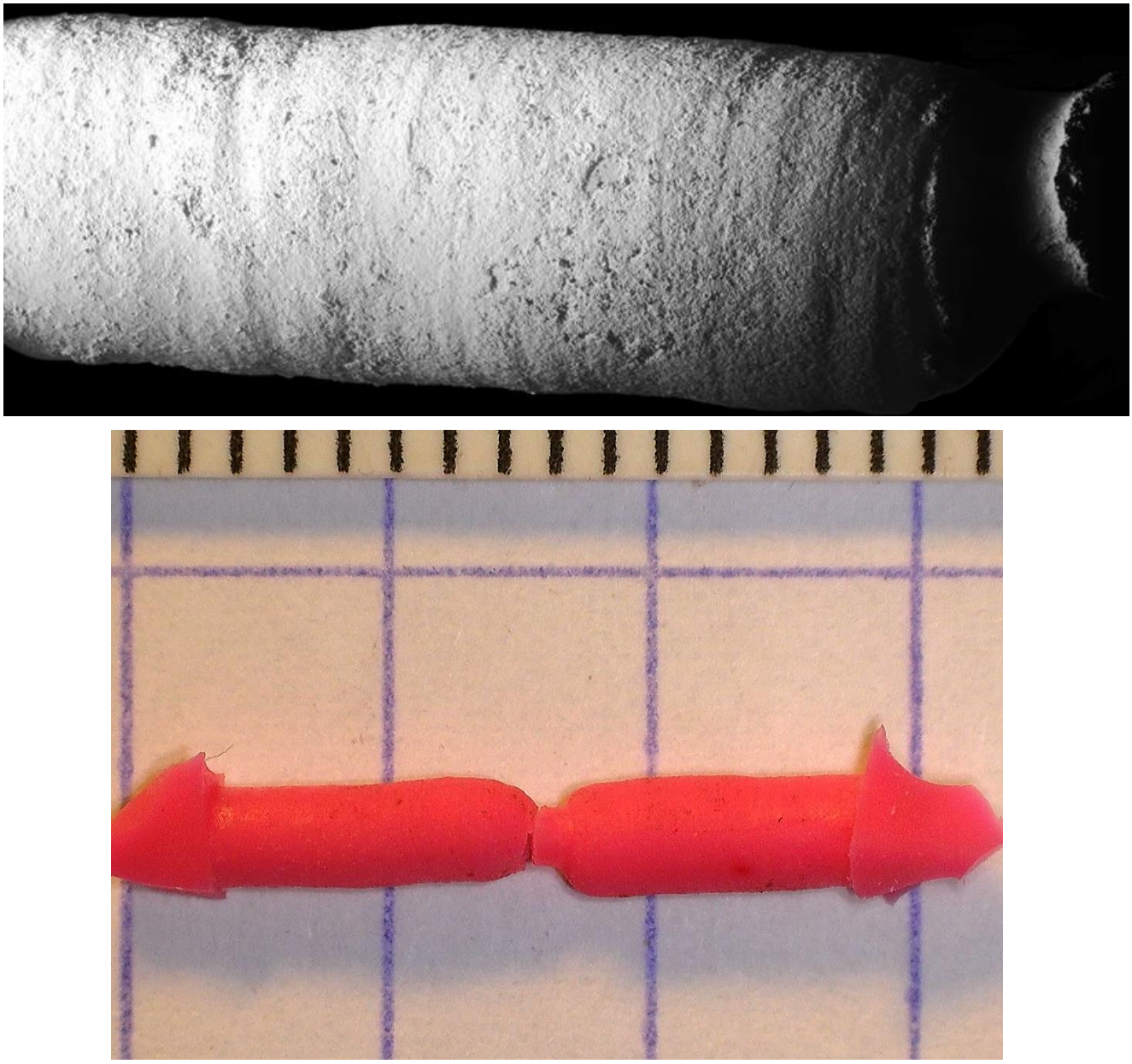


Figure 218: Octagonal-faceted long biconical bead of lapis lazuli (BKG 2057). SEM of drill hole impression, long drilling from two sides, double diamond drill, 90x

The use of double diamond drills is also documented on another carnelian bead with an irregular spherical/globular shape (BKG 4702), which was found broken in half during the excavations of the Hindu-Shahi contexts at Barikot (Figure 219). The drill surface is characterised by parallel drilling striae, which can be recognised quite clearly with the naked eye. BKG 4702 has been drilled from two directions and the drill alignment is centred. Furthermore, the drill sections are both typically straight.



Figure 219: Irregular spherical/Globular bead of carnelian (BKG 4702). Straight drilling from two sides, double diamond drill (Photograph: ISMEO Italian Archaeological Mission in Pakistan)

7.1.15 A note on the marine shell drilling technologies

Although beads of marine shell may not seem interesting compared to beads of semi-precious materials, the study of archaeological objects made from shell can, nevertheless, reveal important information about trade and craft specialisation in the past. In the Indus period, simple beads and pendants of shell were often made by chipping, grinding and drilling, but saws were, occasionally, also used in the preliminary shaping process. Perforation was done by drilling with a stone, copper or bronze drill (Kenoyer 1984b: 55; 2005: 161). Numerous beads of marine shell were recovered from the excavations at Barikot. Although the species is difficult to determine, they appear to have been made from a large gastropod, probably *Turbinella pyrum* also known as the chank or conch shell. The *Turbinella pyrum* is very thick, sturdy and has a smooth exterior surface while the central columella is solid, spiralling and, therefore, suitable for the manufacture of various types of objects. This species has a hardness rate that is between 5 and 6 on the Mohs scale (Bhan 2018; Bhan and Kenoyer 1984).

Turbinella pyrum is, geographically, limited to the western and southern coasts of the Indo-Pakistani subcontinent (Bhan 2018; Bhan and Kenoyer 1984; Kenoyer 2008). Thus far, no associated manufacturing debitage has been found at Barikot that would indicate the on-site production of shell beads. Due to the soft nature of shell, the SEM study has, unfortunately, not enabled us to identify the drilling technologies used to perforate the shell beads from Barikot, although it has allowed us to make some notes about the technological features of the drilling process. In this regard, two selected examples of beads that stand out typologically in the shell assemblage are discussed below but a comprehensive account on the shell drilling traditions, as carried out for the stone beads above, is not presented here owing to the limited nature of the results. It is hoped that this brief discussion on the shell beads will

stimulate new research and the development of new analytical techniques in the future that will allow us to better understand the production process and role that shell beads played in the lives of the ancient communities of South Asia.

To begin with, a lenticular barrel spacer bead of marine shell (two holes) was found from Barikot (BKG 3845: Figure 67), which derives from the Achaemenid period (Macrophase 2a2: 5th – mid-4th century BCE). For the analysis, a silicone cast was taken from the upper perforation of the bead only (Figure 220). The drill surface appears to be characterised by parallel drilling striae, polish and wear. It has been drilled from two sides, but the drill alignment is clearly not centred. In addition, both drill sections are curved, straight cylindrical. Considering these technological features, the impression that we get is that BKG 3845 may have been possibly drilled with some type of a metal drill, although this assumption is currently difficult to verify. Note the preserved shape outline at the leading edge of the drill tip of the first drill, which may provide an important hint about the identification of the precise type of drill used to perforate BKG 3845.

Also, note the long fine horizontal lines cutting parallel to the direction of drilling of the second drill potentially caused by sand particles entering the drill hole and being abraded into the drill surface through the movements of a metal wire or string that was holding the bead. Evidence of polish and wear is, anyhow, attested on the drill surface. This interpretation has also been proposed by G. Ludvik in his study on the stone beads from the Levant (Ludvik 2018: 457-460), but it is currently difficult to verify if similar conditions would leave to a similar result for a bead made from marine shell.

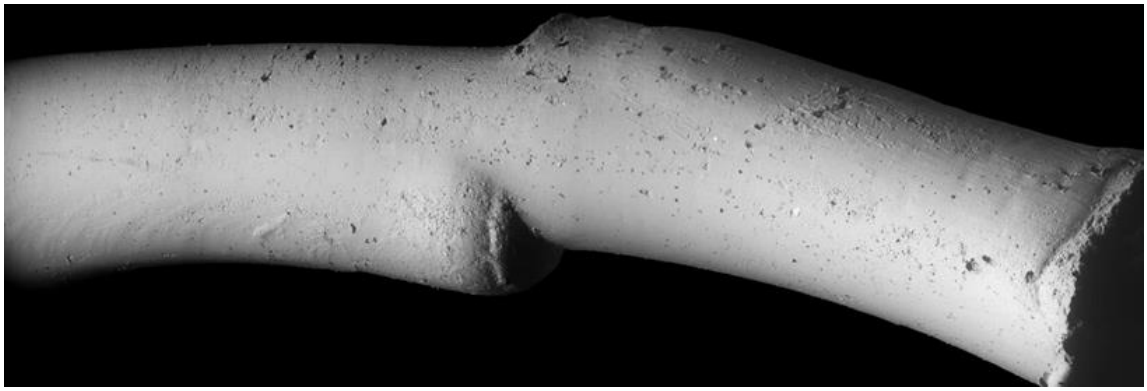


Figure 220: Lenticular barrel two hole spacer bead of marine shell (BKG 3845). SEM of drill hole impression, curved straight cylindrical drilling from two sides, metal drill?, 100x

Likewise, a long barrel collared bead of marine shell was recovered from the excavations at Barikot (BKG 3436), deriving from the Saka-Parthian period (Macrophase 3b: 1st BCE – 1st century CE). The drill surface is characterised by parallel drilling striae and polish. BKG 3436 has been drilled from two sides and the drill alignment is centred. In addition, both drill sections are long, tapered cylindrical. As

in the case of BKG 3845, it is possible that BKG 3436 may have been drilled with a metal drill, which cannot be confirmed based on the amount of data that we have (Figure 221).

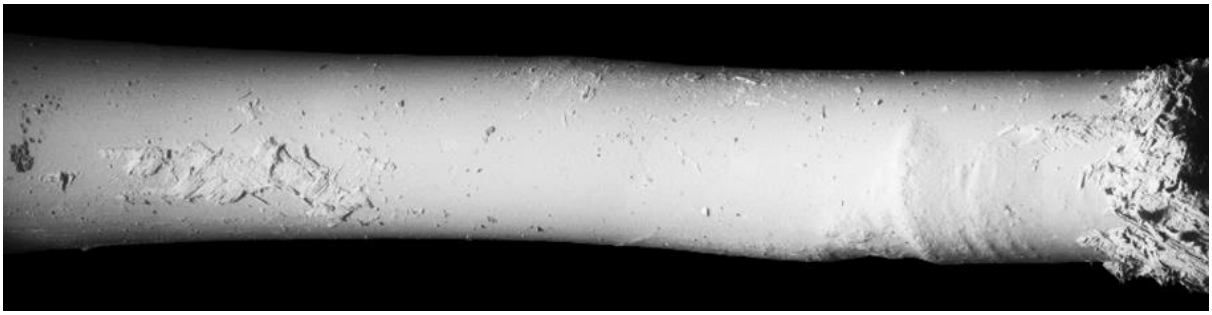


Figure 221: Long barrel collared bead of marine shell (BKG 3436). SEM of drill hole impression, long tapered cylindrical drilling from two sides, metal drill?, 100x

7.1.16 Summary

In summary, due to the small sample size, it is currently not possible to detect detailed local or regional patterns relating to the manufacturing technologies adopted to drill the beads from Barikot within each time period. Because the sample size is currently too small, it has not been possible to identify and differentiate between different workshop traditions. It is also important to note that we are probably observing technological trends of other places (with the possible exception of lapis lazuli and quartz/rock crystal) since there is no conclusive evidence that the examined beads were manufactured at Barikot. It is, however, possible to identify the drilling technologies and put forward some general inferences about how their use develops through time at the site. As such, the present SEM study has identified various types of drills and drilling practices that were used to perforate the stone beads from Barikot. At least four different types of drills have been identified, which include metal drills with coarse abrasive, metal drills with fine abrasive, single and double diamond drills. The current study has, in the process, determined the longevity of metal and diamond drilling technologies at the site. Several examples can be cited from Barikot with evidence of not only continuity but also major transformations occurring in the drilling technologies and practises across chronological sequence of the site.

In addition to the use of metal drills with abrasives, examples of continuity include, for instance, the practice of drilling from one end and popping out the stone at the other end - a technique that can also be found in the Indus Tradition (Kenoyer and Frenez 2018a: 71). At the same time, the chronological sequence under study is characterised by evidence of major transformations, most notably, through the appearance of stone beads drilled by diamond drills – first documented in the Achaemenid period. Since there is currently no data available from the pre-Achaemenid period (Macrophase 2a1), it is not possible to say whether diamond drills were used to perforate the stone beads of Barikot before the Achaemenid

period. The study of more beads from future excavations at Barikot will provide not only the answers to this important question but will also have wider implications for the little documented trade and use of diamonds across South-and-West Asia including the role of diamond-drilled seals reported from the Sasanian world (Gorelick and Gwinnett 1988; 1996). Another example of change is reflected by the fact that the drill hole alignment is not centred in many beads from Barikot. In contrast, the beads of the Indus period that were usually drilled from two sides have their drill holes meet precisely in the centre of the objects (Kenoyer and Frenez 2018b: 404).

It is also interesting to note the absence of other drilling technologies at Barikot that we know were used to drill stone beads during the periods under study. These include, for example, the apparent absence of pecking with a hard stone percussor that can be made from a chert or jasper blade or flake. Pecking was mostly used to perforate short biconical and barrel beads from the Palaeolithic periods across the later chronological periods of South Asia (Kenoyer 2017c: 134; Rienjang et al. 2017; Uesugi and Rienjang 2018). Similarly, stone beads perforated exclusively with single diamond drills also appear to be absent at Barikot, although several specimens were found drilled first with a larger single diamond drill (as a starter drill only) and afterwards a narrower double diamond drill to complete the drilling process (Figure 222).

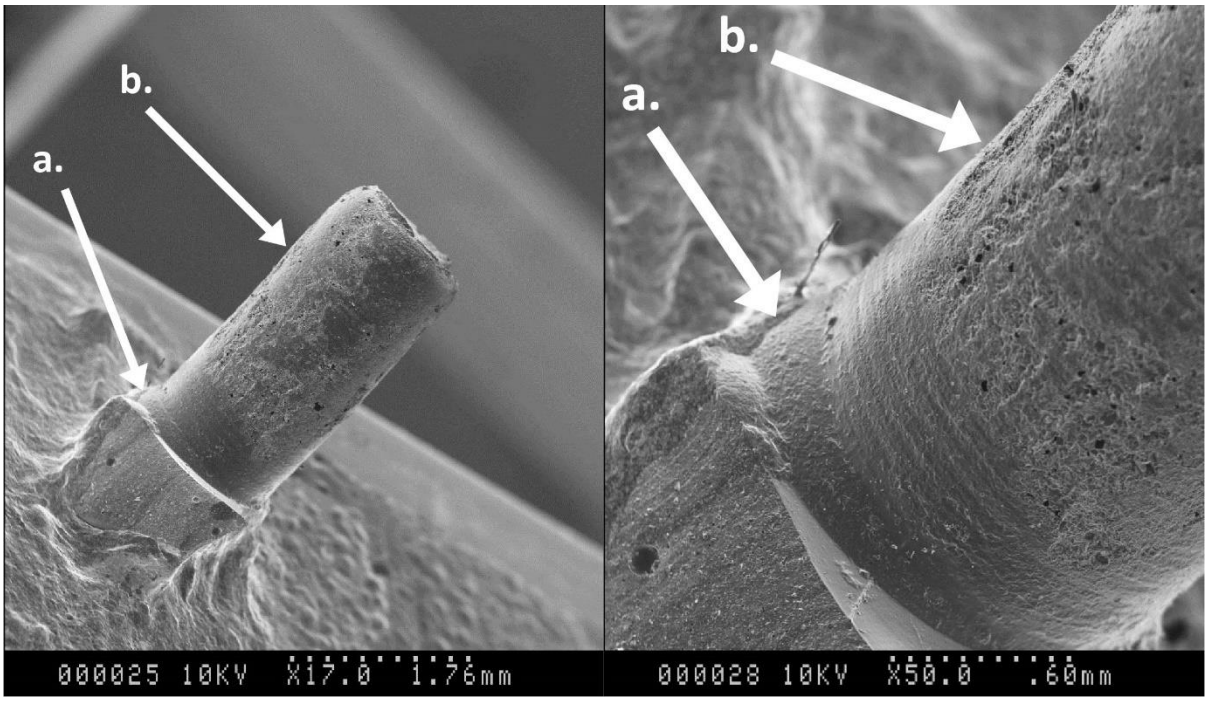


Figure 222: SEM of drill hole (BKG 2657); a) wider single diamond drill was used to start hole; b) narrower double diamond drill was used to complete drilling

Furthermore, many of the discussed beads from Barikot were probably passed down as heirlooms before they eventually entered the archaeological record. This is exhibited in the SEM images in the form of polished and smooth areas on the interior drill hole of the beads, which is indicative of use- wear (Figure 223). Additional evidence of use-wear can also be found on the exterior surface of some of the studied beads. Therefore, numerous stone beads from Barikot must have remained in the possession and use of their owners for a long time before being lost, shedding light onto the level of value attached to these ornaments in the past. It is also important to note that the drill holes that do not meet precisely at the centre of a concerned bead leave a sharp jagged edge inside the drill hole, which would have eventually cut the string used to wear the ornament (Kenoyer and Frenez 2018b: 404). This is how some of the beads from Barikot must have entered the archaeological record.

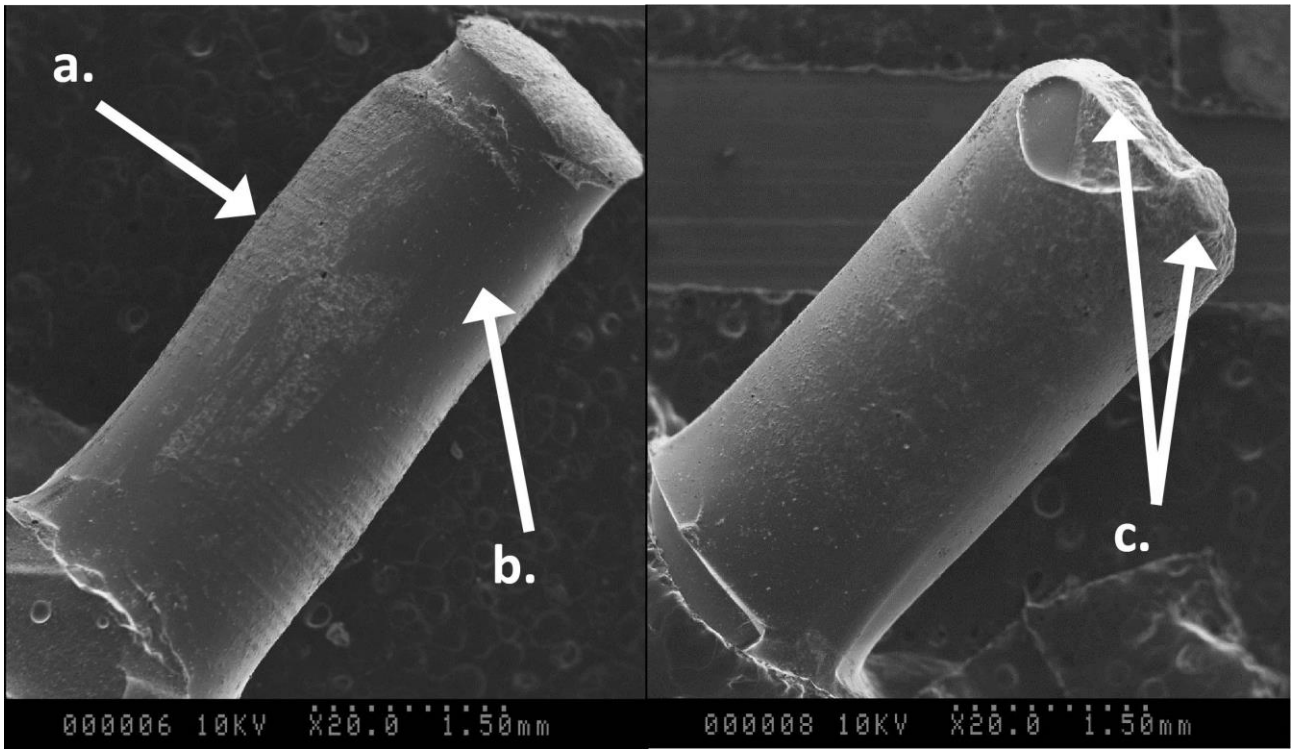


Figure 223: SEM of drill hole of BKG 1350 (Side A and B); a) regular striae from diamond drilling but worn by string wear; b) smooth polished surface from string wear; c) two rounded diamond chips at the edges of the drill tip

In addition, although chemical or compositional analysis was not carried out, preliminary visual investigations indicate that several different carnelian source areas must have been accessed to manufacture the stone beads from Barikot. This assessment is also supported by the uniformity in shape and the drilling features of several beads, which is indicative of the existence of specialised workshops. Further in-depth studies are required to define distinctive local workshop traditions and determine local use patterns by examining variables such as the actual diameter of the drills being used, the maximum

and minimum diameters of the holes being drilled, the taper of the drilling itself, and the distanced drilled from each side of the bead (Kenoyer and Frenez 2018b: 401). Accurate and reliable measurements can be taken with the support of a Dinolite™ digital microscope in the future. It is important, for example, to define the precise sizes of the copper drills and the types of abrasive used to drill the beads from Barikot and differentiate them from the abrasives used in other regions. To distinguish the abrasives, future studies could measure the overall taper of the drill hole, which indirectly measures the amount of abrasion caused to the bead and to the copper drill in the process of drilling (Kenoyer and Frenez 2018b: 404).

Although the sample size from each individual period is currently small, the results of the SEM analysis allow us to identify some general patterns on the distribution and development of drilling technologies across the chronological sequence of Barikot. The current study, hence, suggests that there were potentially two distinct phases marked by major transformations in the drilling traditions between ca. 1300 BCE and at least 1000 CE. Interestingly, the proposed time for these apparent changes, as outlined above, coincides roughly with the chronological periodisation that has been proposed for this thesis by the author in Chapter 2. This chronological periodisation refers to the timing of the onset of the Early Historic and Late Historic periods at Barikot (based on the typological development of the Barikot beads). In this regard, the SEM data seems to indicate the prevalent use of metal drills and abrasives during the protohistoric period of Swat (13th BCE – 7th century BCE). Although it is currently not possible to determine the precise provenance, there are many metal resource areas such as in Baluchistan, Afghanistan, Eastern Iran, Rajasthan and possibly in the Himalayas and related highland areas in northern Pakistan and India (Law 2008; Kenoyer and Miller 1999) that could have been accessed by various communities to make metal drills with abrasives for the perforation of stone beads in the past.

During the Early Historic period of Barikot (6th BCE – 4th century CE), the first major transformation in the use of drilling technologies occurred, characterised by the potential diffusion of stone beads perforated with single and double diamond drills probably imported as finished objects from various areas including Taxila, which came to be used side-by-side with the pre-existing technologies in the form of the metal drills and abrasives. During the Late Historic period of Barikot (ca. 4th – 5th century CE onwards), a second potential transformation occurred characterised by a marked rise in the use of double diamond drills, which may be related to interactions occurring between Barikot and probably Gujarat including the regions of peninsular India, which appear to have expanded like never before in the history of the site. A stronger and more energetic inter-regional connection between Late Historic Barikot and, in particular, peninsular India is, anyhow, indicated by the documented typological data of the beads as discussed in Chapter 6, which indicates a time of economic growth, cultural complexity and increased cross-cultural trade.

In order to confirm this preliminary assessment, it is important to expand the current dataset and examine more stone beads from Barikot in the future. In addition, it would be necessary to determine the drilling technology used to perforate the beads deriving from Macrophase 9 and 10 of Barikot, which would provide a vital set of missing data to understand the types of drills used in the course of the second millennium CE. Future SEM studies on a larger set of materials may, eventually, lead to the development of coherent interpretive models that could explain the precise role of the various drilling technologies that were used to perforate the beads from Barikot and, by extension, other sites in the past of South Asia.

7.2 Geo-political configurations, trade, and exchange

As outlined in Chapter 1, this thesis also seeks to investigate whether the examined beads arrived at Barikot against/with trade flows or political shifts. This study has the potential to allow us, therefore, to interrogate and review the dynamics and directionality of trade contacts during various points in time in the history of occupation of Barikot. As such, a range of different sources have been utilised to create key maps, which show the provenance and distribution of the assumed bead raw materials, the prevailing trade routes, and the approximate geographical position or orientation of the regional political powers of the time. These sources are based on the available amount of information published by J. Neelis (Neelis 2011; 2001), R. Law (Law 2008), U. Singh (Singh 2008), H. C. Verma (Verma 1978), C. Petrie (Petrie 2020a), N. Lahiri (Lahiri 1992), W. K. Rienjang (2017), K. Behrendt (Behrendt 2007; 2020), M. Inaba (Inaba 2013) as well as the Huntington Archive of Buddhist and Asian art, which has made the use of historical maps for scholarly research accessible. Although insufficient information is currently available to discuss the evidence for every time period of Barikot, the identification and the knowledge about the provenance of several bead raw materials indicates that various types of beads arrived at Barikot both against/with trade flows or political shifts.

In broad terms, trade can be understood as a form of exchange involving the movement of commodities with fluctuating values conditioned by a wide range of economic, environmental, geographical, social, cultural, and religious factors (Neelis 2011: 183). During the Early Historic Period of Barikot, the most important trade route would have been the *Uttarāpatha* or the 'Northern Route', covering a large territory stretching from the Gangetic region in northern India to Mathura, Taxila, and Bactria in northern Afghanistan and western Central Asia (Lahiri 1992: 400-401; Neelis 2011: 186, 232). Connections between the Ganga-Yamuna doāb in northern India and the Deccan plateau in central and southern India were established by following the *Dakṣiṇāpatha* or the 'Southern Route' (Neelis 2011: 184). The discovery and distribution of various types of archaeological materials clearly indicates the existence and maintenance of these major routes for transregional interactions in the subcontinent (Lahiri 1992: 370; Neelis 2011: 197).

The beads that have been recovered from the excavations at Barikot especially those that derive from the currently limited exposed stratigraphic layers associated with the Achaemenid, Mauryan and Hellenistic contact phases, probably do not represent the full range of raw materials acquired at the time in the past. They do, however, provide us with some information about the potential procurement locations and the role played by the dominant trade flows at the time and how shifts in political terms may have impacted on the acquisition of certain bead raw materials, shapes and production technologies. It should be stressed at this point, however, that the territorial boundary lines and duration of the various ruling states shown in the maps below, are based on very approximate controls as more research is required to determine the highly fluctuating and dynamic geo-political landscape of the historical sequence of the subcontinent. Likewise, the precise number and direction of routes plotted on the maps is not exhaustive, showing the most relevant routes in relation to the location of the identified raw material sources. Furthermore, although the use of terracotta and glass is documented from the cultural periods under discussion below (Achaemenid, Mauryan, Indo-Greek, Kushana, Hindu-Shahi and Ghaznavid periods), their precise provenance sources remain uncertain, which is why they have not been indicated on the maps below (Figures 224-229).

7.2.1 Achaemenid period

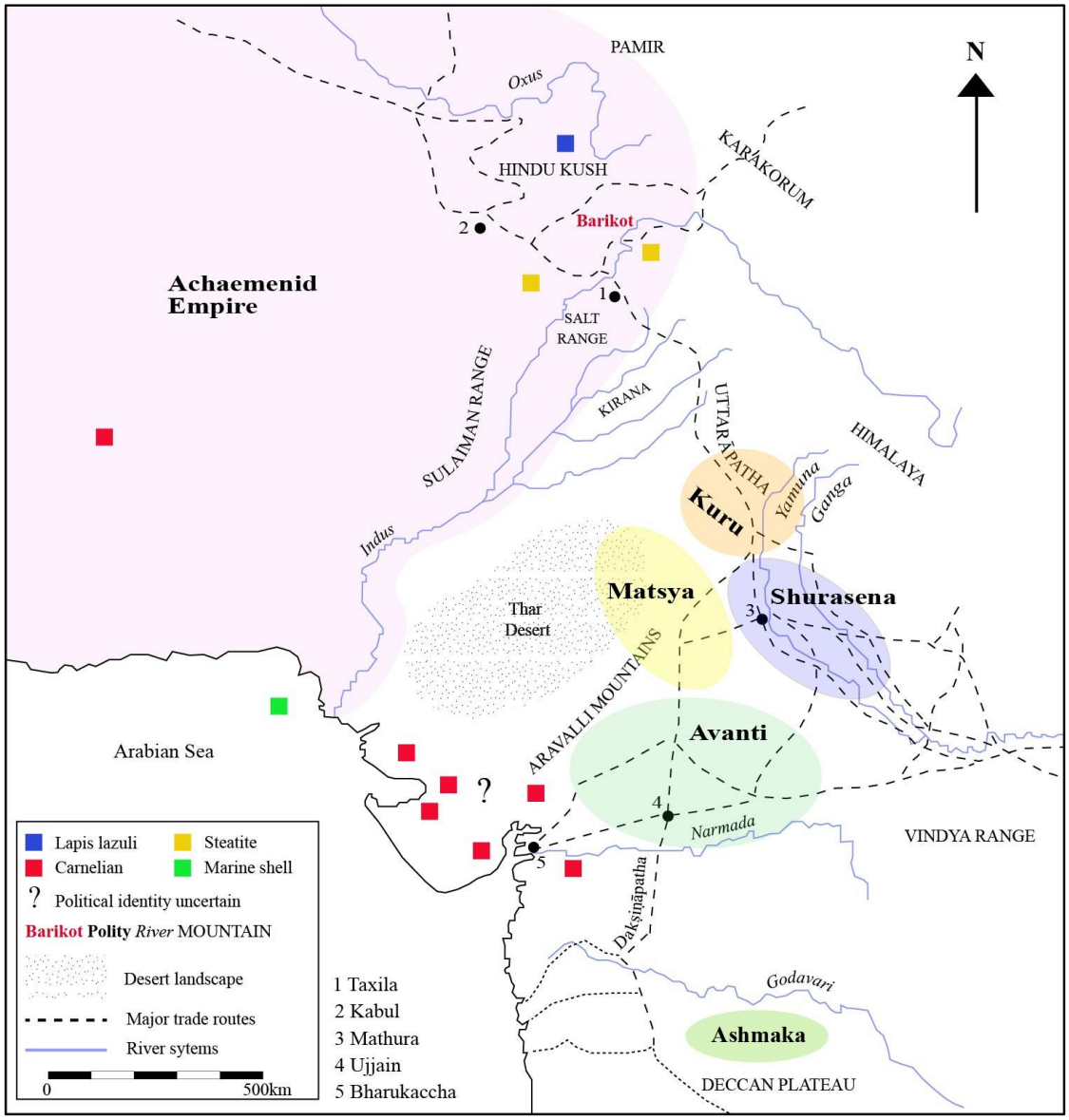


Figure 224: Geo-political configuration of the region around the 5th century BCE

Figure 224 shows the geo-political configuration of the region together with the known sources of the raw materials in around the 5th century BCE. Achaemenid control extended over the region of Gandhara while a range of local polities ruled the northern and southern areas of the subcontinent during this time. As such, resource areas of carnelian, lapis lazuli, steatite and marine shell, most notably, would have been accessible to the people living under Achaemenid rule and could have arrived at Barikot along the *Uttarāpatha*. Although carnelian could have been acquired by the Achaemenids from a range of sources under their control especially along the Helmand River delta in the Sistān region to the south-west (Figure 224), the most important deposits were located in the south-east in areas like Kutch, Saurashtra or Ratanpur (Gujarat region) south of the Thar Desert as shown in figure 224, which had a long history

of exploitation in the earlier Indus Tradition (Law 2008). To be able to try to pinpoint the precise source of the carnelian from Barikot, it would be necessary to re-familiar ourselves with the technological features of the examined carnelian again. BKG 3887, for example, is a triangular long barrel bead, which has been drilled with a double diamond drill.

The production technology of BKG 3887, therefore, represents a typical marker of South Asian production centres while the identified bead shape is well-documented from a range of archaeological sites in the north and north-western parts of the subcontinent (see Chapter 6). As such, BKG 3887 probably arrived at Barikot through a complex series of interactions probably from the south-east along the *Dakṣiṇāpatha*, the *Uttarāpatha* and some other minor channels feeding into them, which are difficult to discern at present. The political or social identity of the ruling power, who was in control over the various carnelian deposits in Gujarat at the time, is unclear but the material possibly passed through a series of critical nodes of long-distance trade and craft production specialism along the journey including Ujjain, Mathura and Taxila before it eventually arrived as a finished item at Barikot.

7.2.2 Mauryan period

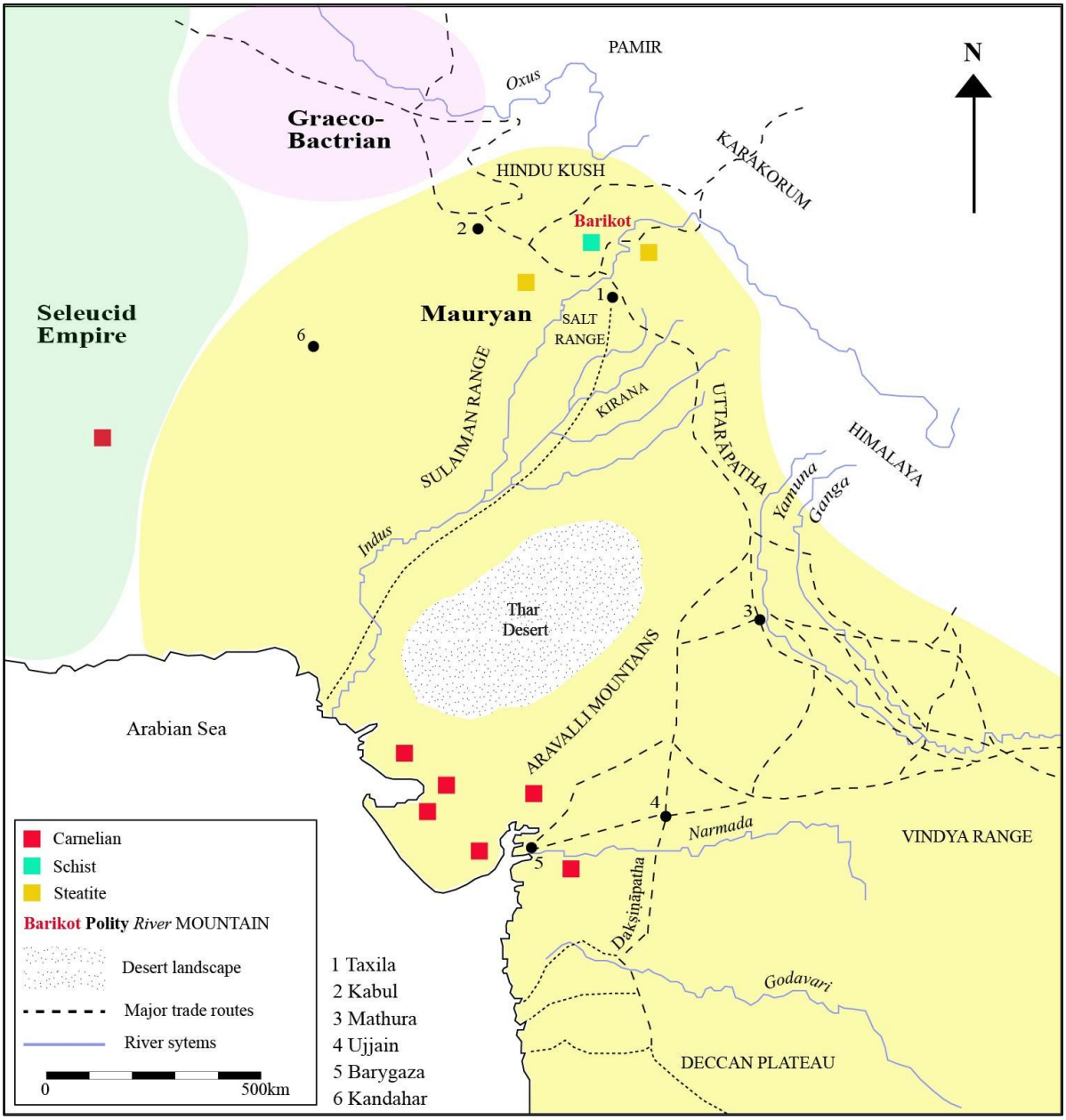


Figure 225: Geo-political configuration of the region around the 3rd century BCE

Figure 225 shows the geo-political configuration of the region together with the known sources of the raw materials in around the 3rd century BCE. The Mauryan dynasty emerged as an important player in the cultural landscape, ruling not only over the region of Gandhara but nearly the entire subcontinent at this time. Geological source areas of carnelian, steatite and schist were located well within the territorial boundaries of the Mauryan state and, as a result, would have been accessible to the people living under Mauryan rule. Carnelian was probably imported to Barikot from the region of Gujarat along the pre-

existing networks of movement including the *Dakṣiṇāpatha* and *Uttarāpatha*. Although the examined carnelian beads were not perforated with the typical South Asian diamond drilling technologies, they probably did not originate from source areas lying well beyond Mauryan control such as the Sistān region to the south-west. Moreover, the apparent absence of lapis lazuli at Barikot may indicate the lack of territorial control over lapis lazuli resource areas by the Mauryans possibly lying within a peripheral zone context.

7.2.3 Indo-Greek period

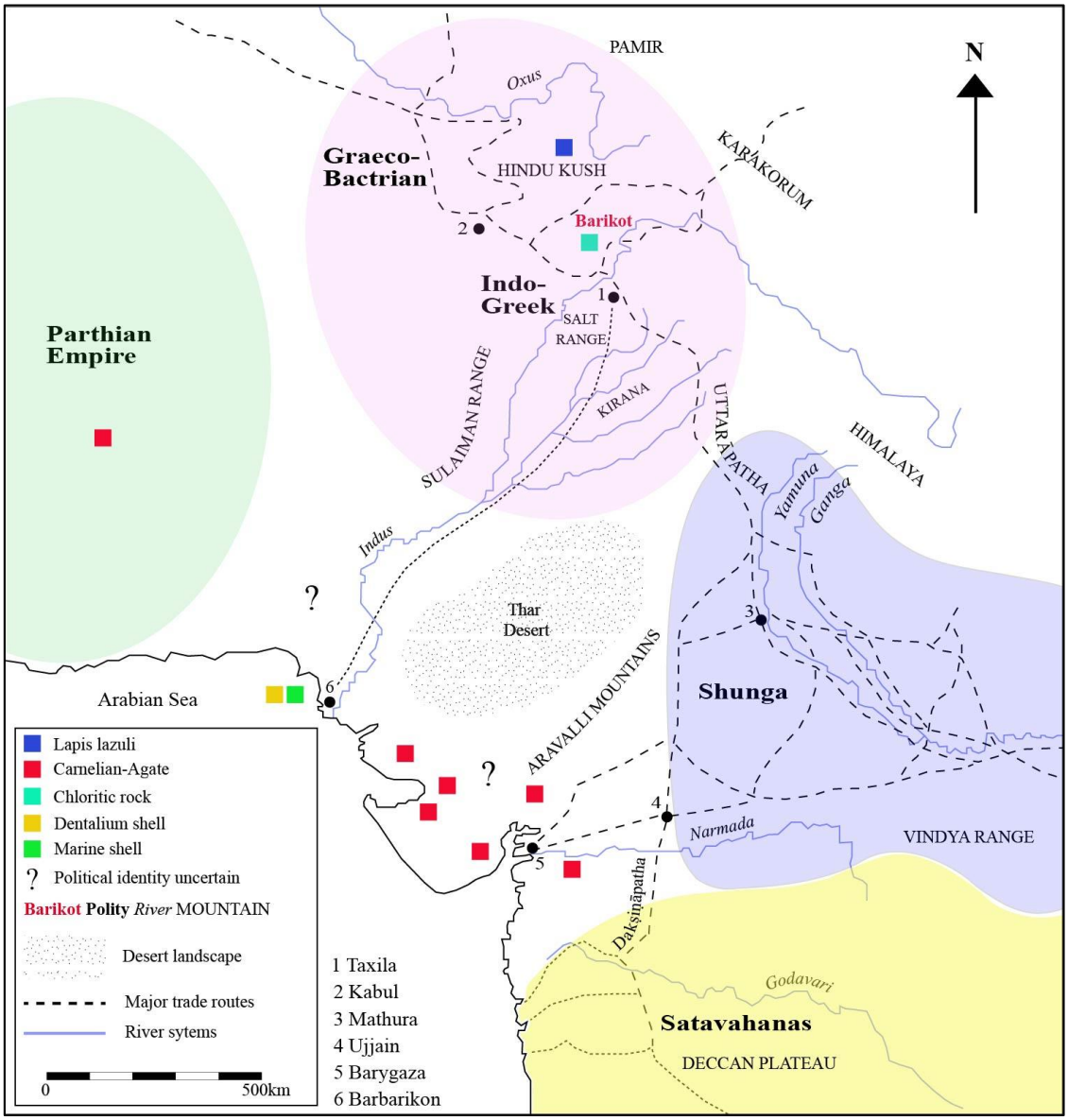


Figure 226: Geo-political configuration of the region around the 2nd century BCE

Figure 226 shows the geo-political configuration of the region together with the known sources of the raw materials in around the 2nd century BCE. The Indo-Greek dynasty ruled over parts of Gandhara and the Punjab during this time. Several raw material resource areas, most notably, of carnelian, lapis lazuli, marine and dentalium shells were located outside the territorial boundaries of the Indo-Greek dynasty and, therefore, must have been imported through long-distance interactions and the dominant trade flows of the time in the form of the *Dakṣiṇāpatha*, the *Uttarāpatha* and some other minor channels feeding into them. As such, carnelian and agate were probably acquired from the region of Gujarat, which is also indicated by the use of diamond drilling technologies, which were used to perforate the carnelian and agate beads of this time.

Access to the deposits in Gujarat is also suggested by the discovery of marine and dentalium shells coming from the Arabian Sea lying immediately to the south and south-west of the carnelian-agate resource areas. The recovery of shell material shows that the people of Barikot had access to the resources of this part of the subcontinent and, as such, it is unlikely that the recovered carnelian and agate from Barikot derived from the Parthian administered Sistān region. Evidence of regional long-distance interactions is also indicated by another route of travel linking the Indus River Delta, which flows into the Arabian Sea, to the Taxila Valley. Various types of shell material were probably transported along this route to Barikot via Taxila.

7.2.4 Kushana period

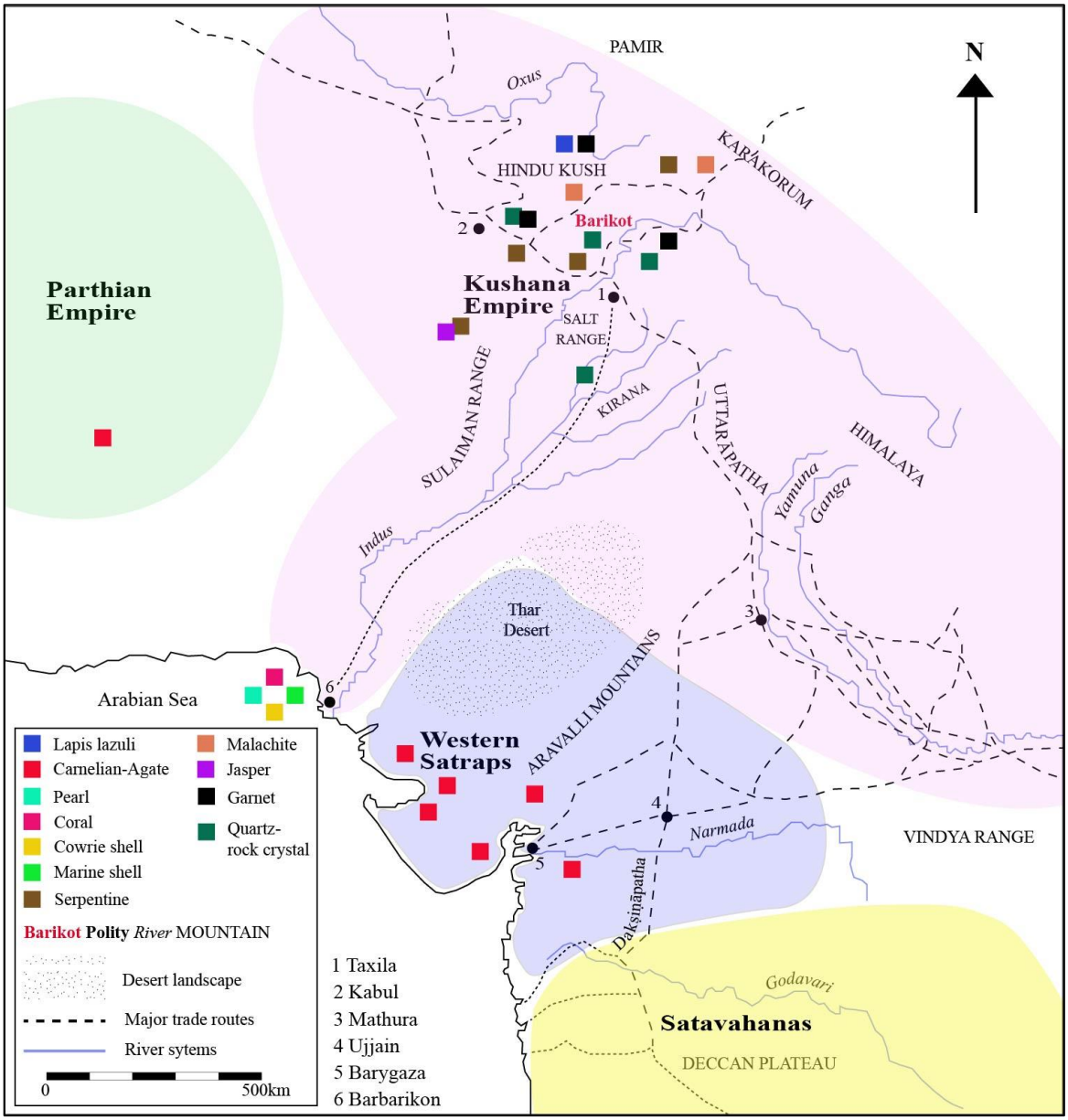


Figure 227: Geo-political configuration of the region between the 2nd CE – mid-3rd century CE

Figure 227 shows the geo-political configuration of the region together with the known sources of the raw materials between around the 2nd CE and mid-3rd century CE. The Kushana dynasty was able to extend their rule across the northern part of the subcontinent, establishing control over the *Uttarāpatha*. A great range of raw material resource areas were accessed from within Gandhara, most notably, of garnet, serpentine, quartz-rock crystal, and malachite, which are closely clustered around the *Uttarāpatha*. Lapis lazuli appears to increase in this period as well, which makes sense given the fact that the concerned sources fell under the control of the Kushanas. Materials such as pearls, corals, cowrie, and marine shells were probably imported to Barikot from the Arabian Sea via Taxila. Marine

and cowrie shells, in particular, are found in notable numbers during the Kushana periods of Barikot, which is reflected by the expansion of Kushana territories, gaining control over the southern coastal areas and routes.

Furthermore, although the Kushanas did not directly administer the southern Indian ports, which were ruled by the Western Satraps or Kshatrapas (Neelis 2011: 144), it is likely that alliances with these regional powers allowed the Kushanas to secure shipments of carnelian and agate from Gujarat and the Deccan traps through the well-maintained overland routes of the *Uttarāpatha* and the *Dakṣiṇāpatha*. The carnelian and agate beads of the Kushana period of Barikot were perforated with both metal and diamond drilling technologies and, consequently, were probably not only imported from the territory of the Western Satraps but other resource areas as well. South-western source areas of carnelian and agate that were located within Parthian territory may have possibly reached Barikot through a complex series of cross-cultural interactions, although it should be noted that the Kushana state considered their Parthian neighbours to be an adversary (McLaughlin 2016: 84-85).

As far as the raw materials and production technologies of the examined beads are concerned, there is enough evidence available to us to put forward the interpretation that the maintenance of Kushana power was probably linked to their territorial control over long-distance interaction networks. Their stable control over these important networks of connectivity probably provided traffic security and enabled the transport of various raw materials including semi-precious stones, shells and probably even glass from regions located to the south and south-east of Barikot, although the precise location of the production centres of beads made from vitreous material remains uncertain. In other words, various types of beads arrived at Barikot through the rise of the Kushana Empire in the political arena of the region and the dominant trade flows of the time.

7.2.5 Hindu-Shahi period

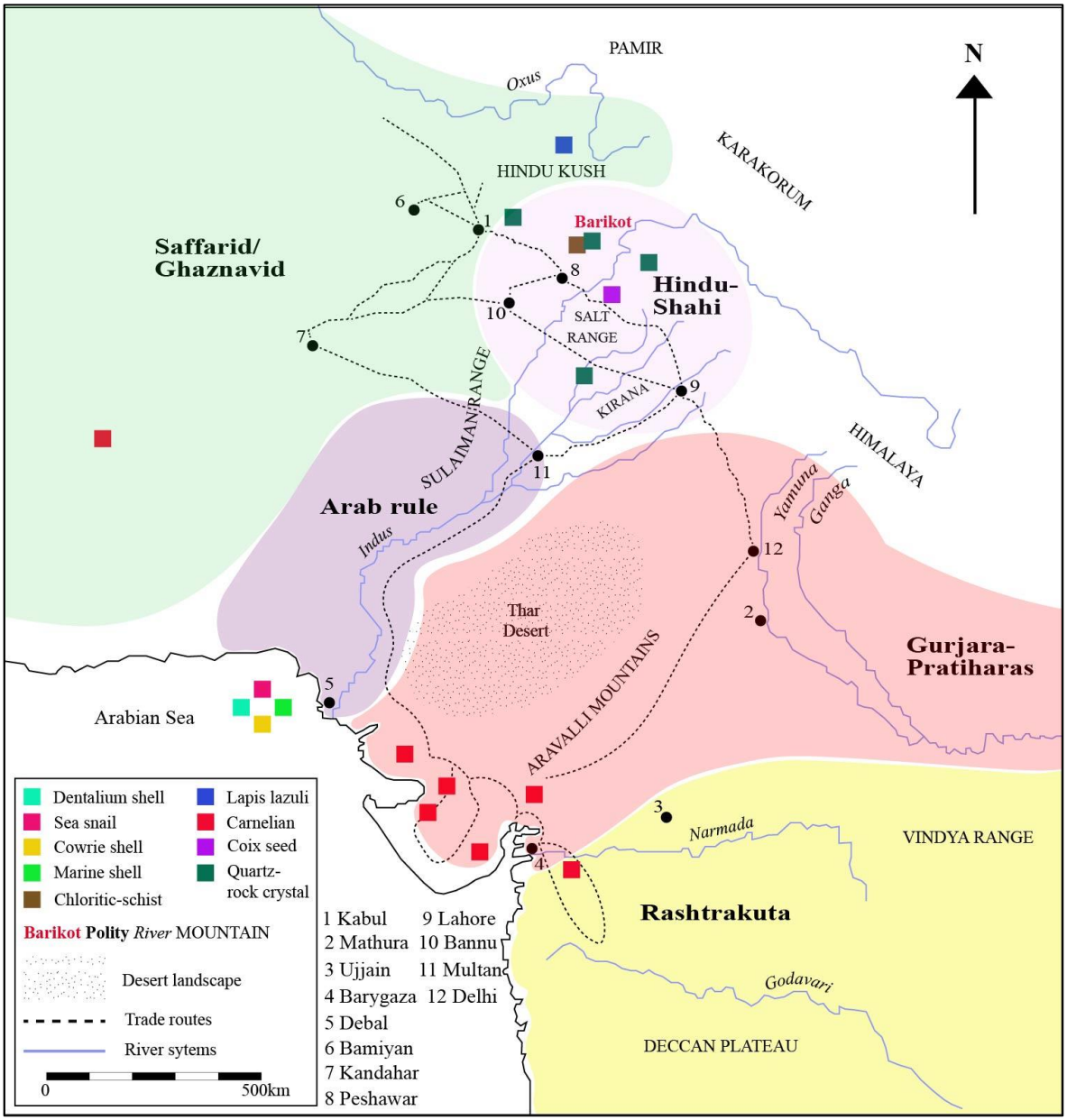


Figure 228: Geo-political configuration of the region around the 10th century CE

Figure 228 shows the geo-political context of the entire region together with the known sources of the raw materials at around the 10th century CE. The Hindu-Shahi dynasty was ruling parts of Gandhara including Barikot at the time. As figure 228 shows, the dominant, pre-existing routes of movement, trade, and exchange of the Early Historic period witnessed a drastic regional transformation in the Late Historic period. The western regions through the Hindukush became quite prosperous with sites such

as Bamiyan and Kapisa, located on a new highway now, thriving from the sixth century CE onwards (Kuwayama 2012: 90-139). Despite this major regional shift in the patterns of the dominant trade route systems, the recovery of several types of beads from Barikot indicates that the Swat Valley remained locally and regionally quite well-connected to various distant geographic regions as shown in the discussions in Chapter 6.

Apart from the raw materials, which were acquired from within Shahi-occupied lands including quartz-rock crystal, chloritic-schist and coix seeds, the recovery of Indo-Pacific glass beads provides potential evidence of cross-cultural interactions between Barikot and the regions of South India. Furthermore, evidence of long-distance connections between Barikot and the western Saffarid/Ghaznavid territory is provided by the discovery of lapis lazuli beads - a link also supported by the discovery of a segmented glass bead, possibly arriving from the Saffarid/Ghaznavid domain to the west or, alternatively, the Arab-ruled territories to the south. It is quite interesting to see the existence of long-distance interaction routes, linking Gandhara to the region of Gujarat, passing clearly through the locations of the known occurrences of carnelian, which were probably the source of the material we see at Barikot. The continued application of diamond drilling technologies also supports this interpretation.

As opposed to the Shahi state in the north-western region, Arab merchants have unanimously accused the Pratihara rajas of being unfriendly towards the Arabs and Islam, possibly in the wake of realising the economic menace posed by the appearance and spread of Arab traders. In the interest of promoting their own contemporary indigenous merchants, the Pratihara ruling elites probably imposed restrictions and checks on the activities of Arab or Muslim merchants as a result (Gopal 1989: 117-118). Consequently, the recovered carnelian beads could have arrived at Barikot through the routes connecting the Shahi domains with the Pratihara-controlled territory rather than through the channels of movement that passed through the intermediary Arab administered region of Sindh to the south.

In addition, several varieties of shells are found in the bead assemblage of the Hindu-Shahi period of Barikot, which must have been obtained either through the route running through the Arab administered region to the south or through the route connecting Delhi with the region of Gujarat controlled by the Pratihara state. Since the number of recovered shell items is quite small compared to the earlier Saka-Parthian and Kushana periods, it is possible that the people and rulers of Barikot may well have struggled to gain full access to the routes that linked up to the coastal regions, which were at the time controlled and maintained by other competing political forces and rivals as seen in figure 228. Alternatively, perceptions about shell materials, may have simply changed becoming undesirable during the Hindu-Shahi period or their use may have fallen out of the trending fashion styles of the time.

7.2.6 Ghaznavid period

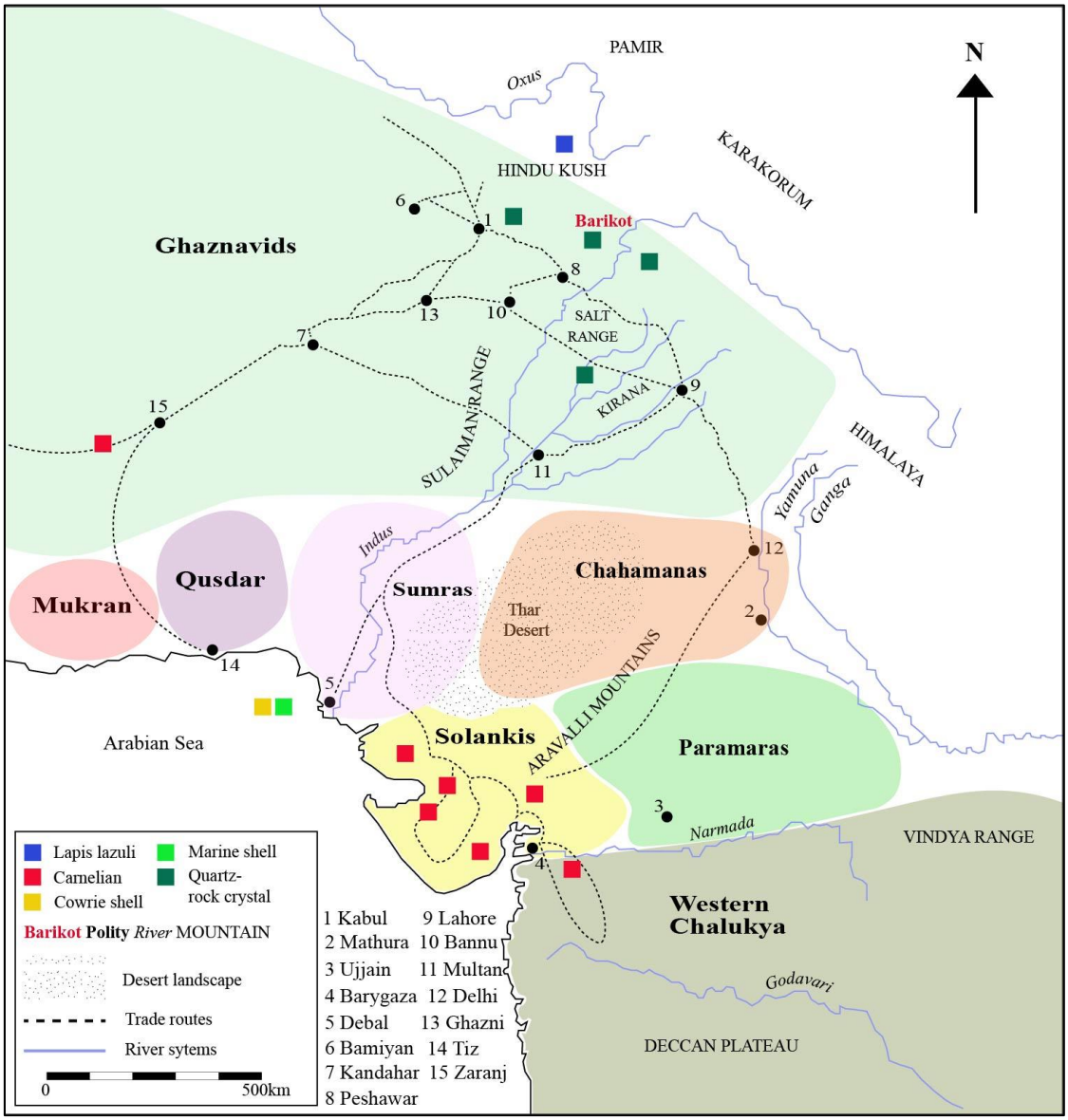


Figure 229: Geo-political configuration of the region around the 11th century CE

Figure 229 shows the geo-political configuration of the region together with the known sources of the raw materials at around the 11th century CE in which the Ghaznavid state has managed to extend its territory over the regions of Gandhara and the Punjab, controlling critical nodes of travel and communication. Although the identification of several raw materials, such as carnelian, marine, and cowrie shells, provides evidence of long-distance interactions occurring between Barikot and other centres of regional power, these materials are found in extremely low quantities at the site. The rulers of Mukran and Qusdar were the vassals of the Ghaznavid state during this time (Raza 2013) and, as such, would have been located in an ideal, strategic position presumably to arrange the transport and

exchange of desirable materials, in particular, shell items if required. The existence of interaction routes to the Arabian sea coast is, anyhow, documented, linking the Ghaznavid sphere of influence over the coastal regions (Figure 229). Evidence of inter-regional connections and trade is possibly also provided in the form of the use of Indo-Pacific glass beads at Barikot during this time.

In light of this information, it is possible that the use of marine and cowrie shells was, for a variety of reasons, not considered highly desirable by the people of Barikot during the Ghaznavid period. The evidence suggests, as a result, that the entry of the Ghaznavids in the existing political arena of the region possibly left a notable impact that was characterised by a low demand and acquisition rate for shell materials, although the continued actions and effects of the dominant trade flows of the time (in the form of trading travellers?) may have enabled shell materials in addition to carnelian and lapis lazuli to reach Barikot in small amounts. As far as the provenance of the carnelian is concerned, it could have well been acquired from within the Ghaznavid administered region of Sistān situated along a major trade route system passing through it. As we do not have the information that is required in terms of the identification of the applied drilling technology of the carnelian beads from the Ghaznavid period of Barikot, it is currently not possible to provide more substantive evidence in this matter.

7.2.7 Summary

According to the data produced above, many of the beads arrived at Barikot with the dominant trade flows of the time, most notably, the well-established and vibrant grand routes of the *Uttarāpatha* and *Dakṣiṇāpatha* of the Early Historic period. The evidence from the Achaemenid and Mauryan periods indicates, for example, that the recovered carnelian probably came from the region of Gujarat being transported along the *Uttarāpatha* and *Dakṣiṇāpatha*. It also quite interesting to note the scarcity of shell materials at Barikot at a time when both Achaemenids and Mauryans are believed to have spread across the vast geography of the entire region. Mauryan inscriptions, for example, occur at several sites along the coastal zones and there are references to transoceanic sailing events (Ray 1994: 3, 22). The apparent scarcity of shell materials at Barikot may, therefore, possibly reflect the loose nature of imperial control over certain territories including the coastal localities to the south. Alternatively, ornaments made from shell materials may have simply not been popular among the local population at Barikot during the Achaemenid and Mauryan periods. Although we have currently limited data at our disposal, the Achaemenid and Mauryan period patterns appear to be quite similar surprisingly, given the completely different orientations of each state.

We have also evidence of both the occurrence of political shifts and the actions of the dominating trade flows, which appear to have left an impact on the acquisition of certain raw materials, for instance, during the Kushana periods of Barikot. The evidence, for example, shows a marked increase in the number of marine shells, pearls and corals at Barikot probably the result of the well-documented

expansionist policies of the Kushana state at the time, gaining territorial control over overland and maritime routes of travel and communication. In other words, both political shifts as well as the actions of the dominant trade flows of the time caused a major impact on the acquisition of various types of long-distance raw materials including marine shells, pearls, corals, carnelian, and lapis lazuli during the Kushana period of Barikot.

Similarly, the number of shell materials from the Hindu-Shahi period of Barikot is quite small compared to the earlier Saka-Parthian and Kushana periods, which probably reflects the lack of Shahi control over the Arabian sea coast areas and associated interaction routes, which were administered by other powerful states at the time as seen in figure 228. In other words, both changes in the political configuration and the actions of the dominant trade flows of the time appear to have left an impact on the acquisition of various types of long-distance raw materials including shell materials and semi-precious stones of carnelian during the Hindu-Shahi period of Barikot. It should be stressed at this point, however, that due to the nature of the available evidence, the discussions produced above are very preliminary, simple, and are not backed by substantive evidence. Our discussions, consequently, may need to be revised as more rigours and scientific research is conducted in the future.

Chapter 8: Iconography and systems of 'value'

Before conducting a critical typological comparison between the beads from Barikot (and other sites) and the iconographic representations of beads, it is important to provide a brief overview on the shortcomings or issues encountered in the study of the visual art of Gandhara. To further contextualise the data, it is also important to introduce the various types of art sculptures that are adorned with bead ornaments and form part of the current study. The following sections will, therefore, provide the reader with the necessary background and context of the art assemblage to better understand the benefits and challenges associated with this critical, cross-comparative investigation.

'Gandharan art' represents a peculiar hybrid artistic tradition predominantly the Buddhist art of northwestern Pakistan and eastern Afghanistan, and to some extent Central Asia (Behrendt 2007; Rhi 2003; Rienjang 2020). The history of western interest in Buddhist antiquities began in the subcontinent in the 17th and 18th centuries, which eventually led to development of the Archaeological Survey of India in 1861 under the British colonial administrator Sir Alexander Cunningham. The work conducted by Cunningham and later Sir John Marshall led to a large-scale collection of sculptural remains, which form the basis of contemporary studies in Gandharan art (Schmidt 2012: 83-85).

Archaeologists and art historians are today, as a result, dependent on working with documents, reports, and photographic records from the 19th and 20th century, which are characterised by significant methodological limitations. Limited information is provided by them especially with regards to the precise provenance, archaeological context and dates of the sculptural material. The lack of inscriptions for the identification of the Gandharan images also remains a major challenge while there is little information available regarding the patronage and production of the sculptures (Behrendt 2009; Schmidt 2009; 2012: 85-88; Tissot 1987: 363).

In addition, in order to gain a better understanding of the visual art, it is important to identify the subjects they represent. The investigation of identities from iconographic contexts remains, however, a challenging theme in the studies of Indian art often due to the lack of inscriptional or written records, the conventionalisation of the image types, unknown provenance, and the lack of detailed studies (Rhi 2006: 151; Schmidt 2016: 669). The identification of characters, including the classification of numerous freestanding bodhisattvas and Buddhas in the artistic repertoire of Gandhara, still remains open to interpretation (Brancaccio and Behrendt 2006: 5). At the same time, the identification and reading of the various, accompanying inanimate objects or elements also remain difficult to determine (Rhi 2003: 153).

Furthermore, for the forthcoming discussions on the iconographic representations of beads, it is important to bear in mind the insightful words of J. Rhi: '…. art serving a religion - although it would inevitably reflect the religion - tends to represent certain segments or aspects of religious ideas and

practices better than others. Quite frequently some segment or aspect could be disproportionately magnified, while others could be entirely missing. Therefore, information deduced from artistic materials could have a limited significance, and extreme caution is necessary in linking it to that of the textual tradition. Most of the monuments and objects in Gandhāran art were related to devotional practice, and were quite conventional and stereotyped in form and iconography' (Rhi 2003: 154). Moreover, when conducting art historical research, it is important to adopt a cautious approach when formulating interpretations in relation to the challenging concept of 'symbolism' and, in this regard, it is important not to draw upon archaeological, art historical and textual sources that derive from widely different geographic areas and periods. Instead, it is important to try to determine the varieties of local archaeological contexts in which individual sculptures are found and, in the process, unlock the potential symbolic meaning imbued in the visual art (Hawkes 2009: XXV-XXVI).

While it is likely that the elaborately adorned art images are reflective of ideals of adornment in ancient Gandhara, some scholars have proposed that the ruling elites and aristocracy of Gandhara may have used the Bodhisattva images as a model to create their own appearance (Baumer 2014; Rosenfield 1967; Tissot 1999). In other words, do the Bodhisattva statues represent portraits of real rulers, dignitaries or individuals? This proposal is difficult to test as few actual ornaments have been recovered from well-dated sites. The fact that the many available representations of Kushana aristocratic types in statues, coins, and seals show no resemblance to the attire of the different types of Bodhisattva images (Callieri 1997: 256; Rowland 1961) would suggest that the Bodhisattva ornaments are indeed highly stylised. Nevertheless, it is useful to try and compare the archaeologically recovered beads and ornaments with those on these sculptures.

Therefore, a cross-comparative study between the archaeological beads from Barikot and the forms of beads reproduced on the Gandharan art especially the Bodhisattvas, has the potential to determine whether the carved depictions represent actual ornaments or they are simply symbolic or imaginative. This investigation can provide new insight into how bead ornaments were worn in the Early Historic period of South Asia and into the accuracy of iconographic depictions. The following discussions will not attempt to resolve the above-stated limitations, which lie beyond the scale of this study, but they will be kept in mind when attempting to critically assess the iconographic reproductions of beads in the art of Gandhara. This chapter will conclude with a section on the study and discussion of the systems of 'value' as outlined in Chapter 3 in order to try to determine (through the consideration of a set of variables) if the beads from Barikot embodied potential value(s) in the past.

8.1. Gandharan art sculptures

The iconographic assemblage of Gandhara is preserved in the form of stone and stucco sculptures in various narrative or static panels that depict the Buddha as well as elaborately ornamented images of male and female elites who worshiped or interacted with the Buddha. Freestanding images of the Buddha are also found in abundance (usually without any ornaments). The art assemblage features different types of aristocrats, donors, devotees, female dancers, bodhisattvas, deities and other important characters (Figure 230), many of which are adorned with bead ornaments made in many different shapes and sizes (Faccenna 1964; Marshall 1951).



Figure 230: a) Sleeping female dancer with a girdle consisting of rows of irregular spherical/globular beads (Dharmarajika; Taxila Museum; dimensions unknown) (Photograph: author's own) b) Standing male royal donor with bracelets consisting of rows of cylindrical beads (h. ca. 98 cm; Butkara I; Swat Museum; Faccenna 1964: Pl. CLXXVII no. 4033)

The Bodhisattva sculptures form the main source of evidence, which are the focus of study in the following discussions together with a small number of other types of Gandharan art sculptures such as the Buddhist goddess of Hariti (Behrendt 2007: 12-13). The Bodhisattvas are found among the most highly ornamented images in Mahayana Buddhist iconography and represent beings who have delayed their passage to *nirvana* or enlightenment (Fogelin 2015: 151-152; Jongeward 2019: 104) in order to help the world, usually depicted as princely male figures. It is important to consider the Bodhisattva

images according to two broad typological groupings and descriptions because they cannot always be identified with certainty (Schmidt 2010; 2012; 2016).

The Maitreya Bodhisattva (Benevolent One) is considered to be a divine being who will come in the future and images of this being are often among the most highly ornamented in the Gandharan art repertoire. Images of Maitreya are represented with the hair arranged into a topknot or *jaṭāmukuṭa* of a brāhmaṇa (a member of the priestly or sacerdotal caste). His notable characteristic features also include the holding of a *kamaṇḍalu* or an ascetic's water jar in the proper left hand while making various symbolic gestures or *mudras* with the right hand including *abhaya-mudrā* (gesture of reassurance) and *namaskāra mudrā* (gesture of adoration or homage) (Behrendt 2014; Huntington 1984; Jongeward: 2019: 104; Schmidt 2016: 669).

The second group consists of the Siddhārtha-Avalokiteśvara-Padmapāṇi type, which is represented wearing a turban of a *kṣatriya* (a member of the regnum or sovereign class). His left hand can be seen placed on the hip or holding a floral wreath while making various gestures with the right hand including *abhaya-mudrā* (gesture of reassurance). Like Maitreya, Avalokiteśvara was a popular figure in the Mahayana Buddhist pantheon representing a Bodhisattva of compassion and protection (Behrendt 2007; Jongeward 2019: 104; Schmidt 2012; 2016; Rhi 2006). Other symbolic features have also been noted in the Bodhisattva artistic media such as holding a garland of twisted strands of jewels as symbols of devotion to the Buddha (Schmidt 2016: 669). Therefore, a wide range of decorative and symbolic elements were incooperated in the Bodhisattva visual repertoire. Hundreds of life-size, half-life-size, and colossal images of Buddhas and Bodhisattvas were carved from individual blocks of schist stone for installation around the walls of Buddhist monastic architectural settings (Schmidt 2012). The peak in the construction of monastic complexes and sculptural embellishment occurred during the time of the Kushana Empire between the 1st and 3rd century CE.

Although many of the art sculptures displayed in the major museums today derive from disturbed contexts or have an uncertain provenance, as stated above, (Behrendt 2004: 112; Rienjang and Stewart 2018), they form the richest available repertoire to study features of adornment during the Kushana periods of Gandhara. They include intricately carved ornamental objects including jewelled necklaces, amulet cases, armbands and earrings, which can be utilised to draw relevant inferences about idealised and possible actual ornamental traditions prevalent in Gandhara between the 1st and 3rd century CE. Any distinctive patterns and findings would provide new perspectives on their function, possible meanings, raw materials, craft organisation, and trade connections with other geographical regions. It will be possible to determine how ancient communities may have used beads from both local as well as more distant cultural traditions to craft their own local identity.

It is unlikely that materials of low-value were included in the richly adorned Bodhisattva sculptures in the presence of high-value stones and metals such as carnelian and gold respectively. In the context of

the current study, preliminary examinations indicate that the Bodhisattva statues were adorned with depictions of beads made from both ‘exotic’ materials such as carnelian, as well as locally available materials such as garnet and rock crystal probably because of the physical properties of these materials. Furthermore, the evidence from Barikot indicates that materials such as rock crystal, garnet, and beryl-aquamarine were introduced for the first time during the Saka-Parthian and early Kushana periods, possibly exerting some specific ritual or cultic function. This factor may yet be another significant reason that made these materials valuable in the eyes of the Gandharan patrons and artists associated with the Bodhisattva sculptural tradition. Figure 231 shows the location of Barikot and other sites mentioned in the forthcoming discussions whereas figure 232 shows the location of several archaeological sites associated with the regional visual art that is discussed below.



Figure 231: The subcontinent showing the location of Barikot and sites mentioned in the text below (Drawing: author's own)

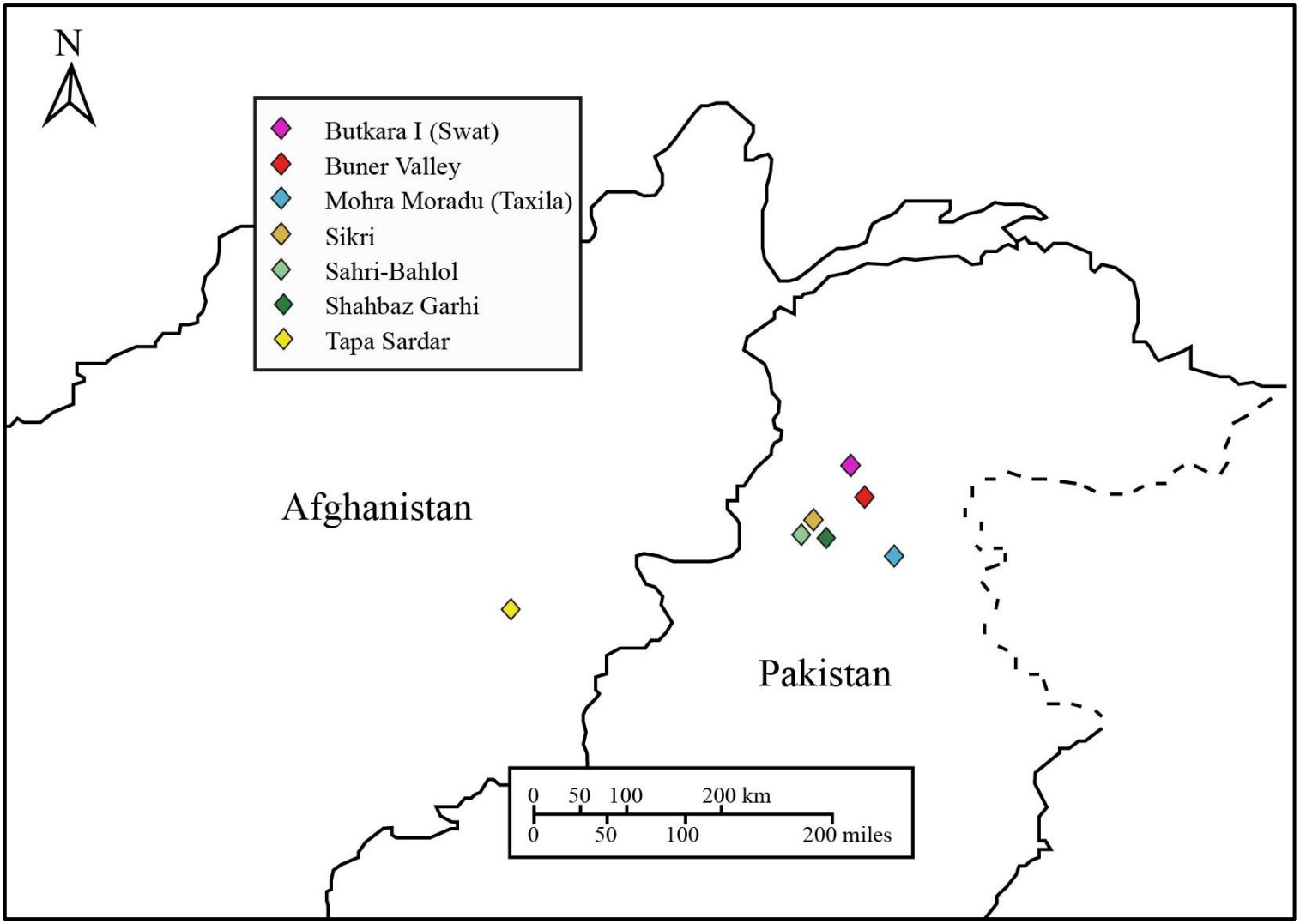


Figure 232: The location of Gandharan sites associated with the visual art discussed in the text below (Drawing: author's own)

8.2 Case studies

The following case studies provide examples of specific types of beads that can be compared with ornaments carved on stone sculptures and are intended to promote new ideas and future debates.

8.2.1 Case Study 1: Ghata-shaped beads

We begin with the vase- or ghata-shaped beads seen on Maitreya Bodhisattva sculptures (Figures 233 a-b). At Barikot, these beads in terracotta are first seen during the Indo-Greek period (Macrophases 3a2-3a4: end of the 2nd century BCE) but those made from stones such as garnet (Figure 233c) are apparently introduced during the Kushana periods (Macrophases 4a-b: 1st-2nd centuries CE). These beads usually have a sub globular shape with a distinct collar or rim at one end and are defined by Beck (Beck 1941: 33) as resembling a globular vase or pot. Later, they have come to be referred to as ghata or ghara, the Hindi word for a traditional terracotta water pot (Dikshit 1952: 52-63; Ghosh 1947-1948: Pl. 43-46). Several of the Bodhisattva sculptures wear various sizes of ghata-shaped beads (see, for example, Bodhisattva Maitreya and Avalokiteshvara from Sahri Bahlol, Peshawar Museum). On the sculptures, this bead is usually depicted suspended as a pendant along with other amulets that are worn together on a long cord that drapes across the torso from the left shoulder to the right hip (Figure 233).

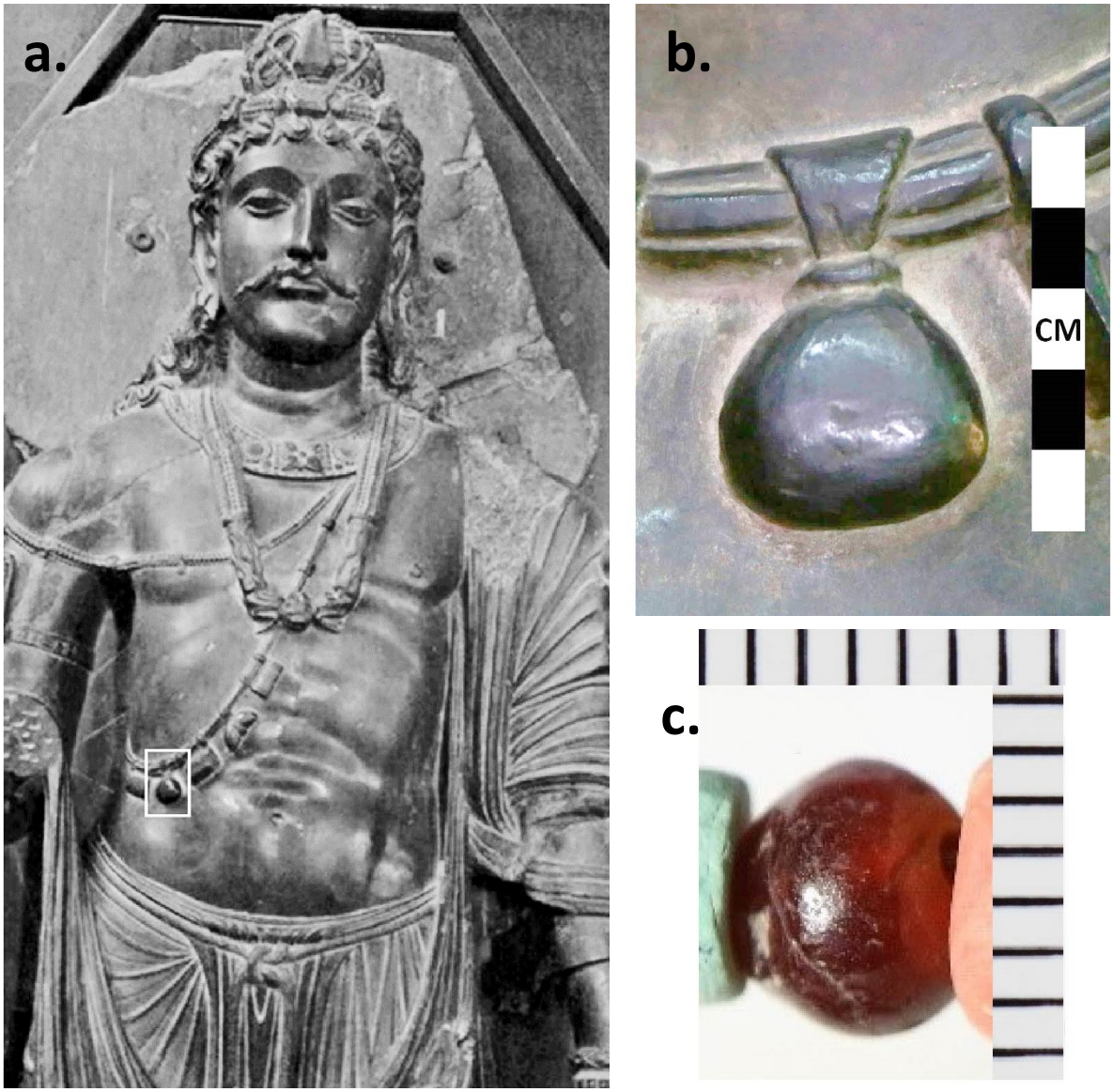


Figure 233: a-b) Carved ghata-shaped bead on Bodhisattva Maitreya (h. ca. 243 cm) Dhamani; Lahore Museum) c) Ghata-shaped bead of garnet from Barikot (Ser. 4175) (Photographs: author's own)

The archaeologically recovered stone beads of this shape are usually made from garnet, rock crystal, beryl, or carnelian. The ghata may have represented a container of sacred water or some other form of offering, but the precise meaning will be difficult to determine without finding some reference in one of the Buddhist texts. In addition, although the vast majority of the ghata-shaped beads are made from terracotta during the Kushana period, it is unlikely that the Gandharan artist used terracotta as a template to embellish the highly decorated sculptures of Bodhisattvas. Instead, it is likely that a stone of high-quality such as garnet or carnelian was conceived and referenced by the artist. Although the size of the sculpted bead is much larger than the proposed Barikot bead of garnet, it is important to take into account the monumental height of the Bodhisattva that would consequently enlarge the visual representation of any adorning bead.

In addition, there is a specific relief narrative probably from the Buddhist centre of Butkara I, Swat, housed at the Museum of Art and Archaeology (University of Missouri), which depicts an important episode in the life of Prince Siddhārtha (the Buddha before enlightenment) riding his horse Kanthaka and leaving the palace to live a life as an ascetic, often referred to as the 'Great Departure'. This relief is dated between the late first or second century CE. In this scene, a parasol is held over the prince, which symbolises the sovereignty of the Buddha (Chowdhuri 2018). Interestingly, the parasol is rimmed with what appears to be a row of decorative pendants (Nagar 1981: 6-7; Schmidt 2012: 92), which resemble the ghata-shaped bead form having a globular shape with a distinct collar at one end (Figure 234a). Royal umbrellas are often depicted in the Gandharan art and have been noted to be decorated with numerous suspended pendants (Figure 234b), although often found in a weathered condition to enable a clear identification of the shape (Faccenna 1964: Pl. CXVI no. 3120; Pl. CXLIII no. 2353).

As such it cannot be ruled out that the depicted objects may, in fact, represent some versions of tassel ornaments, which are common on parasols. The example from the Museum of Art and Archaeology, however, is well preserved to recognise the finer details of the shape and style of the represented objects reminiscent of the ghata-shape. It is possible that the archaeologically recovered ghata-shaped beads made from both stones and terracotta may have been used not only for personal adornment purposes but also to decorate inanimate objects such as umbrellas and possibly even *stupas* or other buildings during the Kushana period.

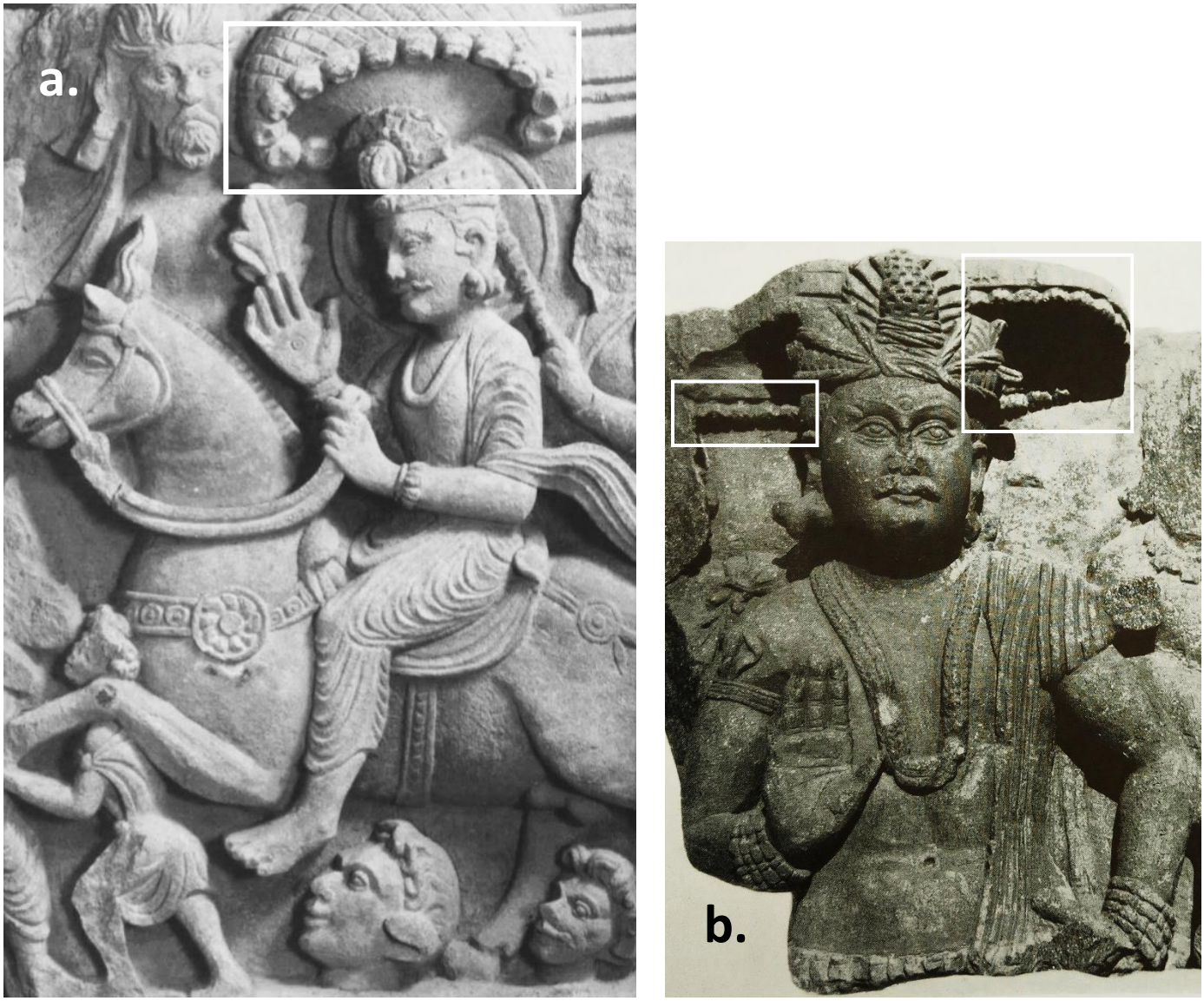


Figure 234: a) Parasol decorated with ghata-shaped objects? (h. 72.5 cm; Butkara I; Nagar 1981: 6-7; Museum of Art and Archaeology, University of Missouri) b) Parasol decorated with suspended objects (h. 0.29 cm; Butkara I; Faccenna 1964: Pl. CXLIII no. 2353)

8.2.2 Case Study 2: 'Eye' glass beads

Another Bodhisattva appears to exhibit a bead with circular motifs or depressions (Figures 235) that resemble glass 'eye' beads, which are found widely distributed across the region (Beck 1941). 'Eye' beads were already produced from faience and agate at Indus period sites such as Harappa, Sanauli, and Mohenjo-daro, possibly imbued with some apotropaic powers to avert the evil eye (Kenoyer 2014; Prabhakar 2014; Vidale 1987). The carved bead on the Bodhisattva is depicted in a visibly clear position on the chest of the figure, possibly to ward off evil rather than being a sign for the display of prestige

and wealth. Although the carved object is without doubt an eye bead, it would be problematic to link it with ‘eye’ beads made from glass. There are depressions on the surface of the engraved bead, which were probably inlaid with stones to form the ‘eye’ design. Similar inlaid ‘eye’ beads have been recovered from excavations at Sirkap and other parts of Taxila but were not found at Barikot. Beck (Beck 1941: Pl. I no. 8; Pl. II no. 36, 38-39, 43-45) defines them as cemented stone eye beads while Marshall (Marshall 1951: 746) describes them as having a stone base to which pieces of a differently coloured stone were cemented in order to form the eyes. The inlaid stones were probably also produced from high-quality materials such as carnelian, agate, or chalcedony as evidenced by the recovered cemented stone beads from Taxila. Therefore, it is difficult to relate the represented raw material on the sculpture with glass.



Figure 235: Carved eye bead on Bodhisattva Avalokiteśhvara (h. ca. 1.02 m; Sahri Bahlol; Peshawar Museum) (Photographs: author’s own)

8.2.3 Case Study 3: Hexagonal-faceted long barrel beads

A particular bead carved on a Bodhisattva Avalokiteśhvara apparently represents a hexagonal-faceted long barrel bead, possibly made from carnelian or rock crystal (Figures 236a-b). In fact, one such bead of carnelian was found at Barikot (BKG 2453: Figure 236c) and, as such, may have been an object of value to the owner. Although this bead derives from the later Kushano-Sasanian period (Macrophase 5b: second half of the 3rd century CE), it is fairly reasonable to argue for the production of such bead shapes in the Kushana periods as well. In fact, another hexagonal-faceted barrel bead of rock crystal has been found from the Kushana layers of Barikot (Macrophase 4-5), which indicates that such types of beads were, indeed, in circulation during the Kushana period (BKG 5082: Figure 237). As a matter of fact, many examples of hexagonal-faceted barrel beads of rock crystal and amethyst have been published from sites at Taxila (Beck 1941: Pl. VI no. 53) and Vaisali (Sinha and Roy 1969: Pl. LXIIA no. 172-173). A more detailed examination of the carved beads shows that the exterior facets have a slightly concave section (Figure 236b). So far, no archaeological examples of concave faceted surfaces have been noted on beads and this feature may be due to specific stone-carving styles rather than being a copy of an actual bead. Although it is difficult to explain the precise meaning associated with the production of faceted beads, they were certainly manufactured to reflect light, possibly with the intention to create a symbolic effect as outlined in Buddhist literary traditions (Granoff 1998). The popularity and significance of creating six facets should also be further investigated through an in-depth examination of the vast body of Buddhist literature.

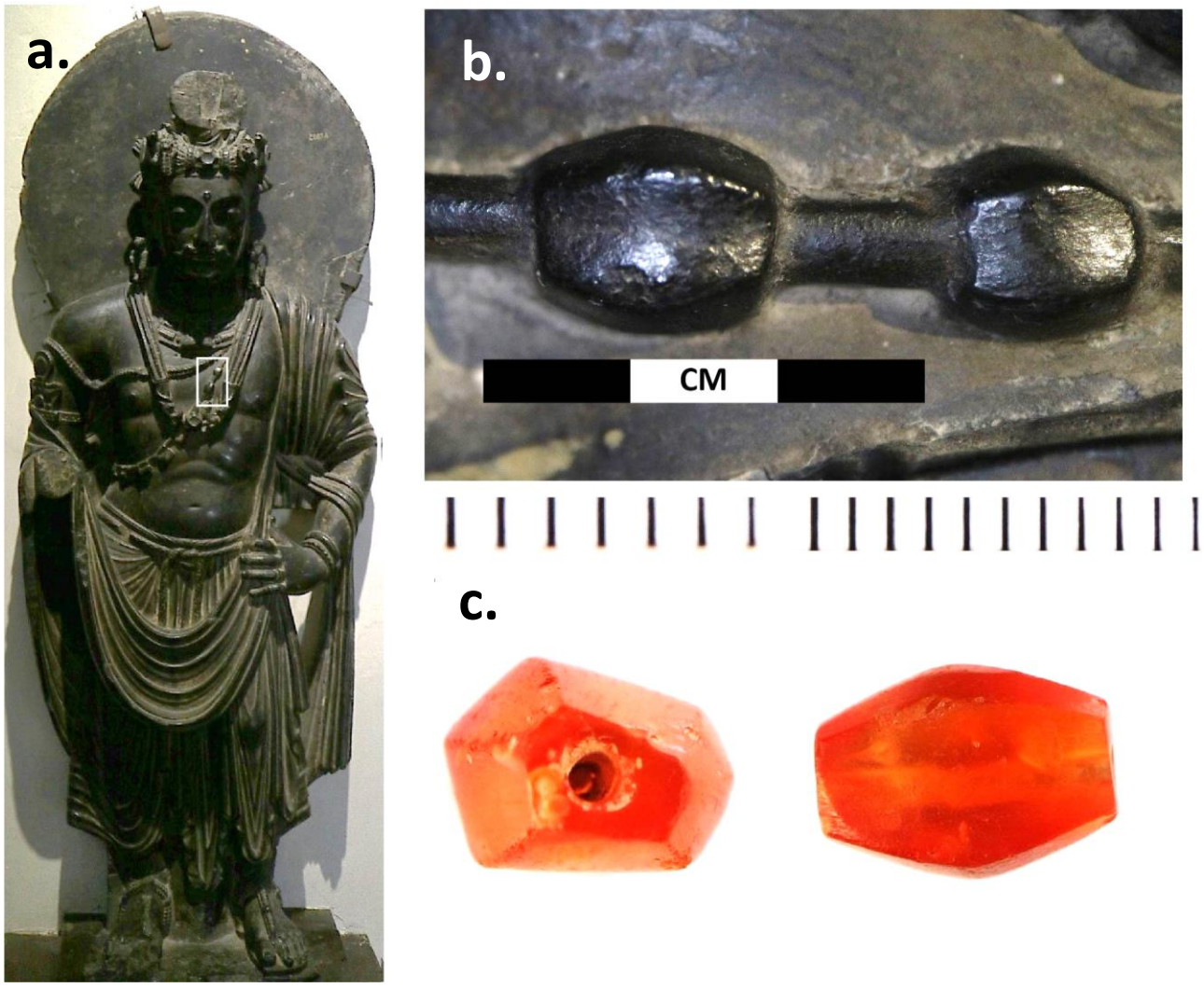


Figure 236: a-b) Carved hexagonal-faceted barrel bead adorning a Bodhisattva Avalokiteśvara (h. ca. 1.53 m; Sahri Bahlol; Peshawar Museum) c) Hexagonal-faceted barrel bead of carnelian from Barikot (BKG 2453) (Photographs: author's own)



Figure 237: Hexagonal-faceted barrel bead of rock crystal from Barikot (BKG 5082) (Photograph: ISMEO)

8.2.4 Case Study 4: Hexagonal-faceted long biconical beads

There is a unique type of bead that is carved on a Bodhisattva Maitreya sculpture. It is clearly another faceted stone bead, possibly manufactured from carnelian or rock crystal, but is biconical rather than barrel in shape (Figure 238). Although a hexagonal-faceted long biconical bead has not been found from the Kushana period at Barikot, these types of beads made from carnelian have been recovered from other contemporaneous sites such as Vaisali (Sinha and Roy 1969: Figure 57B no. 11). Speaking of carnelian, it is important to mention that thus far only six beads of carnelian and four of agate have been recovered from Kushana period contexts in different parts of Barikot (Macrophases 4a-b and 5a: between the 1st century and the first half of the 3rd century CE), possibly reflecting their status as prestige objects (among other associations) in Kushana society (for further discussion see section 8.3). In fact, a variety of faceted beads, possibly representing originals made from carnelian or rock crystal, are common not only on Bodhisattva statues but also on other Gandharan art sculptures such as those of Hariti (Sikri, Lahore Museum) and Panchika (Tahkal, Lahore Museum).



Figure 238: Hexagonal-faceted long biconical bead adorning a Bodhisattva Maitreya (h. ca. 1.02 m; Mohra Moradu; Taxila Museum) (Photographs: author's own)

8.2.5 Case Study 5: Collar beads

The adornments on a Bodhisattva Maitreya sculpture include at least one collar bead. Made in various forms, these beads all have a 'collar' around each end. Although artisans of the Indus Tradition already produced them, such beads only became common during the Early Historic period (Francis 1986: 117; 2002: 42). A single collar bead of marine shell was found in the Saka-Parthian levels at Barikot, but no example has come to light yet from the Kushana period of Barikot. Archaeologists have found greater quantities of collar beads of stone and glass in South India compared to other locations, while Arikamedu has yielded evidence of their production (Francis 2002: 42). There are two major types of collar beads: flat and barrel. The former has a flat section, a round or lozenge-shaped body, and

protruding collars at the ends (Francis 1986: 117) as do some glass collar beads from Sirkap, Ahichchhatra, Sonkh, and Alagankulam (Beck 1941: Pl. IX no.14; Dikshit 1952: Figure 5 no. 112; Gunasena 2018: 315; Härtel 1993: 302 no. 33). Wheeler, Ghosh, and Krishna Deva (Wheeler et al. 1946: 97) define them as 'lug-collared'. Barrel collar beads have a round cross section, a barrel-shaped body, and collars which are little more than incised lines around the ends (Beck 1941: Pl. VI no. 20; Francis 1986: 117). Wheeler, Ghosh, and Krishna Deva (Wheeler et al. 1946: 97) call them 'groove-collared'. The example which appears in the center of the chest of the Bodhisattva sculpture is gadrooned (Figure 239). A similar bead made from glass was found at Sirkap in Taxila (Beck 1941: Pl. IX no. 15).



Figure 239: Gadrooned collar bead on a Bodhisattva Maitreya (h. ca. 1.28 m; Sahri Bahlol; Peshawar Museum) (Photographs: author's own)

A possible collar bead is situated over the sculpture's right armpit (Figure 240a). Its collars are not aligned but point upwards at an angle. An apparent parallel is a unique carnelian bead from Taxila (Figure 240b) referred to as a 'collared ball' by Beck (Beck 1941: Pl. IV no. 11). The carver may thus have copied in stone a real collared ball bead, possibly made from a high-value stone such as carnelian

or garnet. Various types of collar beads adorn numerous figures in Gandharan art, for example, the right-hand-side ‘guard’ figure in narrative relief from the Shotorak monastery in the Musée Guimet. Alternatively, the possible ‘collared ball’ may be a globular or a long barrel-shaped bead flanked by two short barrel-shaped beads, as its configuration is reminiscent of the natural curve of beads strung together. The best interpretation will depend on the finding of collared ball beads at Barikot where the existing chronological resolution would allow us to link them with the Kushana period.

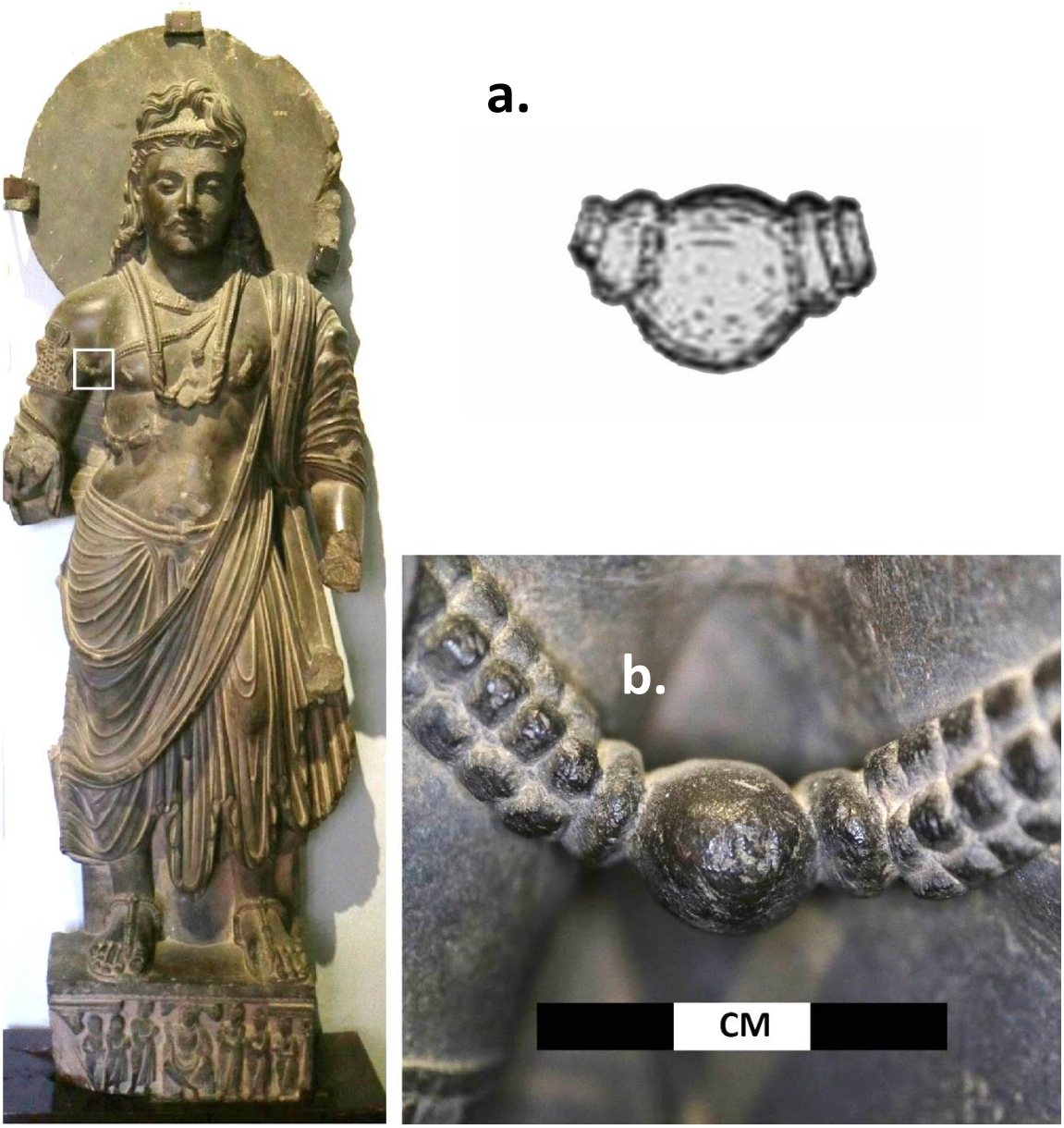


Figure 240: a) A ‘collared ball’ bead of carnelian from Taxila (Beck 1941: Pl. IV, 11) b) A collar bead or a long barrel with two short barrel beads next to it on a Bodhisattva Maitreya (h. ca. 1.28 m; Sahri Bahlol; Peshawar Museum) (Photographs: author’s own)

8.2.6 Case Study 6: Hexagonal-faceted cylindrical beads

From the 3rd-2nd centuries BCE onwards, the Buddhist *Saṅgha* (community) started favouring new symbolic associations with the natural forms of the world, possibly as a reaction against pre-existing 'orthodox' ideological associations which stressed the visual dominance of purely artificial, abstract bead forms (Morrison 1997: 95; Vidale 2005: 324). This development can be observed archaeologically with the evidence emerging from the Kushana period at Barikot in the form of beads made from coral, pearl, marine, and cowrie shells. Interestingly, the imitation of unmodified or minimally modified forms of materials is possibly reflected on the Bodhisattvas. Figure 241 a-b shows a carved, hexagonal-faceted long cylinder flanked by short barrel-shaped beads. The modern emerald mines of Swat were probably not a source of these faceted beads in the past as they produced relatively small emerald crystals.

Rather, the carved depictions probably represent aquamarine, a colour variant of beryl. The latter is commonly found in many areas of the Karakorum range and occurs in relatively large crystals in the Gilgit-Baltistan region (Grande and Augustyn 2009: 125-126; Wenk and Bulakh 2004: Pl. 15, c) that would be appropriate for the forms found on the sculptures. Beryl would have required little modification, supporting the argument for the imitation of natural forms by the carvers. In fact, the excavations at Barikot have revealed what appears to be a hexagonal-faceted long barrel bead of beryl-aquamarine with a slightly bluish-purple colour (BKG 3181: Figure 241c). It is more likely that the beryl-aquamarine was being collected from other regions and not from Swat as it is common in the *stupa* deposits of Bimaran and Hadda in Afghanistan, as well as Dharmarajika in Taxila (Rienjang et al. 2017; Uesugi and Rienjang 2018). This evidence may explain the apparent rarity of beryl-aquamarine beads at Barikot.

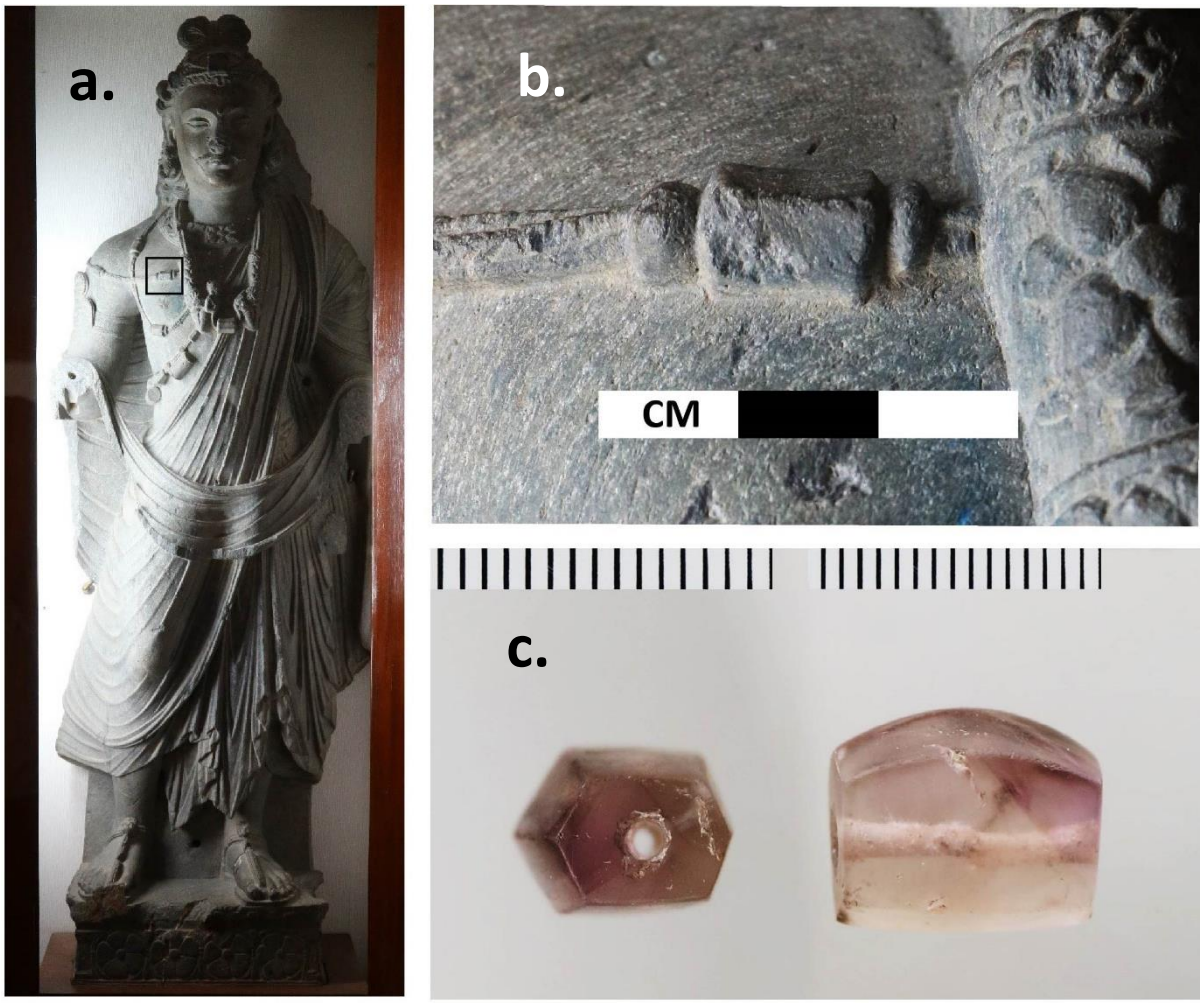


Figure 241: a-b) Carved hexagonal-faceted long cylindrical bead on a Bodhisattva Maitreya (h. ca. 1.02 m; Mohra Muradu; Taxila Museum) c) Hexagonal-faceted long barrel bead of beryl-aquamarine from Barikot (BKG 3181) (Photographs: author's own)

8.2.7 Case Study 7: Short faceted beads

Likewise, the hairnet of another Bodhisattva image is adorned with repeated sequences of what appear to be short faceted biconical and/or barrel-shaped beads (Figure 242). The originals of these beads were most likely faceted rock crystal, amethyst, carnelian, or agate of which there are examples at Taxila and other contemporaneous sites (Beck 1941: Pl. III no. 32; Sinha and Roy 1969: Figure 50, 6, 8; Uesugi and Rienjang 2018). Similar types of beads are also found in Southeast Asia and Korea during this time (Carter 2013; Glover and Kenoyer 2019; Heo 2018). Due to the sheer variability in bead shapes, there is a need to undertake a grounded comparison between the short faceted types of beads excavated from the various archaeological sites and the forms of beads decorating the hairnet. Long faceted barrel-shaped beads are, above all, associated with the Kushana period at Barikot, although they do not match with the short faceted biconical and/or barrel-shaped beads depicted on the Bodhisattva image. It can be argued that the presence of black or deep red garnet crystals, found in the schist deposits of Swat,

may equally present a match especially since the use of garnet by the Great Kushanas is well-documented such as through the recovery of garnet seals and an eight-sided gold amulet case decorated with several inset garnet stones (Adams 2011: 20; Schmidt 1995: 33). Nonetheless, although the use of garnet is attested during the Kushana period, beads were never made from the naturally faceted garnets that come from the schist deposits. Further, the few faceted garnet beads that are today visible in the rocky outcrops of Swat, are usually extremely small and not the size that is depicted on the headdress of the Bodhisattva.



Figure 242: Short faceted beads on a Bodhisattva Maitreya (h. ca. 0.33 m; Buner Valley; Musée Guimet) (Photographs: author's own)

8.2.8 Case Study 8: Perforated cowrie shells

Shells of the genus *Cypraea*, commonly known as cowrie represent a group of small to large marine gastropods of the *Cypraeidae* family. They can be found modified by the removal of a small section of their dorsal side (dome-shaped) in order to facilitate stringing. The symbolism of the cowrie shell is connected with the appearance of its ventral side, resembling a female vulva or a squinting eye whereas their association with males seems to be sporadic as evidenced from the archaeological record (Goalni 2014: 72-74). Therefore, cowries have been commonly interpreted as amulets intended to increase fertility and to ward off the evil eye (Andrews 1994: 42). The use of cowrie shells was adopted during

the Saka-Parthian periods at Barikot, increasing during the Kushana periods, although a few cowrie shells are also reported from the protohistoric period of the second millennium BCE (Stacul 1987: 223).

Several perforated cowrie shells have been found from the Kushana periods of Barikot (Macrophase 4a-b and 5a attributed between the 1st century CE and the first half of the 3rd century CE) while a perforated cowrie shell necklace can be seen adorning a half-life size female sculpture discovered from the sacred *stupa* area of Butkara I in Swat (Faccenna 1964: Pl. CDXXXII no. 3969). Although it is difficult to assign a precise date, the sculpture does not belong to the earliest stylistic group, but to a production that is certainly later than the early 1st century CE (Figure 243). The string can be seen running lengthwise across the aperture of the ventral side of the carved cowries, which may indicate a perforation on either end while the Barikot cowrie shells have been modified with only one perforation (Ser. 4415: Figure 244).

This difference in the number of perforations may suggest that the cowrie shells from Barikot were possibly not adorned in the same fashion as on the sculpture. The association of the sculpture with the sacred area of Butkara I and the symbolism associated with female fertility suggest for a unique ceremonial use of the double perforated shells, which could explain their possible absence at Barikot, being used by a small but high-ranking or specialist class of individuals. It appears that cowrie shells were mainly associated with female groups in Gandhara, although a potential connection with male groups cannot be entirely ruled out at present. Furthermore, this unique sculpted necklace is also characterised by a large central bead possibly representing a ‘collared ball’ bead made from a high-quality stone. If this is the case, it may suggest that the use of a ‘collared ball’ bead was shared by both male and female groups during the Kushana period in Gandhara.

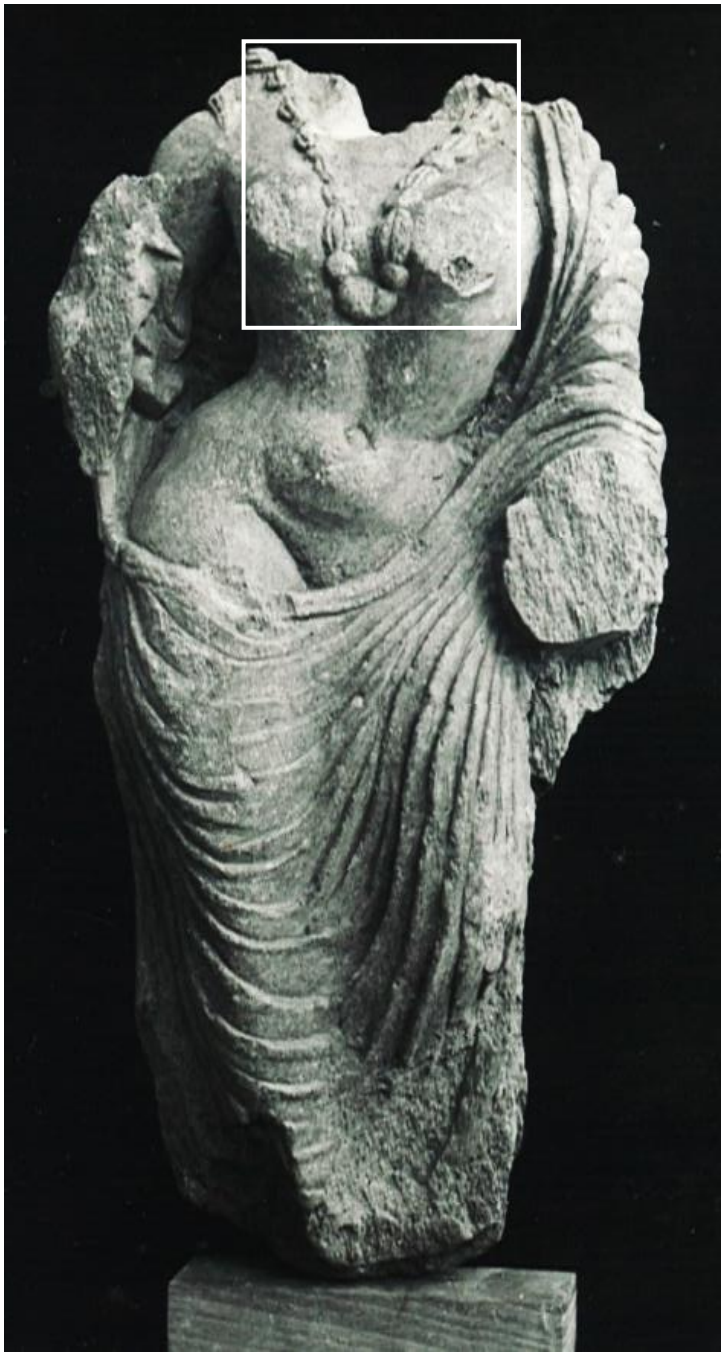


Figure 243: Female adorned with a cowrie necklace (h. 32 cm; Faccenna 1964: Pl. CDXXXII no. 3969; location unknown)

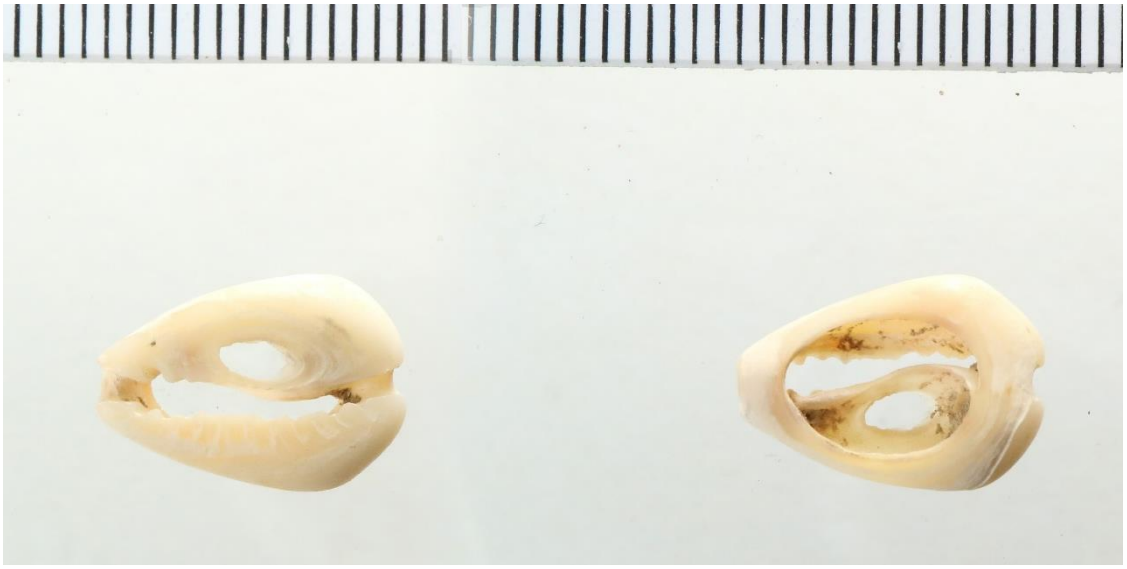


Figure 244: Perforated cowrie shell (*cypraea moneta*) from Barikot (Ser. 4415) (Photograph: author's own)

8.2.9 Case Study 9: Long barrel beads

It has already been established that hexagonal-faceted long barrel beads were chosen to adorn the Bodhisattva sculptures. Interestingly, a half-life size Bodhisattva statue is decorated with at least six visible long barrel beads that are part of a long necklace (Figure 245). It is highly likely that additional long barrel beads would have been part of this necklace, which is depicted partially covered by other necklaces and the *uttarīya* (scarf or upper garment) lying over the left shoulder passing under the right arm of the Bodhisattva. These beads are possibly referencing carnelian while a long barrel bead of carnelian has, indeed, been recovered from Barikot (BKG 2630: Figure 246), attributed to the first half of the 3rd century CE (Macrophase 5a). With regards to the dimensions, this figure is half-life size and as such, the carved beads are equally small in size but very close to the dimensions of the proposed bead of carnelian from Barikot (within 1.0 – 0.8 cm).

This Bodhisattva is the only example in the examined corpus of sculptures that can be found adorned with these types of beads while the excavation at Barikot have similarly revealed only a single long barrel bead of carnelian from the Kushana periods. This trend indicates the high importance associated with carnelian probably considered a wealth or prestige material (among other associations) at the time (for further discussion see section 8.3) as already discussed in the earlier examples. On the other hand, since the sculpture is only half-life size, the depicted beads may have become subject to some degree of stylisation as opposed to the beads that are more complex and finely carved on the larger life-size Bodhisattvas. As such, the facets along the profile view of the represented carved beads may have been omitted while the facets that characterise the cross-section may be concealed from the view of the

observer as a result of the adjoining beads found on the same string. Hence, there is a possibility that these carved beads may, in fact, represent the same hexagonal-faceted long barrel beads that have already been discussed above, depicted in a stylised form rather than representing actual long barrel beads.



Figure 245: Bodhisattva probably adorned with long barrel beads (h. ca. 64 cm; Lahore Museum; provenance unknown) (Photographs: author's own)

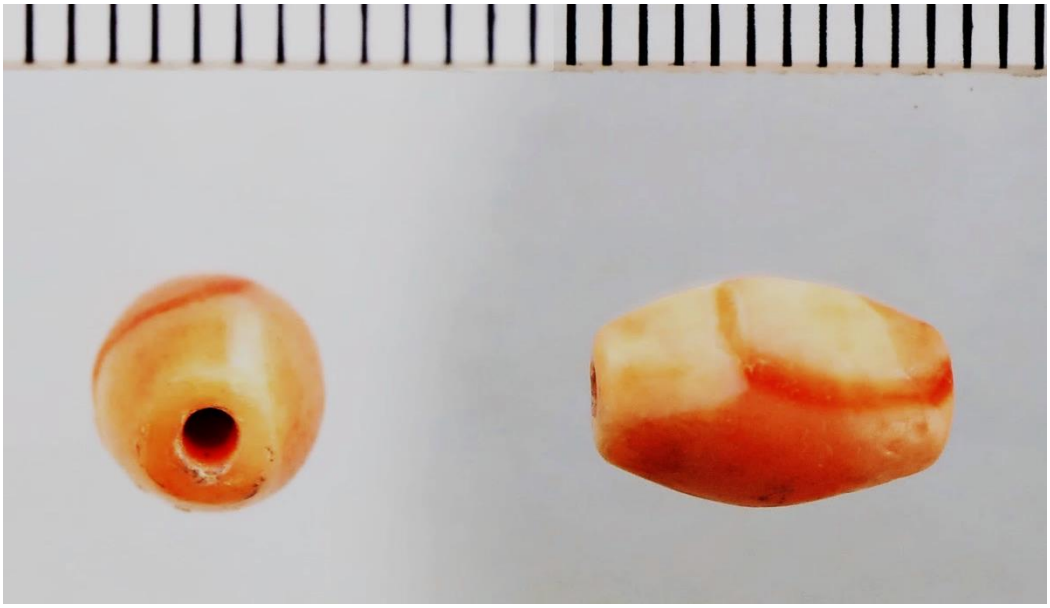


Figure 246: Long barrel bead of carnelian from Barikot (BKG 2630)

8.2.10 Case Study 10: Short biconical beads

Very few short biconical beads of carnelian have been found from the excavations of Barikot, which seems to mirror similar trends at several other sites such as Sonkh and Ahichchhatra (Dikshit 1952; Härtel 1993). Similarly, only one rare Gandharan Bodhisattva sculpture of Siddhārtha Gautama from Shabaz-Garhi that is on display in the Musée Guimet is seen adorned with a short biconical bead (Figure 247). It is likely that the carved bead represents a material of high-quality again possibly carnelian. Other stone varieties of high-quality are usually not produced in short biconical forms but cannot be completely ruled out. A single short biconical bead of carnelian with a red colour (BKG 3378: Figure 248a) was found from the Saka-Parthian levels of Barikot (Macrophase 3b: 1st BCE-1st century CE) while another carnelian bead with an orange colour (BKG 1178: Figure 248b) was found from the Kushano-Sasanian layers of Barikot (Macrophase 5b: second half of the 3rd century CE). No short biconical carnelian bead has been found from the Kushana periods of Barikot yet (Macrophase 4a-b and 5a), however, it should be noted that the sample size of the carnelian beads is currently very small, hence, it is highly likely that these types of beads were also in use during the intervening Kushana period at Barikot. Despite the fact that no comparable bead was found from the Kushana layers of Barikot, it is clear that the sculptor did not carve an imaginative form but faithfully reproduced a real, short biconical bead, which he or she must have seen in person.



Figure 247: Short biconical bead on Bodhisattva Siddhārtha Gautama (h. 120 cm; Shabaz-Garhi; Musée Guimet) (Photographs: author's own)

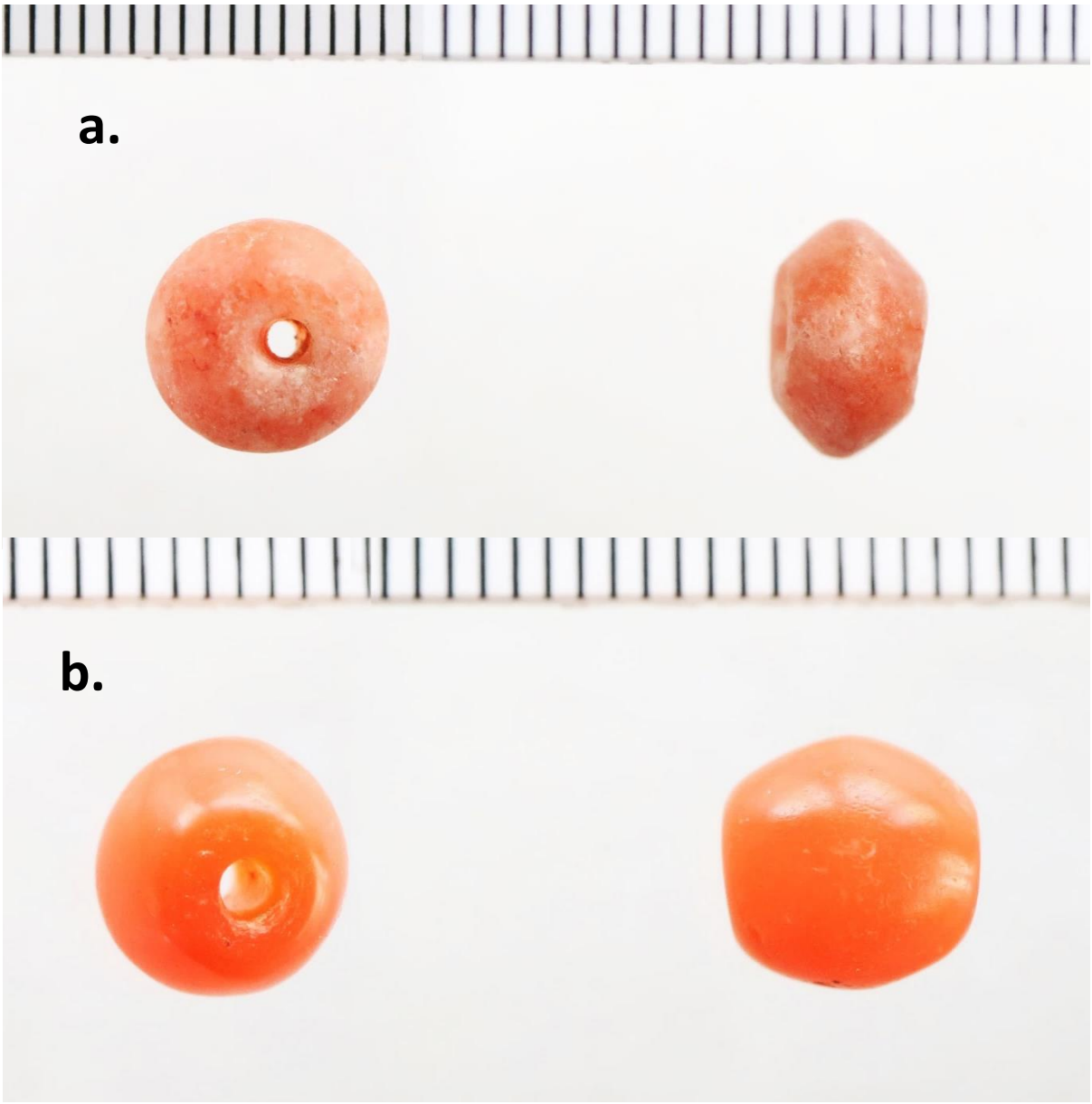


Figure 248: a) Short biconical bead of red carnelian from Barikot (BKG 3378) b) Short biconical bead of orange carnelian from Barikot (BKG 1178) (Photographs: author's own)

8.2.11 Case Study 11: Cornerless cube beads

As already mentioned above, faceted forms of beads are popular characteristic features adorning the Gandharan art sculptures. A sculpture of Hariti with three children from the site of Sikri is adorned with a variety of faceted beads (Figure 249a-b). On her head, she wears a headdress composed of three horizontal rows of long faceted beads interrupted at regular intervals by large spacer beads (three hole) displaying a flower motif. Despite the weathered conditions of the beads, the faceted rows of beads bear some resemblance to the agate and glass beads found from Sirkap in Taxila defined as 'cornerless cube'

by Beck (Beck 1941: Pl. III no. 31-32; Pl. IX no. 21). A single cornerless cube bead of garnet shown in figure 249c (Ser. 4175) was also found from the Kushana period of Barikot (Macrophase 4b: 2nd century CE) while two blue-and-white cornerless cube beads of glass derive from the Kushano-Sasanian and post-Kushana periods of Barikot (Macrophase 6 and 7: 300 – 600 CE). It should also be noted that the carved beads are also to some extent stylistically similar to a carnelian bead found from Jandial near Taxila, which has been described as 'double pentagon' by Beck (Beck 1941: Pl. IV no. 39). A bead with a double pentagon shape was, however, not found from Barikot. Due to the weathered conditions of the carved beads, it is challenging to extrapolate the finer shape details of most of the represented beads in the headdress. The surviving evidence, however, suggests that the original shape, which was conceived by the artist, was probably based on real beads with the cornerless cube beads representing the closest parallel in this regard.

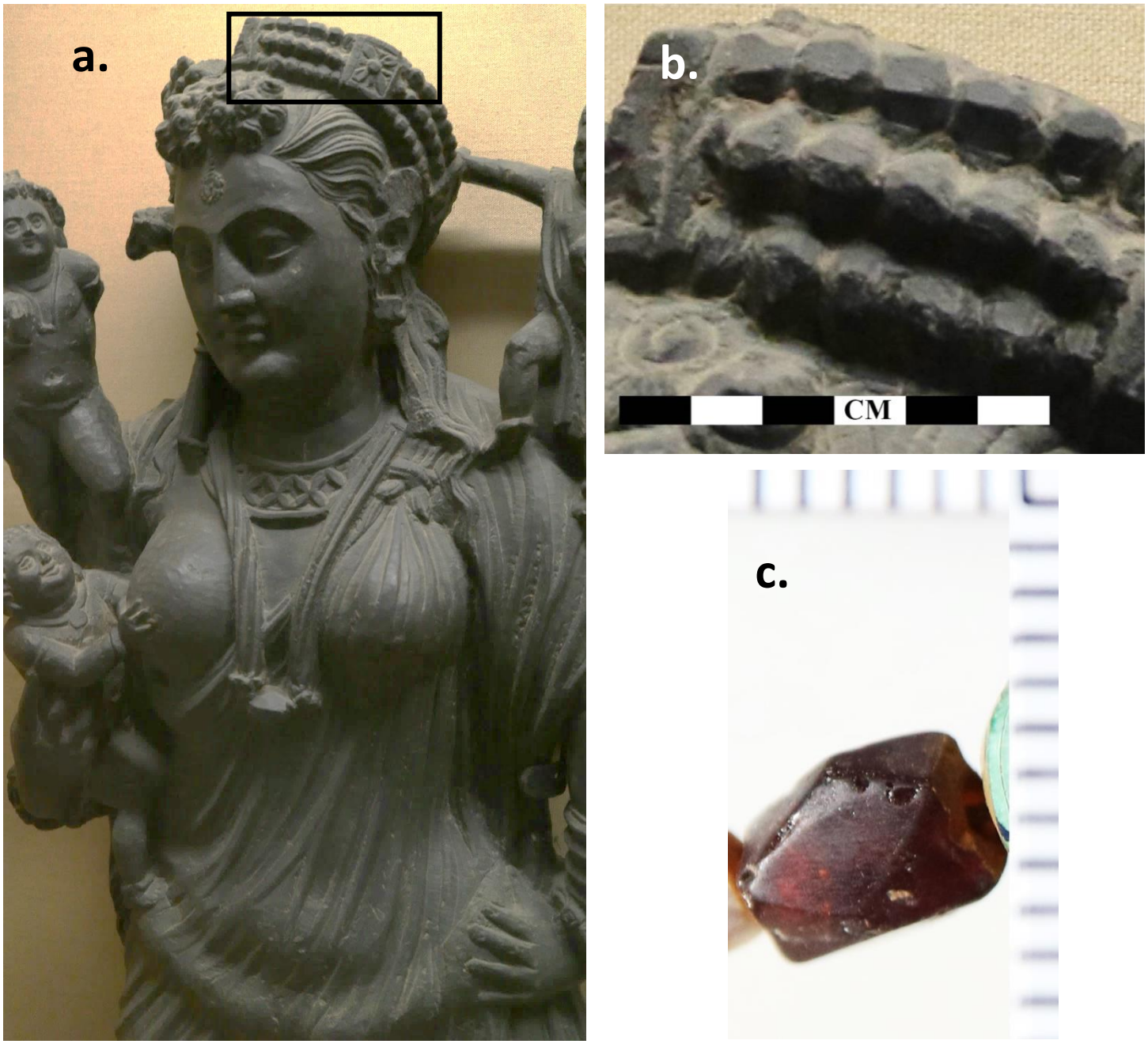


Figure 249: a-b) Hariti adorned with rows of faceted beads (h. 90.8 cm; Sikri; Lahore Museum) c) Cornerless cube bead of garnet from Barikot (Ser. 4175) (Photographs: author's own)

8.2.12 Case Study 12: Hexagonal-faceted cylindrical/barrel and flower shaped beads

A hexagonal-faceted cylindrical or barrel bead can be seen as part of a headdress positioned in the centre on the forehead of a half-life size Bodhisattva framed by two other beads made in the form of flowers with five petals (Figure 250a-b). While it is possible that the faceted bead is the same type of bead that was discussed in case study six, there are several factors that may suggest otherwise. This bead is

visually depicted differently from the hexagonal faceted cylindrical/barrel-shaped bead that was discussed in case study six. The method of adornment is also different with the present bead being flanked by a pair of flowers rather than by short barrel-shaped beads. Besides, by comparison, the Bodhisattva of case study six is produced artistically with a greater level of iconographic complexity possibly deriving from a different chronological or geographical setting. As a result, it is possible that a material other than beryl-aquamarine is represented on the Bodhisattva in the current case study. The style and technique applied to produce the facets is strongly reminiscent of rock crystal although other stone varieties such as carnelian or amethyst that come archaeologically in a great range of shapes may equally represent potential matches.

As already pointed out, faceted beads especially made from stones represent a characteristic feature of the ornamental traditions of the people especially of the Kushana periods of Gandhara and other parts of the subcontinent (Beck 1941; Sinha and Roy 1969). The examination of the recovered beads from the various sites indicates that the number of facets and styles greatly varied from bead to bead, which consequently does not represent a limiting factor when attempting to correlate archaeological beads with the forms of beads carved on the Gandharan imagery. There is no doubt that the highly skilled Gandharan craftspeople were, indeed, capable of producing any type of bead with any number of facet combinations as the surviving archaeological evidence indicates. As such, the excavations at Barikot have revealed an octagonal-faceted long barrel bead of rock crystal (Ser. 4359: Figure 250c), which forms the closest typological match with the bead cut in stone of the Bodhisattva.

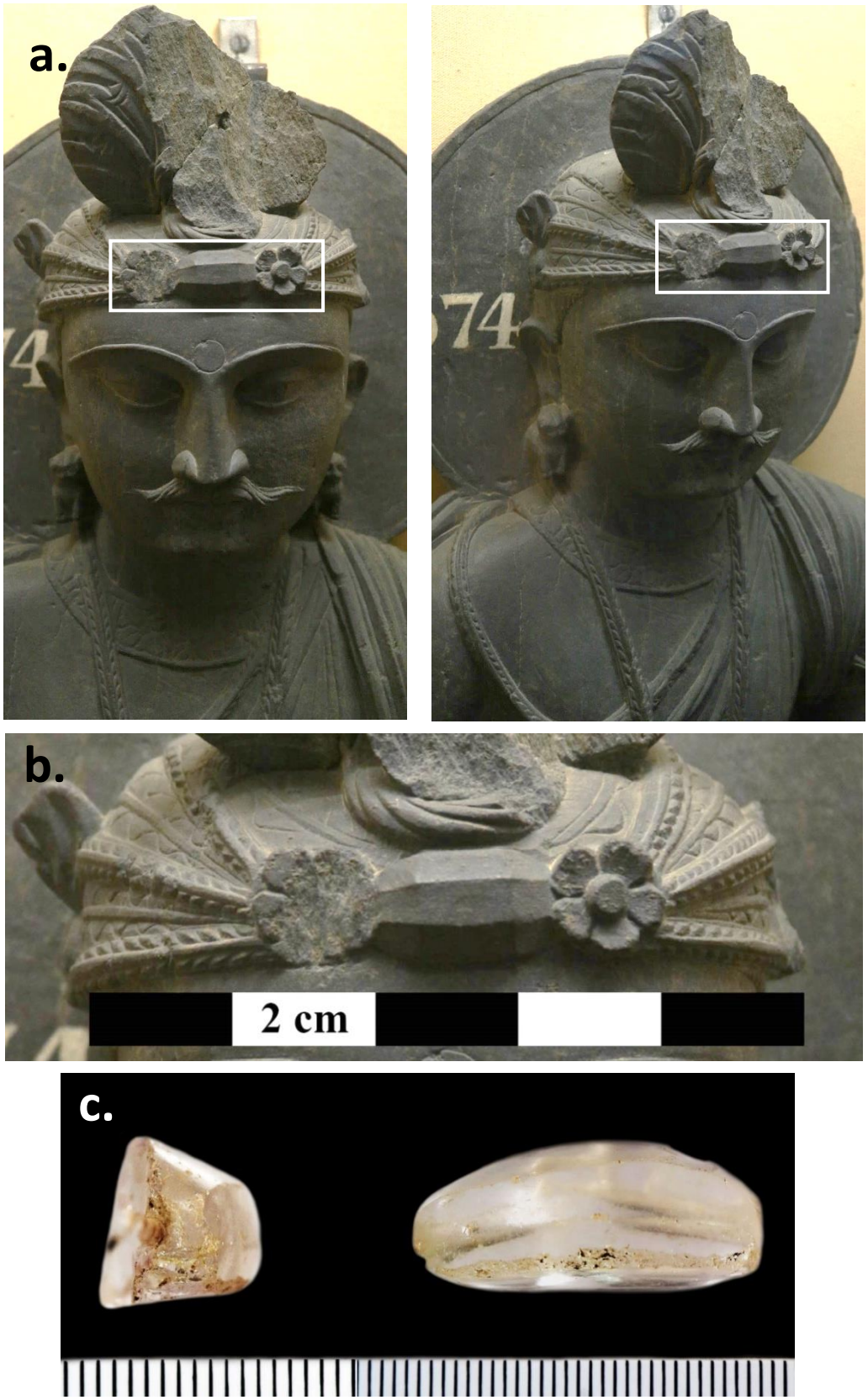


Figure 250: a-b) Carved hexagonal-faceted cylindrical or barrel bead on Bodhisattva flanked by two flower shaped beads (h. 69.9 cm; provenance unknown; Lahore Museum) c) Octagonal-faceted barrel bead of rock crystal from Barikot (Ser. 4359) (Photographs: author' own)

With regards to the two flanking flower shaped beads on this sculpture, they are perforated from their side sections rather than through their cross-section. Interestingly, several parallels have been discovered in the archaeological bead assemblages from Barikot. Similar types of flower shaped beads are found from the Kushana and Kushano-Sasanian periods of Barikot (BKG 4352 and BKG 2328). They come with multiple perforations (spacer beads) and are made from marine shell (Ser. 4352: Figure 251a). The sculpted flower beads, however, probably have only a single perforation in which three approaching small strings or chains can be seen entering, exiting from the other end moving into the perforation of the faceted stone bead. Gadrooned short barrel beads of lapis lazuli have also been found from the Kushana periods of Barikot (Ser. 4333: Figure 251b) and are reminiscent of the flower shape, but they are perforated through their cross-section rather than through their sides. It is likely that a higher-quality material was chosen by the artist to represent the floral ornament in the sculpture rather than marine shell. Many small gold flowers, for example, have been found from Gandharan reliquaries that were probably meant to be strung and worn (Brown 2006: 190).

Flower motifs are a major characteristic feature in Gandharan art and lotus flowers are extensively mentioned in Mahāyāna Buddhist scriptures (the Buddha is, for example, seated on a large lotus blossom in the Mohammed-Nari Stele, Lahore Museum; Rhi 2003). If the intention of the artist was to reflect lotus flowers on the Bodhisattva imagery, then it is possible that they denoted symbolic values of purity, fragrance, victory, immortality and transcendent dominion (Rhi 2003; Schmidt 2012: 670). Alternatively, they may symbolise the law or *Dharma* (teachings of the Buddha) due to their resemblance to a wheel (Fabrègues 1991: 318). Whichever interpretation is applicable to this Bodhisattva will depend on a critical assessment of the various textual sources. The examination of the archaeological context, in which this sculpture was found, may also facilitate the correct symbolic interpretation of the flowers, which, currently remains inconclusive as a result of the poor documentation methods employed by the early excavators and investigators. On the other hand, it is possible that the flowers that are depicted in the art represent the adornment of real flowers rather than actual beads. Flowers can be seen commonly on the headdresses of Indus figurines and also on the ‘Baroque lady’ figurines of the Early Historic period.

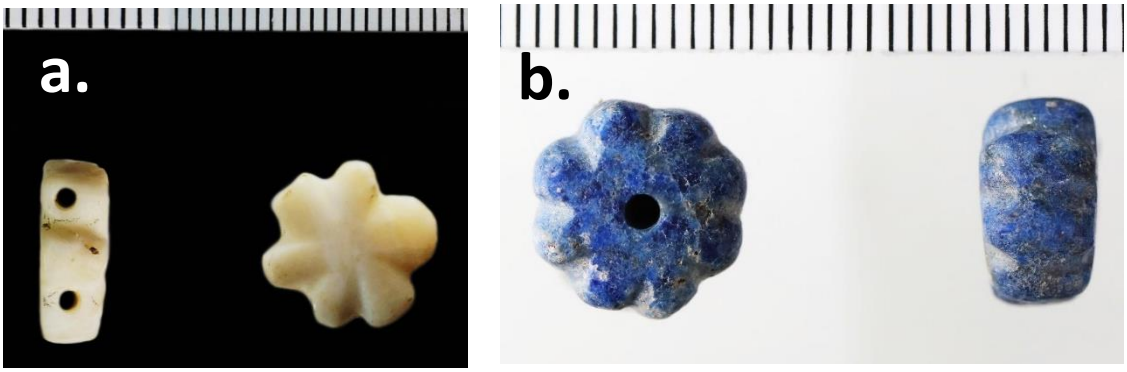


Figure 251: a) Flower shaped two hole spacer bead of marine shell from Barikot (Ser. 4352) b) Gadrooned short barrel bead of lapis lazuli from Barikot (Ser. 4333) (Photographs: author's own)

8.2.13 Case Study 13: Double axe shaped beads

Among a large repertoire of sculptures, a standing female figure has been found from Butkara I in Swat (Faccenna 1964: Pl: CDXXIX b no. 743). She wears a very elaborate selection of ornaments across the length and breadth of her body including elongated spiral ear-pendants, a short necklace with trapezoidal pendants and a long necklace of three rows of stylised beads. The most noteworthy ornamental feature of this figure is the use of a *mekhalā* or girdle of five rows consisting of alternating circular and possibly double axe shaped beads (Figure 252a). Multiple rows of beads, as part of a girdle, are well-documented in the art of Gandhara and other parts of the subcontinent (see, for example, the sleeping female dancer and musician sculpture from Dharmarajika, Taxila Museum; Ray 2014). The choice of depicting potential double axe shaped beads would represent an interesting stylistic development and, consequently, be of particular significance to discuss in the current study.

Double axe shaped beads of marine shell (BKG 2917: Figure 93a) have indeed been found from the Kushana periods of Barikot (Macrophase 4a: 1st-2nd century CE) but due to the richly decorated nature of the figure, it is unlikely that low-quality materials would have found their way into the attire of this image. It is more likely that the actual template of the artist was based on the double axe shaped beads made from carnelian. Although examples of carnelian have not been found from Barikot, they have been recovered from Bhir Mound in Taxila (Beck 1941: Pl. II no. 14-15). Therefore, it is possible to argue for a potential correlation between these two beads. It should be stressed, however, that the sculpted beads are extremely small and there are also no other distinguishing details associated with it that would provide a stronger link with the retrieved double axe shaped beads of carnelian from the archaeological record of Taxila (Figure 252b). The chronological limitations associated with the various sites in Taxila also need to be taken into consideration, which can only be resolved through new stratigraphically controlled excavations in the future.

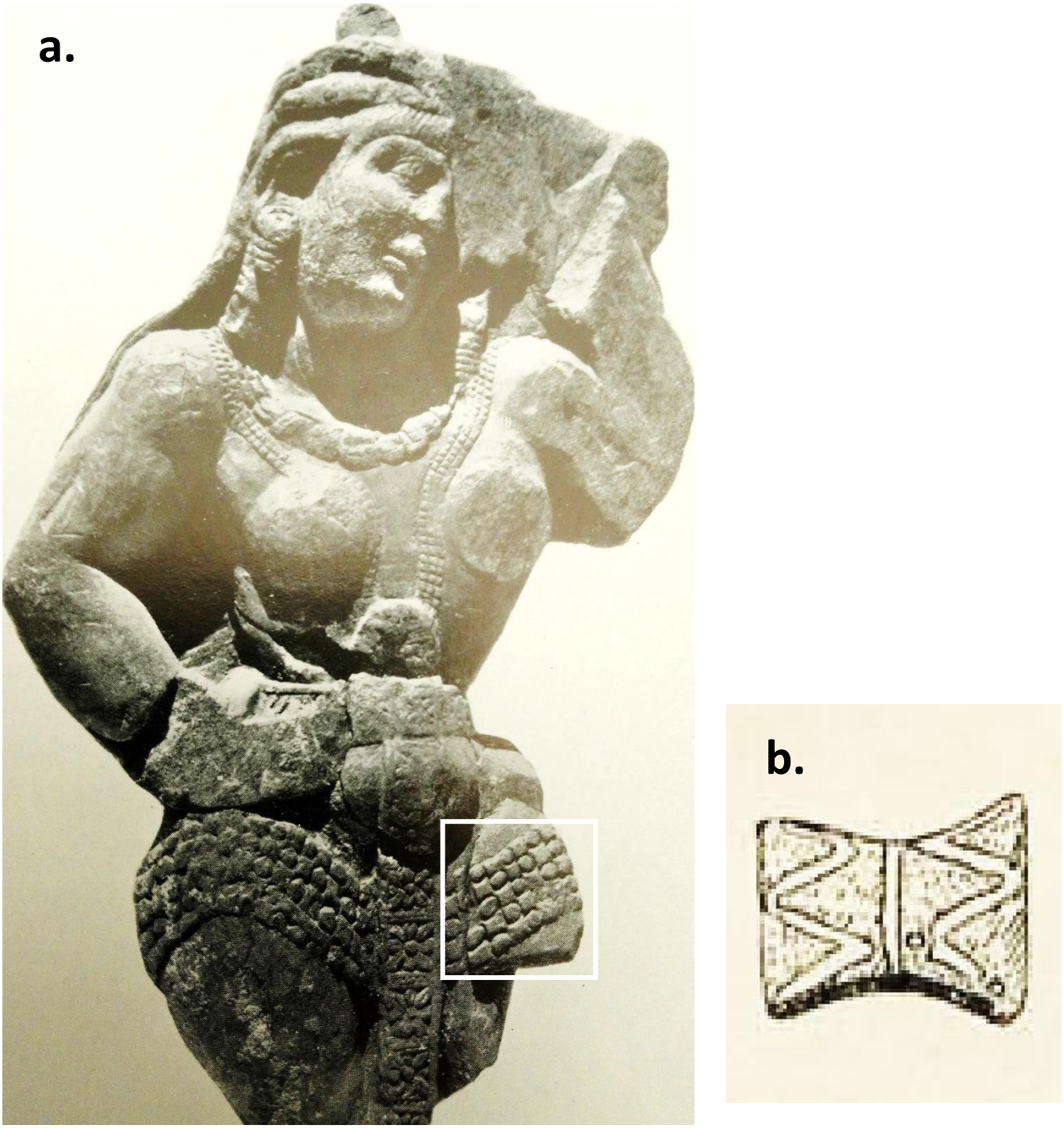


Figure 252: a) Female figure with a girdle consisting of rows of alternating circular and possibly double axe shaped beads (h. 0.49 cm; Butkara I; Faccenna 1964: CDXXIX no. 743) b) Double axe shaped bead of bleached carnelian from Bhir Mound (Beck 1941: Pl. II no. 14)

8.2.14 Case Study 14: Faceted barrel shaped bead?

Another Bodhisattva Avalokiteśhvara appears to be decorated with a barrel-shaped bead (Figure 253a-b). It is important to point out that there are numerous low depressions on the exterior surface of the carved bead, which are unlike the deep depressions of the carved 'eye' bead of cement stone discussed in case study two. These fine depressions appear to be divided into three rows moving around the exterior surface of the bead. It may well represent a bead of a different nature, although it must be borne in mind that no bead has been found from the archaeological assemblage yet that would match the iconographic evidence. As such, it may either represent a stylised or idealised form of a bead or does, indeed, represent a barrel-shaped bead of carnelian, agate, rock crystal or jasper. The apparent depressions may, instead, simply reflect the presence of facets and/or the effects of post-depositional weathering. Although faceted barrel-shaped stone beads have been found from Barikot, none of them qualify typologically with the example depicted in the visual art. Instead, there are several faceted stone beads made from quartz, agate, and jasper from Taxila and Vaisali, which appear typologically similar to the bead adorning the Bodhisattva and may, hence, represent potential matches with the sculpted bead (Beck 1941: Pl. III no. 28; Pl. V no.19; Sinha and Roy 1969: Pl. LXV no. 18-19, 22).

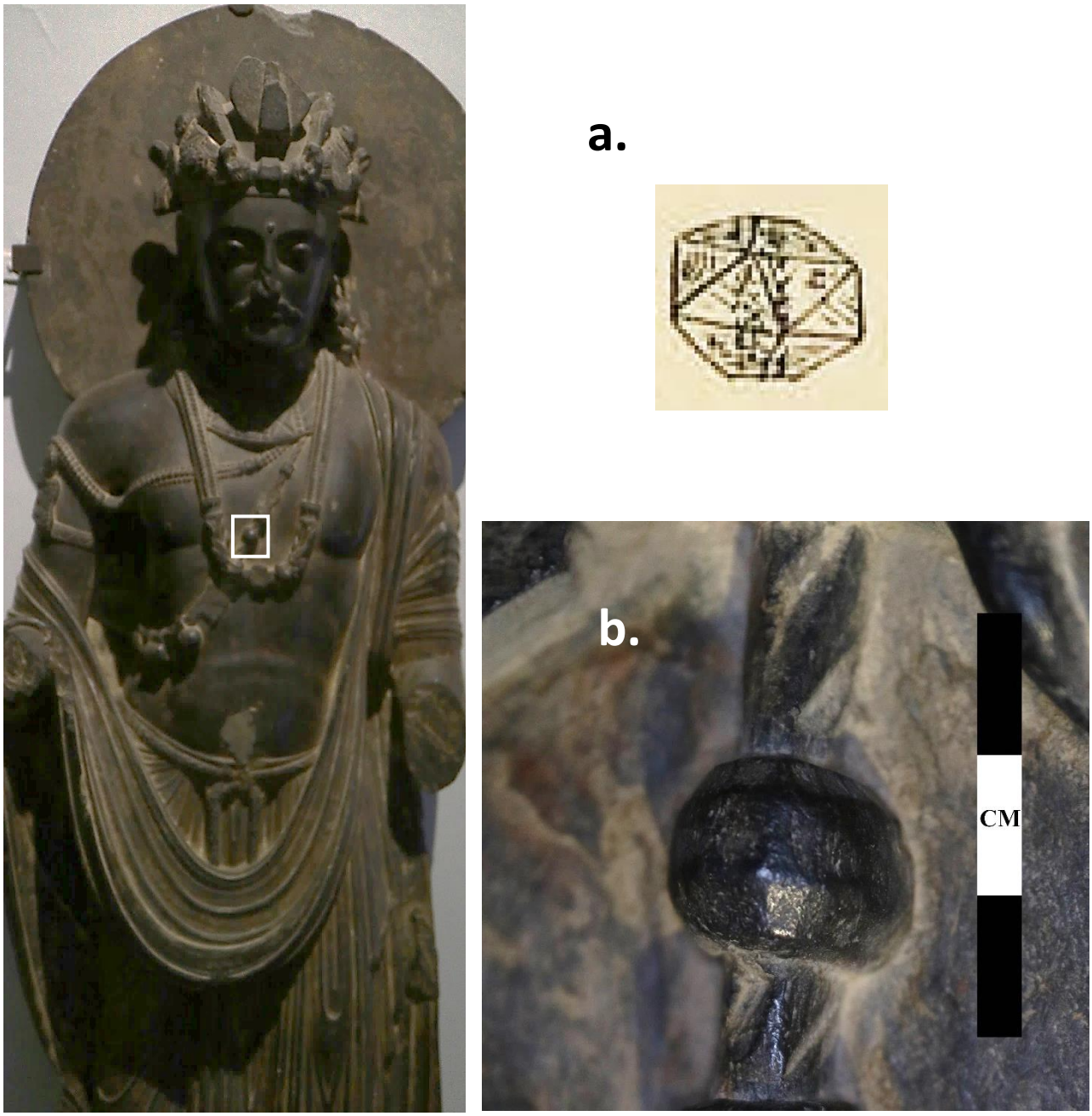


Figure 253: a) Double pentagon bead of quartz from Sirkap, Taxila (Beck 1941: Pl. V no. 19) b) Possible faceted barrel-shaped bead carved on Bodhisattva Avalokiteśhvara (h. ca. 124 cm; Sahri-Bahlol; Peshawar Museum) (Photographs: author's own)

8.2.15 Case Study 15: Faceted long cylindrical spacer bead?

The next example shows a carved object that is depicted on a Bodhisattva Maitreya, which may represent a faceted long cylindrical three hole spacer bead (Figure 254) as indicated by the incoming three strings holding small beads on either ends of the object (probably pearl beads). Again, no spacer bead of such a type has been recovered from the excavations at Barikot. The only bead, which shows a similar configuration is a long faceted barrel-shaped spacer bead of garnet recovered from Bhir Mound in Taxila (Beck 1941: Pl. VI no. 28). Although it has only two perforations, the shape is in agreement with the iconographic evidence while the popularity of garnet by the Kushanas has already been established. Spacer beads made from various materials and in different shapes are well-documented from the Kushana periods of Gandhara (Beck 1941). At the same time, numerous male and female sculptures are embellished with various types of spacer beads (see, for example, Athena from Naogram and Hariti from Sikri, Lahore Museum). The archaeological spacer beads found from Barikot, however, are all made from marine shell and it is clear that this durable, organic material enjoyed a specific cultic function at Barikot especially during the Kushana and Kushano-Sasanian periods (see section 8.3).

Although, it is likely that a higher-quality material is reflected in the imagery, it should be taken into account that the proposed garnet bead from Taxila is reported to date to the 3rd century BCE. Hence, it is possible that the artist was, in fact, not referencing a stone spacer bead but potentially some form of a metal silver or gold ornament as there are currently no comparable spacer beads from any site of this general time. The chronological uncertainties associated with the excavations at Taxila, however, make it difficult to argue against the production of this garnet bead during the Kushana period. The recovery of new, stratified beads of this type in the future will establish a reliable chronological framework for the various artefacts recovered from Taxila, which may enable us to assign a more reliable date to this faceted bead of garnet. Since the production and use of spacer beads and faceted beads was quite common during the Kushana period, a possible identification of the sculpted ornament with a faceted spacer stone bead of high-quality cannot be entirely ruled out at present.



Figure 254: Possible faceted long cylindrical spacer bead or a precious metal ornament on Bodhisattva Maitreya (h. 120 cm; Shari-Bahlol; Peshawar Museum) (Photographs: author's own)

8.2.16. Case Study 16: Short spherical and barrel beads

The next sculpture represents Hariti with a trident and four arms found from the monastic site of Sahri-Bahlol. Hariti is adorned with a long necklace around her neck made of three strands of extremely small beads probably representing pearl beads as indicated by their shape, small size and large quantity (Figure 255a-b). Several long and short barrel beads of pearl have been found from Barikot as well (Ser. 4175: Figure 101), which are typologically similar to the iconographic depictions (Macrophase 4b: 2nd century CE). They are commonly found engraved on both male and female figures in the Gandharan

art. The pearl has been interpreted by its luminosity and brilliance to symbolise the Buddha and the Doctrine. As a symbol of purity, it may represent the truth of the Buddha and the veracity of the Law (Eitel 1888; Fabrègues 1991: 316; Saunders 1960). As already stated above, interpretations dealing with symbolic meaning that are based upon textual records must be treated with caution as they should ideally derive from the same local geographic area and time period as the sculpture itself. In addition, these pearl beads meet three large beads at the centre of the necklace, which are spherical in shape (Figure 255b).

At a first glance, the surface features of these three spherical beads appear to show some stylistic affinities with a special type of material that is beads made from seeds or *Elaeocarpus ganitrus* (Sanskrit: *rudrākṣa*), which grow in the foothills of the Himalayas. *Elaeocarpus ganitrus* is a large evergreen broad-leaved tree whose seed is traditionally used for prayer beads (Joshi and Jain 2014). On the other hand, no seed bead of any kind has been found from the Kushana period of Barikot. It can be argued that any organic material may simply not have become preserved in the archaeological record.

However, hundreds of well-preserved seeds of rice and wheat have been discovered from Barikot, casting doubt on the validity of this possibility. There is another point, which renders an artistic association with perforated seeds as highly unlikely. Upon closer examination, the exterior surfaces of the three carved beads are more likely to have undergone severe weathering, making it problematic to determine the original nature of the surface. Some exterior areas appear to have had originally a smoother surface and, as such, it is likely that the carver was imitating three spherical stone beads of high-quality. Hence, the three carved beads probably represent actual prototypes of short spherical carnelian beads (BKG 1296: Figure 255c), which are well-documented from the Kushana period of Barikot (Macrophase 4b: 2nd century CE).



Figure 255: a-b) Hariti with a necklace consisting of short spherical and small barrel-shaped beads (h. 122 cm; Shari-Bahlol; Peshawar Museum) c) Short spherical bead of red carnelian from Barikot (BKG 1296) (Photographs: author's own)

8.2.17 Case Study 17: Tubular bead with a bulbous end

The imagery of a smiling Bodhisattva housed in the Musée Guimet (Figure 256a-b) is seen decorated with a silver or gold finial. It is not a single bead, but it is probably a tubular silver bead with a bulbous end. A similar sculpted bead is also decorating a Bodhisattva Maitreya image discovered from Shari Bahlol, which is now housed in the Peshawar Museum. The closest comparable analogue to the iconographic record is documented in the archaeological assemblage from Barikot (BKG 5092: Figure 256c) in the form of a gadrooned barrel-shaped bead of glass (Macrophase 4-5). At the same time, the carved bead is typologically similar to the gadrooned short barrel bead of lapis lazuli that was discussed in case study 12 (BKG 4333), although it is shorter in length than the sculpted bead. Although the shape and size of both BKG 5092 and the carved bead of the Bodhisattva are comparable, it cannot be ruled out that the artist may have been referencing a real tubular silver bead with a bulbous end. The precise nature of the material will also remain debatable because both lapis lazuli and glass were popular raw materials that were utilised during the Kushana period.



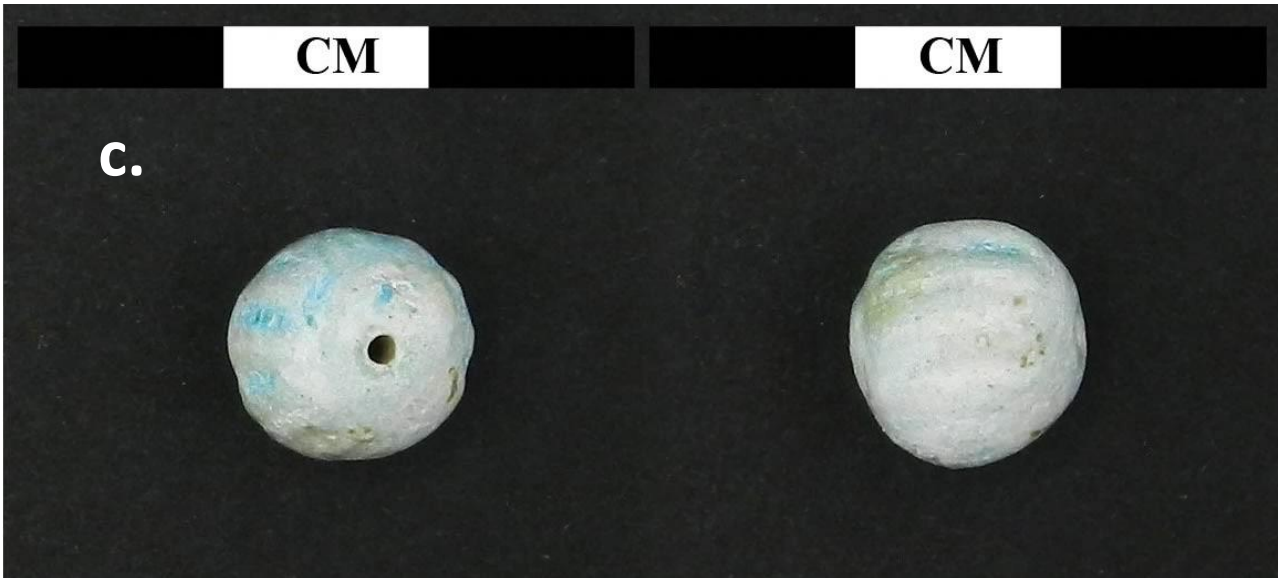


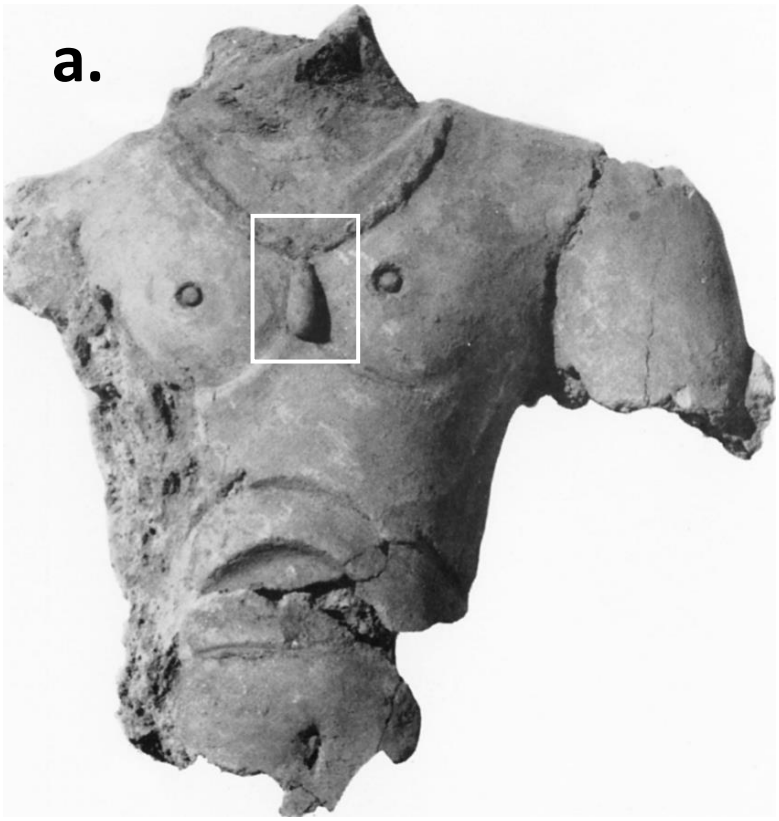
Figure 256: a-b) Tubular bead with a bulbous end adorning a smiling Bodhisattva (h. 46 cm; Musée Guimet; provenance unknown) c) Gadrooned barrel-shaped bead of glass from Barikot (BKG 5092) (Photographs: author's own and ISMEO)

8.2.18 Case Study 18: Drop-shaped pendant

Established during the Kushana period, the excavations at the Gandharan Buddhist site of Tapa Sardār have unearthed a large *stupa* surrounded by several minor *stupas* and *vihāras*. Numerous sculptures of the Buddha, the Bodhisattvas and other figures were found during the excavations, forming the great majority of the finds. Rather than made from schist stone, they consist of unbaked clay mixed with straw on the inside, while the outside layer, is of red clay - a material which was very suitable for modelling, hard-wearing, and gave a good consistency (Taddei 1968; Taddei and Verardi 1978). A well-grounded dating for these buildings and monuments can currently not be suggested but it appears that they are associated with the later chronological periods of the site (Taddei 1968; Taddei and Verardi 1978). From *vihāra* 17, a unique sculpture was found (Figure 257a) placed in front of a figure of the Buddha (TS. 900: Figure 133). It shows a male torso with strongly emphasised musculature, wearing a necklace with a marked drop-shaped pendant on it (Taddei and Verardi 1978: 85, 101-102).

Interestingly, three drop-shaped pendants of banded agate have been found from Bhir Mound and the Dharmarajika *stupa* in Taxila while one agate pendant was recovered from the site of Rang Mahal (Beck 1951: Pl. III no. 12, 13, 36; Rydh 1959: Pl. 82 no. 17; Uesugi and Rienjang 2018). However, the chronological problems associated with Taxila, Rang Mahal and other sites cannot provide a precise date for the production and use of these archaeological ornaments or the proposed sculpture from Tapa Sardār. On the other hand, the excavations at Barikot have revealed a unique drop-shaped pendant of banded carnelian (BKG 1158: Figure 257b), deriving from the Kushano-Sasanian period (Macrophase 6: 4th century CE). The recovery of BKG 1158 marks the first appearance of this type at Barikot and, in

this case, proves that the sculpted pendant from Tapa Sardār is based on a real prototype. The discovery of the carnelian pendant from Barikot may also provide a more secure date to the sculpture from Tapa Sardār - in or around the 4th century CE. However, it is premature to agree on this date for the sculpture as a drop-shaped pendant of marine shell was also recovered from Barikot (BKG 4196), which is dated between ca. 400 – 1000 CE (Macrophase 7-8). It is unlikely that a pendant of marine shell would have constituted part of the necklace in the sculpture from Tapa Sardār for reasons already discussed in the earlier case-studies. The pendant of marine shell does, however, indicate that drop-shaped pendants remained in circulation after the 4th century CE (in very small numbers) and, thus, it may be possible to tentatively assign a 4th century CE date to the male torso from Tapa Sardār.



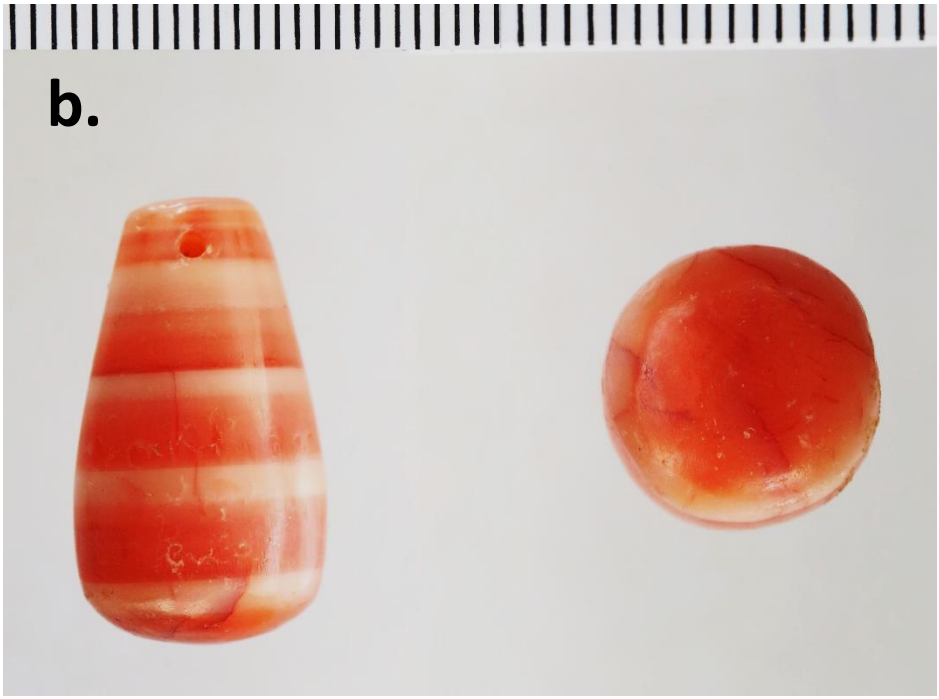


Figure 257: a) Male torso wearing a necklace with a drop-shaped pendant (h. 30 cm; Tapa Sardār; Taddei and Verardi 1978: Fig. 133 TS 900) b) Drop-shaped pendant of banded carnelian from Barikot (BKG 1158) (Photograph: author's own)

8.2.19 Summary

There can be no doubt that at least some of the beads depicted in the Gandharan art especially the Bodhisattva images were based on actual real-life prototypes. From a visual perspective, there are several strong parallels between the two sources of evidence with only minor differences as a result of the sheer variability among the bead types as well as the weathered conditions of the carved ornaments. It is highly likely that the proposed beads were highly valued and well-polished to create not only a light receiving and reflecting effect but also to symbolically denote purity, luminous qualities and divine properties. Further, the identification of the portrayed beads has shed light on the long-distance trade network that was operating at the time with carnelian, for example, imported from either Gujarat to the south-east and/or the region of Sistān in Iran to the south-west (Law 2011; Tosi 1969: 374).

This analysis has also shown that both male and female groups adorned themselves with a great range of bead ornaments and jewellery in Gandhara as they did in other parts of the subcontinent during the same time range (Fabrègues 1991). In fact, various types of beads with both geometric and figurative forms derive from the Kushana periods of Barikot, signifying a period of economic growth and prosperity. Furthermore, the study of the Gandharan art ornaments by the present author shows that beads were worn across different parts of the body rather than restricted to a specific area. The collared

beads, for example, can be seen positioned on the chest as well as around the shoulder of the Bodhisattvas. They were also worn on the forehead as part of the headdress of some of the figures. It is also interesting to note their presence among the artistic traditions of Gangetic India as evidenced, for example, by the sculpture of a female figure from the site of Sanghol embellished with a multi-stranded girdle consisting of numerous collared beads (Gupta 1987: 99-100).

It is also important to point out that there are some types of beads that are strongly related to the Buddhist religious sphere and would have been expected to be prominently featured in the assemblage of the studied sculptures especially on the religious statues of the Bodhisattvas – yet their depiction remains under-represented. The *Triratna* symbol (Pali: *ti-ratana*; Sanskrit: *tri-ratna*), for instance, represents the 'Three Jewels of Buddhism' (the Buddha, the Dharma, and the Sangha) and is commonly found widely distributed as a bead of carnelian or garnet (Beck 1941; Pongpanich 2017). It is, however, hardly seen used as a bead in the iconographic assemblage of Gandhara (Anwar 2019: 72), which has also been noticed by Fabrègues (Fabrègues 1991: 316).

That is not to say that beads associated with Buddhism are completely absent from the art corpus of Gandhara. On the contrary, the ghata-shaped forms of beads, for example, are strong candidates for the visible presence of Buddhism in the visual art of Gandhara. A potential religious connection is also indicated by the recovery of butterfly nut beads from the Kushana period of Gandhara (BKG 1534: Figure 106), which can be linked to the pipal-leaf ornaments suspended as central pendants as part of beaded belts worn by female divinities in the visual art of Gandhara (Fischer 1897: 62; Juhel 2014: 41-42; Marshall 1960: Pl. 61).

On the other hand, many contemporary sculptures from other sites of the subcontinent including Bharhut, Sanchi, and Sarnath have been noted to be decorated with *triratna* beads (Pongpanich 2017: 387), suggesting that some of the Buddhist communities deliberately depicted, omitted and/or stylised certain forms of beads in their art according to their needs and preferences. In Gandhara, faceted bead forms and spacer beads, for example, were especially popular as evidenced from the archaeological evidence and the visual art. Many of the archaeological beads, however, are not depicted on the Gandharan art as evidenced by the study on the bead assemblages unearthed from Barikot and other sites. Therefore, the results obtained from the current study on the iconography appear to support J. Rhi argument (outlined above) that 'art serving a religion tends to represent certain aspects of religious ideas and practices better than others' (Rhi 2003: 154).

This study has also shown that some of the sculpted beads are somewhat larger in size than the actual archaeological beads while some of the carved beads, especially those depicted on the half-life size statues, show evidence of being simpler in form and artistic elaboration. Another critical investigation should be conducted on the bead assemblages from Taxila, representing a key metropolitan site of much greater archaeological significance, taking its chronological limitations into account. Likewise, it would

be beneficial to study on a greater scale the carved ornaments depicted on the clay art assemblages found from the archaeological sites of eastern Afghanistan. The archaeological beads that have come to light from the excavation of these sites including the key-site of Mes Aynak appear to represent precise replicas of the beads adorning the clay sculptures recovered from various sites in the region (Forgione and Filigenzi, personal communication).

At the same time, there is a need to conduct more stratigraphically controlled excavations of historical sites across the subcontinent to obtain reliable information on the chronology of each new bead. Lastly, since the Gandharan art sculptures were originally painted or gilded, it may be useful to carry out a systematic pigment residue analysis of the bead ornaments adorning the visual art in an attempt to determine their original colour that would be reflective of the selected raw material. The results could provide a better understanding of the raw materials that were favoured and possibly utilised in reality by a range of different groups of people during the dynamic Kushana period of Gandhara.

8.3 Systems of 'value' and the beads from Barikot

In addition to the various attributes or variables outlined in Chapter 3, such as rarity of raw material or labour investment, the existence of textual accounts, iconographic depictions, and ethnographic parallels can also provide extremely useful information to shed light on systems of 'value' imbued in materials from the past (Ludvik 2018; Miller 2008: 146). Compared to the other time periods in the historical sequence of Gandhara, the Kushana and Kushano-Sasanian periods, currently, represent the most suitable chronological case-studies to determine the relative value of raw materials and their relationship to economic wealth, status, rank, symbolism, and ideology as multiple pieces of evidence and sources are available at our disposal. These include the discovery of literary traditions that actually inform us about the value of certain raw materials, a range of iconographic representations of beads as well as the benefit of having a well-documented understanding of the archaeological contexts of the finds. As such, several examples can be cited, which reveal the existence of systems of socio-economic and symbolic-ideological values imbued in various types of beads, which derive from the Kushana and Kushano-Sasanian periods of Barikot. The types of raw materials, which will be part of the discussions below, are lapis lazuli, cowrie and marine shells, carnelian, glass coated in gold as well as terracotta.

8.3.1 Lapis lazuli of the Kushana period

The geologic occurrence of lapis lazuli can be found at the steep and rocky Sari- Sang mines in the Badakhshan province of north-eastern Afghanistan approximately 260 km to the northwest of Barikot. The costs of acquisition, transport, and production combined may have been possibly lower compared to other long-distance materials such as carnelian and marine shell. Since the concerned shafts of lapis lazuli were located within the boundaries of Kushana territory (Figure 227), a reduction in costs would be additionally expected, although the material would have had to pass through the difficult highland regions of the Hindu Kush. Likewise, although the traveling distance may have been comparatively shorter, there were other economic variables that must have mattered and complicated the procurement of lapis lazuli including the use of a substantial amount of labour, equipment, wood and costly oil for extraction purposes (Mariottini et al. 2017: 164-165).

Furthermore, it is unclear if lapis lazuli arrived at Barikot through direct channels of movement while the precise route(s) along which transportation occurred also remains debatable. A network of river valleys and mountain passes through the Pamir and Hindu Kush, which connect the Chitral region with Gilgit, Badakhshan, Swat, and other parts of Gandhara. (Neelis 2001: 412, 508). It is possible that batches and blocks of unworked or semi-processed lapis lazuli were available for acquisition at some intermediate nodal point of travel (Chitral?) between Barikot and the actual geological sources in Badakhshan, but there is, to my knowledge, currently no archaeological evidence for the existence of such an acquisition centre for lapis lazuli that operated between the two locations during the Kushana and/or Kushano-Sasanian periods.

Given the quantity of lapis lazuli recovered from Barikot, the use of horses for transport purposes may have been a possibility not only enabling travel across the rugged terrain but also providing more safety and swift movement. Keeping horses required immense investment in time or money (Wilkinson 2012: 36) and, as a result, may have increased the resulting costs of the acquisition of desirable raw materials. The use of horses is, anyhow, well-documented in Gandharan art while the excavations at Barikot have also revealed terracotta figurines of horses with saddle as well as a large fragment of armoured lamellate iron legging intended for a cataphract horse rider (Olivieri 2014: 113). Pack animals such as camels, sheep, goats, mules, and bullocks represent another transportation choice to counter aridity and enable mountain crossings (Miller 2006: 287-288), although wheel-based vehicles may have possibly struggled to cross the steep, rocky, slopy terrain of highland regions.

Evidence for definite elite control is difficult to detect for any bead raw material at Barikot. Several fragments of lapis lazuli have been found in the excavations of the southern most areas (trenches 3 and L) as well as the eastern quarters of the city (trench 1). The part of trench 3 extending north of the defensive wall, so the area inside the fortification wall has revealed a large, single-planned palatial complex with a series of rooms (Callieri et al. 1990). This complex has revealed a single fragment (Ser. 4244: Figure 258a) as well as a complete long barrel bead made from lapis lazuli (Ser. 4132: Figure 258b). A few more fragments of lapis lazuli have come to light from the neighbouring trench L located just outside the city wall. No drill bits or unfinished beads have been reported that would point to the existence of specialised working areas or workshops. In light of these findings, the picture, which emerges is that of small-scale production of lapis lazuli potentially occurring in several locations at the site.

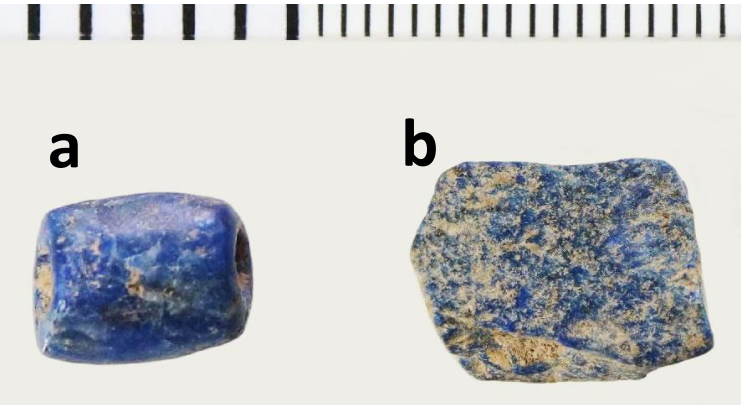


Figure 258: a) Long barrel bead of lapis lazuli (Ser. 4132) b) Fragment of lapis lazuli (Ser. 4244) (Photograph: author's own)

Regardless, lapis lazuli appears to have functioned as an important commodity primarily in the execution of local cultic practises and was probably imbued with symbolic-ideological values.

Archaeological excavations, for example, have revealed gadrooned short barrel beads of lapis lazuli, dating to the Kushana periods of Barikot (Ser. 4333: Figure 105b), which are reminiscent of the flower shape. As already discussed above, flower motifs are a major characteristic feature in Gandharan art and lotus flowers are extensively mentioned in *Mahāyāna* Buddhist scriptures (Fabregues 1991: 318; Rhi 2003; Schmidt 2012: 670). Associations with sacred religious meanings are also indicated by the discovery of other types of beads such as in the shape of a lion and the *trirantna* symbol from Taxila and Wardak (Beck 1941; Rienjang et al. 2017).

In addition, it is quite interesting to note the discovery of ten lapis lazuli beads (BKG 456) in a walled room (BKG 456) among a series of adjoining walled rooms with a set of 15 ghata and areca nut beads made from terracotta. In this area at least, there is no evidence for a division in the location of lapis lazuli and a commonly available material like terracotta. As such, symbolic-ideological values may have mattered more to the people of Barikot than systems of socio-economic values during the Kushana periods. Given the multi-faceted significance of lapis lazuli, various groups of merchants and pilgrims may have been involved in the transportation of the material to Barikot, travelling along a network of routes as indicated by the presence of religious inscriptions and rock drawings dating to the early to middle first millennium CE (Neelis 2001; 2011).

8.3.2 Cowrie shell of the Kushana period

A remarkable pendant made from red jasper has been found imitating the shape of a cowrie shell, which raises new research questions about the precise role played by cowrie shells in the past, in particular, in relation to the concept of 'symbolism' (Ser. 4294: Figure 94). The imitation of cowrie shells is, in fact, not limited to Barikot but can be evidenced from the material record of other contemporary sites including Sirkap in Taxila (Beck 1941: Pl. VIII no. 13). The symbolic-ideological value imbued in cowrie shells during the Kushana times is further supported by the discovery a half-life size female sculpture from the sacred stupa area of Butkara I, which is adorned with a perforated cowrie shell necklace (Faccenna 1964: Pl. CDXXXII no. 3969) (Figure 243).

At Barikot, five cowrie shells have been found from the Kushana periods (Macrophase 4a-b and 5a). These cowrie shells and the jasper pendant (Ser. 4294) have all been found in the south-western quarter of the urban settlement of Barikot (BKG 4-5 and 12) (Figure 38). The types of contexts of their deposition include a series of contiguous rooms, an outer area containing a quadrangular well, a sloped passageway next to the city wall (probably used for drainage), and the immediate vicinity outside the city wall. Interestingly, one cowrie shell was recovered from a small room that opens to a larger area, which contains a paved tank probably designed, according to the excavators, to furnish bathing facilities (Callieri et al. 1992). The nature of these contexts points towards an interpretation where complex cultic

or celebratory activities may have been possibly taking place, characterised by the use of cowrie shells in this part of the city.

Evidence for elite control over the production and/or use of cowrie shells is currently difficult to detect, but the fact that the recovered specimens were all found in the south-western part of the city potentially suggests for an attempt to restrict their distribution to other areas of the settlement. As the closest native habitats for the growth of cowrie shell populations or *Cypraea Moneta* are situated in the warm and shallow waters of the shores and lagoons of the Indian Ocean (Yang 2011: 2-3; Yang 2018), their transportation over a considerable distance, some 1200 km to the north of the coastal areas, may have accorded greater socio-economic value to them. Considering these factors, a hierarchy and system of 'value' becomes noticeable in which cowrie shells were probably imbued with more socio-economic and symbolic-ideological value than other raw materials such as red jasper.

8.3.3 Marine shell, carnelian, glass coated in gold and terracotta of the Kushana and Kushano-Sasanian periods

In general, long-distance shell materials were quite popular during the Kushana and Kushano-Sasanian periods at Barikot in a manner never experienced at the site before or after. Beads of marine shells have been found in various types of contexts at Barikot, which can be described as residential and sacred or cultic activity areas. A notable two hole spacer bead of marine shell (BKG 2490: Figure 120a), for example, has been found in the excavations from an area designated as Court 13 in trench BKG 11 (Figure 259). Here, the excavations have revealed a sacred and partly secluded space adorned with niches, an altar and votive benches, indicating that Court 13 was a setting specifically designed for carrying out Buddhist ceremonial practises, which is also supported by the discovery of various types of cultic offerings or donations such as shell bangles and other precious items (Olivieri 2014).

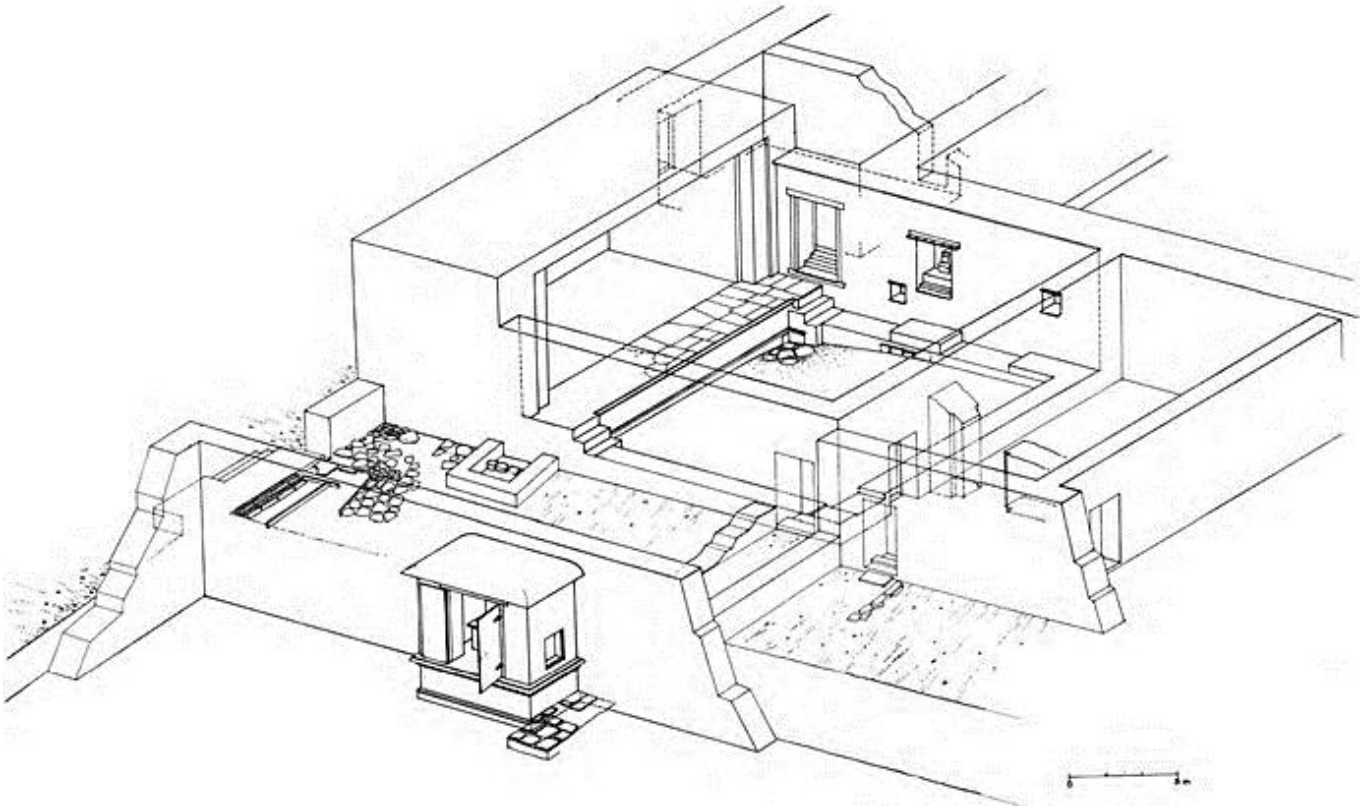


Figure 259: Isometric reconstruction of the sacred area of Court 13 in the north-western part of Barikot (Iori and Olivieri 2014: 107)

As BKG 2490 is also part of this cultic assemblage of finds, the significance of marine shell, as a material imbued with symbolic-ideological value, becomes similarly noticeable. An additional piece of evidence may potentially be reflected in the bead shape of BKG 2490, which appears to echo the form of the double-domed Gumbat Balo-Kale *vihāra* near the site of Barikot in Swat (Figure 120b). In addition, the existence of socio-economic and symbolic-ideological values imbued in marine shell can be deduced by the presence of other types of precious beads, which have been found from Court 13 as well. These include a long hexagonal-faceted barrel bead of carnelian (BKG 2453: Figure 236c), a short barrel-shaped glass bead coated in gold (BKG 2459: Figure 117) as well as a well-manufactured ghata-shaped terracotta bead of fine quality (BKG 2457: Figure 260). Systems of socio-economic and symbolic-ideological value(s) are also revealed by the discovery and examination of these materials in Court 13.

In terms of technological complexity, the carnelian bead (BKG 2453), for instance, has been drilled from two sides with single and double diamond drills. The exterior surface of the bead shows traces of chipping or flaking, heavy grinding on a hard stone followed by light grinding on a softer stone and

low-lustre polishing (Kenoyer, personal communication). There is also evidence of heavy string wear in the interior drill hole indicative of the long use of the bead in the past. Moreover, long hexagonal-faceted barrel beads and ghata-shaped beads can be seen reproduced in the religious art of Gandhara in the form of the Bodhisattva figures, providing some further evidence of socio-economic and symbolic-ideological values, which were imbued in these types of beads.



Figure 260: A ghata-shaped bead of terracotta (BKG 2457) (Photograph: author's own)

8.3.4 Summary

The discussions produced above have revealed evidence for the existence of socio-economic and symbolic-ideological values, which were probably imbued in some of the examined beads from Barikot. Many of the raw materials, including lapis lazuli, carnelian and glass coated in gold, appear to have been considered very important in the execution of Buddhist cultic or ceremonial activities during Kushana and Kushano-Sasanian periods. According to Neelis, 'Buddhist donations of precious commodities demonstrate an intertwined relationship between religious and economic values, since high-value/low-volume objects were highly significant as both commercial goods in long-distance trade exchanges and as Buddhist symbols' (Neelis 2011: 22; Neelis 2001: 506).

Confirmation is provided, as such, by the Buddhist textual sources of this time, which list a range of wealth commodities or the "seven jewels" (*saptaratna*) including gold, silver, crystal, lapis lazuli, carnelian, coral, and pearls. These materials are valorised as laudable donations in literary sources especially in the *Mahāyāna sūtras* (Khettry 2015: 52; Liu 1988: 93-94, 100; Neelis 2011: 22, 144; Neelis 2001: 506-509). The listing of these precious materials in literary religious traditions, the discovery of such materials in archaeological reliquaries (Neelis 2001: 509-510) and now, in cultic area

contexts of Barikot, provides evidence for the existence of systems of socio-economic and symbolic-ideological values, which characterised these materials in the early centuries of the common era.

In addition to low-volume raw materials, commonly available or abundant materials were also valued during the Kushana and Kushano-Sasanian periods. The ghata-shaped terracotta beads, for example, were most probably imbued with symbolic-ideological value. The discovery of terracotta in Court 13 is certainly interesting given the fact that terracotta beads are, to my knowledge, neither found as donations in relic deposits in stupas nor are they listed among the "seven jewels" (*saptaratna*). Terracotta beads are also not mentioned in other contemporary accounts, such as the Periplus of the Erythraean Sea, which list a whole range of items that were traded across the Indian Ocean in the early centuries of the common era. The discovery of terracotta in an elite or wealthy context (Court 13), in fact, recalls the discussion made in Chapter 2 and may potentially reflect a piece of evidence to argue for an association between a low-cost material and a member of the elite circles. A compositional analysis of BKG 2457 may reveal if the clay used to make it derived from local sources or some distant part of the region.

Examples for the identification of potential value systems are indicated by the study of beads from other time periods as well including the carnelian beads of the protohistoric period of Barikot, which show evidence of extensive use-wear. The adoption of a multi-faceted approach in terms of the consideration of the intersection of several factors, including the rarity of raw material, labour investment, and the examination of the archaeological contexts of the finds (Flad 2012: 2), has the potential to enable us to determine the existence of systems of 'value' imbued in the beads from Barikot at various times. It should be stressed at this point, however, that the 'intended' or 'expected' value associated with an object may be very different from the 'ultimate value' associated with the same object at the time of its deposition. Both of these 'states of being' may even differ from the various values imbued in the object throughout its use life (Flad 2012: 5).

Chapter 9: Final conclusion

The study on the beads from Barikot presented in this thesis has produced a wealth of meaningful data and information, providing valuable insight into the prevailing ornamental traditions of the inhabitants of Barikot and how they changed through time across the long chronological sequence of the site. This thesis has provided the first comprehensive and chronologically reliable data and analysis on beads from the protohistoric, the Early Historic and Late Historic periods, filling in a crucial gap in our understanding about the typology, technology, adornment, and chronological variation of bead ornaments in South Asia. The research presented in this thesis shows that beads were, for a variety of reasons, very important in the lives of the inhabitants of Barikot during the protohistoric, the Early Historic, and Late Historic periods.

Research question 1

This thesis has attempted to address three main research questions outlined in Chapter 1. The aim of the first research question was not only to determine the raw materials and shapes of beads within each time period at Barikot but also how their distribution develops through the chronological sequence of the site. Based on the typological analysis of the beads from the current dataset, we see the use of both long and short beads at protohistoric Barikot and Swat (Macrophase 1) that show not only evidence of typological and stylistic continuity with the beads from the preceding Indus period (see, for example, the beads: BKG 2719 and BKG 3978) but also connections with the succeeding chronological periods of Barikot (see, for instance, bead: BKG 3976). The beads from Macrophase 1 of Barikot were made from a variety of materials including steatite, carnelian, chloritic rock, marine shell, glass, faience, and terracotta. In terms of shapes, the beads were made in the form of barrel, disc-shaped, biconical, conical, rectangular circular, rectangular biconical, rectangular conical with a concave end and lobe-shaped forms.

As a result, not only were locally available materials such as chloritic rock accessed, but long-distance materials such as carnelian were equally important to the protohistoric communities at Barikot and Swat. The physical characteristics and external surface features of the beads appear to have mattered to the people of the time, but their precise cultural significance remains currently debatable. Since the sample size is relatively small at present, we are currently not in the position to detect detailed local and regional patterns in the distribution and use of the ornaments during this time. Based on the archaeological evidence discussed in Chapter 6, which includes the punctate decorated terracotta figurines, it is, however, likely that most of the recovered beads were considered quite valuable by their owners during this time, probably resulting in few ornaments entering the archaeological record. This possibility may explain the apparent low bead frequency calculated from trench BKG 11 K-105 of

Barikot. Alternatively, a potential scarcity in the number of beads could simply be related to the fact that the excavations just missed the areas where beads were deposited in the past. The discussions made in Chapter 6 make it clear, in any case, that beads did not form a minor role in the lives of the protohistoric people of Swat.

During the early part of the Early Historic period of Barikot, specifically from the pre-Achaemenid to the Mauryan periods (Macrophase 2a1 – 2b), the most popular types of beads appear to have been made from glass occurring, most notably, in a short barrel shape. Raw materials such as carnelian and marine shell, which represent long-distance products, were also favoured by the people of Barikot during these periods, although possibly on a smaller scale in comparison. From the Graeco-Bactrian to the Kushano-Sasanian periods (Macrophase 3a1 – 6), the local prevailing taste for certain bead raw materials and shapes clearly shifted, most notably, in favour of various types of terracotta beads. The most popular specimens occur in a short biconical, areca nut and ghata-shaped form, probably imbued with symbolic meanings associated with the Buddhist faith that was prevailing and flourishing like never before or after in the history of the entire region during this time. Short biconical beads of terracotta with various designs are particularly dominant during the Hellenistic and Saka-Parthian periods of Barikot. In contrast, areca nut shaped beads and ghata shaped beads witness an explosion in their production and use during the succeeding Kushana and Kushano-Sasanian periods of Barikot (Macrophase 4a – 5b).

In general, the range of raw materials and shapes used to produce beads between the Graeco-Bactrian and Kushano-Sasanian periods (Macrophase 3a1 – 6) appears to have expanded on a massive scale - many of which show evidence of symbolism and cultic use. These include beads made from marine shell, cowrie shell, and lapis lazuli, which appear to have been quite popular among the inhabitants of Barikot especially during the Kushana periods. The raw materials of the beads from the Early Historic period are characterised by more variation than in the protohistoric period of Barikot, with lead, bone, reworked pottery, schist, coral, pearl, agate, dentalium shell, rock crystal, malachite, garnet, jasper, beryl-aquamarine, glazed quartz, gold glass, serpentine, and *Engina Mendicaria* materials being added to the range of materials from the protohistoric period.

Similarly, we see evidence of more variation in types of shapes and styles in the beads from Early Historic Barikot as opposed to the protohistoric period. The most notable shape additions include cylindrical, spherical, irregular spherical/globular, ovoid, lenticular, ghata-shaped, areca nut, short asymmetrical truncated biconical, double axe, butterfly nut, double comb, crimped, cornerless cube, drop shapes including various types of faunal and floral shapes being added to the range of forms from the protohistoric period. The significance of the variations detected in bead raw materials and shapes and the changing pattern of styles is compatible with the emergence of increased socio-economic complexity and affluence indicated by the wider archaeological data coming from Early Historic Barikot.

During the Late Historic period of Barikot especially from the post-urban to the Hindu-Shahi periods (Macrophase 7 – 8), another major change in the local taste for beads is documented according to the data produced by the current research. It is during this time that the site opens up on a larger scale to regional influences and interactions with various other locations. While terracotta was the most popular bead raw material in use at Barikot during the Early Historic period, the significant increase in glass beads detected during Macrophase 7 – 8 effectively replaces terracotta as the most dominant material circulating at the site. The Indo-Pacific glass beads, in particular, are found in notable numbers from the assemblages of these periods, possibly connecting Barikot more firmly with peninsular India (although certainly not exclusively as evidenced, for instance, by the recovery of lapis lazuli) and integrating the site more firmly within the vibrant Indian Ocean trading sphere. The same pattern of trans-regional and international connectivity is also observed in Macrophase 9 of Barikot, although possibly on a slightly reduced level where we seem to witness an increase in terracotta beads again. This assessment is very preliminary, however, and may need to be revised as more beads from Macrophase 9 become available for study in the future.

In the Late Historic period of Barikot, it is interesting to note the apparent absence of several types of bead raw materials and shapes that were in circulation during the Early Historic period of Barikot. Most prominently, they include materials such as bone, schist, pearl, malachite, garnet, jasper, beryl-aquamarine, glazed quartz, and serpentine that were used to manufacture beads during the Early Historic period. Likewise, several types of shapes distinctive of the Early Historic period are absent in the assemblages from the Late Historic period of Barikot, most notably, ovoid, short asymmetrical truncated biconical, double axe, butterfly nut, double comb, crimped, cornerless cube including the various types of faunal and floral bead shapes.

This partial vacuum left behind in the bead repertoire gets gradually filled to some extent by the appearance of new raw materials and shapes during the Late Historic period of Barikot, being added to some of the pre-existing, familiar types of beads from the Early Historic period (note, for example, the areca nut and ghata shaped terracotta beads). The new additions in the bead raw material assemblage include marble, amber, coix seed, peridot and various types of perforated sea snails. In terms of new shapes, the glass beads that were made in the form of segmented forms are the most noteworthy inventions of the Late Historic period of Barikot. As has become apparent, little is known about the types of beads used during the Late Historic period compared to the Early Historic period of South Asia where we find a larger set of relevant published literature on archaeological beads at our disposal to conduct cross-comparative analysis. Unfortunately, we can, currently, not make the same claim for the dataset on beads deriving from the Late Historic period. Therefore, the discussions made on the typological aspects of the Barikot beads in Chapter 6 (from Macrophase to 7 to 9) could, in many instances, not be expanded to the beads from other sites as done for the Early Historic period.

Although the present dataset currently indicates a notable high number of beads in circulation at Barikot during the pre-Kushana periods, more data on the calibrated bead frequencies by soil volume is needed from the protohistoric, Early Historic and especially Late Historic periods to pick up stronger signals of potential chronological variations across the occupation history of Barikot and, by extension, obtain a better understanding about the level of demand for beads at various times. Based on the current archaeological evidence that has been presented in this thesis the answer to the first question on the precise typological development of the beads from Barikot remains complex and multi-faceted as more research is required on multiple fronts while much of the site still needs to be excavated and studied in the future. This research has, nevertheless, allowed us to determine the prevailing types of beads within each cultural period of Barikot and, in the process, shed light on the long-term trends and trajectory of the typological development of the beads from the site (Figures 261-262).

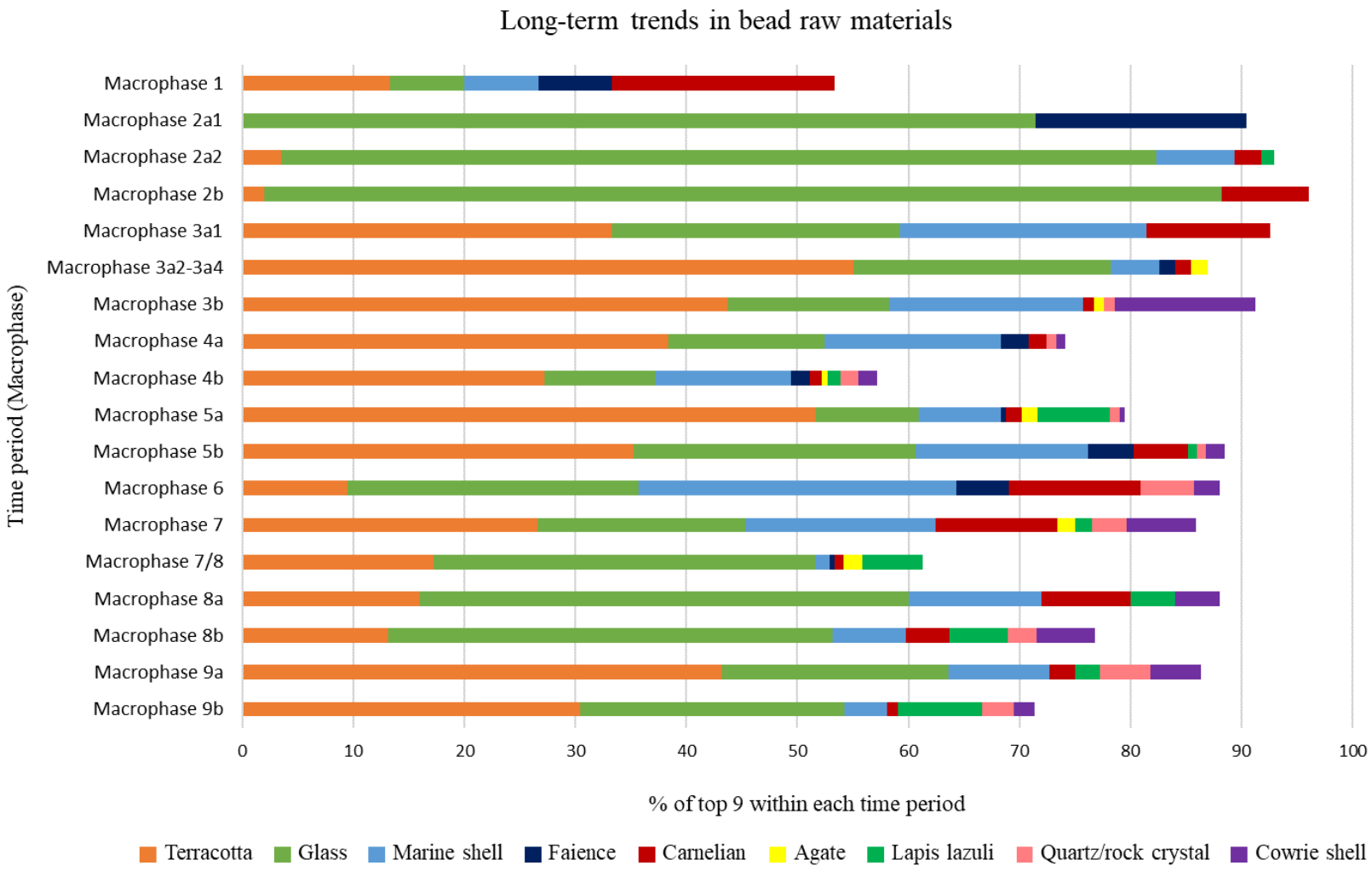


Figure 261: Long-term trends of the top 9 bead raw materials

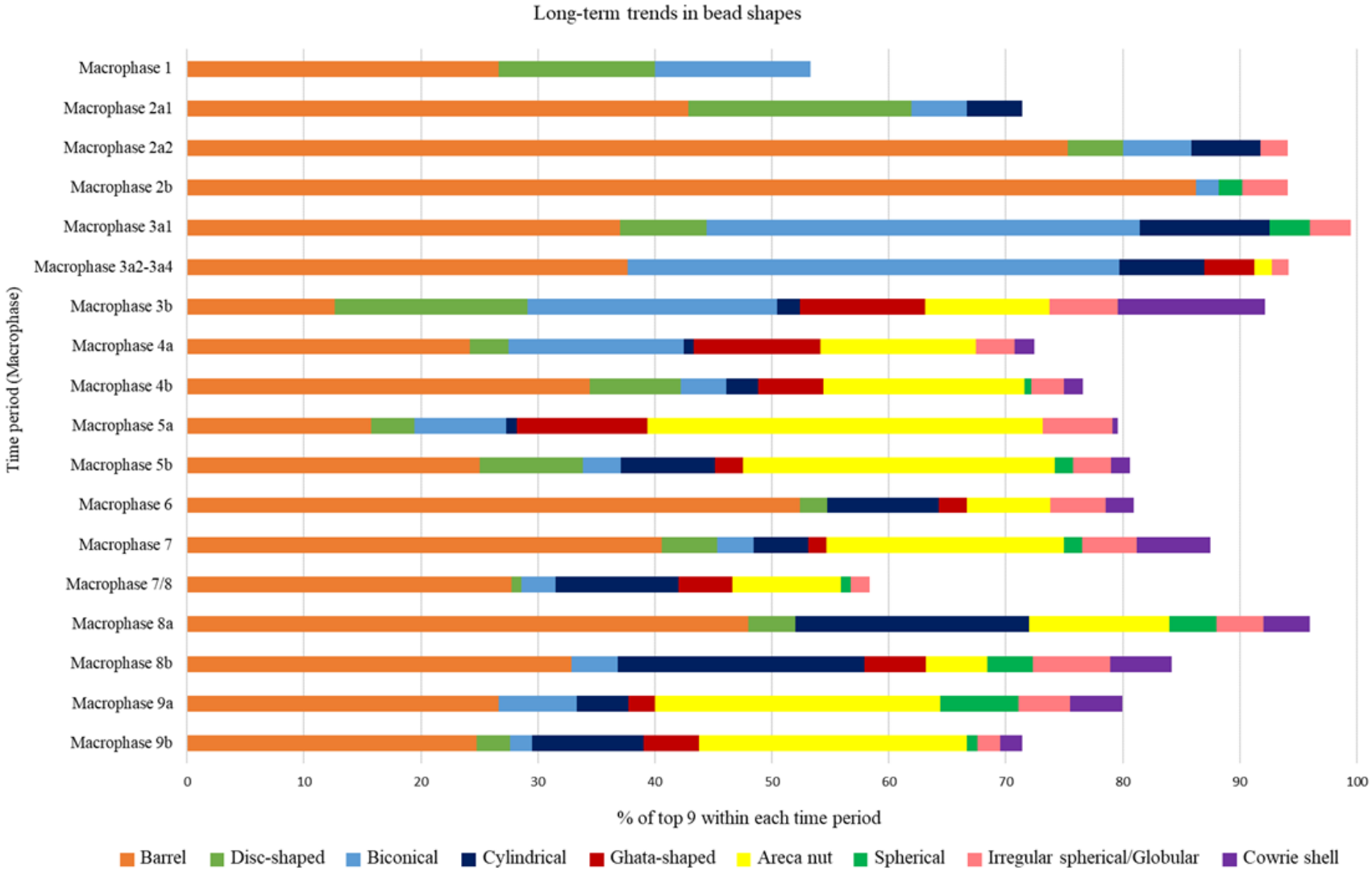


Figure 262: Long-term trends of the top 9 bead shapes

Research question 2

The aim of the second research question was to identify the various types of drilling technologies that were used to perforate the beads from Barikot within each period and then determine how their use develops through time at the site. As such, the current SEM study has identified various types of drills and drilling practices that were used to perforate the stone beads from Barikot. At least four different types of drills have been identified thus far, which include metal drills with coarse abrasive, metal drills with fine abrasive, single and double diamond drills. Regarding the latter, it is clear that diamond drilling technologies were already in use during the Achaemenid period of Barikot (Macrophase 2a2), but, in the absence of data, their use during the pre-Achaemenid period of Barikot (Macrophase 2a1) cannot currently be ruled out.

Although the sample size of stone beads from each individual period of Barikot is currently small, the results of the SEM analysis allow us to identify some general patterns in the distribution and development of drilling technologies across the chronological sequence of the site. The current study, as such, suggests that there were potentially two distinct phases marked by major transformations in the drilling traditions between ca. 1300 BCE and at least 1000 CE. Interestingly, the proposed time for these apparent changes, as outlined in Chapter 7, coincides roughly with the chronological periodisation that has been proposed for this thesis by the author in Chapter 2. This chronological periodisation refers to the timing of the onset of the Early Historic and Late Historic periods at Barikot (based on the typological development of the Barikot beads). In this regard, the SEM data seems to indicate the prevalent use of metal drills and abrasives during the protohistoric period of Swat (ca. 13th BCE – 7th century BCE). Many metal resource areas can be found, most notably, in Baluchistan, Afghanistan, Eastern Iran, Rajasthan and possibly in the Himalayas and related highland areas in northern Pakistan and India (Law 2008; Kenoyer and Miller 1999). Any one of these sources could have been accessed to make metal drills with abrasives for the perforation of stone beads in the past.

During the Early Historic period of Barikot (6th BCE – 4th century CE), the first major transformation in the use of drilling technologies occurred, characterised by the potential diffusion of stone beads perforated with single and double diamond drills probably imported as finished objects from various areas including Taxila, which came to be used side-by-side with the pre-existing technologies in the form of the metal drills and abrasives. During the Late Historic period of Barikot (ca. 4th – 5th century CE onwards), a second potential transformation occurred characterised by a marked rise in the use of double diamond drills, which may be related to interactions occurring between Barikot and probably Gujarat including the regions of peninsular India, which appear to have expanded like never before in the history of the site. A stronger and more energetic inter-regional connection between Late Historic Barikot and, in particular, peninsular India is, anyhow, indicated by the documented typological data of the beads as discussed in Chapter 6, which indicates a time of economic growth, cultural complexity

and increased cross-cultural trade. In order to confirm this preliminary assessment, it is important to expand the current dataset and examine more stone beads from Barikot in the future.

Research question 3

The third research question involved the examination of the carved bead ornaments in Gandharan art to try to determine how they might inform on actual real types of archaeological beads as recovered from the excavations at Barikot and other sites of the time. Seeking the answers to this question has given us the opportunity to adopt a unique, integrated approach in terms of combining the examination of archaeological and art historical materials, which is rarely attempted in archaeological or art historical scholarships (Hawkes 2009: XXV). There can be no doubt that at least some of the beads depicted in Gandharan art were based on actual real-life prototypes. From a visual perspective, there are several strong parallels between the two sources of evidence with only minor differences as a result of the sheer variability among the bead types as well as the weathered conditions of the carved ornaments.

During Kushana period, faceted beads were especially popular as evidenced from the archaeological evidence and the depictions of beads in the visual art. Gandharan art is, in fact, adorned with a great range of types of short and long beads made in the form of barrel, biconical, collared, cylindrical, spherical, cowrie shell, double axe, butterfly nut, flower, ghata and drop-shaped forms. These types of beads are well-documented not only from Barikot but also other archaeological sites in Gandhara, most notably, Taxila. At the same time, many of the archaeological beads recovered from the Kushana and extended Kushano-Sasanian periods are, interestingly, not carved in the visual art of Gandhara as evidenced from the assemblages of beads unearthed from Barikot and other sites. This study has also shown that some of the carved beads are somewhat larger in size than their proposed archaeological counterparts. Could the beads have been so important that the sculptor enlarged them, so they could be seen and understood by viewers? Similarly, some of the sculpted beads especially those depicted on the half-life size images, show evidence of being simpler in form and artistic elaboration.

This interesting pattern suggests that at least some of the iconographic reproductions of the ornaments were, indeed, stylised for various reasons by the artist who produced them. Therefore, the results gained from the current study on the iconography seem to support J. Rhi argument (see Chapter 8) that, ‘art serving a religion tends to represent certain aspects of religious ideas and practices better than others’ (Rhi 2003: 154). Moreover, it is clear that Taxila is currently the most extensively excavated Early Historic site in South Asia (Fussman 1993b: 83; Srinivasan 1993: 15). As a result, another critical investigation should be conducted on the bead assemblages recovered from the various sites of Taxila, which have revealed a more diverse range of types of beads made from various raw materials. Comparing the beads from Taxila with the forms of beads carved in the Gandharan art, in fact, promises

to provide us with further insight into prevailing adornment traditions during the Kushana periods of Gandhara. Establishing positive correlations between stratified beads and the forms of beads depicted in the Gandharan art may, eventually, even allow us to date the sculptures themselves with more accuracy and place them more securely in their precise chronological and archaeological context.

While we know, through the study of the numerous iconographic depictions of beads in this thesis, about the prevailing adornment practises during the Kushana periods of Gandhara and, to some extent, about the succeeding chronological periods, the evidence relating to Macrophase 2a1 – 3a2-3a4 is, in comparsion, severly limited. This is beause very little art sculptural material has come to light from these periods while iconographic representations of beads are hardly featured on coins and other forms of artistic media in contrast to the later chronological periods of Gandhara. Therefore, there is a need to adopt another integrated approach including use-wear analysis of the beads and the study of the archaological contexts of the finds in order to try to reconstruct the prevailing adornment practises of the people of Barikot during and between the pre-Achaemenid and Indo-Greek periods.

Research question 4

The investigation of the known sources and resources of the raw materials, shapes, and drilling technologies suggests that some of the beads arrived at Barikot against/with trade flows or political shifts. The number of shell materials from the Hindu-Shahi period of Barikot, for instance, is quite small compared to the earlier Saka-Parthian and Kushana periods, which probably reflects the lack of Shahi control over the Arabian sea coast areas and interaction routes, which were maintained by other competing states at the time. Furthermore, most of the Indo-Pacific glass beads of this time may well have arrived at Barikot through the utilisation of the thriving maritime trade routes, which were established between the Rashtrakuta dynasty of the Deccan and the Arab rulers of the Sindh region (Figure 228). The potential import of Indo-Pacific glass beads via the existing overland trade networks may have posed a risky and complicated business venture given the fact that the Rashtrakuta and the Pratihara states remained in conflict with each other during this period (Bhandare 2020; Thapar 2004). At this stage of the research, it is difficult to propose robust models and mechanisms as to how precisely these beads moved and arrived at Barikot.

Are they, for example, the personal possessions of people that moved or are they traded in their own right? The quantity of raw materials may be used as a factor to answer this question: BKG 4124, for example, is a single, rare peridot bead (Figure 170) and, as such, possibly arrived at Barikot as a finished product or, in other words, as a personal possession of an individual traveller during the Timurid-Dardic period. With regards to lapis lazuli, for example, a more complex set of factors may need to be considered: As the discussions on the systems of ‘value’ have shown (Chapter 8.3.1), it is likely that

groups of merchants, pilgrims and/or possibly even skilled craftspeople travelled and transported, with the support of animals, unprocessed or semi-processed pieces of lapis lazuli to Barikot (and other places) where they were probably manufactured into finished items during the Kushana period of Gandhara.

Some of the raw materials that originated from far-away places could have arrived at Barikot through the 'down-the-line exchange' process, passing from one social group to the next whereby there is only exchange occurring between neighbouring groups at any one time (Gijn 2010: 22). Marine shell, for example, may have just arrived at Barikot through this process during the Ghaznavid period, where it seems to have been potentially an undesirable or less important raw material in comparison to others. The discussions produced in this thesis show, in any case, that the import of certain raw materials, such as carnelian, continued across the chronological sequence of Barikot despite changes occurring in the geo-political configuration of the region and the prevailing trading networks of the time. As our data on aspects of trade and exchange is currently not backed by substantive evidence, it is important to carry out a more rigorous, scientific analysis of the beads from Barikot in the future.

Possible future research directions

As a result, the next logical step would be to adopt a scientific, compositional approach to study the beads from Barikot, which will allow us to better determine how the trade spheres were forming, expanding and/or shrinking in the socio-political and cultural landscape across the occupation sequence of the site. Since Gandhara was a crossroad of international commerce, there is a huge potential to determine the role of the region in the dynamics of cultural transmission and integration within a long-distance trade environment. In this regard, the systematic investigation of the various Indo-Pacific glass beads, for example, is of utmost importance. Apart from their presumed South Indian origin (Abraham 2016; Abraham et al. 2013: 19; Bellina and Glover 2004: 74; Francis 2002), we do not know with certainty about the precise location of their production centres, distribution and use across South Asia and beyond. The specimens recovered from Barikot may well have been produced locally, but there is currently no conclusive evidence of glass bead production at the site at any point in time.

During the Late Historic period, the restructuring of regional connections is already suggested by the scarcity of beads made from marine shell and an increase in other bead raw materials, most notably, the glass beads. The non-destructive portable XRF analytical technique, for example, can be used, which can reveal insight into source location by quantifying chemical elements in glass and in defining glass sub-groups potentially linked to production centres of glass beads (Bonneau et al. 2014). Similarly, we know that several different resource areas of carnelian were accessed to manufacture the beads that were found at Barikot. The shapes of the carnelian beads, in particular, appear to have more variation

during the Early Historic period than the Late Historic period of Barikot. We have also noted the production of both long and short carnelian beads of various types and quality during the protohistoric and Early Historic periods of Barikot.

During the Late Historic period, in contrast, we note the production of mostly irregular short spherical/globular or short barrel-shaped carnelian beads, which do not show evidence of the exquisite craftsmanship that was employed in the manufacture of beads from the protohistoric and Early Historic periods of Barikot. This changing pattern may reflect a potential, general decline in technical knowledge and skill or could simply indicate some cultural choices made in favour of the trending fashions in bead styles at the time. Therefore, it is important to carry out a scientific analysis on the carnelian beads from Barikot to determine if the observed changes in material quality and shape can be precisely and better linked to specific production centres. It is interesting to note that the overall trend of the prevailing drilling technologies also shifts in favour of double diamond drills during the Late Historic period of Barikot, but whether it relates to the changes noted in the material quality and shapes of the carnelian beads remains currently open to question.

The recovery of finished carnelian and agate beads and apparently no evidence of by-products from manufacturing processes is noteworthy. It may be useful to carry out fine screening of sediments or water separation in an attempt to obtain micro debitage by the removal of fine silts. The presence of micro debitage from all stages of production is a strong indication of primary craft working areas or, alternatively, the total maintenance and dumping from such areas (Kenoyer 1997a: 269-270). As such, water sieving of street sediments, for example, and their subsequent analysis under a microscope, may, after all, reveal evidence of carnelian micro debitage linked to the activities of potential local bead workshops.

Nevertheless, the recovery of a bead grinding stone slab from Macrophase 6 is, however, quite significant (BKG 2272: Figure 130) but it may be related to the manufacture of other types of beads such as quartz, rock crystal, and lapis lazuli, which are found, in addition to finished beads, in the form of several unprocessed fragments especially from the Kushana periods of Barikot. It is likely that Barikot was receiving finished beads of various types from other sites including the Taxila Valley during the Early Historic period as indicated by the various examples discussed in Chapter 6. Taxila may have, alternatively, functioned as an intermediary node for the distribution of beads made from semi-precious stones and other materials probably acquired from various sites located somewhere in western, northern, central, and/or southern India. Taxila was, anyhow, located on the most important trade routes leading to other towns and cities of Gandhara, Gangetic India, Central Asia and Iran (Bopearachchi and Pieper 1998: 59; Fussman 1993b; Srinivasan 1993), which is, therefore, a fact not to be contested and doubted.

According to the current evidence, the beads from Barikot are, based on typological grounds, more similar to the beads from Taxila than any other Early Historic site. The marked, close contacts that have been noted, through the study of beads in this thesis, between Barikot and other places including the Taxila Valley as well as peninsular India during the Kushana and succeeding chronological periods probably reflect a complex, multi-faceted phenomenon known as the 'Indianisation' process, which is well-known from the study of other material culture items in the literature (see, for example, Bellina 2003; Bellina and Glover 2004; Smith 1999; Micheli 2007; 2020; Olivieri 2014: 220, 241; Olivieri and Callieri 2020; Olivieri et al. 2006: 135-136).

By determining the prevailing typological and technological features of the stratified beads from Barikot, the research presented in this thesis allows us to date more securely many of the beads from other historical sites of the region, most notably, Taxila. In fact, the current study has, by conducting cross-comparative analyses, possibly provided a secure date to some of the beads from the other historical sites already including Taxila. The beads from Barikot, hence, may be used as practical tools for carefully trying to date and re-interpret the beads recorded from other historical sites of the region that do not have the specific chronological data that is needed. The studies conducted on the stratified beads from Barikot may be used to help us understand the precise impact and role of beads not only in the lives of the people of Barikot, but potentially also the wider regions of South Asia in the future.

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10: Appendix

The data on the studied material, which I have recorded in the Excel spreadsheet was reproduced in table 23 (below). It is organised in columns and provides information about the beads and other material culture items from Barikot and Swat that are part of the current study. The order of entries of the archaeological materials from Barikot in table 23 is organised according to their chronological order (or Macrophase) while material culture items from other discussed sites are listed in the final entries of table 23 (after the material from Barikot). Also note that beads made from marine shell are recorded in a shorted form simply as 'shell'. Some beads could not be documented and studied hands-on by the present author in Swat due to time constraints, but their raw material and shape were verified later as already stated in Chapter 4. For this reason, they are part of the current study and dataset. The information recorded on the various measurements for these beads is, however, based on the documentation carried out by the original excavators, which is grouped together into one column rather than arranged into separate columns (see, for example, the beads: BKG 3016 below). Those beads that remained unverified both in terms of material and shape have been arranged in table 24 of the appendix section. It is followed by a brief visual guide to the identified raw materials and descriptions to help future researchers conduct further work (table 25).

Inventory number	Locus/ context	Material	Pro-portion	Overall shape	Length	Dia-meter	Max width	Max thickness	State	Macrophase/ structural period	Season/ year	Notes
3016	BKG 12 W (217)	Chloritic rock		Barrel	d. 0.8 l. max. 2.2				Undamaged	1b/IB	11	
3016	BKG 12 W (217)	Steatite		Barrel	d. 0.8 l. max. 1.3				Undamaged	1b/IB	11	
3978	BKG 11 K-1690 (2193)	Carnelian, bleached	Long	Barrel	0.67	0.51			Undamaged	1c/IC	12	
3976	BKG 11 K-1690 (2193)	Carnelian	Short	Rectangular circular	0.66	0.7			Broken	1c/IC	12	
3982	BKG 11 K-1690 (2193B)	Glass	Short	Barrel					Broken	1c/IC	12	
2564	BKG 12 (20)	Carnelian	Long	Biconical	1.37	0.85			Undamaged	1b/IB	7	
3920	BKG 12 W (318)	Terracotta, brownish black	Very Short	Biconical with radial pattern?	2.9	3.96			Spalled and scarred	1a/IA	12	
2733	BKG 12 (152) B	Chloritic rock	Short	Conical	1.39	1.9			Undamaged	1b/IB	7	
3945	BKG 11 K-1690 (2193)	Shell	Short	Rectangular conical with a concave end	0.79		0.82	0.32	Undamaged	1c/IC	12	

3974	BKG 11 K-1690 (2193)	Faience	Very very short	Disc-shaped	0.21	0.58			Undamaged	1c/IC	12	
3977	BKG 11 K-1690 (2193)	Shell	Short	Disc-shaped	0.23	0.44			Undamaged	1c/IC	12	
3869	BKG 12 W (220)	Steatite, dark green		Lobe shaped					Broken	1b/IB	12	
4027	BKG 11 K (3005)	Shell?		Irregular spherical/Globular?	D 0.2 0.1				Undamaged	1b/IB	13	
2719	BKG 12 (152) B	Fired Steatite		Rectangular biconical	0.68		0.66	0.3	Undamaged	1b/IB	7	
3964	BKG 12 W (320A)	Terracotta, brown							Broken	1a/IA	12	
3893	BKG 11 K-1690 (2177)	Glass, dark blue	Short	Biconical	0.58	0.59			Undamaged	2a1/IIA	12	
3929	BKG 11 K-1690 (2180)	Glass	Short	Biconical/Pear-shaped	0.26	0.43			Undamaged	2a1/IIA	12	
4026	BKG 11 K (2194)-(2196)	Dentalium shell	Long	Cylindrical	D. 0.4 0.75				Undamaged	Macrophase: 1c/2a1 Period: IC/IIA	13	
3989	BKG 11 K-1690 (2197)	Faience	Very very short	Disc-shaped	0.22	0.57			Undamaged	1c/2a1	12	
3990	BKG 11 K-1690 (2197)	Faience	Short	Disc-shaped	0.12	0.41			Undamaged	1c/2a1	12	

3940	BKG 11 K-1690 (2177)	Glass	Very very short	Barrel	0.14	0.3			Undamaged	2a1/IIA	12	2x beads
3994	BKG 11 K-1690 (2188)	Faience	Very very short	Disc-shaped	0.17	0.46			Undamaged	2a1/IIA	12	
3929	BKG 11 K-1690 (2180)	Faience	Very short	Disc-shaped	0.17	0.51			Undamaged	2a1/IIA	12	
4025	BKG 11 K (2194)-(2196)	Vitreous material?		Irregular spherical/Globular?	D. 0.3 0.3				Damaged	Macrophase: 1c/2a1 Period: IC/IIA	13	
3942	BKG 11 K-1690 (2177)	Glass	Short	Biconical	0.37	0.45			Undamaged	2a1/IIA	12	
3944	BKG 11 K-1900 (2184)	Glass	Short	Pear-shaped	0.25	0.35			Undamaged	2a1/IIA	12	
3929	BKG 11 K-1690 (2180)	Glass	Very short	Barrel	0.16	0.34			Undamaged	2a1/IIA	12	
3929	BKG 11 K-1690 (2180)	Glass	Short	Barrel	0.17	0.32			Undamaged	2a1/IIA	12	
3929	BKG 11 K-1690 (2180)	Glass	Short	Barrel	0.21	0.29			Undamaged	2a1/IIA	12	
3929	BKG 11 K-1690 (2180)	Glass	Very short	Barrel	0.11	0.29			Undamaged	2a1/IIA	12	
3929	BKG 11 K-1690 (2180)	Glass	Short	Barrel	0.22	0.28			Undamaged	2a1/IIA	12	
3929	BKG 11 K-1690 (2180)	Glass	Short	Barrel	0.26	0.36			Undamaged	2a1/IIA	12	

3929	BKG 11 K-1690 (2180)	Glass		Barrel					Broken	2a1/IIA	12	
3929	BKG 11 K-1690 (2180)	Glass							Broken	2a1/IIA	12	
3929	BKG 11 K-1690 (2180)	Glass							Broken	2a1/IIA	12	
3862	BKG 11 K-1690 (2161)	Glass	Long	Biconical	0.9	0.62			Undamaged	2a2/IIA	12	
3907	BKG 11 K-1690 (2176)	Glass, dark green	Long	Biconical	0.99	0.68			Undamaged	2a2/IIA	12	
3582	BKG K-1900 (1928)	Terracotta, brownish reddish		Biconical with radial pattern		2.34			Damaged	2a2/IIA	11	
3851	BKG 11 K-1690 (2158)	Glass	Short	Conical	0.38	0.42			Undamaged	2a2/IIA	12	
3868	BKG 11 K-1690 (2162)	Lead	Long	Cylindrical	2.08	0.8			Spalled and scarred	2a2/IIA	12	
3908	BKG 11 K-1690 (2161)	Shell	Long	Cylindrical	0.84	0.52			Undamaged	2a2/IIA	12	
3894	BKG 11 K-1690 (2167)	Bone	Short	Cylindrical, irregular, pendant	0.44	0.53			Broken	2a2/IIA	12	
3892	BKG 11 K-1690 (2167)	Terracotta, brownish reddish	Very short	Disc-shaped	0.49	1.47			Undamaged	2a2/IIA	12	
3875	BKG 11 K-1690 (2165)	Reworked pottery, reddish	Very very Short	Disc-shaped	0.5	1.47			Undamaged	2a2/IIA	12	

3941	BKG 11 K-1690 (2176)	Glass	Very very short	Disc-shaped	0.1	0.36			Undamaged	2a2/IIA	12	
3922	BKG 11 K-1690 (2176)	Lapis Lazuli	Short	Cylindrical	0.2	0.29			Undamaged	2a2/IIA	12	
3842	BKG 11 K-1690 (2157)	Agate?	Short	Irregular spherical/Globular	0.5	0.53			Undamaged	2a2/IIA	12	
3851	BKG 11 K-1690 (2158)	Glass	Short	Irregular spherical/Globular	0.26	0.38			Undamaged	2a2/IIA	12	
3906	BKG 11 K-1690 (2161)	Carnelian	Very Short	Lenticular short biconical	0.42	1.08			Spalled and scarred	2a2/IIA	12	
3885	BKG 11 K-1690 (2165)	Glass	Short	Barrel	0.48	0.63			Undamaged	2a2/IIA	12	
3887	BKG 11 K-1690 (2161)	Carnelian	Long	Triangular long barrel	0.48	0.39			Undamaged	2a2/IIA	12	
3948	BKG 11 K-1690 (2163)	Glass	Short	Barrel	0.14	0.28			Undamaged	2a2/IIA	12	
3883	BKG 11 K-1690 (2165)	Glass	Short	Barrel	0.11	0.32			Spalled and scarred	2a2/IIA	12	
3900	BKG 11 K-1690 (2175)	Glass	Very very Short	Barrel	0.1	0.29			Undamaged	2a2/IIA	12	
3900	BKG 11 K-1690 (2175)	Glass	Very very Short	Barrel	0.12	0.31			Undamaged	2a2/IIA	12	
3900	BKG 11 K-1690 (2175)	Glass	Very very Short	Barrel	0.18	0.44			Undamaged	2a2/IIA	12	

3851	BKG 11 K-1690 (2158)	Glass	Very Short	Barrel	0.13	0.29			Undamaged	2a2/IIA	12	
3851	BKG 11 K-1690 (2158)	Glass	Very Short	Barrel	0.16	0.33			Spalled and scarred	2a2/IIA	12	
3889	BKG 11 K-1690 (2161)	Glass	Short	Barrel	0.43	0.85			Undamaged	2a2/IIA	12	
3884	BKG 11 K-1690 (2165)	Glass	Short	Barrel	0.53	0.66			Spalled and scarred	2a2/IIA	12	
3905	BKG 11 K-1690 (2161)	Glass	Large beads	Barrel	4.2	0.57				2a2/IIA	12	Total 51 beads from this inv. no.
3905	BKG 11 K-1690 (2161)	Glass	Medium beads	Barrel	0.37	0.38				2a2/IIA	12	
3905	BKG 11 K-1690 (2161)	Glass	Small beads	Barrel	0.12	0.26				2a2/IIA	12	
3886	BKG 11 K-1690 (2161)	Shell	Short	Barrel	0.43		0.54	0.41	Undamaged	2a2/IIA	12	
3884	BKG 11 K-1690 (2165)	Glass	Short	Barrel	0.57	0.61			Spalled and scarred	2a2/IIA	12	
3902	BKG 11 K-1690 (2167)	Shell	Short	Barrel, irregular	0.44		0.55	0.48	Undamaged	2a2/IIA	12	
3888	BKG 11 K-1690 (2161)	Marble? Glass?	Short	Biconical	0.76	1.04			Undamaged	2a2/IIA	12	
3903	BKG 11 K-1690 (2159)	Shell	Very Short	Disc-shaped	0.12	0.36			Undamaged	2a2/IIA	12	

3909	BKG 11 K-1690 (2161)	Steatite	Short	Cylindrical	0.32	0.37			Undamaged	2a2/IIA	12	
3845	BKG 11 K-1690 (2157)	Shell	Short	Lenticular barrel, spacer bead	0.92		1.22	0.39	Damaged	2a2/IIA	12	Drill hole partly broken
3597	BKG K-1900 (1928)	Shell		Lenticular rectangular (spacer bead)	1.05		0.99	0.25	Damaged	2a2/IIA	11	
4378 (Serial number)	BKG 4S (2805)	Terracotta, black		Biconical					Damaged	2/II	1992	
3835	BKG 11 K-1690 (2155)	Carnelian	Short	Ovoid, irregular	0.33	0.37			Undamaged	2b/IIB	12	
3817	BKG 11 K-1690 (2153)	Glass	Large beads	Barrel	0.27	0.44				2b/IIB	12	Total 44 beads from this inv. no.
3817	BKG 11 K-1690 (2153)	Schist		Irregular spherical/Globular					Undamaged	2b/IIB	12	
3817	BKG 11 K-1690 (2153)	Steatite		Irregular spherical/Globular					Undamaged	2b/IIB	12	
3817	BKG 11 K-1690 (2153)	Glass	Medium beads	Barrel	0.16	0.37				2b/IIB	12	
3817	BKG 11 K-1690 (2153)	Glass	Small beads	Barrel	0.1	0.27				2b/IIB	12	
3800	BKG 11 K-1690 (2152)	Carnelian, opaque	Short	Rectangular circular	1	1			Undamaged	2b/IIB	12	
3811	BKG 11 K-1690 (2153)	Terracotta, brownish reddish	Short	Biconical with radial pattern	2.47	2.66			Undamaged	2b/IIB	12	

3815	BKG 11 K-1690 (2153)	Carnelian, low quality	Very very long	Lenticular short biconical	0.34	1.12			Undamaged	2b/IIB	12	
3583	BKG K-1900 (1923)	Carnelian	Short	Spherical	0.72	0.79			Undamaged	2b/IIB	11	
3795	BKG 11 K-1690 (2149)	Shell	Short	Barrel	0.53	0.62			Undamaged	3a1/III	12	
3570	BKG K-1900 (1917)	Terracotta, brown	Short	Biconical	1.49	2.24			Undamaged	3a1/III	11	
3743	BKG 11 K-1690 (2142)	Terracotta, brownish reddish	Long	Biconical	3.14	3			Undamaged	3a1/III	12	
3571	BKG K-1900 (1920)	Terracotta, brown	Short	Biconical with grooves and radial pattern. Zigzag lines?	1.62	1.89			Undamaged	3a1/III	11	
3748	BKG 11 K-1690 (2144)	Terracotta, brown	Short	Biconical with radial and dotted pattern	1.55	1.81			Broken	3a1/III	12	
3588	BKG K-1900 (1917)	Terracotta, brown	Short	Biconical with radial pattern	2.34	3.11			Spalled and scarred	3a1/III	11	
3589	BKG K-1900 (1917)	Terracotta, brown	Short	Biconical with radial pattern. Zigzag lines?	1.91	2.52			Undamaged	3a1/III	11	
3721	BKG 11 K-1690 (2139)	Terracotta, brown	Short	Biconical with radial patterns?	2.1	3.06			Spalled and scarred	3a1/III	12	
3816	BKG 11 K-1690 (2149)	Glass	Short	Barrel	0.22				Undamaged	3a1/III	12	5x from this inv. no.
3818	BKG 11 K-1690 (2132)	Red coral	Very very short	Cylindrical, irregular branch	0.19	1.08		0.2	Broken	3a1/III	12	

3816	BKG 11 K-1690 (2149)	Shell	Very long	Cylindrical	0.35	0.15			Undamaged	3a1/III	12	
3779	BKG 11 K-1690 (2148)	Shell	Very very short	Disc-shaped	0.31	0.78			Undamaged	3a1/III	12	
3590	BKG K-1900 (1917)	Shell	Very short	Disc-shaped	0.53	1.23			Spalled and scarred	3a1/III	11	
3799	BKG 11 K-1690 (2149)	Carnelian, bleached	Short	Barrel	0.95	1.09			Undamaged	3a1/III	12	
3745	BKG 11 K-1690 (2138)	Carnelian	Short	Spherical	0.58	0.6			Undamaged	3a1/III	12	
3780	BKG 11 K-1690 (2148)	Shell	Short	Hexagonal-faceted barrel	0.54	0.76			Broken	3a1/III	12	
3820	BKG 11 K-1690 (2148)	Pearl	Short	Irregular spherical/Globular	0.3	0.4			Undamaged	3a1/III	12	
3816	BKG 11 K-1690 (2149)	Glass	Very short	Barrel	0.14	0.3			Spalled and scarred	3a1/III	12	
3816	BKG 11 K-1690 (2149)	Glass	Short	Barrel	0.21	0.38			Undamaged	3a1/III	12	
3781	BKG 11 K-1690 (2147)	Carnelian	Short	Biconical	0.51	0.54			Undamaged	3a1/III	12	
3746	BKG 11 K-1690 (2145)	Shell	Short	Biconical	0.22	0.42			Undamaged	3a1/III	12	
3572	BKG K-1900 (1920)	Terracotta, brownish reddish	Very short	Biconical with a groove and radial pattern	0.99	2.08			Undamaged	3a1/III	11	

3824	BKG 11 K-1690 (2142)	Terracotta, brownish reddish	Short	Cylindrical with radial pattern	2.95	3.42			Undamaged	3a1/III	12	
3624	BKG 11 K-1690 (2113)	Chloritic rock with radial pattern	Short	Barrel	1.74	2.69			Undamaged	3a4/III	12	
3646	BKG 11 K-1690 (2116)	Glass coated in gold (gold foil)	Long	Barrel	0.53	0.51			Undamaged	3a3/III	12	
3527	BKG 11 K-1690 (1663 S)	Shell		Barrel	D. 0.5 h. 0.5 d. 0.1				Undamaged	3a4/III	11	
3515	BKG 11 K-1690 (1663)	Glass		Barrel	D. 0.7				Undamaged	3a4/III	11	
3564	BKG 11 K-1690 (1910)	Glass		Barrel	D. 0.5 h. 0.4				Undamaged	3a2/III	11	
3565	BKG 11 K-1690 (1910)	Glass		Barrel	D. 0.9 h. 0.7 d. 0.2				Undamaged	3a2/III	11	
3566	BKG 11 K-1690 (1910)	Glass		Barrel	D. 0.5 h. 0.3 d. 0.1				Undamaged	3a2/III	11	
3577	BKG 11 K-1690 (1663)	Glass		Barrel	D. 0.7				Undamaged	3a4/III	11	
3528	BKG 11 K-1690 (1663 S)	Terracotta, brown	Short	Biconical	2.05	2.92			Scarred	3a4/III	11	
3529	BKG 11 K-1690 (1663 S)	Terracotta, brown	Short	Biconical	1.31	1.6			Undamaged	3a4/III	11	
3420	BKG 11 K-1690 (1663)	Terracotta, brown	Short	Biconical	1.55	1.61			Spalled and scarred	3a4/III	11	

1532	BKG 419 (791)	Glass	Very long	Barrel, quadrangular	2.04	0.78			Undamaged	3/III		
3538	BKG K-1690 (1909)	Terracotta, brownish black	Short	Biconical	1.66	2.83			Undamaged	3a2/III	11	
3545	BKG K-1690 (1908)	Terracotta, brown	Short	Biconical	1.43	1.69			Spalled and scarred	3a2/III	11	
3540	BKG K-1690 (1909)	Terracotta, brown	Short	Biconical	1.14	1.83			Undamaged	3a2/III	11	
3562	BKG K-1900 (1912)	Terracotta, brown	Short	Biconical	1.56	2.09			Broken	3a2/III	11	
3539	BKG K-1690 (1909)	Terracotta, brownish reddish	Short	Biconical	1.35	1.98			Spalled and scarred	3a2/III	11	
3467	BKG 11 K-1690 (1676)	Terracotta, brown	Short	Biconical with incised dotted pattern	1.59	1.75			Undamaged	3a4/III	11	
3675	BKG 11 K-1690 (2124)	Terracotta, brownish reddish	Short	Biconical with radial pattern	2.12	2.71			Broken	3a2/III	12	
3655	BKG 11 K-1690 (2117 E)	Terracotta, brown	Short	Biconical with radial pattern	1.38	2.08			Broken	3a2/III	12	
3576	BKG K-1690 (1663)	Terracotta, brownish reddish	Short	Biconical with radial pattern	1.68	2.54			Broken	3a4/III	11	
3561	BKG K-1900 (1912)	Terracotta, brownish reddish	Short	Biconical with radial pattern	1.15	2.27			Spalled and scarred	3a2/III	11	
3481	BKG 11 K-1690 (1681)	Terracotta, brownish reddish	Very short	Biconical with radial pattern?	1.17	2.39			Damaged	3a4/III	11	
3559	BKG K-1900 (1912)	Terracotta, brownish reddish	Short	Biconical with row of dentils	1.88	2.84			Undamaged	3a2/III	11	

				and radial pattern								
3819	BKG 11 K-1690 (2118)	Glass, coated in gold	Short	Biconical	0.68	0.74			Scarred	3a2/III	12	
3461	BKG 11 K-1690 (1663)	Glass		Biconical	L. max. 0.7 w. max. 0.7				Broken	3a4/III	11	
3592	BKG 11 K-1900 (1912bis)	Terracotta, reddish		Biconical	D. 2.5 h. 1.4 d. 0.8				Undamaged	3a2/III	11	
3544	BKG K-1690 (1908)	Terracotta, brown	Short	Barrel	1.13	1.98			Spalled and scarred	3a2/III	11	
3709	BKG 11 K-1690 (2133)	Shell	Long	Cylindrical	1.33	1.17			Broken	3a2-3a3/III	12	
3822	BKG 11 K-1690 (2133)	Carnelian	Very very long	Cylindrical (pendant)	0.39	1.29			Damaged	3a2-3a3/III	12	
3623	BKG 11 K-1690 (2113)	Dentalium shell	Very very long	Cylindrical	1.8	0.52			Undamaged	3a4/III	12	
3708	BKG 11 K-1690 (2133)	Dentalium shell	Very very long	Cylindrical	1.77	0.5			Undamaged	3a2-3a3/III	12	
3542	BKG K-1690 (1909)	Terracotta, black	Very very short	Barrel	0.62	2.52			Undamaged	3a2/III	11	
3460	BKG 11 K-1690 (1663)	Glass, green	Short	Irregular spherical/Globular	0.63	0.71			Undamaged	3a4/III	11	Imitating a stone?
3563	BKG K-1900 (1912)	Terracotta, brownish reddish	Short	Short asymmetrical truncated biconical. Radial pattern	1.04	1.76			Broken	3a2/III	11	

3684	BKG 11 K-1690 (2131)	Terracotta, brown	Short	Ghata-shaped, grooved	1.98	2.51			Spalled and scarred	3a2-3a3/III	12	
3480	BKG 11 K-1690 (1681)	Terracotta, greyish	Short	Areca nut. Very short convex truncated conical	D. 1.5				Damaged	3a4/III	11	
2581	BKG 12 (30)	Faience	Short	Barrel	0.53	0.63			Undamaged	3a3-3a4/III	7	
3681	BKG 11 K-1690 (2131)	Glass, green	Short	Barrel	0.54	0.56			Undamaged	3a2-3a3/III	12	
3622	BKG 11 K-1690 (2113)	Glass	Short	Barrel	0.5	0.78			Undamaged	3a4/III	12	
3458	BKG 11 K-1690 (1663)	Chloritic rock with radial pattern	Short	Barrel	1.93	2.65			Undamaged	3a4/III	11	Glued?
3560	BKG K-1900 (1912)	Terracotta, brownish black	Short	Barrel with double concentric circles and radial pattern	2.06	3.64			Undamaged	3a2/III	11	
3578	BKG K-1690 (1912)	Terracotta, brown	Short	Barrel with radial pattern	1.36	1.63			Undamaged	3a2/III	11	
3682	BKG 11 K-1690 (2133)	Carnelian? Glass?	Short	Barrel	0.52	0.55			Undamaged	3a2-3a3/III	12	
3707	BKG 11 K-1690 (2133)	Glass	Short	Barrel	0.49	0.5			Undamaged	3a2-3a3/III	12	
3490	BKG 11 K-1690 (1681) = (1686)	Chloritic rock with radial pattern		Barrel					Broken	3a2-3a3/III	11	

2583	BKG 12 (30)	Bone?	Short	Collared barrel	0.59	0.94			Undamaged	3a3-3a4/III	7	
4277 (serial number)	BKG 451 = 433 (1366)	Shell	Short	Barrel	0.71	0.84			Undamaged	3/III	1991	
4356 (serial number)	BKG 519 (2806)	Glass with green and white stripes	Short	Barrel	0.38	0.4			Well-preserved	3/III	1992	
4140 (serial number)	BKG 308 W (506)	Terracotta, brown	Short	Biconical	1.18	1.69			Undamaged	3/IIB	1987	
4254 (serial number)	BKG 453 (1451)	Terracotta, brownish reddish	Short	Biconical	1.57	2.04			Spalled and scarred	3/III	1991	
4261 (serial number)	BKG 413 (1544)	Terracotta, brown	Short	Biconical	1.6	2.33			Broken	3/III	1991	
4380 (serial number)	BKG 523 (2768)	Terracotta, brown	Short	Biconical	1.89	1.94			Broken	III/3	1992	
4383 (serial number)	BKG 519 (2808)	Terracotta, brown	Short	Biconical	2.15	3.1			Spalled and scarred	3/III	1992	
4444 (serial number)	BKG 4 W (2734)	Terracotta red	Short	Biconical	1.88	1.96			Scarred	3/III	1992	
4253 (serial number)	BKG 453 (1451)	Terracotta, reddish	Short	Biconical with grooves and radial pattern	1.44	1.93			Undamaged	3/III	1991	
4386 (serial number)	BKG 526 (2792)	Terracotta, black	Short	Biconical with radial pattern	1.5	2.38			Spalled and scarred	3/III	1992	
4252 (serial number)	BKG 453 (1451)	Bone?	Very short	Conical disc	0.56	2.58			Broken	3/III	1991	
4226 (serial number)	BKG 310 (221)	Glass, reddish	Short	Barrel	0.16	0.27			Undamaged	3/IIB	1987	
4278 (serial number)	BKG 449 (1483)	Terracotta, brown	Short	Short asymmetrical truncated bicone with grooves and radial pattern	1.28	2.32			Broken	3/III	1991	
4255 (serial number)	BKG 453 (1451)	Terracotta, brown	Short	Cylindrical	1.52	2.41			Spalled and scarred	3/III	1991	

4128 (serial number)	BKG 308 (287)	Glass, green	Long	Barrel	0.53	0.44			Spalled and scarred	3/IIB	1987	
4135 (serial number)	BKG 308 (287)	Lapis Lazuli	Short	Barrel	0.55	0.76			Undamaged	3/IIB	1987	
4357 (serial number)	BKG 519 (2803)	Terracotta brownish red	Short	Ghata-shaped	1.49	2.36			Damaged	III/3	1992	
4375 (serial number)	BKG 519 (2808)	Terracotta, black	Short	Ghata-shaped	1.01	1.72			Undamaged	3/III	1992	
4298 (serial number)	BKG 459 (1501)	Agate, banded	Long	Biconical	1.69	1.11			Undamaged	3/III	1991	
5190	BKG F (8)	Terracotta		Barrel	D. 2.3 h. 1.0 d. 1.0				Chipped	3	2019	
5191	BKG F (8)	Terracotta		Biconical with zig-zag motif	D. 2.6 h. 1.6 d. 0.9				Undamaged	3	2019	
5192	BKG F (8)	Terracotta		Barrel	D. 2.7 h. 1.5 d. 0.9				Damaged	3	2019	
2652	BKG 12 (79)	Glass, dark blue	Short	Barrel	0.37	0.61			Undamaged	3b/IV	7	
2823	BKG 12E (74)	Shell	Short	Barrel	0.4	0.51			Undamaged	3b/IV	10	
3278	BKG 11 K-1690 (1647)	Glass		Barrel	D. 0.4				Undamaged	3b/IV	11	
3452	BKG 11 K-1690 (1658)	Glass, yellowish-brown		Barrel	D. 0.4				Undamaged	3b/IV	11	
2821	BKG 12E (74)	Terracotta, brown	Short	Areca nut, grooved	1.67	1.74			Undamaged	3b/IV	10	
2705	BKG 12 (135)	Terracotta, brownish reddish	Short	Biconical, radial pattern	2.58	3.79			Scarred	3b/IV	7	
2696	BKG 12 (130)	Terracotta, brownish reddish	Short	Biconical	1.22	1.78			Spalled and scarred	3b/IV	7	

2695	BKG 12 (130)	Terracotta, brownish reddish	Short	Biconical	1.62	2.56			Spalled and scarred	3b/IV	7	
3609	BKG 11 K-1690 (2103)	Terracotta, brown	Short	Biconical	2.31	3.41			Undamaged	3b/IV	12	
3440	BKG 11 K-1690 (1643 S)	Terracotta, brown	Short	Biconical	1.34	1.77			Undamaged	3b/IV	11	
3378	BKG 11 K-1690 (1662)	Carnelian	Short	Biconical	0.54	0.92			Undamaged	3b/IV	11	
3343	BKG 11 K-1690 (1654-1655)	Glass	Short	Biconical	0.26	0.28			Undamaged	3b/IV	11	
3334	BKG K-1690 (1655)	Terracotta, brown	Short	Biconical	1.49	2.07			Spalled and scarred	3b/IV	11	
3333	BKG K-1690 (1655)	Terracotta, brown	Short	Biconical with grooves and radial pattern	1.41	1.73			Broken	3b/IV	11	
3602	BKG 11 K-1690 (2101)	Terracotta, brownish reddish	Short	Biconical with radial pattern	1.98	2.65			Spalled and scarred	3b/IV	12	
3625	BKG 11 K-1690 (2107)	Terracotta, brown	Short	Biconical with radial pattern	1.41	2.29			Spalled and scarred	3b/IV	12	
3351	BKG 11 K-1690 (1652)	Terracotta, brown	Short	Biconical with radial pattern	1.72	2.56			Broken	3b/IV	11	
3318	BKG 11 K-1690 (1654)	Terracotta, brownish reddish	Short	Biconical with radial pattern?	1.4	1.96			Damaged	3b/IV	11	
3436	BKG 11 K-1690 (1666)	Shell	long	Collared barrel	0.85	0.48			Undamaged	3a4/III-3b/IV	11	

2651	BKG 12 (79)	Terracotta, brown reddish	Short	Areca nut, short convex truncated conical	1.15	1.86			Undamaged	3b/IV	7	
3305	BKG 11 K-1690 (1651)	Dentalium shell	Very very long	Cylindrical	1.48	0.36			Undamaged	3b/IV	11	
3364	BKG 11 K-1690 (1656)	Glass		Disc-shaped	D. 0.4				Undamaged	3b/IV	11	
2694	BKG 12 (130)	Shell	Very short	Disc-shaped	0.27	0.67			Undamaged	3b/IV	7	
3304	BKG 11 K-1690 (1651)	Shell	Short	Disc-shaped	0.29	0.38			Undamaged	3b/IV	11	
3277	BKG 11 K-1690 (1647)	Shell	Very very short	Disc-shaped	0.11	0.37			Undamaged	3b/IV	11	
3261	BKG 11 K-1690 (1643)	Terracotta, brown	Very short	Disc-shaped	0.9	2.6			Damaged	3b/IV	11	
3498	BKG 11 K-1690 (1657 S)	Shell	Short	Cylindrical, irregular	0.45	0.58			Spalled and scarred	3b/IV	11	
3293	BKG 11 K-1690 (1647)	Terracotta, reddish	Very short	Disc-shaped, grooved	0.62	1.7			Spalled and scarred	3b/IV	11	
3410	BKG 11 K-1690 (1658)	Glass, light greenish/yellowish		Irregular spherical/Globular	D. 0.8 h. 0.7 d. 0.2				Undamaged	3b/IV	11	
3618	BKG 11 K-1690 (2105)	Rock crystal	Long	Octagonal-faceted biconical	1.62	1			Spalled and scarred	3b/IV	12	
2754	BKG 12 (136)	Shell	Short	Parallelogram	0.63	0.81			Undamaged	3b/IV	7	
3331	BKG K-1690	Terracotta, brown	Short	Areca nut, short convex	1.21	2.05			Undamaged	3b/IV	11	

	(1654-1655)			truncated conical)								
3524	BKG 11 K-1690 (1654 S)	Terracotta, brown	Short	Areca nut, short truncated conical	1.24	1.64			Spalled and scarred	3b/IV	11	
2800	BKG 12E (59)	Schist		Rectangular long rectangular	1.36		1.05	0.53	Broken	3b/IV	10	
3389	BKG 11 K-1690 (1658)	Terracotta, brown	Short	Ghata-shaped	1.42	1.96			Spalled and scarred	3b/IV	11	
3388	BKG 11 K-1690 (1658)	Terracotta, brownish reddish	Very short	Ghata-shaped	0.89	1.86			Damaged	3b/IV	11	
2820	BKG 12E (59)	Terracotta, blueish black	Very short	Ghata-shaped, grooved	1.17	2.36			Undamaged	3b/IV	10	
4088 (serial number)	BKG 308 W (276)	Agate, banded	Very long	Barrel	2.23	0.84			Spalled and scarred	3/III	1987	
4209 (serial number)	BKG 302 (629)	Glass, brownish	Short	Barrel	0.58	0.68			Undamaged	3b/1a	1987	
4321 (serial number)	BKG 433 (1309)	Malachite	Short	Barrel	0.19	0.28			Undamaged	3b/IV	1991	
4326 (serial number)	BKG 4 NW (30)	Shell	Short	Barrel	0.75	0.91			Undamaged	3b/IV	1991	
4392 (serial number)	BKG 519 (2773)	Shell	Very short	Barrel	0.23	0.55			Undamaged	3b/IV	1992	
4445 (serial number)	BKG 523 (2735)	Shell	Short	Barrel	0.64	0.86			Undamaged	3b/IV	1992	
4452 (serial number)	BKG 519 (2773)	Glass, light greenish	Short	Barrel	0.33	0.56			Undamaged	3b/IV	1992	
4151 (serial number)	BKG 311 (594)	Terracotta, brown	Short	Biconical	2.63	3.07			Undamaged	3b/1a	1987	
4327 (serial number)	BKG 519 (2802)	Terracotta, brown	Short	Biconical	1.51	2.18			Spalled and scarred	3b/IV	1992	
4366 (serial number)	BKG 519 (2802)	Shell? Limestone? Faience?	long	Biconical	1.06	0.64			Undamaged	3b/IV	1992	

4248 (serial number)	BKG 426 (1461)	Terracotta, brown	Short	Biconical with radial pattern?	1.79	2.42			Broken	3b/IV	1991	
4283 (serial number)	BKG 433 (1300)	Glass, yellowish brown	Very very short	Disc-shaped	0.14	0.44			Undamaged	3b/IV	1991	
4283 (serial number)	BKG 433 (1300)	Glass, yellowish brown	Very short	Disc-shaped	0.26	0.55			Undamaged	3b/IV	1991	
4283 (serial number)	BKG 433 (1300)	Glass, yellowish brown	Very short	Disc-shaped	0.18	0.51			Undamaged	3b/IV	1991	
4320 (serial number)	BKG 433 (1309)	Glass, yellowish brown	Very very short	Disc-shaped	0.21	0.79			Undamaged	3b/IV	1991	
4320 (serial number)	BKG 433 (1309)	Glass, yellowish brown	Very short	Disc-shaped	0.24	0.51			Undamaged	3b/IV	1991	
4320 (serial number)	BKG 433 (1309)	Glass, yellowish brown	Very short	Disc-shaped	0.19	0.52			Undamaged	3b/IV	1991	
4320 (serial number)	BKG 433 (1309)	Glass, yellowish brown	Very short	Disc-shaped	0.21	0.52			Undamaged	3b/IV	1991	
4147 (serial number)	BKG 304 (324)	Terracotta, brown	Long	Irregular spherical/Globular	1.83	1.81			Undamaged	3/III	1987	
4269 (serial number)	BKG 443 (1280)	Terracotta, brown	Short	Irregular spherical/Globular	1.93	2.16			Undamaged	3b/IV	1991	
4284 (serial number)	BKG 426 (1462)	Terracotta, brownish reddish	Short	Irregular spherical/Globular	1.5	1.88			Undamaged	3b/IV	1991	
4453 (serial number)	BKG 519 (2773)	Shell	Short	Barrel	0.42	0.47			Undamaged	3b/IV	1992	
4179 (serial number)	BKG 302 (605)	Terracotta, brown		Areca nut					Broken	3b/1a	1987	

4143 (serial number)	BKG 301 (598)	Terracotta, brownish black	Short	Areca nut, short convex truncated conical	1.27	1.9			Undamaged	3b/1a	1987	
4112 (serial number)	BKG 311 (386)	Terracotta, brown	Short	Modified Ghata-shaped	1.77	1.82			Broken	3b/1a	1987	
4446 (serial number)	BKG 523 (2735)	Terracotta, black	Short	Areca nut, short convex truncated conical	1.19	1.86			Undamaged	3b/IV	1992	
4344 (serial number)	BKG 523 (2735)	Terracotta red	Short	Areca nut, short convex truncated conical	1.38	1.96			Well-preserved	3b/IV	1992	
4394 (serial number)	BKG 519 (2802)	Shell	Very short	Square short cylindrical	0.22		0.62	0.22	Undamaged	3b/IV	1992	
4285 (serial number)	BKG 449 (1408)	Terracotta, brownish reddish	Short	Ghata-shaped	1.41	2.58			Undamaged	3b/IV	1991	
4454 (serial number)	BKG 519 (2773)	Terracotta, black	Short	Ghata-shaped	1.27	1.85			Undamaged	3b/IV	1992	
795	BKG 113 (245)	Garnet		Barrel	h. max. 0.008 L. 0.016 Perforation: 0.002					3b/IV	1984	
810	BKG 115 (254)	Shell		Irregular spherical/Globular	h. max. 0.005-0.007 D. 0.008-0.01 Perforation: 0.0008-0.00005					3b/IV	1984	2x beads
811	BKG 115 (254)	Shell		Disc-shaped, irregular	h. max. 0.003/0.004 D. 0.006/0.008					3b/IV	1984	4x beads
809	BKG 115 (254)	Cowrie shell		Cowrie shell	h. max. 0.013/0.015					3b/IV	1984	13x cowrie shells
797	BKG 113 (255)	Terracotta, dark grey		Biconical	h. max. 0.023 D. 0.028 Perforation: 0.004				Chipped	3b/IV	1984	
847	BKG 113 (229)	Terracotta		Ghata-shaped	h. max. 0.014 D. 0.019 Perforation: 0.004				Chipped Burnt	3b/IV	1984	

848	BKG 113 (229)	Terracotta, light brown		Biconical	h. max. 0.015 D. 0.019 Perforation: 0.004				Chipped slipped.	3b/IV	1984	
794	BKG 113 (237)	Terracotta, light brown		Areca nut	D. 0.02				Chipped	3b/IV	1984	
779	BKG 114 (236)	Terracotta		Biconical	h. max. 0.015 D. 0.026 Perforation: 0.004 max. and 0.0035 min.				Chipped Burnt	3b/IV	1984	
804	BKG 114 (252)	Terracotta		Biconical Grey	h. max. 0.021 h. min. 0.02 D. 0.025 Perforation: 0.004				Chipped	3b/IV	1984	
805	BKG 114 (286)	Terracotta, grey		Areca nut	h. max. 0.014 D. 0.022 Perforation: 0.003					3b/IV	1984	
806	BKG 115 (248)	Terracotta, grey		Ghata-shaped	h. max. 0.011 D. 0.024 Perforation: 0.005				Chipped	3b/IV	1984	
808	BKG 115 (254)	Terracotta, reddish		Ghata-shaped	h. max. 0.015 D. 0.025 Perforation: 0.05-0.04				Chipped	3b/IV	1984	
1995	BKG 9 (68)	Terracotta		Ghata-shaped	D. 0.021					3/III	1999	
1379	BKG 401 (310)	Terracotta		Modified Ghata-shaped	h. max. 1.3 D. 1.9 Perforation: 0.35					3b/IV	1990	
Non-inventoried	BKG 419 W (806 and 815)	Terracotta, brown		Areca nut	h. 2.1 D. 3.2 Perforation: 0.4					3b/IV		
2674	BKG 12 (119)	Shell	Short	Barrel	0.7	0.84			Undamaged	4a/V	7	
2660	BKG 12 (99)	Shell	Short	Barrel	0.6	0.71			Undamaged	4a/V	7	
2563	BKG 12 (19)	Terracotta, black	Short	Areca nut, short convex truncated conical	1.65	1.9			Damaged	4a/V	7	

2679	BKG 12 (119)	Glass, yellowish brown	Very very short	Disc-shaped	0.14	0.4			Undamaged	4a/V	7	
3772	BKG 11 K-1690 (1619)	Terracotta, brown	Short	Biconical with fading radial pattern	1.53	2.17			Undamaged	4a/V	12	
3181	BKG 11 K-1690 (1622)	Beryl-Aquamarine	Long	Hexagonal-faceted barrel	1.42	1.06			Scarred	4a/V	11	
3204	BKG 11 K-1690 N (1631)	Terracotta, brown	Short	Biconical	1.47	1.91			Broken	4a/V	11	
3180	BKG 11 K-1690 (1630)	Glass, green	Very short	Barrel	0.3	0.4			Spalled and scarred	4a/V	11	
3177	BKG 11 K-1690 (1622)	Terracotta, brown	Short	Biconical	1.64	1.83			Undamaged	4a/V	11	
3179	BKG 11 K-1690 (1622)	Beryl	Very long	Hexagonal-faceted cylindrical	1.85	0.7			Damaged	4a/V	11	Glued together
3236	BKG 11 K-1690 (1388)	Terracotta, brownish reddish	Short	Biconical with radial pattern	1.84	2.81			Spalled and scarred	4a/V	11	
3082	BKG 11 K-1690 (1603)	Terracotta	Short	Areca nut, grooved	2.62	3.66			Undamaged	4a/V	11	
2944	BKG 11 K-1690 (1373)	Shell	Short	Barrel, irregular	0.55	0.77			Damaged	4a/V	11	
2935	BKG 11 K-1690 (1369)-(1370)	Shell	Short	N/A	0.91	1.09			Broken	4a/V	11	
3078	BKG 11 K-1690 (1604)	Terracotta, brown	Short	Barrel	1.4	1.85			Undamaged	4a/V	11	

3044	BKG 11 K-1690 (1391)	Terracotta, brown	Short	Short asymmetrical truncated biconical	1.38	1.53			Spalled and scarred	4a/V	11	
3080	BKG 11 K-1690 (1396)	Terracotta, brown	Short	Biconical	2.07	2.6			Spalled and scarred	4a/V	11	
3077	BKG 11 K-1690 (1604)	Terracotta, brown	Short	Ghata-shaped	1.35	2.17			Undamaged	4a/V	11	
2986	BKG 11 K-1690 (1387)	Shell	Short	Barrel	0.65	0.93			Undamaged	4a/V	11	
2938	BKG 11 K-1690 (1373)	Terracotta, brown	Short	Biconical	1.49	1.96			Spalled and scarred	4a/V	11	
3079	BKG 11 K-1690 (1396)	Terracotta, brown	Short	Areca nut, grooved	1.56	2.18			Broken	4a/V	11	
2984	BKG 11 K-1690 (1386)	Shell	Short	Barrel	1.12	1.34			Undamaged	4a/V	11	
3120	BKG 11 K-1690 (1603)	Terracotta, brown	Short	Ghata-shaped	1.2	1.72			Damaged	4a/V	11	
3235	BKG 11 K-1690 (1388)	Terracotta, black	Short	Biconical with dotted and radial pattern	1.33	1.72			Undamaged	4a/V	11	
2905	BKG 11 K-103 (1370)	Carnelian, bleached		Rectangular barrel	0.76		0.98	0.37	Undamaged	4a/V	10	
2766	BKG 11 K-103 (1329)	Shell	Short	Barrel	0.52	0.75			Undamaged	4a/V	10	
2917	BKG 11 K-103 (1373)	Shell		Double-axe shaped, spacer bead	1.07		0.66	0.28	Undamaged	4a/V	10	

2910	BKG 11 K-103 (1370)	Terracotta, black	Short	Areca nut, grooved	1.5	1.94			Spalled and scarred	4a/V	10	
2862	BKG 11 K-103 (1360)	Terracotta, brown	Short	Areca nut, grooved	1.27	1.92			Spalled and scarred	4a/V	10	
2892	BKG 11 K-103 (1368)	Terracotta, brownish black	Short	Areca nut	1.58	1.96			Spalled and scarred	4a/V	10	
2891	BKG 11 K-103 (1368)	Terracotta, brownish black		Areca nut					Broken	4a/V	10	
2921	BKG 11 K-103 (1374)	Terracotta, brownish black	Short	Areca nut, grooved	1.51	2.04			Spalled and scarred	4a/V	10	
2911	BKG 11 K-103 (1370)	Terracotta, brown	Short	Biconical	1.45	1.99			Spalled and scarred	4a/V	10	
2902	BKG 11 K-103 (1370)	Shell		Lenticular short biconical	0.38		1.13	0.49	Undamaged	4a/V	10	
3059	BKG 11 K-1690 (1395)	Quartz		Irregular spherical/Globular	D. 0.9				Undamaged	4a/V	11	
2974	BKG 11 K-1690 (1378)	Shell		Barrel	D. 0.6 h. 0.5				Undamaged	4a/V	11	
3081	BKG 11 K-1690 (1396)	Shell		Biconical	D. 0.6 h. max. 0.5				Damaged	4a/V	11	
2985	BKG 11 K-1690 (1386)	Shell		Barrel	D. 0.5 h. 0.4				Undamaged	4a/V	11	
3002	BKG 11 K-1690 (1388)	Shell		Barrel	D. 0.8 h. 0.7				Undamaged	4a/V	11	

2894	BKG 11 K-103 (1368)	Glass		Barrel	D. 0.5 h. 0.3				Undamaged	4a/V	10	
2943	BKG 11 K-1690 (1388)	Glass, yellowish-brown		Disc-shaped	D. 0.5 d. 0.1				Undamaged	4a/V	11	
3056	BKG 11 K-1690 (1395)	Glass		Barrel 'eye' motif	D. 0.9 t. 0.5 d. 0.4				Broken	4a/V	11	
3126	BKG 11 K-1690 (1607)	Glass, yellowish-brown		Barrel	D. 0.4 t. 0.1				Undamaged	4a/V	11	
3127	BKG 11 K-1690 (1607)	Glass		Barrel	D. 0.6 l. 0.8				Undamaged	4a/V	11	
3176	BKG 11 K-1690 (1607)	Glass, yellowish-brown		Barrel	D. 0.5 h. 0.2				Undamaged	4a/V	11	
3500	BKG 11 K-1690 Section S (1631-1657)	Glass, greenish		Biconical, irregular	D. 0.8				Damaged	4a/V	11	
2889	BKG 11 K-103 (1363-1367)	Glass, yellowish-brown		Barrel, concentric lines along the rim	D. 0.9 h. 0.8				Broken	4a/V	10	
2904	BKG 11 K-103 (1370)	Glass, yellowish-brown		Barrel, concentric line along one rim	D. 0.8 h. 0.7				Broken	4a/V	10	
2906	BKG 11 K-103 (1370)	Glass, yellowish-brown		Barrel	D. 0.5 t. 0.2				Undamaged	4a/V	10	
4407 (Serial number)	BKG 519 (2758)	Terracotta, brown	Short	Areca nut, irregular	1.52	1.83			Spalled and scarred	4a/V	1992	Perforation but not aligned

4304 (Serial number)	BKG 456 (1492)	Terracotta, brown	Short	Areca nut, grooved	2.28	2.84			Spalled and scarred	4a/V	1991	
4271 (Serial number)	BKG 422 (1317)	Shell	Short	Barrel	0.6	0.8			Undamaged	4a/V	1991	
4296 (Serial number)	BKG 449 (1320)	Shell	Short	Barrel	0.57	0.78			Undamaged	4a/V	1991	
4297 (Serial number)	BKG 449 (1320)	Glass	Short	Irregular spherical/Globular	0.7	0.73			Undamaged	4a/V	1991	
4381 (Serial number)	BKG 519 (2758)	Shell	Short	Barrel	0.46	0.85			Undamaged	4a/V	1992	
4185 (Serial number)	BKG 301 (618)	Shell	Short	Barrel	0.51	0.83			Undamaged	3b/1b	1987	
4299 (Serial number)	BKG 428 (1307)	Stone?	Long	Barrel	1.16	0.76			Undamaged	4a/V	1991	
4144 (Serial number)	BKG 312 (596)	Terracotta, brownish reddish	Short	Biconical	1.65	2.72			Broken	4/1b	1987	
4272 (Serial number)	BKG 426 (1424)	Terracotta, brown	Short	Biconical	1.84	2.36			Undamaged	4a/V	1991	
4273 (Serial number)	BKG 455 (1398)	Terracotta, brown	Short	Biconical	2.23	3.27			Spalled and scarred	4a/V	1991	
4276 (Serial number)	BKG 442 (1221)	Terracotta, brown		Biconical					Broken	4a/V	1991	
4301 (Serial number)	BKG 449 (1384)	Terracotta, brownish black	Short	Biconical	1.43	2.11			Undamaged	4a/V	1991	
4294 (Serial number)	BKG 450 (1320)	Red jasper		Cowrie shell	0.33		1.33	0.43	Undamaged	4a/V	1991	
4264 (Serial number)	BKG 422 (1317)	Shell	Short	Disc-shaped	0.26	0.51			Undamaged	4a/V	1991	
4455 (Serial number)	BKG 521 (2749)	Glass, yellowish brown	Very short	Disc-shaped	0.22	0.51			Undamaged	4a/V	1992	
4275 (Serial number)	BKG 422 (1317)	Terracotta, brownish reddish	Short	Ghata-shaped	1.22	1.89			Undamaged	4a/V	1991	

4266 (Serial number)	BKG 422 (1317)	Terracotta, brown	Short	Ghata-shaped, grooved	1.78	2.32			Broken	4a/V	1991	
4398 (Serial number)	BKG 519 (2771)	Faience, green	Short	Irregular spherical/Globular	0.75	0.81			Undamaged	4a/V	1992	
4370 (Serial number)	BKG 433 (1394)	Terracotta, brown, banned on a floral pattern	Short	Modified Ghata-shaped	1.54	2.27			Undamaged	4a/V	1991	
4371 (Serial number)	BKG 520 (2762)	Terracotta, brown	Short	Modified Ghata-shaped with grooves	1.4	2.01			Spalled and scarred	4a/V	1992	
4303 (Serial number)	BKG 428 (1307)	Faience	Short	Barrel	0.71	0.98			Undamaged	4a/V	1991	
4300 (Serial number)	BKG 449 (1384)	Glass, black	Short	Irregular spherical/Globular	1.22	1.22			Undamaged	4a/V	1991	
4270 (Serial number)	BKG 422 (1317)	Shell		Rectangular long rectangular (spacer bead)	1.06			0.4	Broken	4a/V	1991	
4161 (Serial number)	BKG 312 (437)	Malachite		Perforated irregular shaped pendant	0.57		1.18	0.59	Damaged	4/1b	1987	
4282 (Serial number)	BKG 443 (1269)	Glass, blue		Biconical					Broken	4a/V	1991	With 5x small fragments
4408 (Serial number)	BKG 519 (2758)	Cowrie shell		Cowrie shell	1.55		0.98	0.5	Undamaged	4a/V	1992	
5119	BKG 13 (351)	Terracotta		Biconical	h. 2.0 D. 2.0 d. 0.3				Undamaged	3-4	2019	
842	BKG 109 (152)	Carnelian		Barrel	h. max. 0.006 D. 0.007				Chipped	4a/V	1984	
751	BKG 110 (157)	Faience, white		Barrel	h. max. 0.014 D. 0.011					4a/V	1984	

823	BKG 108 (129, C)	Terracotta, grey		Areca nut	h. max. 0.012-0.011 D. 0.022 Perforation: 0.004	Chipped	4a/V	1984	
824	BKG 108 (129, C)	Terracotta, grey		Areca nut	h. max. 0.014 D. 0.018 Perforation: 0.005-0.004	Chipped	4a/V	1984	
828	BKG 108 (131)	Terracotta, grey		Areca nut	h. max. 0.016 D. 0.02 Perforation: 0.004	Chipped	4a/V	1984	
829	BKG 108 (131)	Terracotta, grey		Modified ghata-shaped	h. max. 0.013 D. 0.02 Perforation: 0.005-0.004		4a/V	1984	
742	BKG 109 (144)	Terracotta, brown		Areca nut	h. max. 0.016 h. min. 0.015 D. 0.02 Perforation: 0.0035		4a/V	1984	
767	BKG 109 (194)	Terracotta, grey		Ghata-shaped	h. max. 0.014 D. 0.019 Perforation: 0.004		4a/V	1984	
770	BKG 109 (192)	Terracotta, grey		Ghata-shaped	h. max. 0.019 D. 0.02 Perforation: 0.004		4a/V	1984	
771	BKG 109 (153)	Terracotta, reddish		Ghata-shaped	h. max. 0.015 D. 0.022 Perforation: 0.004 max. and 0.003 min.		4a/V	1984	
745	BKG 110 (157)	Terracotta, brown		Ghata-shaped	h. max. 0.016 h. min. 0.015 D. 0.019 Perforation: 0.004		4a/V	1984	
749	BKG 110 (131)	Terracotta, Reddish		Areca nut	h. max. 0.01 D. 0.022 Perforation: 0.005 max. and 0.004 min.		4a/V	1984	
765	BKG 110 (168)	Terracotta, grey		Biconical	h. max. 0.019 D. 0.02 Perforation: 0.004		4a/V	1984	
776	BKG 110 (221)	Terracotta, grey		Ghata-shaped	h. max. 0.015 D. 0.02 Perforation: 0.004		4a/V	1984	

777	BKG 110 (221)	Terracotta, reddish		Areca nut	h. max. 0.019 D. 0.028 Perforation: 0.004					4a/V	1984	
841	BKG 109 (152)	Glass, blue		Barrel	h. max. 0.003 D. 0.004 Perforation: 0.001					4a/V	1984	
Non-inventoried	BKG 412 (758)	Terracotta, brown		Ghata-shaped	h. 0.9 D. 1.7 Perforation: 0.4					4a/V		
2683	BKG 12 (126 S)	Cowrie shell		Cowrie shell	1.36		0.91	0.65	Undamaged	4b/VI	7	
2616	BKG 12 (41)	Carnelian	Short	Irregular spherical/Globular	0.5	0.61			Spalled and scarred	4b/VI	7	
2663	BKG 12 (110)	Shell	Short	Barrel	0.69	0.78			Undamaged	4b/VI	7	
1296	BKG 310 (221?)	Carnelian	Short	Spherical	0.95	1.04			Undamaged	4/IVA		
1493	BKG 423 (630)	Glass	Short	Hexagonal-faceted barrel	1.15	1.19			Undamaged	4b/VI		
2810	BKG 11 K-103 (1349)	Shell	Short	Barrel	0.54	0.66			Undamaged	4b/VI	10	
2813	BKG 11 K-103 (1354)	Terracotta, brown	Short	Areca nut	1.75	2.2			Undamaged	4b/VI	10	
2777	BKG 11 K-103 (1329)	Terracotta, brown	Short	Irregular spherical/Globular	2.02	2.16			Undamaged	4b/VI	10	
2765	BKG 11 K-103 (1342)	Shell	Short	Cylindrical	0.85	1.1			Undamaged	4b/VI	10	
2799	BKG 11 K-103 (1351)	Terracotta, brown	Short	Areca nut, grooved	1.42	1.73			Undamaged	4b/VI	10	
2817	BKG 11 K-103 (1355)	Shell		Cylindrical, irregular	D. 0.4 h. 0.3				Undamaged	4b/VI	10	

2826	BKG 11 K-103 (1355)	Shell		Barrel	D. 0.6 h. 0.6				Undamaged	4b/VI	10	
2875	BKG 11 K-103 (1361)	Shell		Double comb	w. 1.3 h. 1.2 t. 0.4				Undamaged	4b/VI	10	
2880	BKG 11 K-103 (1361)	Glass, yellowish-brown		Barrel	D. 0.6 h. 0.2				Undamaged	4b/VI	10	
4064 (Serial number)	BKG 308 (193)	Terracotta, brown	Short	Areca nut	1.04	1.85			Spalled and scarred	4/IVA	1987	
4089 (Serial number)	BKG 304 (323)	Terracotta, brownish reddish	Short	Biconical	1.66	2.24			Spalled and scarred	4/IVA	1987	
4100 (Serial number)	BKG 304? (116)	Shell	Short	Barrel	0.51	0.69			Undamaged	4/2a	1987	
4117 (Serial number)	BKG 311 (389)	Glass, yellowish brown	Very short/v. v. short	Disc-shaped	0.23/0.16	0.56/0.47			Undamaged	4/2a	1987	2x beads
4119 (Serial number)	BKG 301 (337)	Terracotta, brownish black	Short	Areca nut	1.39	2.04			Broken	4/2a	1987	
4121 (Serial number)	BKG 308 W (309)	Terracotta, brown	Short	Ghata-shaped	1.51	2.12			Broken	4/IVA	1987	
4122 (Serial number)	BKG 312 (384)	Terracotta, brownish black	Short	Areca nut, grooved	1.76	2.24			Broken	4/2a	1987	
4131 (Serial number)	BKG 312 (383)	Terracotta, brown	Short	Biconical	1.52	1.83			Spalled and scarred	4/2a	1987	
4132 (Serial number)	BKG 308 W (304)	Lapis Lazuli	Long	Barrel	0.42	0.3			Undamaged	4/IVA	1987	
4146 (Serial number)	BKG 302 (382)	Rock crystal	Long	Pentagonal-faceted barrel	0.93	0.9			Undamaged	4/2a	1987	
4149 (Serial number)	BKG 308 (252)	Terracotta, brown	Short	Areca nut	1.44	1.88			Spalled and scarred	4/IVA	1987	
4153 (Serial number)	BKG 301 (382)	Terracotta, brown	Short	Areca nut, dotted pattern	1.32	1.45			Undamaged	4/2a	1987	

4158 (Serial number)	BKG 301 (337)	Terracotta, black	Short	Areca nut	1.45	2.18			Broken	4/2a	1987	
4160 (Serial number)	BKG 302 (440)	Terracotta, black	Short	Areca nut	1.25	1.81			Undamaged	4/2a	1987	
4173 (Serial number)	BKG 302 (419)	Faience	Short	Irregular spherical/Globular	0.6	0.77			Undamaged	4/2a	1987	
4175 (Serial number)	BKG 304 (434)	Glass	Large beads		0.58	0.74			Undamaged	4/2a	1987	29x beads (pearl, malachite, coral and garnet)
4175 (Serial number)	BKG 304 (434)	Glass, plus pearls	Medium beads		0.44	0.55			Undamaged	4/2a	1987	
4175 (Serial number)	BKG 304 (434)	Glass, plus pearl	Small beads		0.15	0.32			Undamaged	4/2a	1987	
4175 (Serial number)	BKG 304 (434)	Glass	Large beads		0.41	0.63			Undamaged	4/2a	1987	8x beads
4175 (Serial number)	BKG 304 (434)	Glass, plus pearl	Medium beads		0.36	0.4			Undamaged	4/2a	1987	
4175 (Serial number)	BKG 304 (434)	Glass	Small beads		0.1	0.28			Undamaged	4/2a	1987	
4182 (Serial number)	BKG 310 (172)	Shell	Very long	Cylindrical	0.74	0.26			Undamaged	4/IVA	1987	
4183 (Serial number)	BKG 310 (172)	Stone?	Short	Square cylindrical	0.57	0.79			Spalled and scarred	4/IVA	1987	
4187 (Serial number)	BKG 313 (201)	Shell	Short	Barrel	0.21	0.33			Undamaged	4/IVA	1987	
4194 (Serial number)	BKG 304 (435)	Terracotta, black	Short	Areca nut	1.42	1.97			Broken	4/2a	1987	
4204 (Serial number)	BKG 308 (194)	Glass, greenish bluish	Short	Barrel	0.44	0.56			Undamaged	4/IVA	1987	
4205 (Serial number)	BKG 311 (332)	Glass with fragments	Short	Irregular spherical/Globular	0.27	0.31			Undamaged	4/2a	1987	
4206 (Serial number)	BKG 311 (399)	Glass, yellowish brown	Very short	Disc-shaped	0.16	0.4			Undamaged	4/2a	1987	

4207 (Serial number)	BKG 312 (383)	Glass, yellowish brown	Very short	Disc-shaped	0.22	0.48			Undamaged	4/2a	1987	
4212 (Serial number)	BKG 301 (312)	Terracotta, brown	Short	Areca nut	1.2	1.96			Undamaged	4/2a	1987	
4213 (Serial number)	BKG 301 (312)	Shell	Short	Irregular spherical/Globular	0.4	0.49			Undamaged	4/2a	1987	
4213 (Serial number)	BKG 301 (312)	Glass, bluish		Barrel		0.49			Broken	4/2a	1987	
4215 (Serial number)	BKG 312 (384)	Glass, yellowish brown	Very short	Disc-shaped	0.18	0.45			Undamaged	4/2a	1987	
4217 (Serial number)	BKG 304 (498)	Terracotta, brown	Short	Areca nut	1.28	1.82			Undamaged	4/2a	1987	
4245 (Serial number)	BKG 310 (192)	Glass, yellowish brown	Short	Barrel					Broken	4/IVA	1987	
4249 (Serial number)	BKG 433 (1270)	Terracotta, brownish black	Short	Areca nut	1.19	1.69			Broken	4b/VI	1991	
4257 (Serial number)	BKG 433 (1261)	Shell	Very short	Disc-shaped	0.27	0.81			Undamaged	4b/VI	1991	
4257 (Serial number)	BKG 433 (1261)	Shell	Very very short	Disc-shaped	0.22	0.88			Undamaged	4b/VI	1991	
4258 (Serial number)	BKG 433 (1261)	Glass, yellowish brown	Very short	Disc-shaped	0.19	0.53			Undamaged	4b/VI	1991	
4258 (Serial number)	BKG 433 (1261)	Glass, yellowish brown	Very very short	Disc-shaped	0.2	0.58			Undamaged	4b/VI	1991	
4258 (Serial number)	BKG 433 (1261)	Glass, yellowish brown	Very short	Disc-shaped	0.21	0.47			Undamaged	4b/VI	1991	
4258 (Serial number)	BKG 433 (1261)	Glass, yellowish brown	Very short	Disc-shaped	0.18	0.55			Undamaged	4b/VI	1991	

4259 (Serial number)	BKG 422 (1317)	Shell	Short	Barrel	0.75	0.94			Spalled and scarred	4b/VI	1991	
4262 (Serial number)	BKG 433 (1273)	Terracotta, black	Short	Areca nut, grooved	1.32	1.66			Broken	4b/VI	1991	
4263 (Serial number)	BKG 426 (1248)	Terracotta, brown	Short	Biconical with a groove and radial pattern	1.47	2.5			Undamaged	4b/VI	1991	
4268 (Serial number)	BKG 422 (661)	Terracotta, brown	Short	Biconical	1.7	1.97			Broken	4b/VI	1991	
4274 (Serial number)	BKG 437 (1497)	Shell		Cylindrical, irregular	0.44		0.68	0.52	Undamaged	4b/VI	1991	
4286 (Serial number)	BKG 413 (738)	Shell	Short	Barrel	0.61	0.9			Spalled and scarred	4b/VI	1991	
4288 (Serial number)	BKG 413 (738)	Terracotta, reddish	Short	Modified Ghata-shaped, grooved	1.32	2.5			Broken	4b/VI	1991	
4289 (Serial number)	BKG 413 (738)	Terracotta, brown	Short	Biconical with radial pattern	2.76	3.16			Spalled and scarred	4b/VI	1991	
4328 (Serial number)	BKG 514 (2641)	Shell	Short	Barrel	0.84	0.94			Undamaged	4b/VI	1992	
4329 (Serial number)	BKG 519 (2724)	Quartz	Short	Barrel	0.71	0.85			Undamaged	4b/VI	1992	
4330 (Serial number)	BKG 519 (2724)	Glass, yellowish-brown	Very short	Disc-shaped	0.23	0.56			Undamaged	4b/VI	1992	
4331 (Serial number)	BKG 519 (2724)	Shell	Short	Barrel	0.44	0.55			Undamaged	4b/VI	1992	
4332 (Serial number)	BKG 519 (2724)	Shell	Very short	Disc-shaped	0.25	0.73			Undamaged	4b/VI	1992	
4333 (Serial number)	BKG 501 (2618)	Lapis Lazuli	Short	Gadrooned Barrel	0.62	1.15			Well-preserved	4b/VI	1992	
4334 (Serial number)	BKG 519 (2724)	Terracotta, brown	Short	Biconical	1.64	1.88			Scarred	4b/VI	1992	
4340 (Serial number)	BKG 421 (2737)	Terracotta, brown	Short	Modified Ghata-shaped	1.43	2.1			Undamaged	4b/VI	1992	
4341 (Serial number)	BKG 504 Section (from	Shell	Short	Barrel	0.62	0.72			Damaged	4b/VI - 5a/VII	1992	

	2595 to 2644)											
4343 (Serial number)	BKG 519 (2682)	Terracotta, brown	Short	Ghata-shaped	1.36	2.02			Undamaged	4b/VI	1992	Pigment ?
4358 (Serial number)	BKG 513 (2673)	Terracotta, brown	Very short	Areca nut, grooved	0.81	1.7			Undamaged	4b/VI	1992	
4361 (Serial number)	BKG 519 (2680)	Shell	Short	Barrel	0.29	0.47			Undamaged	4b/VI	1992	
4362 (Serial number)	BKG 519 (2680)	Glass, yellowish brown	Very short	Disc-shaped	0.22	0.5			Undamaged	4b/VI	1992	
4363 (Serial number)	BKG 519 (2680)	Terracotta, black	Short	Areca nut, grooved	1.38	1.84			Undamaged	4b/VI	1992	
4365 (Serial number)	BKG 504 (2638). Inside a jar	Terracotta, brown	Short	Ghata-shaped	1.31	1.44			Damaged	4b/VI	1992	Fill of a jar
4372 (Serial number)	BKG 522 (2733)	Terracotta, black		Areca nut, grooved					Broken	4b/VI	1992	
4393 (Serial number)	BKG 521-522 (2716)	Terracotta, red	Short	Areca nut	1.51	2.37			Damaged	4b/VI	1992	
4397 (Serial number)	BKG 501 (2621)	Terracotta, brown	Short	Areca nut, grooved	2.18	2.87			Damaged	4b/VI	1992	
4400 (Serial number)	BKG 520 (2722)	Terracotta, black	Short	Areca nut, grooved	1.28	1.81			Spalled and scarred	4b/VI	1992	
4402 (Serial number)	BKG 520 (2712)	Terracotta, brown	Short	Areca nut	1.76	2.14			Spalled and scarred	4b/VI	1992	
4403 (Serial number)	BKG 522 (2727)	Terracotta, brown							Broken	4b/VI	1992	
4404 (Serial number)	BKG 514 (2687)	Shell	Long	Barrel	0.8	0.77			Undamaged	4b/VI	1992	
4406 (Serial number)	BKG 514 (2687)	Cowrie shell		Cowrie shell	1.54		1.13	0.66	Undamaged	4b/VI	1992	
4409 (Serial number)	BKG 501 (2601)	Terracotta, brown	Short	Areca nut, grooved	1.54	1.75			Undamaged	4b/VI	1992	
4409 (Serial number)	BKG 501 (2601)	Terracotta, brown	Short	Areca nut, grooved	1.66	2.19			Undamaged	4b/VI	1992	

4410 (Serial number)	BKG 501 (2601)	Terracotta, black	Short	Modified Ghata-shaped	1.33	1.67			Spalled and scarred	4b/VI	1992	
4410 (Serial number)	BKG 501 (2601)	Terracotta, black	Short	Modified Ghata-shaped	1.14	1.38			Spalled and scarred	4b/VI	1992	
4415 (Serial number)	BKG 521 (2738)	Cowrie shell		Cowrie shell	1.3		0.93	0.34	Undamaged	4b/VI	1992	
4418 (Serial number)	BKG 501 (2611)	Shell	Very short	Barrel	0.3	0.69			Undamaged	4b/VI	1992	
4440 (Serial number)	BKG 517 (2681)	Terracotta, brown	Short	Modified Ghata-shaped	1.18	1.97			Damaged	4b/VI	1992	
4440 (Serial number)	BKG 517 (2681)	Terracotta, brown	Short	Areca nut, grooved	1.18	1.79			Damaged	4b/VI	1992	
4458 (Serial number)	BKG 521 (2736) Inside a jar	Faience	Long	Barrel	0.96	0.44			Spalled and scarred	4b/6	1992	
4459 (Serial number)	BKG 521 (2736) Inside a jar	Faience	Short	Barrel, irregular	0.51	0.65			Undamaged	4b/6	1992	
4359 (Serial number)	BKG 513 (2673)	Rock crystal		Octagonal-faceted barrel	3.5				Broken	4b/VI	1992	
826	BKG 108 (129, d)	Terracotta, grey		Areca nut	h. max. 0.016 D. 0.022 Perforation: 0.005-0.0055				Chipped	4b/VI	1984	
827	BKG 108 (129, d)	Glass, yellowish-brown	Short	Barrel	h. max. 0.003 D. 0.006 Perforation: 0.003				Scratched	4b/VI	1984	
1999	BKG 9 (39)	Terracotta, grey		Areca nut	D. 0.0265					4/IV	1999	
1239	BKG 308 (407)	Agate		Barrel	L. 0.012					4/2a	1987	
1231	BKG 308 (403)	Bone		Cylindrical	L. 0.01					4/IVA	1987	
1534	BKG 427 (547)	Glazed quartz		Butterfly nut	h. max 1.1 Perforation: 0.1 Thickness: 0.5 Width: 1.2					4b/VI	1990	

1470	BKG 422 (91)	Terracotta, brown		Biconical	h. max. 2.1 D. 3.15 Perforation: 0.45					4b/VI	1990	
1535	BKG 427 (621)	Terracotta, grey		Areca nut	h. max. 2.0 D. 2.5/1.9 Perforation: 0.5 (base)/0.4				Chipped	4b/VI	1990	
Not inventoried	BKG 304 (293)	Terracotta		Areca nut	D. 2.2 h. 1.1 Perforation: 0.5					4/IVA		
Not inventoried	BKG 412 (735)	Terracotta, brown		Ghata-shaped	D. 2.1 h. 1.4 Perforation: 0.4					4b/VI		
Not inventoried	BKG 422 (91)	Terracotta, black		Areca nut	D. 1.6 h. 1.4 Perforation: 0.4					4b/VI		
Not inventoried	BKG 422 (91)	Terracotta, grey		Areca nut	D. 2 h. 1.5 Perforation: 0.5					4b/VI		
Not inventoried	BKG 422 (636)	Terracotta, brown		Areca nut	D. 2.3 h. 1.6 Perforation: 0.3					4b/VI		
2458	BKG 11 E 5-6/7-8 107 (1219)	Glass, yellowish brown	Very short	Disc-shaped	0.19	0.45			Undamaged	5a/VII	5	
2489	BKG 11 E 5-6/7-8 107 (1208)	Glass	Short	Barrel	0.38	0.61			Undamaged	5a/VII	5	
2426	BKG 11 E 5-6/7-8 107 (1219)	Shell, columella	Short	Barrel	1.18	1.34			Spalled and scarred	5a/VII	5	
2428	BKG 11 E 7-8 109 (1205)	Shell	Very short	Bird shape	0.7		0.65	0.3	Undamaged	5a/VII	5	

2427	BKG 11 E 5-6/7-8 107 N (1208)-(1211)	Shell	Short	Rectangular barrel, spacer bead	1.12	1.61	1.51	0.41	Undamaged	5a/VII	5	
2460	BKG 11 E 7-8 109 (1205)	Terracotta, brownish reddish	Short	Biconical with outer incisions and dot patterns	2.45	3.64			Undamaged	5a/VII	5	
2589	BKG 12 (31)	Terracotta, brown	Short	Biconical	2.43	3.54			Undamaged	5a/VII	7	Kharoshti aksara sign
2638	BKG 12 (69)	Glass, dark blue	Short	Barrel	0.32	0.63			Undamaged	5a/VII	7	
2587	BKG 12 (31)	Terracotta, brown reddish	Short	Biconical	1.69	2.27			Undamaged	5a/VII	7	
2657	BKG 12 (85)-(86)	Agate, banded black-and-white (dyed)	Short	Irregular spherical/Globular	0.75	0.89			Undamaged	5a/VII	7	
2593	BKG 12 (31)	Agate, banded black-and-white (dyed)	Long	Barrel	0.83	1.1			Broken	5a/VII	7	
2592	BKG 12 (31)	Shell	Short	Barrel	0.89	1			Undamaged	5a/VII	7	
2585	BKG 12 (31)	Terracotta, brown	Short	Areca nut, grooved	1.08	1.88			Undamaged	5a/VII	7	
2643	BKG 12 (69)	Terracotta, black	Short	Areca nut, grooved	1.34	2.06			Undamaged	5a/VII	7	
2627	BKG 12 (47)	Serpentine, green	Very long	Barrel	2.23	1.01			Undamaged	5a/VII	7	
2675	BKG 12 (51)	Glass, yellowish brown	Very very short	Disc-shaped	0.18	0.46			Undamaged	5a/VII	7	
2620	BKG 12 (49)	Shell	Short	Barrel	0.83	1.01			Undamaged	5a/VII	7	

2605	BKG 12 (38)	Shell	Short	Barrel	0.55	0.67			Undamaged	5a/VII	7	
2586	BKG 12 (31)	Terracotta, brownish	Short	Areca nut	1.54	2.05			Undamaged	5a/VII	7	
2646	BKG 12 (77)	Glass, yellowish brownish	Very short	Disc-shaped	0.21	0.58			Undamaged	5a/VII	7	
2647	BKG 12 (77)	Lapis Lazuli	Short	Barrel	0.37	0.45			Undamaged	5a/VII	7	
2554	BKG 12 (2)	Terracotta, brown	Very short	Biconical	1.07	2.58			Undamaged	5a/VII	7	
2588	BKG 12 (31)	Terracotta, brown	Short	Biconical with dotted decoration along the edge	1.96	2.72			Spalled and scarred	5a/VII	7	
2678	BKG 12 (64)	Terracotta, brownish reddish	Short	Modified Ghata-shaped	1.13	1.53			Damaged	5a/VII	7	
2630	BKG 12 (52)	Carnelian, opaque, bleached	Long	Barrel	0.98	0.62			Undamaged	5a/VII	7	
2637	BKG 12 (69)	Glass, green (wound)		Crimped in the centre and grooves ground at the ends	1.04				Broken	5a/VII	7	
2591	BKG 12 (31)	Glass, dark blue	Short	Barrel	0.43	0.69			Undamaged	5a/VII	7	
2740	BKG 12 (69)	Glass, dark blue	Very very short	Disc-shaped	0.1	0.5			Undamaged	5a/VII	7	
3342	BKG 11 115 (1546)	Terracotta	Very short	Modified Ghata-shaped, grooved	0.93	2.34			Undamaged	5a/VII	11	
3339	BKG 11 W 61 [1486]	Glass, yellowish-brown	Short	Disc-shaped	D. 0.5				Undamaged	5a/VII	11	
4256 (Serial number)	BKG 456 (1450)	Terracotta, brown	Short	Areca nut grooved	1.75	2.43			Undamaged	5/VII	1991	

4260 (Serial number)	BKG 418 (677) S	Terracotta, black	Short	Areca nut grooved	1.38	1.92			Spalled and scarred	5/VII	1991	
4265 (Serial number)	BKG 456 (1450)	Terracotta, black	Short	Areca nut	1.75	2.21			Spalled and scarred	5/VII	1991	
4281 (Serial number)	BKG 418 (1257)	Terracotta, brown	Short	Areca nut	1.48	1.99			Spalled and scarred	5/VII	1991	
4290 (Serial number)	BKG 504 (2595)	Terracotta, grey	Short	Areca nut	1.02	1.89			Undamaged	5/VII	1991	
4291 (Serial number)	BKG 504 (2595)	Chloritic rock	Short	Barrel	1.76	3.45			Undamaged	5/VII	1991	
4292 (Serial number)	BKG 421 (1397)	Shell	Long	Barrel	0.92	0.88			Undamaged	5/VII	1991	
4295 (Serial number)	BKG 456 (1450)	Glass, black	Short	Barrel	0.43	0.57			Undamaged	5/VII	1991	
4305 (Serial number)	BKG 456 (1492)	Terracotta, black	Short	Modified Ghata-shaped	1.45	1.71			Broken	5/VII	1991	
4306 (Serial number)	BKG 456 (1492)	Terracotta, black	Short	Ghata-shaped	1.16	1.43			Spalled and scarred	5/VII	1991	
4307 (Serial number)	BKG 456 (1492)	Terracotta, brownish black	Short	Ghata-shaped	1.26	1.62			Broken	5/VII	1991	
4308 (Serial number)	BKG 456 (1492)	Terracotta, black	Short	Ghata-shaped	1.29	1.76			Spalled and scarred	5/VII	1991	
4309 (Serial number)	BKG 456 (1492)	Terracotta, black	Short	Ghata-shaped	1.26	1.53			Broken	5/VII	1991	
4310 (Serial number)	BKG 456 (1492)	Terracotta, black	Short	Ghata-shaped	1.07	1.45			Broken	5/VII	1991	
4311 (Serial number)	BKG 456 (1492)	Terracotta, black	Short	Areca nut	1.16	1.62			Spalled and scarred	5/VII	1991	
4312 (Serial number)	BKG 456 (1492)	Terracotta, brownish black	Short	Areca nut, grooved	1.23	1.6			Undamaged	5/VII	1991	
4313 (Serial number)	BKG 456 (1492)	Terracotta, black	Short	Areca nut	1.25	1.65			Undamaged	5/VII	1991	
4314 (Serial number)	BKG 456 (1492)	Terracotta, brown	Short	Ghata-shaped	1.14	1.79			Undamaged	5/VII	1991	
4315 (Serial number)	BKG 456 (1492)	Terracotta, black	Short	Areca nut, grooved	0.83	1.28			Spalled and scarred	5/VII	1991	

4316 (Serial number)	BKG 456 (1492)	Terracotta, black	Short	Areca nut	0.94	1.61			Broken	5/VII	1991	
4317 (Serial number)	BKG 456 (1492)	Terracotta, black	Short	Areca nut	1.01	1.65			Spalled and scarred	5/VII	1991	
4318 (Serial number)	BKG 456 (1492)	Terracotta, brownish black	Short	Areca nut					Broken	5/VII	1991	
4322 (Serial number)	BKG 456 (1492)	Terracotta, brown	Short	Biconical	1.41	2.14			Spalled and scarred	5/VII	1991	
4323 (Serial number)	BKG 456 (1492)	Rock? Brownish black	Short	Couched lion	1.21		1.01	0.65	Spalled and scarred	5/VII	1991	
4324 (Serial number)	BKG 456 (1492)	Faience	Short	Barrel, irregular	0.47	0.61			Spalled and scarred	5/VII	1991	
4325 (Serial number)	BKG 456 (1492)	Lapis Lazuli	Short	Globular	0.48	0.57			Undamaged	5/VII	1991	
4325 (Serial number)	BKG 456 (1492)	Lapis Lazuli	Short	Irregular spherical/Globular	0.46	0.57			Undamaged	5/VII	1991	
4325 (Serial number)	BKG 456 (1492)	Lapis Lazuli	Short	Irregular spherical/Globular	0.49	0.55			Undamaged	5/VII	1991	
4325 (Serial number)	BKG 456 (1492)	Lapis Lazuli	Short	Irregular spherical/Globular	0.43	0.43			Undamaged	5/VII	1991	
4325 (Serial number)	BKG 456 (1492)	Lapis Lazuli	Short	Irregular spherical/Globular	0.48	0.54			Undamaged	5/VII	1991	
4325 (Serial number)	BKG 456 (1492)	Lapis Lazuli	Short	Irregular spherical/Globular	0.33	0.47			Undamaged	5/VII	1991	
4325 (Serial number)	BKG 456 (1492)	Lapis Lazuli	Short	Irregular spherical/Globular	0.45	0.56			Undamaged	5/VII	1991	
4325 (Serial number)	BKG 456 (1492)	Lapis Lazuli	Long	Irregular spherical/Globular	0.5	0.47			Undamaged	5/VII	1991	

4325 (Serial number)	BKG 456 (1492)	Lapis Lazuli	Short	Pear shaped	0.41	0.45			Undamaged	5/VII	1991	
4325 (Serial number)	BKG 456 (1492)	Lapis Lazuli	Short	Irregular spherical/Globular	0.43	0.5			Undamaged	5/VII	1991	
4335 (Serial number)	BKG 503-445 (2528)	Shell	Short	Barrel	0.39	0.46			Well-preserved	5/VII	1992	
4336 (Serial number)	BKG 448 (2543)	Shell	Short	Barrel	0.47	1.12			Undamaged	5/VIII	1992	
4337 (Serial number)	BKG 501 (2501)	Terracotta, brown	Short	Areca nut, grooved	1.74	2.05			Damaged	5/VII	1992	
4339 (Serial number)	BKG 503 (2624)	Shell	Short	Barrel	0.69	0.84			Undamaged	5/VII	1992	
4341 (Serial number)	BKG 504 Section (from 2595 to 2644)	Shell	Short	Barrel	0.62	0.72			Damaged	4b/VI - 5a/VII	1992	
4342 (Serial number)	BKG 509 (2585)	Terracotta, black	Short	Areca nut, grooved	1.29	1.87			Damaged	5/VII	1992	
4346 (Serial number)	BKG 504 (2595)	Terracotta, black	Short	Ghata-shaped	1.23	1.54			Undamaged	5/VII	1992	
4347 (Serial number)	BKG 504 (2595)	Terracotta, black	Short	Areca nut	1.1	1.65			Undamaged	5/VII	1992	
4348 (Serial number)	BKG 504 (2595)	Terracotta, brown	Short	Areca nut	1.37	1.66			Undamaged	5/VII	1992	
4349 (Serial number)	BKG 504 (2595)	Lapis Lazuli	Short	Irregular spherical/Globular	0.42	0.51			Spalled and scarred	5/VII	1992	
4350 (Serial number)	BKG 504 (2595)	Glass, blue	Very short	Biconical	0.23	0.5			Undamaged	5/VII	1992	
4350 (Serial number)	BKG 504 (2595)	Glass, blue	Very short	Biconical	0.15	0.41			Undamaged	5/VII	1992	
4352 (Serial number)	BKG 504 (2576)	Shell		Flower, spacer bead	0.78		1.23	0.42	Undamaged	5/VII	1992	
4353 (Serial number)	BKG 504 (2576)	Terracotta, black	Short	Areca nut	1.53	1.99			Spalled and scarred	5/VII	1992	

4354 (Serial number)	BKG 504 (2576)	Terracotta, brown reddish	Short	Areca nut, simple and low-quality	1.91	1.95			Undamaged	5/VII	1992	
4354 (Serial number)	BKG 504 (2576)	Terracotta, brown reddish	Short	Areca nut, simple and low-quality	1.92	2.36			Undamaged	5/VII	1992	
4355 (Serial number)	BKG 504 (2576)	Terracotta, black	Short	Areca nut					Broken	5/VII	1992	
4355 (Serial number)	BKG 504 (2576)	Terracotta, black	Short	Areca nut		1.7			Broken	5/VII	1992	Glued together
4355 (Serial number)	BKG 504 (2576)	Terracotta, brown	Short	Barrel		1.41			Spalled and scarred	5/VII	1992	
4360 (Serial number)	BKG 504 (2635)	Terracotta, black	Short	Areca nut, grooved	1.23	1.86			Undamaged	5/VII	1992	
4367 (Serial number)	BKG 519 (2695)	Shell	Very short	Disc-shaped	0.37	0.85			Well-preserved	5/VII	1992	
4379 (Serial number)	BKG 507 (2521)	Cowrie shell		Cowrie shell	1.4		0.85	0.41	Undamaged	5/VII	1992	
4384 (Serial number)	BKG 519 (2695)	Jasper, brown	Long	Barrel	1.35	0.7			Spalled and scarred	5/VII	1992	
4388 (Serial number)	BKG 503 (2504)	Terracotta, black	Short	Areca nut, grooved	1.39	1.93			Damaged	5/VIII	1992	
4390 (Serial number)	BKG 501 (2534)	Glass							Broken	5/VII	1992	
4391 (Serial number)	BKG 465 (1553)	Glass, yellowish brown	Long	Barrel	0.41	0.4			Undamaged	5/VII	1992	
4395 (Serial number)	BKG 510 (2551)	Terracotta, brown	Short	Areca nut	1.52	2.33			Well-preserved	5/VII	1992	no photo
4399 (Serial number)	BKG 445 (2561)	Glass, yellowish brown	Short	Barrel	0.22	0.33			Undamaged	5/VII	1992	
4411 (Serial number)	BKG 5 (1)	Terracotta, black	Short	Areca nut	1.62	1.95			Well-preserved	5/VIII	1992	
4412 (Serial number)	BKG 5 (1)	Glass	Short	Biconical	0.52	0.84			Well-preserved	5/VIII	1992	
4413 (Serial number)	BKG 501 (2582)	Terracotta, black	Short	Areca nut, grooved	1.22	1.56			Undamaged	5/VII	1992	

4414 (Serial number)	BKG 501 (2582)	Terracotta, brown	Short	Areca nut	1.2	1.61			Undamaged	5/VII	1992	no photo
4421 (Serial number)	BKG 504 (2565)	Terracotta, brown blackish	Short	Areca nut, grooved	1.66	2.21			Undamaged	5/VII	1992	
4421 (Serial number)	BKG 504 (2565)	Terracotta, brown blackish	Short	Areca nut, grooved	1.46	1.91			Undamaged	5/VII	1992	
4421 (Serial number)	BKG 504 (2565)	Terracotta, brown blackish	Short	Areca nut	1.26	1.54			Spalled and scarred	5/VII	1992	
4421 (Serial number)	BKG 504 (2565)	Terracotta, black	Short	Areca nut	1.84	2.1			Broken	5/VII	1992	
4421 (Serial number)	BKG 504 (2565)	Terracotta, black	Short	Ghata-shaped, grooved	1.35	1.5			Undamaged	5/VII	1992	
4421 (Serial number)	BKG 504 (2565)	Terracotta, brownish black		Areca nut					Broken	5/VII	1992	
4421 (Serial number)	BKG 504 (2565)	Terracotta, brown		Areca nut					Broken	5/VII	1992	
4421 (Serial number)	BKG 504 (2565)	Terracotta, black		Areca nut					Broken	5/VII	1992	
4422 (Serial number)	BKG 504 (2602)	Terracotta, black	Short	Areca nut	1.21	1.62			Spalled and scarred	5/VII	1992	
4422 (Serial number)	BKG 504 (2602)	Terracotta, black	Short	Areca nut, grooved	1.21	1.7			Spalled and scarred	5/VII	1992	
4423 (Serial number)	BKG 503 (2606)	Terracotta, black	Short	Areca nut	1.47	1.97			Broken	5/VII	1992	
4424 (Serial number)	BKG 448 (2543)	Malachite	Short	Barrel	0.33	0.37			Undamaged	5/VIII	1992	
4425 (Serial number)	BKG 5 SW (2648)	Terracotta, brown	Short	Areca nut, grooved	1.29	1.89			Undamaged	5/VII	1992	
4426 (Serial number)	BKG 503 (2606)	Agate, banded	Long	Barrel		1.03			Broken	5/VII	1992	
4429 (Serial number)	BKG 5 SW (2648)	Terracotta, brown	Short	Areca nut	1.63	1.82			Undamaged	5/VII	1992	

4430 (Serial number)	BKG 448 (2543)	Glass, yellowish brown	Very very short	Disc-shaped	0.15	0.46			Undamaged	5/VIII	1992	
4431 (Serial number)	BKG 504 (2576)	Terracotta, black	Short	Ghata-shaped	1.78	1.99			Undamaged	5/VII	1992	
4431 (Serial number)	BKG 504 (2576)	Terracotta, black	Short	Ghata-shaped	1.21	1.77			Broken	5/VII	1992	
4431 (Serial number)	BKG 504 (2576)	Terracotta, black	Short	Areca nut					Damaged	5/VII	1992	
4435 (Serial number)	BKG 505 (2517)	Terracotta, black	Short	Areca nut	1.51	1.86			Broken	5/VII	1992	
4437 (Serial number)	BKG 504 (2602)	Terracotta, brown	Short	Ghata-shaped, grooved	1.5	1.66			Spalled and scarred	5/VII	1992	
4438 (Serial number)	BKG 504 (2576)	Oyster shell?	Very very short	Disc-shaped	0.2	1.21			Undamaged	5/VII	1992	
4439 (Serial number)	BKG 504 (2576)	Terracotta, brown	Short	Areca nut, grooved	1.18	2.16			Boken	5/VII	1992	
4442 (Serial number)	BKG 505 (2517)	Terracotta, brown	Short	Areca nut	1.38	2.33			Undamaged	5/VII	1992	
4443 (Serial number)	BKG 504 (2583)	Terracotta, black	Short	Areca nut, grooved	1.51	1.79			Undamaged	5/VII	1992	
4448 (Serial number)	BKG 501 (2534)	Terracotta, brown	Short	Areca nut	1.26	1.93			Spalled and scarred	5/VII	1992	
4449 (Serial number)	BKG 501 (2534)	Terracotta, brownish black	Short	Modified Ghata-shaped, grooved	2.56	2.85			Broken	5/VII	1992	
4450 (Serial number)	BKG 501 (2534)	Terracotta, black	Short	Areca nut	1.37	1.7			Broken	5/VII	1992	
4451 (Serial number)	BKG 504 (2562)	Terracotta, black	Short	Modified Ghata-shaped	1.24	1.63			Undamaged	5/VII	1992	
4456 (Serial number)	BKG 5 SW (2648)	Terracotta, brown	Short	Areca nut, grooved	1.26	1.88			Undamaged	5/VII	1992	
4457 (Serial number)	BKG 504 (2619)	Terracotta, black	Short	Areca nut	1.66	2.01			Damaged	5/VII	1992	
4374 (Serial number)	BKG 501 (2581?)	Terracotta, black	Short	Areca nut, grooved	1.4	1.7			Undamaged	5/VII	1992	

5045	BKG 13 (315)	Terracotta		Areca nut	D. 1.9 h. 1.4 d. 0.4	Fair	4-5	2019	
5046	BKG 13 (315)	Terracotta		Biconical	D. 2.0 h. 1.2 d. 0.4	Fair	4-5	2019	
5051	BKG 13 (315)	Schist, grey		Cylindrical	D. 0.8 l. 1.1 d. 0.2	Fair	4-5	2019	
5052	BKG 13 (315)	Shell		Barrel	D. 0.6 h. 0.5	Chipped	4-5	2019	
5064	BKG 13 (329)	Terracotta		Areca nut	D. 1.7 h. 0.9 d. 0.5	Half	4-5	2019	
5073	BKG 13 (325)	Terracotta		Areca nut	D. 1.8 h. 1.6 d. 0.4	Fair	4-5	2019	
5076	BKG 13 (324)	Terracotta		Areca nut	D. 1.8 h. 1.1 d. 0.3	Fair	4-5	2019	
5079	BKG 13 (332)	Glass, yellowish brown		Barrel	D. 0.5 h. 0.2 d. 0.3	Fair	4-5	2019	
5082	BKG 13 (320)	Quartz		Hexagonal-faceted barrel	l. 1.5 D. 1.1 d. 0.2	Fair	4-5	2019	
5084	BKG 13 (331)	Carnelian, orange		Barrel	D. 0.6 h. 0.4 d. 0.1	Chipped	4-5	2019	
5088	BKG 13 (334)	Terracotta		Areca nut	D. 1.7 h. 1.3 d. 0.4	Fair	4-5	2019	
5090	BKG 13 (330)	Glass, blue		Barrel	D. 0.6 h. 0.2 d. 0.1	Fair	4-5	2019	
5091	BKG 13 (330)	Lapis lazuli		Irregular spherical/Globular	D. 0.5 h. 0.3 d. 0.1	Fair	4-5	2019	

5092	BKG 13 (330)	Glass, blue		Gadrooned barrel	D. 1.1 h. 1.0 d. 0.1	Fair	4-5	2019	
5093	BKG 13 (330)	Shell		Barrel, irregular	D. 0.6 h. 0.5 d. 0.15015	Fair	4-5	2019	
5184	BKG L or F (3)	Lapis lazuli		4x fragments	weight. 4.0 gr	Raw material fragments	4-5	2019	
702	BKG 104 (88)	Terracotta, grey		Areca nut	h. max. 0.015 D. 0.019 Perforation: 0.005	Chipped	5/VII	1984	
708	BKG 104 (113)	Terracotta, grey		Areca nut	h. max. 0.016 D. 0.023 Perforation: 0.004-0.0045	Chipped	5/VII	1984	
709	BKG 104 (113)	Terracotta		Areca nut	h. max. 0.014 D. 0.018 Perforation: 0.004		5/VII	1984	
710	BKG 104 (113)	Terracotta, grey		Areca nut	h. max. 0.015 D. 0.019 Perforation: 0.004	Chipped	5/VII	1984	
711	BKG 104 (113)	Terracotta, grey		Biconical	h .max. 0.024 D. 0.031 Perforation: 0.004	Chipped	5/VII	1984	
861	BKG 104 (71)	Terracotta, brown		Areca nut	D. 0.02 Perforation: 0.003		5/VII	1984	
718	BKG 108 (118)	Terracotta, grey		Biconical	h. max. 0.024-0.023 D. 0.028 Perforation: 0.004		5/VII	1984	
1388	BKG 423 (21)	Carnelian	Short	Hexagonal-faceted biconical	h. max. 0.4 D. 0.55 Perforation: 0.1		5/VIII	1990	
1371	BKG 4 (213)	Lapis Lazuli		Gadrooned barrel	h. max. 0.5 h. min. 0.4 D. 0.8 Perforation: 0.1		5/VIII	1990	
1473	BKG 422 (611)	Quartz		Irregular spherical/Globular	h. max. 1.4 D. 1.65 Perforation: 0.15		5/VII	1990	

1538	BKG 434 (688)	Shell		Barrel	h. max. 1.2/1.1 D. 1.3 Perforation: 0.3		5/VII	1990	
1380	BKG 4 (405)	Terracotta, brown		Biconical	h. max. 2.4 D. 2.6 Perforation: 0.35		5/VIII	1990	
1431	BKG 413 (285)	Terracotta, brown		Biconical	h. max. 0.025 D. 0.0265 Perforation: 0.0045		5/VII	1990	
1374	BKG 416 (30)	Terracotta		Ghata-shaped	h. max. 1.9 D. 2.2 Perforation: 0.4		5/VIII	1990	
1540	BKG 421 (51)	Terracotta, brown		Ghata-shaped	h. max. 1.6 D. 2.0 max. 0.8 min.? Perforation: 0.45 (base)/0.35	Chipped	5/VIII	1990	
1466	BKG 422 (30)	Terracotta, reddish		Biconical	h. max. 1.9 D. 2.3 Perforation: 0.4		5/VII	1990	
1440	BKG 427 (169)	Terracotta, brown		Areca nut	h. max. 1.85 D. 2.2 Perforation: 0.4 (base)/0.35	Chipped	5/VIII	1990	
1475	BKG 429 (448)	Terracotta Grey		Biconical	h. max. 1.2 D. 1.7 Perforation: 0.3		5/VII	1990	
Not inventoried	BKG 415 (31)	Terracotta, brown		Areca nut	D. 2.5 h. 2.1 Perforation: 0.5		5/VIII		
Not inventoried	BKG 421 (51)	Terracotta, grey		Areca nut	D. 2 h. 1.6 Perforation: 0.35		5/VIII		
Not inventoried	BKG 422 (30)	Terracotta		Ghata-shaped	D. 2.4 h. 1.6 Perforation: 0.5		5/VIII		
Not inventoried	BKG 422 (55)	Terracotta, black		Areca nut	D. 1.8 h. 1.6 Perforation: 0.5		5/VII		
Not inventoried	BKG 422 (55)	Terracotta, brown		Ghata-shaped	D. 2 h. 1.2		5/VII		

					Perforation: 0.4							
Not inventoried	BKG 422 (60)	Terracotta, brown		Ghata-shaped	D. 2.3 h. 1.5 Perforation: 0.35					5/VII		
Not inventoried	BKG 422 (79)	Terracotta, grey		Areca nut	D. 1.7 h. 1.3 Perforation: 0.5					5/VII		
Not inventoried	BKG 422 (80)	Terracotta, brown		Areca nut	D. 2 h. 1.9 Perforation: 0.4					5/VII		
Not inventoried	BKG 422 (80)	Terracotta, grey		Areca nut	D. 2 h. 1.8 Perforation: 0.4					5/VII		
Not inventoried	BKG 422 (80)	Terracotta, brown		Ghata-shaped	D. 1.8 h. 1.4 Perforation: 0.55					5/VII		
Not inventoried	BKG 427 (169)	Terracotta, brown		Areca nut	D. 1.75 h. 1.3 Perforation: 0.4					5/VIII		
Not inventoried	BKG 427 (517)	Terracotta, brown		Areca nut	D. 2.1 h. 1.1 Perforation: 0.3					5/VII		
Not inventoried	BKG 427 (517)	Terracotta		Areca nut	D. 2.2 h. 1.75 Perforation: 0.6					5/VII		
Not inventoried	BKG 427 (527)	Terracotta, brown		Areca nut	D. 1.9 h. 1.1 Perforation: 0.4					5/VII		
Not inventoried	BKG 429 (465)	Terracotta, brown		Ghata-shaped	D. 2.2 h. 1.9 Perforation: 0.45					5/VII		
Not inventoried	BKG 430 (340)	Terracotta		Ghata-shaped	D. 2.2 h. 1.6 Perforation: 0.5					5/VIII		
2455	BKG 11 E 5-6/7-8 107 (1200)	Glass, yellowish brown	Very short	Disc-shaped	0.18	0.42			Undamaged	5b/VIII	5	

2450	BKG 11 E 5-6 105 (455)	Glass, yellowish brown	Short	Barrel	0.25	0.33			Undamaged	5b/VIII	5	
2450	BKG11 E 5-6 105 (455)	Glass, yellowish brown	Short	Disc-shaped	0.17	0.31			Undamaged	5b/VIII	5	
2451	BKG 11 E 5-6 105 (455)	Carnelian	Long	Rectangular circular, good quality	0.73	0.72			Undamaged	5b/VIII	5	
2456	BKG 11 E 5-6/7-8 107 (1160)	Glass	Short	Barrel	0.48	0.51			Undamaged	5b/VIII	5	
2453	BKG 11 W 1-2 13 (1075)	Carnelian, reddish-orange	Long	Hexagonal-faceted barrel	0.84	0.62			Undamaged	5b/VIII	5	
2490	BKG 11 W 1-2 13 (1075)	Shell	Short	Lenticular barrel stupa-like, spacer bead	0.71	0.94	0.1	0.29	Undamaged	5b/VIII	5	
2459	BKG 11 W 1-2 13 (1007) on [1070]	Glass, coated in gold	Short	Barrel	0.63	1.14			Corroded	5b/VIII	5	
2482	BKG 11 E 5-6/7-8 107 (1204)	Shell	Short	Barrel	0.51	0.73			Undamaged	5b/VIII	5	
2482	BKG 11 E 5-6/7-8 107 (1204)	Shell	Short	Cylindrical	0.47	0.63			Undamaged	5b/VIII	5	

2457	BKG-11 W 1-2 13 (1075)	Terracotta, black	Short	Ghata-shaped	1.59	1.77			Undamaged	5b/VIII	5	
2628	BKG 12 (50)	Glass, yellowish brown	Very short	Barrel	0.2	0.49			Undamaged	5b/VIII	7	
3683	BKG 11 W 1-2 NW ext. (2015)	Terracotta, brown	Short	Areca nut	1.28	2.05			Undamaged	5b/VIII	12	
3606	BKG 11 W 1-2 TB (2016)	Terracotta, brown	Short	Areca nut, grooved	1.35	2.04			Undamaged	5b/VIII	12	
3603	BKG 11 W 1-2 TB (442E)	Terracotta, brown	Short	Gadrooned short barrel	1.44	2.04			Undamaged	5b/VIII	12	
3178	BKG 11 W 57 (1411)	Terracotta, brown	Short	Gadrooned short barrel, irregular	2.12	2.42			Undamaged	5b/VIII	11	
3290	BKG 11 W 2 (1705)	Terracotta	Short	Biconical with dotted pattern	1.92	2.02			Undamaged	5b/VIII	11	
3385	BKG 11 W 1710 (1722)	Terracotta, black	Short	Areca nut, grooved	1.27	1.58			Spalled and scarred	5b/VIII	11	
3361	BKG 11 W 1-2 1711 (1715)	Terracotta, brown	Short	Areca nut	1.19	1.96			Undamaged	5b/VIII	11	
3362	BKG 11 W 1-2 1711 (1715)	Shell	Short	Barrel	0.55	0.73			Spalled and scarred	5b/VIII	11	
3346	BKG 11 E 115 (1541)	Terracotta, brownish-reddish	Short	Barrel	1.59	1.94			Undamaged	5b/VIII	11	

3233	BKG 11 K-1690 (section W) (= Per. VIII)	Shell	Very very short	Lenticular short biconical	0.2	1.17			Undamaged	5b/VIII	11	
3234	BKG 11 K-1690 (section W) (= Per. VIII)	Terracotta, brown	Short	Areca nut, grooved	1.44	2.03			Spalled and scarred	5b/VIII	11	
3155	BKG 11 W 57 (1432)	Terracotta, brown	Short	Irregular spherical/Globular with dotted lattice and grooves	1.81	2.02			Broken	5b/VIII	11	
3237	BKG 11 D-53 (1442)	Terracotta, black	Short	Areca nut	1.34	1.83			Undamaged	5b/VIII	11	
1178	BKG 312 (187)	Carnelian	Short	Biconical	0.73	0.74			Undamaged	5/2b		
1157	BKG 305 (85)	Carnelian	Short	Irregular spherical/Globular	1.42	1.64			Spalled and scarred	5/2b		
2213	BKG 11 W 5-6 10 (409)	Faience		Tortoise	L. 1.1				Undamaged	5b/VIII	4	
2246	BKG 11 W 5-6 57 (252)	Shell	Short	Disc-shaped	D. 1, 0.2				Undamaged	5b/VIII	4	
3324	BKG 11 115 (1538)	Lapis Lazuli		Barrel, lateral side decorated with amalaka-like pattern	D. 1.3/1.6 h. 1.6 d. 0.3				Damaged	5b/VIII	11	
3232	BKG 11 B-2 = W 1-2 (442)	Glass	Long	Cylindrical	L. 0.6/0.6 w. 0.4/0.3				Undamaged	5b/VIII	11	2x pieces

3258	BKG 11 W 2 (442)	Glass, yellowish-brown	Short	Barrel, irregular	L./D. 0.4/0.3				Undamaged	5b/VIII	11	2x beads
3350	BKG 11 W 1710 (1715)	Glass, yellowish-brown	Short	Disc-shaped	D. 0.3				Undamaged	5b/VIII	11	
3384	BKG 11 W 1710 (1722)	Glass	Short	Disc-shaped, irregular	D. 0.4				Undamaged	5b/VIII	11	
3536	BKG 11 W 1-2 ext. N. (1757)	Glass, yellowish-brown	Short	Barrel	D. 0.5 d. 0.3				Undamaged	5b/VIII	11	
4279 (Serial number)	BKG 422 foundation of [23]	Carnelian	short	Plano convex short barrel	0.82	1.21			Undamaged	5b/VIII	1991	
4099 (Serial number)	BKG 309 (138)	Glass, bluish	Long	Cylindrical	0.44	0.41			Undamaged	5/2b	1987	
4101 (Serial number)	BKG 303 (50)	Glass, yellowish brown	Very short	Barrel	0.15	0.42			Undamaged	5/2b	1987	
4106 (Serial number)	BKG 305 (66)	Faience	Short	Cylindrical	0.58	0.62			Undamaged	5/2b	1987	
4107 (Serial number)	BKG 305 (66)	Engina Mendicaria (sea snail)			1.17		0.66	0.51	Undamaged	5/2b	1987	
4126 (Serial number)	BKG 303 (50)	Terracotta, brown	Short	Areca nut	1.84	2.18			Broken	5/2b	1987	
4152 (Serial number)	BKG 301 (303)	Terracotta, brown	Short	Areca nut	1.08	2.11			Undamaged	5/2b	1987	
4166 (Serial number)	BKG 303 (56)	Shell		Lenticular barrel	0.42		1.25	0.37	Undamaged	5/2b	1987	
4169 (Serial number)	BKG 304 (298)	Terracotta, brown	Short	Areca nut	1.11	2.11			Undamaged	5/2b	1987	
4170 (Serial number)	BKG 302 (104)	Terracotta, brownish reddish	Short	Ghata-shaped	1.75	2.43			Broken	5/2b	1987	

4178 (Serial number)	BKG 301 (269)	Shell	Short	Barrel	0.45	0.46			Undamaged	5/2b	1987	
4179 (Serial number)	BKG 309 (512)	Shell	Short	Barrel	0.6	0.82			Undamaged	5/2b	1987	
4180 (Serial number)	BKG 304 (291)	Glass, yellowish brown	Very short	Barrel	0.19	0.41			Undamaged	5/2b	1987	Serial no. on label 4780 to be corrected to 4180
4181 (Serial number)	BKG 301 (303)	Shell	Short	Barrel	0.73	1.03			Undamaged	5/2b	1987	
4186 (Serial number)	BKG 305 (85)	Faience	Short	Cylindrical	0.48	0.75			Undamaged	5/2b	1987	
4190 (Serial number)	BKG 301-304 (265) (266) (267) top-down	Faience	Short	Irregular, faceted?	1.02	1.08			Broken	5/2b	1987	
4461 (Serial number)	No label (BKG 44B 2522)?	Terracotta, brown	Short	Areca nut, grooved	1.06	1.79			Spalled and scarred	5b/IX	1992	
4042	BKG 11 C (3032) room 3084	Terracotta		Biconical	D. 3 d. 0.6				Fair	5b	2018	
4044	BKG 11 J (1273)	Glass, blue		Conical	D. 0.5 d. 0.2				Fair	5b	2018	
4045	BKG 11 J (1273)	Glass, blue-and- white		Rectangular long rectangular	l. 0.6 w. 0.4 d. 0.1				Fair	5b	2018	
4050	BKG 11 C (3032)	Shell		Barrel	D. 1.3				Fair	5b	2018	

	room 3083				d. 0.3 h. 0.8				
4051	BKG 11 C (3082) room 3089	Terracotta		Areca nut	d. (hole) 0.4 h. 1.2 w. max 1.5	Fair	5b	2018	
4055	BKG 11C (3091) corridor 3085	Glass, yellowish brown		Cylindrical	D. 0.4 d. 0.1 h. 0.4	Fair	5b	2018	
4056	BKG 11C (3091) corridor 3085	Glass, yellowish brown		Disc-shaped	D. 0.5 d. 0.2 h. 0.15	Fair	5b	2018	
4057	BKG 11C (3091) corridor 3085	Shell		Barrel	D. 1.3 d. 0.3 h. 1.0	Fair	5b	2018	
4064	BKG 11 C (1273)	Terracotta		Areca nut	d. (hole) 0.35h. 1.5 w. max 1.9	Fair Chipped	5b	2018	
4065	BKG 11 C (1273)	Glass, yellow		Barrel	D. 0.2 d. 0.05h. 0.1	Fair	5b	2018	
4066	BKG 11 C (1273)	Glass, yellowish brown		Barrel	D. 0.4 d. 0.15 h. 0.2	Fair	5b	2018	

4067	BKG 11 C (3110) room 3084	Glass, yellowish brown		Barrel	D. 0.4 d. 0.15 h. 0.2	Fair	5b	2018	
4072	BKG 11 C (3110) room 3084-3085	Terracotta		Areca nut	h.1.2 D. 1.5 d. 0.3	Fair Chipped	5b	2018	
4073	BKG 11 C (3106)	Terracotta		Areca nut	h. max 1.3 D. 1.9 d. 0.5	Heavily chipped on top	5b	2018	
4074	BKG 11 C (3110) room 3111	Terracotta		Areca nut	h. 1.8 D. 2.2 d. 0.6	Fair Heavily chipped	5b	2018	
4075	BKG 11 C (3110) room 3085	Glass, orange brownish		Spherical	D. 0.9 d. 0.1	Fair	5b	2018	
4077	BKG 11 B (442) corridor 4	Terracotta		Modified Ghata-shaped	h. 1.8 D. max 2.0 d. 0.35	Fair	5b	2018	
4081	BKG 11 B (3147) corridor 4	Glass, yellowish-brown		Barrel	h. 0.3 D. 0.3 d. 0.07	Fair	5b	2018	
4082	BKG 11 B (3149) corridor 4 (?)	Shell		Flower shaped, spacer bead	D. 1.6 w. 0.7	Fair Chipped	5b	2018	

4090	BKG 11 C (3160) cell 82	Shell		Rectangular long rectangular, spacer bead	l. max 0.8 w. 0.9 t. 0.35	Chipped	5b	2018	
4113	BKG 11 C (1273) locus 3128	Shell		Cylindrical	h. 0.8 d. 0.9	Chipped	5b	2018	
4118	BKG 11 C (3097) Locus 3088	Terracotta, brown		Areca nut	h. 1.7 d. 1.8	Fair	5b	2018	
4144	BKG 11, STREET 10, surface	Shell		Disc-shaped, double perforated	D. 0.8 d. 1.5 t. 0.3	Fair	5b	2018	
4076	BKG 11 C-J (1273	Quartz, white		Spherical, irregular	D. 0.9 d. 0.1	Fair	5b	2018	
4186	BKG 11 1-2W 9S (4003)	Shell		Cylindrical	h. 1.1. D. 1	Fair	5b	2018	
4192	BKG 11 1-2W 9S (4000)	Glass, brown		Barrel	0.4, D. 0.5	Fair	5b	2019	
5086	BKG 13 (317)	Glass, yellow		Barrel	D. 0.2 h. 0.1 d. 0.1	Fair	5	2019	
5087	BKG 13 (317)	Glass, yellowish-brown		Barrel	D. 0.2 h. 0.1 d. 0.1	Fair	5	2019	

5160	BKG 11 B section N	Terracotta		Areca nut	D. 2.0 h. 1.8 d. 0.3	Chipped	5b	2019	
5169	BKG 11 B section N	Cowrie shell		Cowrie shell	h. max 0.7 l. 1.9 t. 0.2	Broken	5b	2019	
5170	BKG 11 B section N	Cowrie shell		Cowrie shell	h. 0.8 l. 1.8 t. 0.2	Fair	5b	2019	
5171	BKG 11 B section N	Shell		Disc-shaped	D. 0.5 h. 0.3 d. 0.2	Fair	5b	2019	
5172	BKG 11 B section N	Shell		Barrel, irregular	D. 0.5 h. 0.4 d. 0.1	Chipped	5b	2019	
5173	BKG 11 B section N	Shell		Irregular spherical/Globular	D. 0.4 h. 0.3 d. 0.1	Chipped	5b	2019	
5329	BKG 11 E 3-4 Macrophase 5b	Shell		Disc-shaped	D. 0.4 d. 0.1 h. 0.4	Fair	5b	2019	
5330	BKG 11 E 3-4 Macrophase 5b	Glass, yellowish-brown		Barrel	D. 0.5 d. 0.1 h. 0.4	Fair	5b	2019	
5331	BKG 11 E 3-4	Faience		Disc-shaped	D. 0.5	Fair	5b	2019	

	Macroph ase 5b				d. 0.1 h. 0.2				
1114	BKG 303 (50)	Carnelian		Irregular spherical/Glob ular	D. 0.8 Perforation: 0.1	Chipped	5/2b	1987	
1161	BKG 301 (99)	Terracotta, brown		Areca nut	h. max. 1.7 D. 1.9 Perforation: 0.5	Chipped	5/2b	1987	
1103	BKG 303 (50)	Terracotta, brown		Areca nut	h. max 1.7 D. 2.2 Perforation: 0.3	Chipped	5/2b	1987	
1104	BKG 303 (50)	Terracotta, brown		Areca nut	h. max. 0.018 D.0.023 Perforation: 0.003	Chipped	5/2b	1987	
1105	BKG 303 (50)	Terracotta, brown		Areca nut	h. max. 1.7 D. 2.2 Perforation: 0.3	Chipped	5/2b	1987	
1106	BKG 303 (50)	Terracotta, brown		Areca nut	h. max. 1.7 D. 2.2 Perforation: 0.35	Chipped	5/2b	1987	
1107	BKG 303 (50)	Terracotta, brown		Areca nut	h. max. 1.7 D. 2.2 Perforation: 0.3	Chipped	5/2b	1987	
1108	BKG 303 (50)	Terracotta, brown		Areca nut	h. max. 1.6 D. 2.0 Perforation: 0.35	Chipped	5/2b	1987	
1110	BKG 303 (50)	Terracotta, brown		Areca nut	h. max. 1.6 D. 1.9 Perforation: 0.3	Chipped	5/2b	1987	
1111	BKG 303 (50)	Terracotta, grey		Areca nut	h. max. 0.016 D. 0.018 Perforation: 0.003		5/2b	1987	
1112	BKG 303 (50)	Terracotta, brown		Areca nut	h. max. 1.3 D. 2 Perforation: 0.3		5/2b	1987	
1113	BKG 303 (50)	Terracotta, brown		Areca nut	h. max. 1.2 D. 2	Chipped	5/2b	1987	

					Perforation: 0.4						
1123	BKG 303 (50)	Terracotta, brown		Areca nut	h. max. 0.014 D. 0.019 Perforation: 0.003				Chipped	5/2b	1987
1132	BKG 303 (50)	Terracotta, brown		Areca nut	h. max. 0.013 D. 0.019 Perforation: 0.003				Chipped	5/2b	1987
1176	BKG 312 (132)	Terracotta, brown		Areca nut	h. max. 1.8 D. 2.1 Perforation: 0.4/0.5					5/2b	1987
1373	BKG 4 (214)	Terracotta, brown		Biconical	h. max. 1.2 D. 1.6 Perforation: 0.4				Chipped	5/VIII - IX	1990
1377	BKG 4 (265)	Terracotta, brown		Areca nut	h. max. 0.9 D. 2.1 Perforation: 0.4				Chipped	5/VIII - IX	1990
1272	BKG 304 (323)	Glass, green	Short	Barrel	h. max. 0.5 D. 0.62 Perforation: 0.2					5/2b	1987
Not inventoried	BKG 415 (12a)	Terracotta, brown		Areca nut	D. 2.8 h. 2.3 Perforation: 0.5					5b/IX	
Not inventoried	BKG 418 (121a)	Terracotta, brown		Areca nut	D. 2.0					5b/IX	
2483	BKG 11 E 5-6 105 (259)	Faience	Short	Barrel	0.52	0.67			Undamaged	6/IX	5
2454	BKG-11 E 107 (35)	Glass, yellowish brown	Short	Cylindrical	0.29	0.3			Undamaged	6/IX	5
3416	BKG 11 E 7-8 (1545)	Terracotta, brownish reddish	Very short	Areca nut, grooved	0.82	1.98			Undamaged	6/IX	11
2226	BKG 11 W 5-6 (205)	Carnelian	Short	Irregular spherical/Globular	0.62	0.74			Spalled and scarred	6/IX	4

1158	BKG 302 (44)	Carnelian, banded	Very short	Drop shaped, pendant	0.82	2.36			Undamaged	6 slash 3		
2231	BKG 11 W 5-6 (207)	Carnelian	Short	Plano convex barrel with white bands	0.96	1.41			Undamaged	6/IX	1-2	
1350	BKG 4 (1)	Carnelian, banded	Short	Barrel	1.02	1.16			Undamaged	6/X		
2429	BKG 11 E 5-6 (203)	Quartz	Short	Irregular spherical/Globular	0.94	1.16			Spalled and scarred	6/IX	5	
2228	BKG 11 W (46)	Glass	Long	Cornerless cube	0.67	0.43			Undamaged	6/IX	4	
2930	BKG 11 W 1 surface Per. IX	Shell	Short	Barrel	0.37	0.49			Undamaged	6/IX	10	
2931	BKG 11 W 1 surface Per. IX	Shell	Short	Barrel	2.29	0.62			Undamaged	6/IX	10	
2272	BKG 11 W 3-4 20 (255bis)	Bead grinding stone slab							Damaged	6/IX	4	8 grooves (from 0.5 to 0.25) on one side (concave), 6 grooves (from 1 to 0.6) on the other (flat, polished)
2224	BKG 11 W 28 (255)	Shell		Double-axe, flat with concave sides	D. 0.8				Damaged	6/IX	4	

2238	BKG 11 W 7-8 (15)-(22)	Faience	Short	Barrel	D. 10				Damaged	6/IX	4	
2174	BKG 11 W 5-6 365	Shell	Long	Barrel	D. 1.6 0.5				Damaged	6/IX	3	
2237	BKG 11 W 7-8 (15)-(22)	Shell		Barrel	D. 1.0 t. 0.5				Undamaged	6/IX	3	
2328	BKG 11 W 5-6 (206)	Shell		Flower shaped, spacer bead	1.0 max. 1.1 0.4				Damaged	6/IX	4	
3224	W 5-6 (=D-53) (1442)	Glass, yellowish brown		Barrel	D. 0.3 h. 0.15				Undamaged	6/IX	11	
4114 (Serial number)	BKG 304 (93)	Glass, yellowish brown	Very very short	Disc-shaped	0.14	0.49			Undamaged	6/three	1987	
4176 (Serial number)	BKG 3 Cleaning surface	Carnelian	Short	Barrel	0.42	0.54			Spalled and scarred	6/IVB	1987	
4177 (Serial number)	BKG 3 Cleaning surface	Terracotta, brown		Ghata-shaped		1.96			Broken	6/IVB	1987	
4732	BKG 11 Surface	Shell		Cylindrical	D. 1.0 l. 0.9 d. 0.3				Fair	6	2019	
4733	BKG 11 Surface	Glass, yellowish-brown		Cylindrical	D. 0.45 h. 0.18 d. 0.15				Fair	6	2019	
4964	BKG 11 (surface)	Bone?		Barrel	h. 0.3 cm D. 0.5 cm d. 0.1 cm				Fair	6	2019	
4966	BKG 11 (surface)	Shell		Cylindrical	h. 0.2 cm D. 0.6 cm d. 0.1 cm				Fair	6	2019	
4967	BKG 11 (surface)	Glass		Barrel	h. 0.4 cm D. 0.5 cm				Fair	6	2019	

					d. 0.1 cm				
4968	BKG 11 (surface)	Glass, yellowish-brown		Barrel	h. 0.2 cm D. 0.4cm d. 0.2 cm	Fair	6	2019	
4970	BKG 11 (surface)	Terracotta		Areca nut	h. 1.7 cm D. 2.3 cm d. 0.5 cm	Fair Corroded	6	2019	
5177	BKG 11 (surface)	Glass, yellowish-brown		Barrel	D. 0.45 h. 0.2 d. 0.2	Fair	6	2019	
5178	BKG 11 (surface)	Glass, yellowish-brown		Barrel	D. 0.3 h. 0.1 d. 0.1	Fair	6	2019	
5216	BKG 11 W 1-2 (cleaning Macro Phase 6)	Cowrie shell		Cowrie shell	l. 1.3 h. max 0.6 t. 0.1	Broken	6	2019	
5217	BKG 11 W 1-2 (cleaning Macro Phase 6)	Glass, blue		Barrel	D. 0.5 h. 0.3 d. 0.2	Fair	6	2019	
5218	BKG 11 W 1-2 (cleaning Macro Phase 6)	Quartz		Hexagonal-faceted barrel	l. 1.4 w. 1.2 d. 0.1	Broken	6	2019	
5219	BKG 11 W 1-2 (cleaning Macro Phase 6)	Shell Glass, white grey		4x barrel-shaped shell beads 1x barrel-shaped glass bead	1. D. 0.6 h. 0.5 d. 0.1 2. D. 0.5 h. 0.4 d. 0.1 3. D. 0.5	Fair	6	2019	

					h. 0.4 d. 0.1 4. D. 0. 45 h. 0.4 d. 0.1 5. D. 0.5 h. 0.3 d. 01							
Non-inventoried	BKG 4 (1)	Terracotta, brown		Areca nut	D. 2.2 h. 1.4 Perforation: 0.5							
2236	BKG 11 W (4)	Shell	Short	Irregular spherical/Globular	1.22	1.36			Undamaged	7/X	1-2? 4?	
2257	BKG 11 E 7-8 (2)	Carnelian	Short	Barrel	0.41	0.66			Undamaged	7/X	4	
2487	BKG 11 E 5-6/7-8 107	Glass, yellowish brown	Short	Barrel	0.18	0.36			Undamaged	7/X	5	
2452	BKG 11 E 5-6 105 (8)	Glass	Short	Barrel	0.41	0.56			Undamaged	7/X	5	
2480	BKG 11 E 7-8 109 (13)	Terracotta, brownish	Short	Areca nut	2.66	3.07			Undamaged	7/X	5	
2258	BKG 11 E 7-8 (2)	Carnelian	Short	Spherical	0.43	0.52			Undamaged	7/X	4	
2205	BKG 11 E 3-4 (2)	Shell		Flower shaped	D. 0.85				Undamaged	7/X	4	
2225	BKG 11 W 7-8 (2)	Rock crystal		Rectangular circular	D. 1.4 t. 0.7				Undamaged	7/X	4	
2259	BKG 11 E 3-4 (2)	Garnet		Barrel	D. 0.8				Undamaged	7/X	4	
2256	BKG 11 E 7-8 (2)	Carnelian		Barrel	D. 0.7				Undamaged	7/X	4	

2204	BKG 11 E 3-4 (2)	Quartz	Long	Barrel	L. 2.7				Undamaged	7/X	4	
4115 (Serial number)	BKG 308 (152)	Shell	Short	Barrel	0.54	0.65			Undamaged	6-7/V	1987	
4120 (Serial number)	BKG 308 (152)	Shell	Short	Barrel	0.33	0.46			Undamaged	6-7/V	1987	
4157 (Serial number)	BKG 308 W (276)	Terracotta, brown	Short	Areca nut	1.1	1.71			Spalled and scarred	6-7/V	1987	
1098	BKG 303 (40)	Terracotta, brown		Areca nut	h. max. 1.7 D. 2.1 Perforation: 0.3 Thickness: 2.2				Chipped	6-7/ Phase 3	1987	
1099	BKG 303 (40)	Terracotta, brown		Areca nut	h. max. 1.7 D. 2.2 Perforation: 0.3				Chipped	6-7/ Phase 3	1987	
1100	BKG 303 (40)	Terracotta, brown		Areca nut	h. max. 0.019 D. 0.022 Perforation: 0.003				Chipped	6-7/ Phase 3	1987	
1101	BKG 303 (40)	Terracotta, brown		Areca nut	h. max. 1.7 D. 2.1 Perforation: 0.3				Chipped	6-7/ Phase 3	1987	
1102	BKG 303 (40)	Terracotta, grey		Areca nut	h. max. 1.2 D. 1.9 Perforation: 0.3				Chipped	6-7/ Phase 3	1987	
1121	BKG 307 (55)	Terracotta, grey		Areca nut	h. max. 0.014 D. 0.017 Perforation: 0.003				Chipped	6-7/Phase 3	1987	
1173	BKG 308 (152)	Terracotta, brown		Areca nut	h. max. 1.1 D. 1.9 Perforation: 0.5				Chipped	6-7/V	1987	
4107	BKG 13 (5)	Glass, yellowish-brown	Short	Barrel	h. 0.2 D. 0.5 d. 0.2				Fair	7	2018	
4108	BKG 13 (5)	Shell		Disc-shaped profile, triangular cross- section	h. 0.3 w. 0.4 d. 0.1				Fair	7	2018	

4109	BKG 13 (5)	Glass, reddish (Mixed Alkali)		Cylindrical	h. 0.8 D. 0.12 d. 0.05	Chipped	7	2018	
4815	BKG 132 (151)	Carnelian	Short	Barrel, irregular	D. 0.9 h. 0.7 d. 0.1	Fair	7	2019	
4816	BKG 132 (151)	Carnelian	Short	Barrel, irregular	D. 0.55 h. 0.5 d. 0.1	Fair	7	2019	
4817	BKG 132 (151)	Shell		Barrel	D. 0.7 h. 0.55 d. 0.1	Fair	7	2019	
4818	BKG 132 (151)	Terracotta, black		Ghata-shaped	D. 2 h. 1.6 d. 0.4	Chipped	7	2019	
4819	BKG 132 (151)	Terracotta, brown		Areca nut, grooved	D. 1.9 h. 1.4 d. 0.4	Fair	7	2019	
4834	BKG 135 (158)	Glass, yellowish-brown		Disc-shaped	D. 0.2 h. 0.1	Fair	7	2019	
4835	BKG 135 (158)	Glass, blue	Short	Barrel	D. 0.5 h. 0.4 d. 0.1	Fair	7	2019	
4836	BKG 135 (158)	Carnelian	Short	Barrel, irregular	D. 0.7 h. 0.6 d. 0.1	Fair	7	2019	
4837	BKG 135 (158)	Terracotta, brown		Areca nut, grooved	D. 1.5 h. 1.3 d. 0.3	Fair	7	2019	
4969	BKG 13 5 (158)	Terracotta		Biconical	h. 1.9 cm max. D. 2.5 cm d. 0.4 cm	Chipped at the edge	7	2019	dotted decoration
4976	BKG 13 (250)	Glass, dark green		Barrel	h. 0.3 cm D. 0.5 cm d. 0.1	Fair	7	2019	

4977	BKG 13 (252)	Carnelian		Barrel	h. 0.5 cm D. 0.5 cm d. 0.1	Fair	7	2019	
4985	BKG 13 (260)	Terracotta		Barrel, irregular	D. 1.8 d. 0.3	Traces of tools	7	2019	
4986	BKG 13 (254)	Shell		Barrel	D. 0.9 d. 0.1	Fair	7	2019	
4987	BKG 13 (254)	Shell		Barrel	D. 0.7 d. 0.1	Fair	7	2019	
4994	BKG 13 (276)	Marble		Pendant	D. 2.5 d. 1.0 t. 0.9	Fair	7	2019	Incised decoration: bird and two leaves
4995	BKG 13 (276)	Marble		Pendant	D. 1.6 d. 0.3 t. 0. 6	Traces of tools	7	2019	
5002	BKG 13 (258)	Terracotta		Biconical	D. 2.3 h. 1.8 d. 0.3	Chipped	7	2019	decorated with single and double parallel incised lines
5005	BKG 13 (276)	Cowrie shell		Cowrie shell	l. 1.5 h. 0.7 t. 0.2	Fair	7	2019	
5010	BKG 13 (259)	Terracotta		Areca nut, grooved	D. 1.7 h. 1.9 d. 0.5	Fair	7	2019	
5011	BKG 13 (276)	Glass, blue		Barrel	D. 0.6 h. 0.4 d. 0.1		7	2019	
5012	BKG 13 (276)	Terracotta		Areca nut	D. 2.1 h. 1,5 d. 0.5	Fair	7	2019	

5013	BKG 13 (276)	Cowrie shell		Cowrie shell	l. 1.4 h. 0.6 t. 0.2	Fair	7	2019	
5016	BKG 13 (282)	Glass, blue-and-white		Cornerless cube	l. 0.6 D. 0.4 d. 0.1	Fair	7	2019	
5033	BKG 13 (259)	Shell		Barrel	D. 0.7 h. 0.3 d. 0.1	Fair	7	2019	
5038	BKG 13 (306)	Glass, black		Barrel	D. 1.0 h. 0.8 d.0.2		7	2019	
5039	BKG 13 (299)	Glass, blue		Barrel	D. 0.5 h. 0.3 d. 0.1	Fair	7	2019	
5043	BKG 13 (287)	Agate		Barrel	D. 1.1 l. 2.0 d. 0.1	Fair	7	2019	
5044	BKG 13 (287)	Cowrie shell		Cowrie shell	l. 1.4 h. 0.7	Fair	7	2019	
5048	BKG 13 (309)	Shell		Irregular spherical/Globular	D. 0.8 h. 0.6 d. 0.1	Chipped	7	2019	
5056	BKG 13 (309)	Glass, blue		Barrel	D. 0.4 h. 0.3	Fair	7	2019)	
5070	BKG 13 (266) E	Glass?		Barrel	D. 0.7 h. 0.7 d. 0.1	Cracked	7	2019	
5071	BKG 13 (266) E	Lapis lazuli		Irregular spherical/Globular	D. 0.4 h. 0.3	Fair	7	2019	
5072	BKG 13 (259) B	Shell		Barrel	D. 1.1 h. 0.8 d. 0.1	Chipped	7	2019	
5156	BKG I (4)	Cowrie shell		Cowrie shell	h. 0.8 l. 1.1 t. 0.2	Chipped	7	2019	

1207	BKG 2 (223)	Lapis Lazuli	Long	Barrel	0.66	0.56			Undamaged	Macrophase 7/8		
1206	BKG 2 (223)	Glass, yellowish greenish	Long	Barrel with bands	1.09	1.05			Spalled and scarred	Macrophase 7/8		
1206	BKG 2 (223)	Glass, yellowish greenish	Short	Barrel with bands	0.78	1.05			Undamaged	Macrophase 7/8		
1498	BKG 218 (496)	Lapis Lazuli	Short	Barrel	0.72	1.02			Undamaged	Macrophase 7/8		
4050 (Serial number)	BKG 2 (217)	Glass, green blue	Short	Barrel	0.23	0.45			Undamaged	Macrophase 7/8	1987	
4051 (Serial number)	BKG 2 (217)	Glass, blue green	Very short	Barrel	0.19	0.41			Undamaged	Macrophase 7/8	1987	
4052 (Serial number)	BKG 2 (217)	Glass, green		Barrel					Broken	Macrophase 7/8	1987	
4053 (Serial number)	BKG 2 (217)	Lapis Lazuli	Short	Barrel	0.28	0.36			Undamaged	Macrophase 7/8	1987	
4054 (Serial number)	BKG 2 (217)	Lapis Lazuli	Short	Barrel	0.24	0.31			Undamaged	Macrophase 7/8	1987	
4055 (Serial number)	BKG 2 (299)	Carnelian	Short	Barrel	0.64	0.72			Spalled and scarred	Macrophase 7/8	1987	
4056 (Serial number)	BKG 2 (299)	Glass, black-and- white	Short	Barrel	0.48	0.61			Spalled and scarred	Macrophase 7/8	1987	Imitating agate?
4057 (Serial number)	BKG 2 (299)	Glass, black	Short	Barrel	0.49	0.77			Spalled and scarred	Macrophase 7/8	1987	
4058 (Serial number)	BKG 2 (299)	Lapis Lazuli							Broken	Macrophase 7/8	1987	
4059 (Serial number)	BKG 2 (299)	Glass, green							Broken	Macrophase 7/8	1987	
4060 (Serial number)	BKG 2 (299)	Terracotta, brown							Broken	Macrophase 7/8	1987	
4061 (Serial number)	BKG 213 (301)	Glass, black							Broken	Macrophase 7/8	1987	
4062 (Serial number)	BKG 213 (301)	Glass, black	Long	Barrel	0.33	0.27			Undamaged	Macrophase 7/8	1987	
4065 (Serial number)	BKG 2 (277)	Glass, white brownish	Short	Ghata-shaped	0.46	0.48			Spalled and scarred	Macrophase 7/8	1987	

4066 (Serial number)	BKG 213 (365)	Glass, yellow	Long	Cylindrical	0.75	0.42			Undamaged	Macrophase 7/8	1987	
4067 (Serial number)	BKG 213 (365)	Glass, green blue		Barrel		0.46			Broken	Macrophase 7/8	1987	
4068 (Serial number)	BKG 2 (292)?	Terracotta, brownish reddish		Areca nut	1.54				Broken	Macrophase 7/8	1987	
4069 (Serial number)	BKG 2 (292)?	Glass, blue green	Long	Cylindrical	1.88	0.77			Broken	Macrophase 7/8	1987	
4070 (Serial number)	BKG 2 (292)?	Glass, blue green	Short	Barrel	0.47	0.68			Undamaged	Macrophase 7/8	1987	
4071 (Serial number)	BKG 2 (292)?	Glass, green blue		Barrel, irregular					Broken	Macrophase 7/8	1987	
4072 (Serial number)	BKG 2 (1)	Glass, green		Barrel					Broken	Macrophase 7/8	1987	
4073 (Serial number)	BKG 2 (1)	Glass, brown, white		Gadrooned barrel					Broken	Macrophase 7/8	1987	
4074 (Serial number)	BKG 2 (1)	Glass, green	Short	Barrel	0.22	0.27			Undamaged	Macrophase 7/8	1987	
4075 (Serial number)	BKG 2 (1)	Carnelian	Long	Barrel	1.18	0.82			Undamaged	Macrophase 7/8	1987	
4076 (Serial number)	BKG 2 (240) (cleaning surface before excavation)	Glass, green	Short	Barrel	0.23	0.44			Undamaged	Macrophase 7/8	1987	
4077 (Serial number)	BKG 2 (240) (cleaning surface before excavation)	Glass, green	Short	Barrel	0.46	0.56			Undamaged	Macrophase 7/8	1987	
4078 (Serial number)	BKG 2 (240) (cleaning	Glass, reddish	Very long	Cylindrical	0.58	0.22			Undamaged	Macrophase 7/8	1987	

	surface before excavation)	(mixed Alkali)										
4080 (Serial number)	BKG 213 (341)	Lapis Lazuli	Long	Hexagonal-faceted cylindrical	0.75	0.58			Spalled and scarred	Macrophase 7/8	1987	Plus, 3x pieces of lapis raw materials
4081 (Serial number)	BKG 213 (347)	Shell	Short	Cylindrical	0.55	0.64			Undamaged	Macrophase 7/8	1987	
4082 (Serial number)	BKG 213 (347)	Glass, yellow	Long	Cylindrical	0.79	0.61			Undamaged	Macrophase 7/8	1987	
4083 (Serial number)	BKG 213 (347)	Glass, yellow	Long	Cylindrical	0.62	0.56			Undamaged	Macrophase 7/8	1987	
4084 (Serial number)	BKG 213 (347)	Glass, yellow	Short	Barrel	0.21	0.37			Undamaged	Macrophase 7/8	1987	
4085 (Serial number)	BKG 213 (347)	Glass, green blue	Short	Barrel	0.24	0.44			Undamaged	Macrophase 7/8	1987	
4086 (Serial number)	BKG 2 (339)	Terracotta, brown	Short	Areca nut	1.34	2.06			Spalled and scarred	Macrophase 7/8	1987	
4090 (Serial number)	BKG 2 (1)	Terracotta, brown	Short	Areca nut, grooved	1.62	2.38			Undamaged	Macrophase 7/8	1987	
4091 (Serial number)	BKG 2 (1)	Terracotta, brownish reddish	Short	Ghata-shaped	1.51	1.89			Undamaged	Macrophase 7/8	1987	
4092 (Serial number)	BKG 2 (1)	Terracotta, brownish reddish		Areca nut	1.09				Broken	Macrophase 7/8	1987	
4093 (Serial number)	BKG 213 (274)	Lapis Lazuli	Short	Barrel	0.33	0.4			Undamaged	Macrophase 7/8	1987	
4094 (Serial number)	BKG 213 (274)	Glass, black		Irregular spherical/Globular					Broken	Macrophase 7/8	1987	
4095 (Serial number)	BKG 213 (274)	Glass, yellow	Short	Barrel	0.22	0.39			Undamaged	Macrophase 7/8	1987	
4096 (Serial number)	BKG 213 (274)	2x Glass, green	Long	Cylindrical	0.47/0.35	0.37/0.29			Undamaged	Macrophase 7/8	1987	2x beads

4097 (Serial number)	BKG 213 (274)	2x Glass, orange yellowish	Short	Barrel	0.3/0.29	0.52/0.49			Undamaged	Macrophase 7/8	1987	2x beads
4098 (Serial number)	BKG 213 (274)	Glass, green blue	Short	Barrel	0.17	0.31			Undamaged	Macrophase 7/8	1987	
4102 (Serial number)	BKG 2 (299)	2x Glass, black	Short	Barrel	0.64/0.60	0.79/0.75			Spalled and scarred	Macrophase 7/8	1987	2x beads
4103 (Serial number)	BKG 2 (299)	Glass, blue	Short	Barrel	0.38	0.62			Undamaged	Macrophase 7/8	1987	
4104 (Serial number)	BKG 2 (299)	Glass, reddish (mixed Alkali)	Long	Cylindrical, irregular	1.01	0.25			Spalled and scarred	Macrophase 7/8	1987	
4105 (Serial number)	BKG 2 (299)	Glass, yellow		Irregular spherical/Globular					Broken	Macrophase 7/8	1987	
4108 (Serial number)	BKG 2 (274)	Glass, yellow	Very short	Barrel	0.27	0.56			Undamaged	Macrophase 7/8	1987	
4109 (Serial number)	BKG 2 (274)	Glass, greenish	Short/short/v. short	Barrel	0.22/0.35/0.19	0.39/0.36/0.46			Undamaged	Macrophase 7/8	1987	1x bead green-blue and remaining 4x beads, green
4110 (Serial number)	BKG 2 (274)	Glass, yellow	Short	Barrel	0.41	0.45			Undamaged	Macrophase 7/8	1987	2x beads and 1x fragment
4111 (Serial number)	BKG 2 (274)	Glass, brownish yellowish	Short	Barrel	0.5	0.53			Undamaged	Macrophase 7/8	1987	
4118 (Serial number)	BKG 213 (301)	Glass, greenish	Short	Barrel	0.22	0.35			Undamaged	Macrophase 7/8	1987	
4123 (Serial number)	BKG 2 Demolition walls [256] [296]	Terracotta, brown	Short	Areca nut, grooved	1.58	2.2			Undamaged	Macrophase 7/8	1987	

	[247] [254]											
4124 (Serial number)	BKG 2 (313)	Terracotta, brown	Short	Areca nut	1.57	2.19			Undamaged	Macrophase 7/8	1987	
4127 (Serial number)	BKG 2 (240)	Terracotta, brownish black	Short	Ghata-shaped	1.32	2.16			Spalled and scarred	Macrophase 7/8	1987	
4129 (Serial number)	BKG 2 (240)	Lapis Lazuli	Short	Cylindrical	0.31	0.4			Undamaged	Macrophase 7/8	1987	
4130 (Serial number)	BKG 2 (441)	Terracotta, brown	Short	Areca nut	1.67	2.15			Broken	Macrophase 7/8	1987	
4133 (Serial number)	BKG 2 (299)	Shell	Short	Barrel	0.42	0.63			Undamaged	Macrophase 7/8	1987	
4136 (Serial number)	BKG 2 (277)	Terracotta, black	Short	Ghata-shaped, grooved	1.65	2.22			Spalled and scarred	Macrophase 7/8	1987	
4137 (Serial number)	BKG 2 (308)	Terracotta, brown	Short	Areca nut	1.4	2.01			Broken	Macrophase 7/8	1987	
4139 (Serial number)	BKG 2 (308)	Agate, banded	Short	Barrel	0.54	0.72			Undamaged	Macrophase 7/8	1987	
4141 (Serial number)	BKG 2 (217) Found over the floor	Terracotta, brown	Short	Areca nut, grooved	1.23	1.78			Spalled and scarred	Macrophase 7/8	1987	
4142 (Serial number)	BKG 2 (217) Found over the floor	Lapis Lazuli	Short	Barrel	0.42	0.5			Undamaged	Macrophase 7/8	1987	
4148 (Serial number)	BKG 2 (313)	Terracotta, brown	Short	Areca nut	1.87	2.07			Undamaged	Macrophase 7/8	1987	
4145 (Serial number)	BKG 2 (315)	Terracotta, brown	Short	Ghata-shaped, grooved	1.79	2.27			Broken	Macrophase 7/8	1987	
4159 (Serial number)	BKG 2 (372)	Terracotta, brown	Short	Biconical	1.59	2.01			Broken	Macrophase 7/8	1987	
4162 (Serial number)	BKG 2 (272)	Terracotta, brown	Short	Ghata-shaped	1.19	2.21			Broken	Macrophase 7/8	1987	

4163 (Serial number)	BKG 2 (272)	Glass, green	Very short	Barrel	0.19	0.46			Undamaged	Macrophase 7/8	1987	
4164 (Serial number)	BKG 2 (272)	Glass, green	Long	Barrel	0.87	0.78			Undamaged	Macrophase 7/8	1987	
4164 (Serial number)	BKG 2 (272)	Glass, yellow	Short	Cylindrical	0.24	0.43			Undamaged	Macrophase 7/8	1987	
4165 (Serial number)	BKG 2 (272)	Glass, reddish (mixed Alkali)	Long	Cylindrical	1.12	0.59			Spalled and scarred	Macrophase 7/8	1987	
4167 (Serial number)	BKG 2 (313)	Terracotta, brown	Short	Biconical	1.69	2.44			Broken	Macrophase 7/8	1987	
4172 (Serial number)	BKG 2 Sal (243)	Terracotta, black	Short	Biconical	1	1.06			Undamaged	Macrophase 7/8	1987	
4183 (Serial number)	BKG 2 (223)	Glass, brown, white	Short	Irregular spherical/Globular	0.57	0.66			Undamaged	Macrophase 7/8	1987	
4184 (Serial number)	BKG 2 Sal (243)	Lapis Lazuli	Short	Barrel	0.43	0.46			Undamaged	Macrophase 7/8	1987	
4192 (Serial number)	BKG 2 (273)	Agate, banded	Long	Barrel	0.97	0.63			Undamaged	Macrophase 7/8	1987	
4196 (Serial number)	BKG 2 (223)	Shell	Long	Drop-shaped pendant	2.12	1.15			Undamaged	Macrophase 7/8	1987	
4198 (Serial number)	BKG 2 (344)	Lapis Lazuli				0.66			Broken	Macrophase 7/8	1987	
4201 (Serial number)	BKG 2 (314)	Engina Mendicaria (sea snail)			1.71		0.98	0.99	Undamaged	Macrophase 7/8	1987	
4202 (Serial number)	BKG 2 (314)	Lapis Lazuli	Short	Barrel	0.38	0.39			Undamaged	Macrophase 7/8	1987	
4203 (Serial number)	BKG 2 (314)	Glass, blueish	Short	Barrel	0.33	0.5			Spalled and scarred	Macrophase 7/8	1987	
4211 (Serial number)	BKG 2 (330)	Glass, greenish		Disc-shaped	1.43				Broken	Macrophase 7/8	1987	
4214 (Serial number)	BKG 2 (299)	Glass, greenish	Short	Irregular spherical/Globular	0.47	0.58			Broken	Macrophase 7/8	1987	

4216 (Serial number)	BKG 2 (311)	Glass, yellowish	Long	Cylindrical	0.75	0.39			Undamaged	Macrophase 7/8	1987	
4218 (Serial number)	BKG 2 (308)	Glass, black	Short	Cylindrical	0.52	0.52			Broken	Macrophase 7/8	1987	
4221 (Serial number)	BKG 2 (339)	Terracotta, brown	Long	Barrel, irregular	1.71	1.57			Undamaged	Macrophase 7/8	1987	A third perforation in section?
4222 (Serial number)	BKG 2 (339)	Glass, green blue		Barrel	0.42				Broken	Macrophase 7/8	1987	
4223 (Serial number)	BKG 2 (359)	Glass, green	Very short	Barrel	0.14	0.34			Undamaged	Macrophase 7/8	1987	
4224 (Serial number)	BKG 213 (279)	Glass, yellow		Barrel					Broken	Macrophase 7/8	1987	3x beads
4225 (Serial number)	BKG 2 (344)	Glass, blue greenish	Short	Barrel	0.56	0.61			Spalled and scarred	Macrophase 7/8	1987	
4227 (Serial number)	BKG 2 (252)	Glass, yellow	Short	Barrel	0.29	0.49			Undamaged	Macrophase 7/8	1987	
4228 (Serial number)	BKG 2 (252)	Glass, yellow	Long	Cylindrical	0.5	0.43			Broken	Macrophase 7/8	1987	
4230 (Serial number)	BKG 213 (279)	Glass, blue-green	Long	Barrel with a groove	0.99	0.9			Undamaged	Macrophase 7/8	1987	
4231 (Serial number)	BKG 213 (279)	Glass, blue	Short	Barrel	0.35	0.49			Undamaged	Macrophase 7/8	1987	
4232 (Serial number)	BKG 213 (279)	Glass, green	Long	Barrel	0.61	0.58			Broken	Macrophase 7/8	1987	
4233 (Serial number)	BKG 213 (279)	Glass, yellow	Short	Barrel	0.28	0.51			Undamaged	Macrophase 7/8	1987	
4234 (Serial number)	BKG 213 (279)	Glass, yellow	Short	Cylindrical	0.26	0.31			Undamaged	Macrophase 7/8	1987	
4235 (Serial number)	BKG 213 (279)	Glass, yellow	Short	Barrel	0.41	0.47			Undamaged	Macrophase 7/8	1987	
4236 (Serial number)	BKG 2 (344)	Lapis Lazuli	Short	Barrel	0.34	0.38			Undamaged	Macrophase 7/8	1987	
4239 (Serial number)	BKG 213 (341)	Glass, yellow	Very long	Cylindrical	1.17	0.56			Undamaged	Macrophase 7/8	1987	
4241 (Serial number)	BKG 213 (309)	Glass, black	Long	Cylindrical	0.34	0.27			Undamaged	Macrophase 7/8	1987	

4243 (Serial number)	BKG 215 (322)	Glass, yellow		Cylindrical (2x) Disc-shaped (1x)					Broken	Macrophase 7/8	1987	3x beads
4246 (Serial number)	BKG 2 (292)	Terracotta, brown	Short	Areca nut, grooved	1.36	1.86			Undamaged	Macrophase 7/8	1987	
4247 (Serial number)	BKG 2 (292)	Glass, brownish greenish		Barrel		0.66			Broken	Macrophase 7/8	1987	
762	BKG 202 (60)	Agate, banded		Spherical	D. 0.009					Macrophase 7/8	1984	
1273	BKG 2 (299)	Agate, banded		Spherical	D. 0.8 Perforation: 0.15					Macrophase 7/8	1984	
728	BKG 205 (41)	Faience		Double axe shaped	h. max. 0.6 h. min. 0.4 L. 0.1 Perforation: 0.15 T. 0.3					Macrophase 7/8	1984	
781	BKG 201 (70)	Terracotta, grey		Areca nut	h. max. 0.016 h. min. 0.015 D. 0.024 Perforation: 0.0045					Macrophase 7/8	1984	
761	BKG 202 (60)	Terracotta, brown		Areca nut	H. max. 0.013 h. min. 0.012 D. 0.023 Perforation: 0.004					Macrophase 7/8	1984	
786	BKG 202 (103)	Terracotta, grey		Areca nut	h. max. 0.012 D. 0.024 Perforation: 0.003 max. and 0.002 min.					Macrophase 7/8	1984	
733	BKG 203 (47)	Terracotta, grey		Areca nut	h. max. 0.015 h. min. 0.014 D. 0.026 Perforation: 0.004					Macrophase 7/8	1984	
757	BKG 203 (75)	Terracotta, brown		Areca nut	h. max. 0.018 D. 0.02 Perforation: 0.004					Macrophase 7/8	1984	
758	BKG 203 (82)	Terracotta, grey		Biconical	h. max. 0.014-0.013 D. 0.02 Perforation: 0.003-0.0035					Macrophase 7/8	1984	

729	BKG 205 (82)	Terracotta, grey		Ghata-shaped	h. max. 0.011 D. 0.023		Macrophase 7/8	1984	
730	BKG 205 (37)	Terracotta, grey		Areca nut	h. max. 0.015 h. min. 0.012 D. 0.022 Perforation: 0.004		Macrophase 7/8	1984	
731	BKG 205 (42)	Terracotta, grey		Areca nut	h. max. 0.012 D. 0.023 Perforation: 0.004		Macrophase 7/8	1984	
732	BKG 205 (42)	Terracotta, grey		Ghata-shaped	h. max. 0.015 D. 0.018 Perforation: 0.004		Macrophase 7/8	1984	
734	BKG 205 (48)	Terracotta, grey		Biconical	h. max. 0.013 h. min. 0.012 D. 0.021 Perforation: 0.004		Macrophase 7/8	1984	
735	BKG 205 (48)	Terracotta, grey		Biconical	h. max. 0.015 D. 0.02 Perforation: 0.004-0.0035		Macrophase 7/8	1984	
877	BKG 206 (145)	Terracotta, Brown		Biconical	h. max. 0.013 D. 0.018 Perforation: 0.004	Chipped	Macrophase 7/8	1984	
868	BKG 206-9 (145)	Terracotta, grey		Ghata-shaped	h. max. 0.015 D. 0.02 Perforation: 0.005		Macrophase 7/8	1984	
870	BKG 206-9 (145)	Terracotta, brown		Areca nut	h. max. 0.013 D. 0.021 Perforation: 0.005	Chipped	Macrophase 7/8	1984	
863	BKG 202 (60)	Glass, yellow		Cylindrical	h. max. 0.006-0.004 D. 0.006-0.004		Macrophase 7/8	1984	4x beads
Not inventoried	BKG 2 (562)	Terracotta, brown		Ghata-shaped	D. 2.3 h. 1.6 Perforation: 0.7		Macrophase 7/8		
Not inventoried	BKG 218 (510)	Terracotta		Areca nut	D. 2.3 h. 1.2 Perforation: 0.3		Macrophase 7/8		
Not inventoried	BKG 218 (589)	Terracotta		Areca nut	D. 2.3 h. 1.4		Macrophase 7/8		

					Perforation: 0.4							
Not inventoried	BKG 219 (544)	Terracotta		Ghata-shaped	D. 1.9 h. 1.2 Perforation: 0.5					Macrophase 7/8		
Not inventoried	BKG 219 (559)	Terracotta		Areca nut	D. 1.6 h. 1.5 Perforation: 0.4?					Macrophase 7/8		
2055	BKG 667 SU (348)	Amber	Very short	Disc-shaped	0.47	1.21			Spalled and scarred	8a/I		
4462 (Serial number)	BKG 654 (257)	Glass, yellow	Long	Cylindrical	0.69	0.51			Broken	8a/I	1999	
4463 (Serial number)	BKG 660 (420)	Terracotta	Short	Barrel	0.45	0.61			Undamaged	8a/I	1999	
4464 (Serial number)	BKG 654 (294)	Glass, yellow	Long	Cylindrical	0.74	0.58			Undamaged	8a/I	1999	
4468 (Serial number)	BKG 655 (258)	Glass, yellow	Long	Cylindrical	0.65	0.6			Undamaged	8a/I	1999	
4757	BKG 132 (100)	Shell		Barrel	D. 1.9 h. 0.9 d. 0.3				Fair	8a	2019	
4615	BKG 132 (100)	Lapis Lazuli		Irregular spherical/Globular	l. 0.4 D. 0.45 d. 0.03				Fair	8a	2019	
4772	BKG 132 (75)	Glass, blue		Barrel	D. 0.5 h. 0.25 d. 0.1				Fair	8a	2019	
4783	BKG 132 (117)	Turbinella pyrum (young)		Sea snail	D. 0.6-0.2 h./l. 1.0				Fair	8a	2019	
4787	BKG 132 (119)	Terracotta, brown		Areca nut	D. 1.9 h. 1.2 d. 0.5				Fair	8a	2019	
4794	BKG 13 (123)	Coral		Oval Barrel	w. 0.8 t. 0.3 d. 0.1				Fair	8a	2019	
4802	BKG 132 (123)	Glass, green		Barrel	D. 0.6 h. 0.2 d. 0.2				Fair	8a	2019	

4803	BKG 132 (123)	Glass, blue		Barrel	D. 0.45 h. 0.3 d. 0.1	Fair	8a	2019	
4804	BKG 132 (123)	Glass, blue		Barrel	D. 0.25 h. 0.2 d. 0.1	Fair	8a	2019	
4805	BKG 132 (123)	Terracotta, brown		Areca nut	D. 2.0 h. 2.0 d. 0.5	Chipped	8a	2019	
4808	BKG 132 (123)	Carnelian		Barrel	D. 0.9 h. 0.7 d. 0.1	Fair	8a	2019	
4810	BKG 132 (147)	Glass, yellow		Cylindrical	D. 0.4 h. 0.3 d. 0.05	Fair	8a	2019	
4811	BKG 132 (147)	Glass, blue		Barrel	D. 0.4 h. 0.3 d. 0.05	Fair	8a	2019	
4812	BKG 132 (147)	Glass, green		Spherical	D. 1.5 h. 1.4 d. 0.4	Broken	8a	2019	
4820	BKG 132 (149)	Shell		Barrel	D. 1.4 h. 1.0 d. 0.3	Fair	8a	2019	
4821	BKG 132 (149)	Cowrie shell		Cowrie shell	l. 1.7	Damaged	8a	2019	
4826	BKG 132 (124)	Glass, Yellow		Barrel	D. 0.5 h. 0.4 d. 0.2	Fair	8a	2019	
4833	BKG 132 (159)	Shell		Cylindrical	D. 0.4 l. 0.6 d. 0.15	Fair	8a	2019	
4840	BKG 132 (186)	Terracotta, brown		Areca nut, grooved	D. 2.0 h. 2.1 d. 0.5	Fair	8a	2019	
4962	BKG 656 (544)	Carnelian, bleached		Barrel, irregular	h. 0.6 cm D. 0.7 cm d. 0.1 cm	Fair	8a	2019	

2056	BKG 656 (501)	Carnelian	Short	Irregular spherical/Globular	1.1	1.27			Undamaged	8		
2057	BKG 656 SU (386)	Lapis Lazuli	Long	Octagonal-faceted biconical	1.26	1.08			Spalled and scarred	8		
4471 (serial number)	BKG 655 (277)	Glass, yellow	Long	Cylindrical	0.82	0.51			Undamaged	8	1999	
4471 (serial number)	BKG 655 (277)	Glass, yellow	Long	Cylindrical	0.88	0.33			Undamaged	8	1999	
4471 (serial number)	BKG 655 (277)	Glass, yellow	Short	Barrel	0.34	0.43			Undamaged	8	1999	
4473 (serial number)	BKG 655 (277)	Shell	Long	Plano convex barrel	0.84	0.37			Undamaged	8	1999	
4474 (serial number)	BKG 655 (277)	Glass, green, opaque	Short	Barrel	0.26	0.38			Undamaged	8	1999	
4622	BKG 13 (30)	Terracotta, black		Modified Ghata-shaped	D. 2.0 h. 1.2 d. 0.4				Fair	8b	2019	
4625	BKG 13 (30)	Terracotta, grey		Areca nut	D. 2.0 h. 1.8 d. 0.4				Fair	8b	2019	
4626	BKG 13 (30)	Terracotta, black		Biconical	D. 2.3 h. 1.4 d. 0.4				Chipped	8b	2019	
4650	BKG 13 (30)	Glass, green		Cylindrical	l. max. 2.0 t. 0.6 d. 0.2				Two fragments recomposed. One end chipped	8b	2019	
4651	BKG 13 (30)	Terracotta, brown		Ghata-shaped	D. 2.2 h. 1.4 d. 0.5				Fair	8b	2019	
4652	BKG 13 (30)	Terracotta, brown		Ghata-shaped	D. 2.1 h. 1.1 d. 0.4				Fair Bottom chipped	8b	2019	

4653	BKG 13 (30)	Glass, black-and- white, wound		Barrel	l. 1.1 t. 0.8 d. 0.05	Fair	8b	2019	
4654	BKG 13 (30)	Cowrie shell		Cowrie shell	l. 1.8	Fair	8b	2019	
4655	BKG 13 (30)	Cowrie shell		Cowrie shell	l. 1.6	Part missing	8b	2019	
4656	BKG 13 (56)	Glass, green		Lenticular biconical	l. 1.3 t. 0.3 d. 0.05	Fair	8b	2019	
4657	BKG 13 (30)	Lapis Lazuli		Barrel	l. 0.6 D. 0.5 d. 0.05	Fair	8b	2019	
4658	BKG 13 (56)	Glass, yellow		Irregular spherical/Globular	l. 0.8 D. 0.8 d. 0.1	Half preserved	8b	2019	
4659	BKG 13 (56)	Glass, green		Barrel	D. 0.5 l. 0.3 d. 0.05	Fair	8b	2019	
4670	BKG 13 (63)	Coix seed		Coix seed	l. 0.8 t. 0.6 l. 0.8 t. 0.6	One fair, the other broken and recomposed Extremely fragile	8b	2019	2x beads
4683	BKG 13 (73)	Rock crystal		Hexagonal-faceted barrel	l. 2.4 t. 1.6 d. 0.2	Fair	8b	2019	
4684	BKG 13 (73)	Glass, green		Cylindrical	l. 1.0 D. 0.4	Fair	8b	2019	
4685	BKG 13 (73)	Glass, white		Cylindrical	l. 0.3 D. 0.4	Fair	8b	2019	
4686	BKG 13 (73)	Glass, yellowish brown		Cylindrical	l. 0.8 D. 0.2	Fair	8b	2019	
4687	BKG 13 (73)	Glass, blue		Barrel	D. 0.5 t. 0.2	Fair	8b	2019	

4689	BKG 13 (55)	Chloritic-schist, grey		Rectangular long rectangular, pendant	l. max. 1.7 w. 1.0 t. 0.5 d. 0.2	Half preserved	8b	2019	
4695	BKG 13 (73)	Glass, dark green		Barrel	D. 0.7 l. 0.7 d. 0.2	Partially broken	8b	2019	
4696	BKG 13 (73)	Dentalium shell		Cylindrical	l. 2.5 t. 0.4 d. 0.3	Fair	8b	2019	
4697	BKG 13 (73)	Dentalium shell		Cylindrical	l. 1.9 t. 0.3 d. 0.2	Fair	8b	2019	
4702	BKG 13 (30)	Carnelian		Irregular spherical/Globular	D. 0.9 h. 0.9 d. 0.1	Fragment Half preserved	8b	2019	
4703	BKG 13 (30)	Glass, light green		Barrel	l. 0.25 h. 0.20 d. > 0.1	Fair	8b	2019	
4705	BKG 13 (73)	Terracotta, brown		Areca nut	D. 2.0 h. 1.8 d. 0.4	Fair	8b	2019	Traces of white slip?
4709	BKG 13 (73)	Serpentine or schist		Cylindrical	l. 1.1 D. 1.0 d. 0.35	Fair	8b	2019	
4710	BKG 13 (73)	Glass, green yellowish		Barrel with grooves	l. 0.9 D. 0.7 d. 0.05	Fair	8b	2019	
4711	BKG 13 (73)	Lapis Lazuli		Hexagonal-faceted barrel	l. 1.8 t. 1.55 d. 0.05	Chipped	8b	2019	
4712	BKG 13 (73)	Quartz (citrine)		Barrel	l. 0.6 D. 0.7 d. 0.1	Fair	8b	2019	
4717	BKG 13 (30)	Glass, green		Barrel	D. 0.4 l. 0.2 d. 0.1	Fair	8b	2019	

4719	BKG 13 (30)	Terracotta, brown		Areca nut	D. 2.2 h. 1.6 d. 0.4	Complete	8b	2019	
4723	BKG 13 under [77]	Shell		Cylindrical	l. 0.6 D. 0.65 d. 0.01	Fair	8b	2019	
4724	BKG 13 under [77]	Glass, blue		Barrel	h. 0.3 D. 0.6 d. 0.01	Fair	8b	2019	
4726	BKG 13 under [77]	Terracotta, black		Areca nut, grooved	D. 1.7 h. 1.6 d. 0.4	Chipped	8b	2019	Burnished. Wheel-made
4731	BKG 13 (31)	Glass, green blue		Barrel	D. 0.35 l. 0.3 d. 0.1	Fair	8b	2019	
4735	BKG 13 (30)-(74)-(80)	Glass, green		Cylindrical, irregular	D. 0.8 l. 0.7 d. 0.33	Fair	8b	2019	
4736	BKG 13 (30)	Glass, green		Barrel	D. 0.29 h. 0.2 d. 0.05	Fair	8b	2019	
4760	BKG 132 (94)	Glass, green		Segmented	l. 0.50 D. 0.65 d. 0.1 total l. 1.0	Fair	8b	2019	
4773	BKG 132 (75)	Glass, green		Barrel	D. 0.48 h. 0.25 d. 0.1	Fair	8b	2019	
4774	BKG 132 (75)	Sea snail		Sea snail	d. 0.9-0.3 h./l. 1.45	Fair	8b	2019	
4825	BKG 134 (172)	Terracotta, brown		Biconical, irregular, grooved	D. 1.9 h. 1.6 d. 0.4	Fair	8b	2019	
4832	BKG 133 (157)	Glass, blue		Barrel	D. 0.4 h. 0.2 d. 0.05	Fair	8b	2019	

5164	BKG 2 TT 1 F	Shell		Barrel	D. 0.6 h. 0.4 d. 0.1	Fair	8	2019	
5165	BKG 2 TT 1 F	Coral?		Cylindrical	D. 0.4 h. 0.4 d. 0.1	Fair	8	2019	
5343	BKG 6.5 (30)	Shell		Irregular spherical/Globular	D. 0.6 d. 0.1	Fair	8b	2019	
5344	BKG 6.5 (30)	Glass, yellow		Cylindrical	D. 0.9 d. 0.3 h. 1	Fair	8b	2019	
5345	BKG 6.5 (30)	Carnelian		Spherical	D. 1 d. 0.1	Fair	8b	2019	
5346	BKG 6.5 (30)	Glass, green		Barrel	D. 0.5 d. 0.1 h. 0.35	Fair	8b	2019	
5347	BKG 6.5 (30)	Glass, black-and- white		Spherical	D. 1.1 d. 0.1	Half	8b	2019	
5367	BKG 6.5 (34)	Terracotta, black		Ghata-shaped	h. 1.7 D. 1.9 d. 0.3	Fair	8b	2019	
5368	BKG 6.5 (34)	Glass, blue		Barrel	h. 0.8 D. 0.7 d. 0.1	Half	8b	2019	
5369	BKG 6.5 (34)	Glass, green		Cylindrical	l. 0.8 D. 0.45 d. 0.1	Fair	8b	2019	
5378	BKG 6.5 (35)	Glass, green		Barrel	D. 0.7 h. 0.35 d. 0.15	Fair	8b	2019	
5379	BKG 6.5 (35)	Glass, orange brownish		Barrel	D. 0.5 h. 0.4 d. 0.1	Fair	8b	2019	
5387	BKG 6.5 (41)	Cowrie shell		Cowrie shell	l. 1.2	Incomplete	8b	2019	
5388	BKG 6.5 (41)	Shell		Cylindrical	l. 0.55 D. 0.7	Fair	8b	2019	

					d. 0.1				
5389	BKG 6.5 (41)	Glass, purple- and-white		Barrel	D. 0.8 d. 0.1	Fair	8b	2019	
5399	BKG 6.5 (41)	Cowrie shell		Cowrie shell	l. 1.6	Incomplete	8b	2019	
5400	BKG 6.5 (41)	Glass, green bluish		Cylindrical	D. 0.5 l. 1.2 d. 0.3	Fair	8b	2019	
5453	BKG 6.5 (41)	Glass, black-and- white		Spherical	D. 0.9 h. 0.8 d. 0.3	Deformed	8b	2019	
5465	BKG 6.5 (30)	Lapis lazuli		Cornerless cube	l. 0.8 w. 0.55 d. 0.1	Fair	8b	2019	
5466	BKG 6.5 (30)	Glass, blue		Irregular spherical/Globular	D. 0.55 d. 0.1	Fair	8b	2019	
5185	BKG 2 (while exposing structures in Aug. 2019)	Shell		Barrel	D. 0.9 h. 0.6 d. 0.1	Fair	8-9	2019	
5186	BKG 2 (while exposing structures in Aug. 2019)	Terracotta		Biconical	D. 2.9 h. max 2.5 d. 0.3	Chipped	8-9	2019	Decorated with incised parallel strokes in the centre
5208	BKG 6.5 (13)	Terracotta		Areca nut, grooved	D. 2.0 h. 1.4 d. 0.5	Fair	9a	2019	
5209	BKG 6.5 (11)	Terracotta		Areca nut, grooved	D. 1.9 h. 1.4 d. 0.5	Chipped	9a	2019	

5240	BKG 6.5 (13)	Terracotta		Areca nut	D. 1.8 h. 1.5 d. 0.4	Chipped	9a	2019	
5243	BKG 6.5 (13)	Terracotta		Areca nut, grooved	D. 2.0 h. 1.4 d. 0.4	Chipped	9a	2019	
5267	BKG 6.5 (17)	Cowrie shell		Cowrie shell	l. 1.4 w. 1	Damaged	9a	2019	
5289	BKG 6.5 (16)	Terracotta, brown		Areca nut	h. 1.5 D. 2 d. 0.5	Fair	9a	2019	
5291	BKG 6.5 (17)	Glass, yellow		Cylindrical	l. 0.5 d. 0.2 D. 0.5	Fair	9a	2019	
5319	BKG 6.5 (25)	Glass, yellow		Spherical	D. 1.2 d. 0.3	Half preserved	9a	2019	
5320	BKG 6.5 (25)	Glass, green		Barrel	D. 0.9 d. 0.3	Fair	9a	2019	
5321	BKG 6.5 (25)	Carnelian, red		Spherical	D. 0.6 d. 0.1	Fair	9a	2019	
5322	BKG 6.5 (25)	Shell		Barrel	D. 0.6 h. 0.3 d. 0.1	Fair	9a	2019	
5324	BKG 6.5 (23)	Terracotta, brown		Areca nut	D. 2.5 d. 0.5 h. 1.7	Fair	9a	2019	
5325	BKG 6.5	Terracotta, brown		Areca nut	D. 2.2 d. 0.3 h. 1.6	Fair	9a	2019	
5352	(23)	Glass, black-and- white		Spherical	D. 0.8 d. 0.1	Fair	9a	2019	
5353	BKG 6.5 (25)	Glass, green		Barrel	D. 0.5 d. 0.1	Fair	9a	2019	
5354	BKG 6.5 (25)	Glass, blue		Segmented	D. 0.65 d. 0.2 l. 0.9	Chipped	9a	2019	
5355	BKG 6.5 (25)	Glass, green		Barrel, irregular	D. 1 d. 0.15	Deformed	9a	2019	

5356	BKG 6.5 (25)	Terracotta brown		Areca nut, grooved	D. 2.1 d. 0.35 h. 1.65	Fair	9a	2019	
5357	BKG 6.5 (25)	Terracotta, brown		Areca nut	D. 2.2 d. 0.45 h. 1.5	Fair	9a	2019	
5444	BKG 6.5 (25)	Glass, Yellow		Cylindrical	h. 0.3 D. 0.7 d. 0.3	Recomposed from two fragments	9a	2019	
5450	BKG 6.5 (23)	Lapis lazuli		Barrel	D. 0.3 d. 0.1	Fair	9a	2019	
5462	BKG 6.5 (64)	Terracotta, brown		Areca nut	D. 2.2 h. 1.5 d. 0.4	Fair	9a	2019	
5540	BKG 141 (37)	Terracotta, red		Ghata-shaped	D. 1.4 h. 1.1 d. 0.4	Fair	9a	2020	
5549	BKG 141 (54)	Terracotta, brown		Barrel	D. 2.0 d. 0.6 h. 1.5	Fair	9a	2020	
5552	BKG 141 (55)	Terracotta, brown		Areca nut	D. 1.7 d. 0.4 h. 1.3	Chipped	9a	2020	
5591	BKG 141 (45)	Terracotta, brown		Biconical	D. 2.0 h. 1.5 d. 0.4	Fair	9a	2020	
5592	BKG 141 (45)	Terracotta, brown		Biconical	D. 2.4 h. 1.6 d. 0.6	Fair	9a	2020	
5593	BKG 145 (58)	Glass, yellow		Barrel	D. 0.6 d. 0.2	Chipped	9a	2020	
5627	BKG 1416 (98)	Terracotta, brown		Barrel	D. 2.4 h. 1.2 d. 0.4	Fair	9a	2020	
5628	BKG 141 (78)	Rock crystal		Irregular spherical/Globular	D. 1.3 h. 1.2 d. 0.2	Fair	9a	2020	

5639	BKG 1416 (98)	Cowrie shell		Cowrie shell	l. 2.1				Fair	9a	2020	
5792	BKG 1414 (56)	Quartz		Barrel	D. 0.9 h. 0.7 d. 0.15				Fair	9a	2020	
5842	BKG 15 (1)	Shell		Triangular short barrel	h. 0.8 t. 1 d. 0.1				Fair	9a	2020	
5847	BKG 15 (213)	Terracotta, grey		Barrel	D. 2.4 h. 1.9 d. 0.5				Fair	9a	2020	
5889	BKG 6.8 (15)	Shell		Irregular spherical/Globular	D. 1.0 h. 0.8 d. 0.1				Fair	9a	2020	
4150 (serial number)	BKG 311 (173)	Terracotta, brownish black	Short	Areca nut	1.29	2.04			Broken	9b/Phase 5	1987	
4465 (serial number)	BKG 654 (282)	Glass, yellow	Long	Cylindrical	0.81	0.59			Undamaged	9	1999	
4466 (serial number)	BKG 655 (259)	Glass, yellow	Short	Barrel	0.34	0.46			Undamaged	9	1999	
4467 (serial number)	BKG 655 (267)	Glass, yellow	Short	Lenticular barrel	0.89	1.06			Undamaged	9	1999	
4469 (serial number)	BKG 654 (276)	Glass, yellow	Short	Cylindrical	0.55	0.58			Undamaged	9	1999	
4469 (serial number)	BKG 654 (276)	Glass, yellow	Long	Cylindrical	0.78	0.46			Undamaged	9	1999	
4470 (serial number)	BKG 655 (273)	Glass, yellow	Long	Cylindrical	0.86	0.41			Undamaged	9	1999	
1767	BKG 701 (26)	Glass, yellow		Cylindrical	L. 0.008					9/VId	1998	
1929	BKG 706 (28)	Glass, green		Cylindrical	L. 0.016 D. 0.005					9/VId	1998	
4097	BKG 2-13 (1)	Terracotta		Ghata-shaped	h. 2.3 D. 2.25 d. 0.5				Fair	9b	2018	

4098	BKG 2-13 (1)	Terracotta		Ghata-shaped	h. 1.3 D. 2.3 d. 0.4	Chipped	9b	2018	
4099	BKG 2-13 (1)	Terracotta		Areca nut	h. 1.6 D. 2 d. 0.4	Chipped	9b	2018	
4100	BKG 2-13 (1)	Terracotta		Areca nut	h. 1.35 D. 1.9 d. 0.45	Fair	9b	2018	
4101	BKG 2-13 (1)	Terracotta		Areca nut	h. 1.5 D. 2.0 0.45	Fair	9b	2018	
4102	BKG 13 (2)	Terracotta		Areca nut	h. 1.9 D. 2.1 d. 0.4	Fair	9a-b	2018	
4103	BKG 13 (2)	Terracotta		Biconical	h. 1.7 D. 2.1 d. 0.4	Chipped	9a-b	2018	
4106	BKG 13 (2)	Lapis lazuli		Rectangular long rectangular	l. 2.6 w. 1.6 t. 0.7 d. 0.3	Fair	9a-b	2018	
4116	BKG 13 (2)	Terracotta, Brown		2x ghata-shaped 7x areca nut	1: d. 1.7/h.1.3 2: d. 2.1/h.1.5 3: d. 2.4/h.1.4 4: d. 2.1/h.1.6 5: d. 1.7/h.1.7 6: d. 1.9/h.1.7 7: d. 2.1/h.1.2 8: d. 2.1/h.1.4 9: d. 2.1/h. 1.6	Chipped	9a-b	2018	
4117	BKG 13 (2)	Glass, yellow		Irregular spherical/Globular	d. 0.4 h. 1.3	Fair	9a-b	2018	
4124	BKG 13 W surface	Peridot		Rectangular long rectangular	l. 1.2 w. 1.0 t. 0.6 d. 1.5	Fair	9b	2018	

4125	BKG 13 (2)	Rock crystal		Barrel	D. 0.6 d. 0.1	Fair	9a-b	2018	
4126	BKG 13 (2)	Glass, blue, white		Barrel	l. 0.6/0.5 t. 0.3 d. 0.15	Fair	9a-b	2018	
4127	BKG 13 (2)	Lapis lazuli		Barrel	D. 0.6 d. 0.16 t. 0.5	Chipped	9a-b	2018	
4128	BKG 13 (2)	Glass, blue		Barrel	D.0.35 d. 0.05 t. 0.2	Fair	9a-b	2018	
4131	BKG 13 (24)	Rock crystal		Spherical	D. 0.7 d. 0.1	Fair	9b	2018	
4132	BKG 13 (24)	Glass, black		Barrel	D. 0.6 d. 1.5	Chipped	9b	2018	
4133	BKG 13 (24)	Terracotta		Cylindrical	l. 1.2 D. 0.25 d. 0.1	Fair	9b	2018	
4137	BKG 13 (24)	Glass, yellowish brown		Disc-shaped	D. 0.5 d. 0.25 t. 0.15	Fair	9b	2018	
4138	BKG 13 (24)	Terracotta		Barrel	l. 0.7 D. 0.5 d. 0.2	Fair	9b	2018	
4139	BKG 13 (24)	Terracotta, brown		Areca nut	h. 1.3 D. 1.9 d. 0.4	Chipped	9b	2018	
4153	BKG 13 (26)	Stone? black		Barrel	D. 0.85	Fair	9b	2018	
4154	BKG 13 (26)	Lapis lazuli		Cylindrical	l. 0.6 D. 0.35	Fair	9b	2018	
4155	BKG 13 (26)	Glass, black		Barrel	D. 0.4	Chipped	9b	2018	
4156	BKG 13 (24)	Terracotta, brown		Areca nut	h. 1.7 D. 2.1	Fair	9b	2018	
4158	BKG 13 (26) S	Glass, yellowish-brown		Barrel	D. 0.35 h. 0.35	Fair	9b	2018	

4160	BKG 13 (26) S	Terracotta, brown		Areca nut	D. 2.8 h. 1.5	Fair	9b	2018	
4621	BKG 13W Surface	Chloritic-schist, black		Ghata-shaped	D. 2.2 h. 1.0 d. 0.3	Fair	9a-b	2019	
4635	BKG 2W (1) under [46]	Terracotta, brown		Areca nut	D. 2.1 h. 1.3 d. 0.5	Fair	9a-b	2019	
4637	BKG 13W Surface	Terracotta, brown		Ghata-shaped	D. 2.0 h. 1.4 d. 0.5	Fair	9a-b	2019	
4639	BKG 13W Surface	Lapis Lazuli		Barrel	D. 0.3 h. 0.3	Fair	9a-b	2019	
4691	BKG 13 surface	Lapis Lazuli		Barrel	D. 0.4 h. 0.3	Fair	9a-b	2019	
4737	BKG 13 Surface	Shell		Cylindrical	D. 0.5 h. 0.4 d. 0.1	Fair	9a-b	2019	
4790	BKG 13 E /1/	Terracotta, brown		Areca nut	D. 2.2 h. 1.5 d. 0.4	Fair	9a-b	2019	
4791	BKG 13 E /1/	Terracotta, red		Areca nut	D. 2.4 h. 1.7 d. 0.4	Fair	9a-b	2019	
4809	BKG 13 (22)-(26)	Glass, green		Barrel	D. 0.55 h. 0.5 d. 0.05	Fair	9b	2019	
4839	BKG 11 surface	Gold		Barrel	D. 0.4 h. 0.3 d. 0.1	Fair	9a-b	2019	
4842	BKG 11 surface	Glass, white		Irregular spherical/Globular	D. 0.6 h. 0.5 d. 0.2	Fair	9a-b	2019	
4965	BKG 13 (surface cleaning)	Glass, black		Barrel	h. 0.7 cm D. 0.9 cm d. 0.3 cm	Fair	9a-b	2019	

4979	BKG 13 (254)	Terracotta		Areca nut	D. 3.3 d. 0.8	Fair	9a-b	2019	
4980	BKG 13 Surface	Carnelian, orange		Barrel	D. 0.8 d. 0.1	Fair	9a-b	2019	
4981	BKG 13 Surface	Shell		Cylindrical	D. 0.7 d. 0.1	Fair	9a-b	2019	
4982	BKG 13 Surface	Lapis lazuli		Barrel	D. 0.5 d. 0.1	Fair	9a-b	2019	
5001	BKG 13 (surface)	Terracotta		Pendant conical	l. max 2.1 w. 1.0 d. 0.2	Fair	9a-b	2019	
5006	BKG 13 (surface)	Glass, yellowish-brown		Disc-shaped	D. 0.4 d. 0.2 h. 0.2	Fair	9a-b	2019	
5018	BKG 13 Erratic	Quartz, white		Biconical	D. 0.7 l. 1.0 d. 0.1	Fair	9a-b	2019	
5028	BKG 13 (surface)	Terracotta		Areca nut	D. 2.2 h. 1.5 d. 0.4	Fair	9a-b	2019	
5029	BKG 13 (surface)	Terracotta		Areca nut	D. 2.1 h. 1.4 d. 0.3	Fair	9a-b	2019	
5030	BKG 13 (surface)	Lapis lazuli		Barrel	D. 0.5 h. 0.5 d. 0.1	Fair	9a-b	2019	
5032	BKG 13 Erratic	Lapis lazuli		Barrel	D. 0.3 h. 0.3 d. 0.1	Fair	9a-b	2019	
5034	BKG (surface) (Aug. 2019)	Shell		Barrel	D. 0.7 h. 0.5 d. 0.1	Fair	9a-b	2019	
5057	BKG 13 (surface)	Shell		Barrel	D. 0.5 h. 0.4 d. 0.1	Fair	9a-b	2019	

5113	BKG 13 (289) room 216	Cowrie shell		Cowrie shell	l. 1.4 w. 1.2 t. 0.7	Fair	9	2019	
5114	BKG 13 W corridor turreted building, surface	Glass, yellowish-brown		Disc-shaped	D. 0.7 h. 0.3 d. 0.3	Fair	9	2019	
5121	BKG 13 cleaning	Glass, Black		Barrel	D. 0.4 h. 0.25 d. 0.1	Fair	9a-b	2019	
5122	BKG 13 cleaning	Terracotta		Areca nut	D. 1.9 h. 1.8 d. 0.4	Fair	9a-b	2019	
5139	BKG 13 (surface)	Glass, blue		Barrel	D. 0.5 h. 0.3 d. 0.1	Fair	9a-b	2019	
5140	BKG 13 (surface)	Glass, yellowish-brown		Barrel	D. 0.4 h. 0.3 d. 0.1	Fair	9a-b	2019	
5251	BKG 6.5 (4)	Glass, yellow		Barrel	D. 0.5 t. 0.3	Fair	9b	2019	
5439	BKG 6.5 (2)	Terracotta		Areca nut	h. 1.2 D. 2.4 d. 0.7	Fair	9b	2019	
5447	BKG 6.5 (2)	Glass, yellow		Barrel	h. 0.6 D. max 0.3 d. max. 0.2	Broken	9b	2019	
5471	BKG 6.5 (2)	Terracotta		Areca nut	D. 1.5 h. 1.2 d. 0.5	Fair	9b	2019	
3801	BKG 11 E 1-2	Garnet	Short	Barrel, irregular	0.37 | 0.71	Complete	Sporadic	12	
KI-254	Katelai (grave 26)	Carnelian	Long	Barrel	L. 1.12 D. 0.67	Complete	1000-800BCE		

KL-467	Kalako-dherai (settlement)	Carnelian	Short	Biconical	L. 0.61 D. 1.2	Complete	1000-650BCE		
LI-637	Loebanr (grave 117/7)	Carnelian	Long	Barrel	L. 0.9 D. 0.7	Complete	1000-800BCE		
D	Aligrama (site? graveyard?)	Lapis Lazuli	Long	Rectangular long rectangular		Complete	Protohistoric period		
KI-280	Katelai (grave 13)	Glass	Long	Barrel		Complete	1000-800BCE		

Table 23: Data of the beads from Barikot and Swat together with other material culture items that are part of the current study

Inv. number	Material	Height	Length	Diameter/ width	Trench	Layer	Macrophase/Structural period	Overall shape	Notes	Year
15	Lapis		0.008	0.004	A	4	1	With cylindrical body		1977
34	Bone		0.006		A	7	1	Cylindrical		1977
69	Carnelian			0.007	A	10	0	With biconical body; central hole		1977
70	Bone		0.012	0.002	A	10	0	Cylindrical		1977
94	Faience		0.013		A	10	0	Ellipsoidal in section with four transversal holes		1977
96	Stone?		0.008		A	10	0	Cylindrical		1977
97	Bone			0.005	A	10	0	Round with central hole		1977
98	Gypsum			0.002-0.003	A	10	0	(31x small beads) with flat round body and hole		1977
99	Alabaster (?)		0.005		A	10	0	Cylindrical		1977
107	Gypsum			0.06	A	10	0	Flat circular bead with central and traversal hole		1977
112	Gypsum				A	10	0	Flat quadrangular bead with transversal hole connected with three hole on one side	0.024x0.012x 0.002	1977
118	Gypsum			0.014 max.	A	11	0	Quadrifoliate bead with five concentric circles incised on both sides and with one transversal hole		1977
119	Gypsum			0.007	A	11	0	Flat circular bead with central hole		1977
120	White stone		0.005		A	11	0	Ovoidal bead with transversal hole		1977
166	Black stone		0.012		A	10	0	Biconical body and transversal hole		1977
382	Chalcedony		0.037	0.008	Area E	4	0	Barrel		1981
534	Red onyx?				Area E	10	0	Flat bead with concave and convex opposite sides and with transversal hole	0.013x 0.011	1982

535	Lapis				Area F	10	0	Barrel shaped, square in section and with transversal hole	0.01x0.006	1982
536	Lapis				Area F	10	0	Barrel shaped, Square/oval in section	0.06x0.05	1982
455	Bone		0.012	0.008	Area G	5	0	Barrel-shaped with transversal hole		1981
496	Bone		0.022	0.004	Area G	10	0	Cylindrical with transversal hole		1981
497	White stone		0.015	0.01	Area G	7	1	Barrel		1981
537	Chalcedony		0.018		Area G	10	0	Barrel shaped with round section and with transversal hole		1982
539	Faience		0.019		Area G	10	0	Barrel shaped with round section and with transversal hole		1982
540	Faience			0.05	Area G	10	0	Flat circular bead with rippled edges and transversal hole		1982
456	Faience		0.012	0.002	Area H	11	0	Cylindrical with transversal hole		1981
457	Calcite			0.006-0.003mt.	Area I	11	0	40x small almost cylindrical beads		1981
1090	Crystal flake		0.027		Area I	15	0	Small crystal rock flake with oval retouched base.		1985
676	Faience			0.008	Area J	11	0	Quadrifoliale-shaped bead with four opposite concentric circles. Transversal hole.		1982
677	Faience			0.012	Area J	11	0	Flat circular bead with central and transversal hole		1982
678	Lapis		0.009	0.008	Area J	11	0	Flat square shaped bead with transversal hole		1982
679	Bone			0.0017x0.014	Area J	11	0	Flat oval bone with large central hole		1982
924	Shell		0.012		Area L	9	0	Spacer bead cut in the shape of a double axe;		1985

								tabular double holed; corroded.		
1042	Faience			0.008	Area L	17	0	Very small discoidal bead with rippled edges. Incised pointed circles on one face. The other side is missing.		1985
952	Carnelian			0.011	Area M	12	0	Biconical		1985
953	Lapis		0.008		Area M	13	0	Cylindrical		1985
954	Jasper		0.007		Area M	12	0	Almost square		1985
961	Terracotta			0.02	Area M	15	0	Biconical. Chipped. Grey.		1985
1025	Terracotta			0.02	Area M	13	0	Convex-cone bead. Chipped. Light brown.		1985
193	Lapis		0.01		B	2	1	Convex shaped bead with transversal hole		1978
281	Faience			0.005	D	7	0	Discoidal bead with a central and a transversal hole		1978
288	Faience			0.012	D	8	0	Discoidal bead with a central and a transversal hole		1978
303	Faience			0.021 max.	D	8	0	Quadrifoliate bead with four dotted circles at both sides and with a transversal hole		1978
322	Faience?			0.007	D	8	0	Shaped like a star with dotted circles at both sides and with a transversal hole		1978
345	Bone	0.012		0.01	D	8	0	Cylindrical with central hole		1978
376	Calcite			0.001	D	8	0	21x small beads cylindrical in shape		1978
377	Calcite		0.009		D	8	0	Cylindrical		1978

538	Agate?		0.01		unknown	unknown	none	Barrel shaped with round section and with transversal hole		1982
1225	Faience						none	Small wheel-shaped faience bead decorated with pointed circles on both sides. Transversal hole.		1987
159	Faience			0.013	A	10	0	Star-shaped Stacul 1987 fig. 43d, pl. XXVI		
1043	Faience	0.008	0.002		Area L	17	0	Stacul 1987 fig. 43 e, pl. XXXVI		
1040	Marble?				Area L	17	0	Stacul 1987 fig. 43 c (0.03 x 0.024x 0.008)		
803	Vitreous paste	h. 0.005 L. 0.012 D. 0.01			BKG 144	220	3b/IV	Circular and flat		1984
1389	Terracotta	h. 1.1 D. 2.1 Perforation 0.3			BKG 401	318	3b/IV	Flat bicone. Dark grey. Slightly chipped. Corroded.		1990
Non-inventoried	Terracotta	D. 2.3 Perforation 0.4			BKG 419	811	3b/IV	Biconical brown reddish		
Non-inventoried	Terracotta	D. 2.0 Perforation 0.3			BKG 429	483	3b/IV	Biconical light brown		
Non-inventoried	Ceramic?				BKG 108	131	4a/V	Green		
Non-inventoried	Coral				BKG 108	129 c	4a/V	Short cylinder		
Non-inventoried	Coral				BKG 109	152	4a/V	Short cylinder		
Non-inventoried	Coral				BKG 109	138	4a/V			
748	Crystal	h. 0.009 D. 0.007			BKG 110	154	4a/V	Conical convex		1984
	Rock crystal				BKG 108	135	4a/V	Barrel (collared at both ends)		
	Rock crystal				BKG 109	138	4a/V			

836	Shell	h. 0.015	BKG 108	363	4a/V			1984
746	Shell	h. 0.007/8 D. 0.012 Perforation 0.015	BKG 110	153	4a/V	Short barrel. Flat. Polished sea shell		1984
846	Shell	h. 0.015	BKG 110	221	4a/V	Cfr. BKG 836. Flat barrel. Polished sea shell		1984
Non-inventoried	Terracotta		BKG 109	144	4a/V	Biconical		
Non-inventoried	Terracotta		BKG 109	152	4a/V	Biconical		
Non-inventoried	Terracotta		BKG 110	202	4a/V	Convex cone		
Non-inventoried	Terracotta		BKG 110	149	4a/V	Convex cone		
Non-inventoried	Terracotta		BKG 110	201	4a/V	Spherical		
833	Terracotta? Schist?	h. 0.014 D. 0.017 Perforation 0.004	BKG 108	355	4a/V	Spherical, pale green. Chipped. Reworked on both sides. (Ghata-shaped)		1984
1480	Jade?	h. 0.95 D. 1.05 Perforation 0.1	BKG 401	335	4a/V	A polyhedral bead.		1990
1479	Quartz	h. 0.8 D. 1.0 Perforation 0.1	BKG 401	335	4a/V	Spherical slightly flattened around the holes. White.		1990
1542	Schist	h. 1.0 D. 2.0 Perforation 0.4/0.35	BKG 401	908	4a/V	Flat convex cone bead with a flat collar decorated by two pairs of incised parallel lines around the maximum and minimum diameter of the body. Bluish. Chipped. Slightly corroded.		1990
Non-inventoried	Carnelian	D. 0.6 h. 1.0 Perforation 0.2	BKG 401	335	4a/V	Barrel		

Non-inventoried	Jasper?	D. 0.7/0.5 h. 1.5 Perforation 0.2	BKG 419	797	4a/V	Figurine	Pendent. Red (opaque)	
Non-inventoried	Shell		BKG 417	309	4a/V		10x 8.5x4.7	
Non-inventoried	Terracotta	D. 0.55 h. 0.2 Perforation 0.25	BKG 401	335	4a/V	Short cylindrical.		
Non-inventoried	Terracotta	D. 0.4 h. 0.2 Perforation 0.2	BKG 417	309	4a/V	Cylindrical.		
Non-inventoried	Terracotta	D. 1.6 h. 0.9 Perforation 0.25	BKG 419	793	4a/V	Biconical.	Brown. Burnt.	
Non-inventoried	Terracotta		BKG 423	663	4a/V	Ball	Greyish-brown.	
1228	Coral	L. 0.007	BKG 308	403	4/IVA	Cylindrical		1987
1178	Faience	D. 0.014	BKG 308	252	4/IVA	A gadrooned bead. Light green. Corroded.		1987
1230	Faience	L.0.006	BKG 308	403	4/IVA	Cylindrical		1987
1237	Faience		BKG 308	407	4/2a	Flat bead quadrangular in shape with transversal hole.		1987
1245	Faience	D. 0.011	BKG 308	407	4/2a	Discoidal bead with two incised concentric circles on both sides. Central and transversal holes.		1987
1226	Gold bead	L. 0.01	BKG 308	403	4/IVA	Very small cylindrical gold bead in form of spiral-shaped wire		1987
1249	Onyx	D. 0.012	BKG 308	407	4/2a	Discoidal in shape. Half of the body is missing. Central hole.		1987
1229	Quartz	L. 0.012	BKG 308	403	4/IVA	Cylindrical crystalline bead.		1987
1276	Vitreous paste	h. 1.2 D. 1.4	BKG 311	356	4/2a	Tabular with near elliptical shape. Pale		1987

		Perforation 0.3 t. 0.4				green. Chipped. Cracked. Encrusted.		
Non-inventoried	Faience	h. 0.3	BKG 308	256	4/IVA	Barrel. Fragmented.		
Non-inventoried	Lapis	D. 1.1 h. 0.9 Perforation 0.6	BKG 310	192	4/IVA			
Non-inventoried	Schist?	D. 2.2 h. 1.5 Perforation 0.95	BKG 423	651	4b/VI	Conical		
Non-inventoried	Shell		BKG 304	135	4/IVA			
Non-inventoried	Shell	D. 1.0 h. 0.8 Perforation 0.2	BKG 422	91	4b/VI	Spherical		
Non-inventoried	Shell	D. 1.1 h. 1.0 Perforation 0.1	BKG 423	93	4b/VI	Spherical		
Non-inventoried	Shell	D. 0.9 h. 0.8 Perforation 0.1	BKG 423	630	4b/VI	Spherical		
Non-inventoried	Shell	D. 0.96 h. 0.8 Perforation 0.1	BKG 423	630	4b/VI	Spherical		
Non-inventoried	Shell	h. 1.1 Perforation 0.1	BKG 427	547	4b/VI	Figurine		
Non-inventoried	Terracotta	D. 2.3	BKG 308	153	4/IVA	Spherical. Scratched.		
Non-inventoried	Terracotta	D. 2.4 h. 2.4 Perforation 0.3	BKG 413 W	761	4b/VI	Biconical (ridged).	Brown? Burnt.	
Non-inventoried	Terracotta	D. 3.9 h. 2.2 Perforation 0.6	BKG 413 W	761	4b/VI	Biconical.	Light brown.	
Non-inventoried	Terracotta	D. 1.9 h. 2.1 Perforation 0.5	BKG 419	759	4b/VI	Spherical.	Light brown.	

Non-inventoried	Terracotta		BKG 422	91	4b/VI	Spherical (compressed)	Brown. Irregular.	
Non-inventoried	Terracotta	D. 2.0 h. 1.0 Perforation 0.6	BKG 422	91	4b/VI	Short cylindrical.	Light brown.	
Non-inventoried	Terracotta	D. 0.5 h. 0.2 Perforation 0.1	BKG 422	91	4b/VI	Cylindrical.		
Non-inventoried	Terracotta	D. 2.0 h. 1.65 Perforation 0.4	BKG 422	91	4b/VI	Biconical.	Light brown.	
Non-inventoried	Terracotta	D. 2.1 h. 1.6 Perforation 0.4	BKG 423	93	4b/VI	Biconical.	Light brown.	
Non-inventoried	Terracotta	D. 0.7 h. 0.25 0.3	BKG 423	630	4b/VI	Short cylindrical.		
Non-inventoried	Terracotta	D. 0.55 h. 0.25 Perforation 0.25	BKG 423	637	4b/VI	Cylindrical.		
Non-inventoried	Terracotta	D. 1.9 h. 1.5 Perforation 0.3	BKG 423	637	4b/VI	Tronco-conical	Light brown. Base convex.	
Non-inventoried	Terracotta	D. 1.8	BKG 423	653	4b/VI	Ball	Greyish.	
Non-inventoried	Terracotta	D. 2.4 h. 1.8 Perforation 0.3	BKG 427	553	4b/VI	Convex cone with flat bottom	Brown.	
Non-inventoried	Unidentified	D. 0.5	BKG 301	26	4/2a	Spherical/short cylinder		
Non-inventoried	Unidentified Stone	D. 0.5 h. 0.2 Perforation 0.02	BKG 311	389	4/2a			
Non-inventoried	Unidentified Stone	D. 0.45 h. 0.1 Perforation 0.28	BKG 311	389	4/2a			
Non-inventoried	Terracotta		BKG 108	129 a	4b/VI	Convex cone		

Non-inventoried	Terracotta		BKG 9	39	4/IV			
Non-inventoried	Coral		BKG 104	80	5/VII	Cylinder.		
860	Terracotta	h. 0.002 D. 0.006 Perforation 0.002	BKG 104	71	5/VII	Short cylindrical. Reddish.		1984
822	Terracotta?	h. 0.018 D. 0.023 Perforation 0.011-0.013	BKG 108	118	5/VII	Truncated cone ring bead. Chipped.		1984
Non-inventoried	Vitreous paste		BKG 104	80	5/VII	Cylindrical.	Red	
Non-inventoried	Vitreous paste?		BKG 104	71	5/VII	Short cylindrical.		
1435	Faience?	h. 0.001-0.008 D. 0.00145 Perforation 0.005	BKG 427	505	5/VII	Gadrooned bead. Irregular. Pale-green yellowish.		1990
1491	Schist	L. 2.7 (base)/ 1.7 D. 1.1 Perforation 0.2	BKG 427	517	5/VII	Long barrel with oblique flattened ends. Grey.		1990
Non-inventoried	Bone	D. 0.6 h. 0.4 Perforation 0.1	BKG 4	1	5/VIII	Cylindrical.		
Non-inventoried	Bone	D. 0.9	BKG 419	424	5/VII			
Non-inventoried	Carnelian	D. 0.8 h. 0.7 Perforation 0.1	BKG 427	518	5/VII	Spherical		
Non-inventoried	Carnelian	D. 1.0 h. 0.7 Perforation 0.15	BKG 427	527	5/VII	Spherical		
Non-inventoried	Faience	D. 0.55 h. 0.6 Perforation 0.1	BKG 421	43	5/VIII	Cylindrical.	Red.	
Non-inventoried	Faience	D. 0.6 h. 0.4 Perforation 0.1	BKG 427	527	5/VII	Spherical		

Non-inventoried	Faience	D. 0.6 h. 0.5 Perforation 0.1	BKG 427	527	5/VII	Spherical		
Non-inventoried	Lapis	D. 0.6 h. 0.45-0.40 Perforation 0.2	BKG 423	78	5/VIII	Cylindrical.		
Non-inventoried	Metal		BKG 426	444	5/VII			
Non-inventoried	Schist?	D. 1.95 h. 0.4 Perforation 0.3	BKG 423	88	5/VII	Cylindrical. Discoidal		
Non-inventoried	Shell	D. 0.9 h. 2.7	BKG 413	285	5/VII			
Non-inventoried	Terracotta	D. 1.9 h. 1.0	BKG 402	238	5/VIII	Biconical.	Light brown. Compressed.	
Non-inventoried	Terracotta	D. 1.4	BKG 402	238	5/VIII	Ball		
Non-inventoried	Terracotta		BKG 416	30	5/VIII	Collared		
Non-inventoried	Terracotta	D. 2.1 h. 1.9 Perforation 0.4	BKG 419	450	5/VII	Spherical (compressed)	Light brown. Irregular.	
Non-inventoried	Terracotta	D. 1.9 h. 1.1 Perforation 0.4	BKG 422	60	5/VII	Biconical.		
Non-inventoried	Terracotta	D. 1.9 h. 1.4 Perforation 0.45	BKG 422	79	5/VII	Biconical.	Light brown.	
Non-inventoried	Terracotta	D. 1.9 h. 1.5 Perforation 0.35	BKG 422	611	5/VII	Biconical.	Light brown. Burnt.	
Non-inventoried	Terracotta	D. 0.5 h. 0.2 Perforation 0.2	BKG 423	56	5/VII	Short cylindrical.		
Non-inventoried	Terracotta	D. 0.35 h. 0.25 Perforation 0.1	BKG 423	56	5/VII	Short cylindrical.		

Non-inventoried	Terracotta	D. 0.3 h. 0.2 Perforation 0.1	BKG 423	56	5/VII	Short cylindrical.		
Non-inventoried	Terracotta	D. 0.35 h. 0.3 Perforation 0.15	BKG 423	56	5/VII	Short cylindrical.		
Non-inventoried	Terracotta	D. 1.5 h. 1.3 Perforation 0.3	BKG 427	505	5/VII	Cylindrical.	Light brown. Irregular.	
Non-inventoried	Terracotta	D. 2.2 h. 1.4 Perforation 0.45	BKG 427	527	5/VII	Biconical (flat).		
Non-inventoried	Terracotta	D. 2.5 h. 1.45 Perforation 0.4	BKG 427	527	5/VII	Tronco-conical	Greyish. Radiating lines around the upper hole.	
Non-inventoried	Vitreous paste		BKG 401	1	5/VIII			
Non-inventoried	Vitreous paste	D. 3.2	BKG 423	30	5/VIII			
Non-inventoried	Vitreous paste		BKG 423	83 and 78	5/VIII			
Non-inventoried	Vitreous paste	D. 0.6 h. 0.35 Perforation 0.2	BKG 427	517	5/VII	Short cylindrical. Blue		
Non-inventoried	Vitreous paste	D. 0.5 h. 0.3 Perforation 0.1	BKG 427	517	5/VII	Short cylindrical. Blue		
1131	Chalcedony?	h. 0.9 D. 1.0 Perforation 1.0	BKG 305	65	5/2b	Spherical. Corroded.		1987
1177	Quartz crystal	h. 1.2 D. 2.0 0.15/0.2	BKG 312	187	5/2b	Conical (irregular). Chipped.		1987
1159	Shell		BKG 305	85	5/2b	Spacer bead. Double holed.		1987

1179	Stone?	h. 1.4 Perforation 0.1 t. 0.05	BKG 312	187	5/2b	Tabular. Flat. Cut in the shape of a couchant lion. Slightly corroded.		1987
1109	Terracotta	h. 0.019 D. 0.026 Perforation 0.003	BKG 303	50	5/2b	Biconical.		1987
Non-inventoried	Bone		BKG 303	50	5/2b			
Non-inventoried	Bone	h. 1.8	BKG 303	50	5/2b			
Non-inventoried	Bone	h. 3.5	BKG 303	50	5/2b			
Non-inventoried	Carnelian	D. 0.7 h. 0.55 Perforation 0.1	BKG 427	142	5b/IX	Spherical		
Non-inventoried	Rock crystal	D. 0.8 h. 1.2 Perforation 0.1	BKG 4	218	5b/IX	Barrel (hexagonal)		
Non-inventoried	Shell		BKG 304	123	5/2b			
Non-inventoried	Shell		BKG 4	218	5b/IX			
Non-inventoried	Vitreous paste	D. 0.9 h. 0.7 Perforation 0.1	BKG 415	12a	5b/IX	Spherical		
Non-inventoried	Terracotta	D. 5.2	BKG 305	57	6/VIII			
Non-inventoried	Terracotta	D. 2.0 h. 1.5 Perforation 0.4	BKG 4	1	6/X	Spherical (compressed)	Light brown	
Non-inventoried	Terracotta	D. 2.0 h. 1.2 Perforation 0.5	BKG 4	1	6/X	Cylindrical.	Light brown. Irregular.	
Non-inventoried	Terracotta	D. 2.2 h. 1.6 Perforation 1.1	BKG 4	1	6/X	Biconical.	Light brown.	
1122	Shell	h. 0.8 D. 1.0	BKG 307	55	6-7/Phase 3	Truncated-conical (irregular). Corroded.		1987

		Perforation 1.0						
1174	Stone?	h. 0.65/0.55 D. 1.1 Perforation 0.15	BKG 308	152	6-7/V	Short cylinder. Slightly corroded. Encrusted.		1987
1196	Terracotta	h. 1.2 D. 2.0 Perforation 0.45/0.5	BKG 308	276	6-7/V	Conical-convex. Decorated with an incised line. Light brown. Slightly corroded.		1987
Non-inventoried	Terracotta		BKG 1	22	7/IX	Convex cone		
Non-inventoried	Terracotta		BKG 1	22	7/IX	Convex cone		
754	Amethyst	h. 0.009 L. 0.017 W. 0.012	BKG 202	78	Macrophase 7/8	Elongated		1984
913	Etched Agate	D. 0.016 Perforation 0.001 T. 0.008	BKG 211	205	Macrophase 7/8	Cylindrical		1984
726	Garnet	D. 0.007	BKG 205	19	Macrophase 7/8	Spherical. Chipped.		1984
862	Lapis	h. 0.02 D. 0.016 Perforation 0.002	BKG 202	3	Macrophase 7/8	Fragment of hexagonal cone bead. Recomposed from two fragments. Encrusted.		1984
871	Shell	h. 0.018	BKG 206-9	145	Macrophase 7/8			1984
881	Shell	h. 0.017	BKG 208	137	Macrophase 7/8	Cfr. BKG 871		1984
753	Terracotta	h. 0.014 D. 0.006 Perforation 0.002	BKG 202	60	Macrophase 7/8	Cylindrical. Reddish.		1984
864	Vitreous paste	h. max. 0.004 h. min. 0.003 D. 0.008 Perforation 0.0015	BKG 202	60	Macrophase 7/8	Ellipsoidal convex. Yellow		1984
865	Vitreous paste	h. 0.005 D. 0.005 Perforation 0.001-0.003	BKG 202	72	Macrophase 7/8	Flat cylindrical. Green.		1984

878	Vitreous paste	h. 0.024 D. 0.006 Perforation 0.002	BKG 206	145	Macrophase 7/8	Cylindrical. Blue.		1984
858	Carnelian	h. 0.008-0.007 D. 0.012 Perforation 0.0015	BKG 101	14	7-8/X	Hexagonal. Fractured.		1984
687	Terracotta	h. 0.032 D. 0.022 Perforation 0.005	BKG 101	14	7-8/X	Long barrel. Light brown. Encrusted.		1984
691	Vitreous paste	h. 0.008 D. 0.008 max. 0.002 min.	BKG 101	27	7-8/IX	Short convex-conical. Black.		1984
Non-inventoried	Carnelian		BKG 1	1	7-8/X		3 perforations (Spacer bead?)	
Non-inventoried	Carnelian		BKG 1	9	7-8/X	Spherical		
Non-inventoried	Carnelian		BKG 1	5	7-8/X			
Non-inventoried	Carnelian		BKG 1	9	7-8/X	Bicone		
Non-inventoried	Coral		BKG 1	2	7-8/X	Oval.		
Non-inventoried	Rock crystal		BKG 1	9	7-8/X	Spherical.		
Non-inventoried	Schist		BKG 1	2	7-8/X			
Non-inventoried	Stone		BKG 102	28	Macrophase 7/8	Spherical.		
Non-inventoried	Terracotta		BKG 1	3	7-8/X	Truncated biconical		
Non-inventoried	Terracotta		BKG 102	60	7-8/X	Spherical		
Non-inventoried	Vitreous paste		BKG 1	9	7-8/X	Short cylinder.		
Non-inventoried	Vitreous paste		BKG 1	2	7-8/X	Conical-convex.		
Non-inventoried	Conch	D. 0.65/0.3 h. 0.2/0.2	BKG 218	510	Macrophase 7/8	Short cylinder		

Non-inventoried	Conch	D. 1.0 h. 0.8 Perforation 0.2	BKG 218/219	559	Macrophase 7/8	Cylinder		
Non-inventoried	Conch	D. 0.7 h. 0.8 Perforation 0.1	BKG 218/219	571	Macrophase 7/8	Barrel		
Non-inventoried	Conch	D. 1.0 h. 1.0-0.5 Perforation 0.1	BKG 219	393	Macrophase 7/8			
Non-inventoried	Conch	D. 0.8 h. 0.8 Perforation 0.2	BKG 219	517	Macrophase 7/8			
Non-inventoried	Conch	D. 0.6/0.5 h. 0.4/0.1	BKG 219	571	Macrophase 7/8	Cylinder		
Non-inventoried	Lapis lazuli	D. 0.6 h. 0.5 Perforation 0.1	BKG 218/219	559	Macrophase 7/8	Cylinder		
Non-inventoried	Schist		BKG 203		Macrophase 7/8	Cylindrical.		
Non-inventoried	Shell		BKG 2	308	Macrophase 7/8			
Non-inventoried	Terracotta	D. 2.05 h. 2.9 Perforation 0.1	BKG 2	399	Macrophase 7/8	Conical		
Non-inventoried	Terracotta		BKG 203	203	Macrophase 7/8	Truncated biconical		
Non-inventoried	Terracotta		BKG 206	164	Macrophase 7/8	Biconical	3x beads	
Non-inventoried	Terracotta		BKG 206	164	Macrophase 7/8	Biconical with central band		
Non-inventoried	Terracotta		BKG 206-209	145	Macrophase 7/8	Biconical		
Non-inventoried	Terracotta		BKG 206-209	145	Macrophase 7/8	Conical		
Non-inventoried	Terracotta		BKG 207	137	Macrophase 7/8	Biconical		
Non-inventoried	Terracotta		BKG 207	178	Macrophase 7/8	Truncated biconical		

Non-inventoried	Terracotta		BKG 207	199	Macrophase 7/8	Biconical		
Non-inventoried	Terracotta		BKG 207	199	Macrophase 7/8	Figurative		
Non-inventoried	Terracotta		BKG 211	162	Macrophase 7/8	Convex cone		
Non-inventoried	Terracotta		BKG 213	279	Macrophase 7/8	2x fragments.		
Non-inventoried	Terracotta	D. 4.2 h. 1.5 Perforation 0.35	BKG 218	536	Macrophase 7/8			
Non-inventoried	Terracotta		BKG 218	583	Macrophase 7/8			
Non-inventoried	Terracotta		BKG 218/219	559	Macrophase 7/8			
Non-inventoried	Terracotta	D. 0.5 h. 0.2 Perforation 0.2	BKG 218/219	590	Macrophase 7/8	Cylinder		
Non-inventoried	Terracotta	D. 1.9 h. 1.5 Perforation 0.5	BKG 219	511	Macrophase 7/8	Spherical		
Non-inventoried	Terracotta		BKG 201	87	Macrophase 7/8	Figurative		
Non-inventoried	Unidentified		BKG 218	473	Macrophase 7/8	Fragmented		
Non-inventoried	Unidentified	D. 0.7 h. 0.6 Perforation 0.2-0.1	BKG 218	496	Macrophase 7/8	Spherical		
Non-inventoried	Unidentified	D. 0.4 h. 0.7	BKG 218	563	Macrophase 7/8	Barrel		
Non-inventoried	Unidentified	D. 0.6 h. 0.5 Perforation 0.1	BKG 218/219	590	Macrophase 7/8	Cylinder		
Non-inventoried	Unidentified	D. 0.7 h. 0.5 Perforation 0.1	BKG 219	440	Macrophase 7/8	Spherical		
Non-inventoried	Vitreous paste	D. 0.5	BKG 2	277	Macrophase 7/8	Barrel.		

Non-inventoried	Vitreous paste	D. 0.4 h. 0.2	BKG 2	277	Macrophase 7/8	Transparent.		
Non-inventoried	Vitreous paste	D. 0.3 h. 0.3	BKG 2	277	Macrophase 7/8	Short cylinder.		
Non-inventoried	Vitreous paste	D. 0.7	BKG 2	277	Macrophase 7/8	Spherical.		
Non-inventoried	Vitreous paste	D. 0.4 h. 0.3	BKG 2	277	Macrophase 7/8	Short cylinder.		
Non-inventoried	Vitreous paste	D. 0.3 h. 0.4	BKG 2	277	Macrophase 7/8	Cylinder.		
Non-inventoried	Vitreous paste		BKG 2	311	Macrophase 7/8		Yellow? Fragment.	
Non-inventoried	Vitreous paste	L. 3.4	BKG 2	315	Macrophase 7/8			
Non-inventoried	Vitreous paste	L. 0.4	BKG 2	315	Macrophase 7/8		Fragment.	
Non-inventoried	Vitreous paste		BKG 2	315	Macrophase 7/8		Fragment. Black.	
Non-inventoried	Vitreous paste		BKG 2	334	Macrophase 7/8		Black. 2x fragments.	
Non-inventoried	Vitreous paste		BKG 2	334	Macrophase 7/8		Green	
Non-inventoried	Vitreous paste	D. 0.5 h. 0.4 Perforation 0.1	BKG 2	562	Macrophase 7/8	Spherical		
Non-inventoried	Vitreous paste		BKG 201	70	Macrophase 7/8	Conical.		
Non-inventoried	Vitreous paste		BKG 202	60	Macrophase 7/8	Spherical.		
Non-inventoried	Vitreous paste		BKG 202	72	Macrophase 7/8	Spherical. Longitudinal.	Semi-transparent.	
Non-inventoried	Vitreous paste		BKG 203	57	Macrophase 7/8	Cylindrical.		
Non-inventoried	Vitreous paste		BKG 206	213	Macrophase 7/8	Cylindrical.	Transparent.	
Non-inventoried	Vitreous paste		BKG 215	322	Macrophase 7/8	Cylindrical.		

Non-inventoried	Vitreous paste	D. 0.9 h. 0.9 Perforation 0.2	BKG 218	551	Macrophase 7/8	Cylinder	Yellow	
Non-inventoried	Vitreous paste	D. 0.55 h. 1.0 Perforation 0.2	BKG 218/219	559	Macrophase 7/8	Cylinder		
Non-inventoried	Vitreous paste	D. 0.9 h. 0.8 Perforation 0.25	BKG 218/219	559	Macrophase 7/8	Spherical		
Non-inventoried	Vitreous paste	D. 0.4/0.3 h. 0.2/0.1	BKG 218/219	571	Macrophase 7/8	Short cylinder		
Non-inventoried	Vitreous paste	D. 0.6 h. 0.6 Perforation 0.15	BKG 218/219	571	Macrophase 7/8	Spherical		
Non-inventoried	Vitreous paste	D. 0.3 h. 0.3 Perforation 0.05	BKG 218/219	590	Macrophase 7/8	Cylinder		
Non-inventoried	Vitreous paste	D. 0.6 h. 0.4	BKG 218/219	590	Macrophase 7/8	Spherical		
Non-inventoried	Vitreous paste	D. 0.3 h. 1.05 Perforation 0.05	BKG 219	453	Macrophase 7/8	Cylinder		
Non-inventoried	Vitreous paste	D. 0.6 h. 0.3 Perforation 0.1	BKG 219	485	Macrophase 7/8	Short cylinder		
Non-inventoried	Vitreous paste	D. 0.7 h. 0.5 Perforation 0.2	BKG 219	559	Macrophase 7/8	Short cylinder	2x beads	
Non-inventoried	Vitreous paste	D. 0.45 h. 0.9 Perforation 0.2	BKG 219	571	Macrophase 7/8	Cylinder		
Non-inventoried	Vitreous paste	D. 0.7-0.4 h. 1.5 Perforation 0.1	BKG 219	571	Macrophase 7/8	Barrel		
Non-inventoried	Terracotta		BKG 9	ten-twelve	8/VI	Pear-shaped.		1999
Non-inventoried	Terracotta		BKG 9	ten-twelve	8/VI	Areca nut		1999

Non-inventoried	Terracotta		BKG 9	ten-twelve	8/VI	Pear-shaped.		1999
Non-inventoried	Terracotta		BKG 9	ten-twelve	8/VI	Short barrel		
Non-inventoried	Terracotta		BKG 9	ten-twelve	8/VI	Short bicone		
1880	Unidentified stone	D. 0.0185	BKG 803	14	9/IV	Spherical. Half missing. Green.		1998
1941	Vitreous paste	D. 0.005	BKG 9	13	9/VII	Spherical showing white and blue dots on black. Broken in three places recomposed.		1999
1942	Terracotta	L. 0.014	BKG 9	13	9/VII	Cylindrical elongated. Half missing.		1999
1944	Carnelian	D. 0.008	BKG 9	13	9/VII	Spherical.		1999
1946	Bone?	D. 0.007	BKG 9	15	9/VII	Cylindrical.		1999
1956	Bone	D. 0.012	BKG 9	15	9/VII	A piece of bone for a bead. Cfr. BKG 1762.		1999
1957	Bone	D. 0.008	BKG 9	11	9/VII	See BKG 1956. Cfr. 1932. Cfr. 2008.		1999
1770	Terracotta	D. 0.018	BKG 6	1	9/III	Tronco-conical.		1998
1938	Shell	L. 0.0165	BKG 601	36	9/II	Cfr. Stacul 989: pl. xxxviii c,d p. 101: Lyncine lynx. Cfr. BKG 1889 and 1762.		1998
1741	Ivory	D. 0.0151	BKG 605	23	9/II	A fragment of circular bead decorated with dots and 'x' on the external side. Half missing. Encrusted.		1998
1743	Vitreous paste	D. 0.014	BKG 605	23	9/II	A fragment of flat circular bead. Half missing. Green.		1998
1981 (ex 1742)	Vitreous paste	L. 0.0195	BKG 606	58	9/I	A fragment of an oval bead. Half missing. Black.		1998
1863	Carnelian	L. 0.026	BKG 6S	1	9/III	Elongated.		1998

1864	Carnelian	D. 0.0082	BKG 6S	1	9/III	Spherical.		1998
1865	Vitreous paste	D. 0.009	BKG 6S	1	9/III	Flattened. Spherical. Blue.		1998
1866	Vitreous paste	D. 0.009	BKG 6S	1	9/III	Fragment of a spherical bead. Green. Half missing.		1998
1867	Terracotta	D. 0.025	BKG 6S	1	9/III	Flat circular bead with a large hole. Grey. Encrusted.		1998
1749	Carnelian	D. 0.007	BKG 7	2	9/VId			1998
1762 (BKG 1956)	Bone? Shell?	D. 0.022	BKG 7	3	9/VId	Irregular.		1998
1765	Ivory	D. 0.015	BKG 7	1	9/VId	Circular bead decorated with four parallel lines incised on the external side. Encrusted. Similar to BKG 1741.		1998
1779	Terracotta	D. 0.021	BKG 7	3	9/VId	Tronco-conical.		1998
1759	Vitreous paste	L. 0.027	BKG 701	4	9/VId	Cylindrical. Encrusted. Black.		1998
1766	Terracotta	D. 0.0195	BKG 701	26	9/VId	Fragment of a circular bead decorated on a side with line incised. More than half missing.		1998
1769	Terracotta		BKG 701	26	9/VId	Circular.		1998
1778	Terracotta	D. 0.021	BKG 701	7	9/VId	Tronco-conical.		1998
1775	Terracotta	D. 0.017	BKG 704	10	9/VId	Tronco-conical.		1998
1930	Lapis	D. 0.005	BKG 704	10	9/VId	Sub-cylindrical.		1998
1802	Terracotta	D. 0.025	BKG 706	28	9/VId	Flat. Spherical. Grey. Corroded.		1998
1803	Terracotta	D. 0.024	BKG 706	28	9/VId	Biconical. Grey. Recomposed from two fragments.		1998
1837	Terracotta	D. 0.02	BKG 706	42	9/VIa	Biconical. Grey.		1998
1838	Terracotta	D. 0.0175	BKG 706	42	9/VIa	Semi-spherical. Grey.		1998

1839	Terracotta	D. 0.02	BKG 706	44	9/VIa	Biconical. Grey.		1998
1932	Bone? Shell?	D. 0.009	BKG 706	42	9/VIa	Irregular. Cfr. 1957		1998

Table 24: Data of the beads from Barikot, which are not part of the current study

Bead material	Total No.	Bead shape	Provenance	Bead material	Total No.	Bead shape	Provenance
Carnelian 	48	Barrel, Biconical, Rectangular circular, Rectangular barrel, Lenticular biconical, Triangular barrel, Spherical, Ovoid, Cylindrical, Irregular spherical/ Globular, Drop-shaped	Gujarat and Peninsular India (Kenoyer et al. 1991; Law 2008; Law et al. 2012; Tosi 1969: 374) Near Shahr-i Sokhta in the Helmand Basin of Iran (Nazari 2004: 21; Tosi 1969: 374; Law 2008: 446)	Agate 	11	Biconical, Barrel, Irregular spherical/ Globular, Spherical	Gujarat and Peninsular India (Kenoyer et al. 1991; Law 2008; Law et al. 2012; Tosi 1969: 374) Near Shahr-i Sokhta in the Helmand Basin of Iran (Nazari 2004: 21; Tosi 1969: 374; Law 2008: 446) Dir Kohistan area of northern Pakistan (Kazmi and Jan 1997: 477; Law 2008: 441)
Varieties of quartz 	19	Biconical, Irregular spherical/ Globular, Barrel, Spherical, Rectangular circular	Northern Areas of Pakistan (Kazmi 1995: 288; Law 2008: 145; Neelis 2001: 508) Kirana Hills (Heron and Crookshank 1954: 131; Law 2008: 145) Himachal Pradesh (Geological Survey of India 1989: 47; Law 2008: 145)	Lapis Lazuli 	47	Cylindrical, Barrel, Irregular spherical/ Globular, Pear-shaped, Biconical, Cornerless cube, Rectangular long rectangular	Sar-i-Sang area deposits in the Badakhshan District of Afghanistan (Law 2008: 808)
				Garnet 	6	Barrel, Ghata-shaped, Cornerless cube	NWFP and Northern Areas of Pakistan (Kazmi 1995: 289; Law 2008: 157) Neelum Valley of Kashmir (Jan et al. 1995; Law 2008: 157)
Red Jasper  Brown Jasper 	2	Cowrie shell, Barrel	Various regions including Baluchistan, northern Waziristan as well as Gujarat (Law 2008; 2013; Durrani et al. 1995: 26; Malkani et al. 2017)	Coral 	6	Cylindrical (branch), Oval barrel, Barrel	The Mediterranean basin as well as various regions of the Indian Ocean including the Red Sea (Berumen et al. 2019; De Romanis 2000; Liu 1988: 54-57; Neelis 2001: 508; Vidale et al. 2015)

Pearl 	19	Irregular spherical/ Globular, Barrel	Persian Gulf and various regions of the Indian Ocean including the Gulf of Mannar between South India and Sri Lanka (Carter 2012: 10-21; Neelis 2001: 508; Ray 1994: 14)	Amber 	1	Disc-shaped	The Baltic and North Sea coasts as well as the eastern African coast (Ahuja 2018: 117; Kashani et al. 2011)
Steatite 	5	Barrel, Rectangular biconical, Lobe-shaped, Cylindrical, Irregular spherical/ Globular	The regions of Shangla and Hazara in northern Pakistan (Law 2008; 2011)	Peridot 	1	Rectangular long rectangular	The region of Kohistan in northern Pakistan (Jan and Khan 1996)
Marine shell 	155	Rectangular conical, Barrel, Cylindrical, Disc-shaped, Lenticular barrel, Lenticular biconical, Lenticular rectangular, Biconical, Irregular spherical/ Globular, Barrel collared, Square short cylindrical, Parallelogram, Rectangular long rectangular, Double axe, Double comb, Flower shaped, Spherical, Drop-shaped, Triangular barrel	The Arabian Sea coast (Micheli 2020; Micheli 2014: 225; Gaur et al. 2005: 944; Kenoyer 1983)	Glazed quartz 	1	Butterfly nut	Uncertain
Malachite 	12	Barrel, Irregular (lump)	Various regions of Afghanistan and northern Pakistan (Reedy 1997: 89-90)	Bone 	2	Cylindrical	Uncertain (possibly from the locality of the Swat Valley)
Coix seed 	2	-	Wah near Hasan Abdal in the region of Punjab (The Pakistan Journal of Forestry 1958 Volumes 8-9: 105)	Faience 	21	Disc-shaped, Barrel, Irregular spherical/ Globular, Cylindrical, Tortoise, Double axe	Uncertain

Chloritic rock/schist 	9	Barrel, Conical, Cylindrical, Rectangular long rectangular, Ghata-shaped	Locality of the Swat Valley (Di Florio et al. 1993; Faccenna et al. 1993; Olivieri 2003)	Serpentine 	1	Barrel	Various regions including Baluchistan, northern Waziristan, the Dargai area and the Gilgit-Skardu region of northern Pakistan (Awan 1987; Kazmi 1995: 286; Law 2008: 155; Neelis 2001: 507)
Cowrie shell 	34	-	The Arabian Sea coast (Yang 2011: 2-3; 2018)	Reworked pottery 	1	Disc-shaped	Uncertain
Marble 	2	Disc-shaped (irregular)	Probably from the locality of the Swat Valley (Di Florio et al. 1993; Faccenna et al. 1993; Olivieri 2003)	Terracotta 	468	Biconical, Disc-shaped, Cylindrical, Barrel, Short asymmetrical truncated biconical, Ghata-shaped, Areca nut, Irregular spherical/ Globular, Conical	Uncertain (possibly from the locality of the Swat Valley)
Dentlium shell 	12	Cylindrical	The Arabian Sea coast (Micheli 2020; Micheli 2014: 225; Gaur et al. 2005: 944; Kenoyer 1983)	Schist 	3	Irregular spherical/ Globular, Rectangular long rectangular, Cylindrical	Locality of the Swat Valley (Di Florio et al. 1993; Faccenna et al. 1993; Olivieri 2003)
				Beryl-aquamarine 	2	Barrel, Cylindrical	Various regions of the Karakorum Range including Gilgit-Baltistan (Grande and Augustyn 2009: 125-126; Neelis 2001: 507; Wenk and Bulakh 2004: Pl. 15, c)
Varieties of glass 	404	Barrel, Biconical, Biconical/pear-shaped, Pear-shaped, Conical,	Uncertain	Varieties of glass 			Uncertain

		Irregular spherical/ Globular, Disc-shaped, Crimped, Rectangular long rectangular, Spherical, Cylindrical, Cornerless cube, Ghata-shaped, Lenticular biconical, Lenticular barrel, Segmented					

Table 25: Visual guide to the identified bead raw materials from Barikot