The Social Significance of Neolithic Stone Bead Technologies at Çatalhöyük

A thesis submitted as partial fulfillment of the requirements
for the degree of Doctor of Philosophy

Institute of Archaeology, University College London

by

Roseleen Bains

I, Roseleen Bains, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

ABSTRACT

This project aims to better understand the social significance of stone bead production and use, from a technological perspective, at the large Neolithic settlement of Çatalhöyük, Turkey. This is done by closely examining technological practices and choices, reconstructing the manufacturing process, and analysing production contexts in order to determine the organization of production at Çatalhöyük, and the presence of craft specialization, all based on a large dataset providing both synchronic and diachronic perspectives of life at Çatalhöyük. Specifically, contexts with production evidence are identified and examined, manufacture marks on finished and unfinished beads are analysed, perforating tools are examined for use-wear, and some basic bead making experiments are also conducted. More importantly, the reasons behind the presence of craft specialization, and what factors may have propelled it, are also discussed. Technology is a fundamental aspect of daily life for Neolithic people, whether it is obtaining raw materials, manipulating them into finished products, using them, or exchanging them; technology is therefore a tangible form of constructing, maintaining, and propagating social ideologies. Stone bead technologies at Çatalhöyük provide important information regarding what regions the people of Çatalhöyük were interacting with, the skillsets they possessed, and why beads were made they way they were and what significance these beads had to both bead makers, bead consumers, and Neolithic society in general.

Similarly, depositional practices and contextual analyses of contexts with evidence of bead use, such as burials and placed deposits, support the idea that stone beads were multipurpose, socially valued goods that became integral to daily, ritual, and social life at Neolithic Çatalhöyük, performing important functions such as the communication of ideas, the forging of relationships, marking important transitions in the lives of people and households, and creating, maintaining and propagating identities, both communal and personal. Stone beads conspicuously performed an integral social role at Çatalhöyük; the story of their manufacture and use is inextricably linked to all aspects of Neolithic life at Çatalhöyük, including identity, technology and symbolism and ritual.

LIST OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGEMENTS

I am deeply indebted to my supervisors, Katherine (Karen) Wright and Marcos Martinón-Torres for their guidance and support. Karen Wright played an instrumental role in the inception of this project and her input has been vital to my research. Similarly, the guidance and feedback provided by Marcos Martinón-Torres has been invaluable and has vastly improved this thesis.

A number of people connected to the Institute of Archaeology and UCL have helped with both administrative and academic advice including: Todd Whitelaw, Cyprian Broodbank, Daniel Antione, James Lankton, Thilo Rehren, Dafydd Griffiths, Lisa Daniel, Sandra Bond, Kevin Reeves, Simon Groom, Philip Connolly, and Ruth Siddall.

The Çatalhöyük Project has been very supportive of my research and I would like to immensely thank Ian Hodder, Shahina Farid, Jason Quinlain, Sarah Jones Nerissa Russell, Katheryn Twiss, Tristan Carter, Marina Milić, Lynn Meskell, Daniella Bar-Yosef Mayer, Philippa Ryan, Chris Doherty, Lori Hager, Başak Boz, Camilla Mazzucato, Lyla Punch-Brock, Julie Cassidy, Milena Vasić, Roddy Regan, and Lisa Yoemans, for their assistance and fruitful discussions. Emma Jordan and Jennifer Booth also provided much needed assistance in the field.

I am also appreciative to the British Institute at Ankara who provided funds for travel to Turkey. John Lord kindly provided me with perforating tools that were essential for bead experiments. I would also like to thank Mihriban Özbaşaran for her permission to study beads from Aşıklı Höyük.

My colleagues at the Institute of Archaeology and friends in London have also provided moral support: Anastasia Sakellariadi, Isabel Villaseñor, Margarita Nazou, Maria Dikomitou, Alice Hunt, Carmen Ting, and Marilena Alivatou. I am also grateful to Richard Allen for helping with various practical matters concerning this thesis and his continuous support.

My family in Britain have been incredibly supportive during my stay in London. Most importantly, my research would not be possible and owes everything to the love and support of my parents, Kalwinder and Jagdish Bains, who have always encouraged me in my academic pursuits. Any achievements I have, I share with them.

CHAPTER 1: INTRODUCTION

1.1. The Neolithic context: Interweaving complexities and the Pre-Pottery Neolithic identity

Although the term "Neolithic Revolution" has become somewhat dated and even at times eschewed by Near Eastern researchers, one cannot dismiss the significant changes that occurred during this transitional phase within and beyond the Near East. The Neolithic Revolution may not have been a revolution in terms of the time it took for these gradual and subtle changes and transitions to occur from the Pre-Pottery or Aceramic Neolithic (9600-7000 B.C.) and throughout the Pottery or Ceramic Neolithic (7000-6000 B.C.), but the power and intensity the phrase conveys captures the significance of this period (Twiss 2007:33).[1] During the Neolithic period, taking into account some regional variability, sedentism and year round village life became much more common than previously seen, population numbers increased, domestication of plants and animals continued and grew, raw material engagement and exploitation increased, strides were made in stone and bone technologies, the use of ritual and symbolism proliferated, all which led to greater social complexity between Neolithic peoples, their environments, and materials (Özdoğan 2002; 1999; Esin 1999; Asouti 2006; Twiss 2007; Kuijt and Goring-Morris 2002; Kuijt 1996; Banning 1998; Verhoeven 2002a; 2002b; 2007; Bar-Yosef & Belfer-Cohen 1989; Bar-Yosef & Meadow 1995; Hole 2000; Sagona & Zimansky 2009; Hauptmann 1999; Düring 2011).

Moreover, some scholars, whilst acknowledging degrees of regional variability, have argued that the Pre-Pottery Neolithic (PPN) can be linked by a group of common cultural characteristics to do with architecture (individual rectangular houses, plastered and painted floors), mortuary practices (skull removal, skull plastering and or painting, domestic burials), lithic technology (similarities in type and distribution), and symbolism and iconography (plaster statues, busts, stone masks, stele, reliefs, painted and or plastered skulls, and figurines, all exhibiting wild animals, headless people, women with emphasis on fertility traits, and phallic symbols) (Kuijt & Goring-Morris 2002; Cauvin 2000a; Verhoeven 2002a; Rollefson 1983; Banning 1998; Bar-Yosef & Belfer-Cohen 1989; Bar-Yosef & Meadow 1995; Goring-Morris 2000; Kuijt 2000; Kuijt 2008; Goring-Morris & Belfer-Cohen 2002; Hodder and Meskell 2011). At the apex of the PPN (specifically, the Pre-Pottery Neolithic B period, according to Levantine chronology), these common cultural characteristics become more frequent and visible in the archaeological record, especially in the Levant and Eastern and Southeastern Turkey (Kuijt & Goring-Morris 2002:420).

There is much debate amongst researchers on how sedentism, the origins of agriculture and domestication, interaction and exchange between and within communities, and symbolism and ritual worked together, or preceded or proceeded one other, resulting in a level of social complexity that had not been seen before this period. This is beyond the scope of this dissertation, and the complex relationship between these factors will therefore not be delved into further; however, it is important to understand what these processes may have entailed and how these may relate to Neolithic technologies.

[1] Chronology based on the Central Anatolian Neolithic provided by Sagona and Zimansky (2009) and Hodder (2006). According to the Levantine chronology, occupation at Çatalhöyük (7400-6000 B.C.) falls under the Pre-Pottery Neolithic B Period, or PPNB (8500-6700 B.C.), PPNC (6600-6250 B.C.), and finally the Pottery Neolithic, or PN (6250-5300 B.C). Chronology is discussed further in Section 1.4.1.

The process of sedentism provided an important setting for the formation and maintenance of relationships and identities within and between individuals, families, and communities. The Neolithic villagers were now faced with inter- and intragroup "cohabitation, competition, and cooperation" on a daily basis and found themselves dealing with constantly evolving social, political, and economic tensions that were present in every aspect of their lives (Asouti 2006:119). The processes involved in sedentism, agriculture, and domestication are invariably linked to the gradual intensification or modification of rituals, including mortuary practices, use of symbolism and iconography, and feasting, in order to cope with such changes and tensions (Cauvin 2000a; Twiss 2008; Verhoeven 2002a; Kuijt & Goring-Morris 2002). Kuijt (2000:159) has argued that mortuary practices, architecture, and ritual were material forms of social control developed by "community leaders" to ease competition and promote cooperation.

The household, both physically and metaphorically, became the centre of Neolithic life in the village, as a context in which all these complex social relationships played out (Hodder and Cessford 2004; Hodder 2003); greater symbolic value was hence embodied to architecture and burials (Watkins 2002:45; 1990). The house promoted material engagement in terms of food production and storage, ritual activities, and the manufacture of stone, bone, shell, and clay materials. Hodder (2004:46) suggests that increasing material entanglement not only preceded sedentism, but also may have been a stimulus for it.

Material entanglement, engagement, and exploitation cannot be discussed without referring to interaction and exchange. We can trace the movement of obsidian as early as the late Pleistocene (14,000-12,000 B.C.) from central Anatolia to the northern Levant (Sagona & Zimansky 2009:73). By the PPNB, significant amounts of obsidian, shells, and various types of stones were being exchanged (Kuijt & Goring-Morris 2002:427) most likely along the Fertile Crescent and along the Levantine Corridor, some materials ending up as far as 1000km away from their source (Sagona & Zimansky 2009:73). Exchange between Neolithic communities indicates complex communal, intraregional, and interregional interactions and networks. A number of researchers have provided models to account for PPNB interactions such as "interaction spheres" which suggests that the PPNB was a pan-regional culture with regional variation that spread as far as central Anatolia and Cyprus (Bar-Yosef & Belfer-Cohen 1989; Bar-Yosef & Meadow 1995). Watkins (2008:165) believes the PPNB was part of a complex "supra-regional socio-cultural network" with Neolithic people exhibiting "multi-layered identities", while Asouti (2006:118) emphasizes carefully examining migrations by looking at new types of production and culture within localities rather than regions.

Irrespective of specific debates and research perspectives, there is little doubt that in the Neolithic period, important social transformations, including new materials and technologies, affected and reflected these changes. Neolithic stone bead technologies exemplify in material form these intertwined complex concepts – from the procurement of raw materials, to manufacturing choices and techniques, to eventual use and discard. As social complexity increases from the early to late Neolithic so does the symbolic expression (as seen by the diversification of raw materials, colours, manufacturing techniques, and typologies) and prevalence of stone beads. Beads are not simply a product of these complex concepts; they may very well be the instigators.

Researchers have dedicated much energy to studying and discussing plastered or painted skulls and stone masks, figurines and statues, iconography on reliefs or wall paintings, and other such overt materials, all of which leave little doubt of their symbolic use in Neolithic rituals and practices or their role in negotiating and promoting social cohesion and coexistence, social controls and shared identities and memories (for example see Cauvin 2000a; 2000b; Kuijt 2000; 2002; 2008; Goring-Morris 2000; Verhoeven 2002a; 2007; Rollefson 1983; Hodder & Meskell 2011; Gifford-Gonzalez 2007; Meskell 2008; Last 1998). What is missing from this list is *personal ornamentation*. Stone beads, which comprise approximately 75% of the of the bead assemblage at Çatalhöyük, were used by Neolithic people for this same purpose and served to be a powerful outlet to communicate, maintain, propagate, and negotiate both individual and social inter and intra-group identities. Beads were not simply a craft; they were an integral part of the larger Neolithic symbolic system.

1.2. Introduction to project, research questions, and research significance

Technology is a fundamental aspect of daily life for Neolithic people, whether it is obtaining raw materials, manipulating them into finished products, using them, or exchanging them. Technology is a tangible form of constructing, maintaining, and propagating social ideologies. Given that the creation, use, transformation, and value of technology within a society are all social phenomena (Dobres 2000), the complex relationships formed between bead makers, bead wearers and users, and tools and materials, can provide important insight into Neolithic social perceptions of domestic life, material entanglement, agriculture, interaction and exchange, and symbolic and ritual practices, as mentioned in the previous section.

This project aims to provide a comprehensive study of stone beads from the Neolithic site of Çatalhöyük, Turkey, and to help determine the social significance of stone beads to individuals, the community, and their role within the broader Neolithic cultural context. To do this, each of the various stages of a stone bead's life, from raw material procurement and manufacture, to use and deposition, is carefully studied with special emphasis on technology and manufacturing choices. In the past, beads from the Near East frequently tended to be studied for their typological, aesthetic, or stylistic qualities, and although important, the greater social implications of bead manufacture and use were often neglected. Only recently have scholars broadened the limited scopes by which Neolithic beads were previously studied and are now dealing with larger social issues such as identity, technology, craft specialization, trade, and adornment (Garfinkel 1987; Coşkunsu 2008; Wright *et al.* 2008; Wright 2010; Wright & Garrard 2003; Bar-Yosef Mayer & Porat 2008).

In the same spirit of inquiry, this project hopes to tackle two primary questions:

1. What is the social significance of stone bead production and use at Çatalhöyük and what can stone beads tell us about Neolithic identities, ritual and symbolism, memory, interaction and exchange, raw material engagement and exploitation, daily domestic life, and technology?

2. Can changes in stone bead technologies be traced during the span of Neolithic occupation at Çatalhöyük? If so, how does their social significance and role change over time?
These questions, will be approached by closely addressing a number of equally important secondary questions:

3. Which raw materials were utilized for stone bead production, and why? Can we see clear preferences for raw materials or colours? Where were raw materials used for stone bead production coming from? Can we locate the closest possible sources?

4. How were stone beads manufactured? Can manufacturing sequences be recognized for the various types of stone beads? What technical choices were made during the manufacturing process? Can we explain these choices and preferences?

5. Where were stone beads manufactured? Can production contexts for bead manufacture be identified? How was production organized? Were some households more engaged in stone bead production than others? Is there evidence for craft specialization?

6. In what types of contexts are stone beads deposited/found and what is the significance of this? What was the role of stone beads in mortuary practices? What can diachronic and synchronic distribution patterns and contextual analyses tell us about stone bead consumption?

To answer these questions, manufacturing processes of stone beads must be examined and contextual analyses, to do with both production and use, need to be conducted. Specifically, to study manufacturing processes involved in stone bead production, we must: 1) identify the raw materials and find potential sources; 2) identify and record manufacturing marks left behind on unfinished and finished beads; 3) examine all potential tools for possible use-wear, especially perforating tools; and 4) conduct basic bead manufacturing experiments to verify the identification of manufacture marks. Potential production contexts, as identified by the presence of more than one element of the bead making process (finished beads, preforms, roughouts, nodules, debitage, or tools associated with bead making) are analysed to help understand the manufacturing process but also provide spatial information on the organization of production that may be compared both synchronically and diachronically. Similarly, use contexts, such as burials and placed deposits, and distributions of deposition, are also integral to interpreting how and why stone beads were used and the social implications of such uses.

This study, to my knowledge, is the first of its kind to study in detail entire life histories of stone beads at a large Neolithic village in the Near East using a number of different methods in order to extract insights into the social and symbolic significance as well as to determine their role within Neolithic society. The various types of analyses conducted in this project, which include: descriptive analyses, manufacture marks analyses, use-wear analysis on perforating tools, basic bead making experiments, and the identification and detailed examination of both production and use contexts, are all performed on a dataset which has been collected meticulously using methodological techniques to find even the smallest of beads and debitage (discussed further in Chapter 2). The dataset also provides both diachronic and synchronic perspectives of bead manufacture and use at Çatalhöyük, so that patterns within settlement phases and those found over the course of Neolithic occupation at Çatalhöyük can be identified and discussed, all within a social framework.

1.3. Brief summary of past and current bead studies in the Near East and beyond

In terms of importance to human evolution and cognition, the use of beads is a major milestone in our history. Beads have been deemed among the earliest examples of humans demonstrating "symbolic expression" and communicating "abstract ideas" (Kenoyer 1986:18; Bednarik 2006:1; White 1987:3; Gwinnett and Gorelick 1991:187). In addition to symbolic expression and abstract thinking, beads are the products of technological inventiveness, artistic creativity, and self-awareness (Diamanti 2003:8). Beads are not essential to human survival in a practical or functional sense; however, symbolically they are very important to those who manufactured and used them (Kenoyer 1986:18). The presence of beads predates other important milestones such as sedentism, the origins of agriculture, and the development of pottery. Beads have been around since at least the Upper Palaeolithic (Gwinnett and Gorelick 1991; Kuhn *et al.* 2001; White 1992); however, it is not until the Neolithic period, particularly the PPNB, that these stone "art" forms become more widespread and can be found at most sites throughout the Near East (Wright and Garrard 2003:267).

The study of beads and personal ornaments in modern academia began with Horace C. Beck (1873-1941) who was not only the first to study beads from famous sites such as Ninevah, Ur, and Taxila, using a microscope, but he also devised a meticulous bead classification system that is still used today (Bead Study Trust website 2008; Beck 1928). Other early research similarly categorized beads into typologies and merely gave descriptions. The use of beads was simply thought as a means of decoration and adornment with a predominantly artistic and aesthetic function (Orchard 1975:15).

More current research on the other hand has focused on beads and their roles in larger social systems pertaining to production, exchange, and reproduction (Williams 1987:31). Numerous archaeological and ethnographic studies throughout the world have been particularly enlightening and have revealed multiple uses for beads such as the promotion of fertility, use in magic, as items of prestige or currencies, markers for major life events, use as medicines or cures, escape from the evil eye, or status markers (for example, Graeber 1996; Brier 1981; Wright 2010, in press; Deo 2000:1-2; Bar-Yosef Mayer and Porat 2008:8548).

A number of significant contributions have been made in stone bead studies from the Near East. Most excavation reports contain important information about the stone beads found at their sites and excavators try to study beads to some degree. Garfinkel (1987) provided evidence of on-site bead manufacture at the PPNB site of Yiftahel, in Israel. Bar-Yosef Mayer has worked on a few sites in the Near East and has had a multi-disciplinary approach to stone beads including manufacture and provenance studies, and also examining the significance of colour of stone beads (Bar-Yosef Mayer & Porat 2008; Bar-Yosef Mayer *et al.* 2004). Gwinnett and Gorelick (1981; 1989; 1991; 1999) are pioneers in bead technological studies and have focused their attention on ancient lapidary techniques and manufacture marks studies of stone beads.

Wright and Garrard have also carried out extensive research on the social and technological significance of bead making in Neolithic Jordan (2003), by placing beads found in production contexts from four sites in the Aqraq region into social context, by looking at identity, specialization, and exchange. They were not only able to identify production contexts and manufacturing marks but also complete bead making assemblages, and hence able to determine operational sequences in production from quarrying to final polishing (Wright *et al*. 2008). Wright (2010) has also conducted a comprehensive study of stone beads from Building 3 at Çatalhöyük. Her analysis of Building 3, from the late Neolithic, in the BACH Area revealed that bead production at Çatalhöyük most likely occurred at a household level from local raw materials and was likely a prestige technology that was vital in defining social identity (2010, in press). This study was, however, only based on a single building of a large Neolithic village, and therefore not necessarily representative of what else was happening on-site.

There has been very important and significant experimental bead research at the Neolithic site of Kumartepe situated in Southeastern Turkey. A number of micro-borers used in carnelian bead production were found and subsequently closely examined for wear traces and then experimentally replicated (Grace 1989:145). A number of beads have also been found in Domuztepe, a 6th millennium B.C. site also situated in Southeastern Turkey. This site is known for its participation in long distance trade and beads made from turquoise, serpentine, obsidian, carnelian, bone, shell, limestone, and quartz have been excavated (Campbell and Carter 2006). The site of Boncuklu (named after the word "bead" in Turkish), also situated in the Konya Plain, 9 km from Çatalhöyük, has also recently been studied as a Ph.D. project, but is, as of yet, still unpublished (Twigger 2009). At this site many incised stones, pendants and beads were found (Baird 2007:17). In addition to Çatalhöyük, I am also studying bead technologies at Aşıklı Höyük, where a number of beads made from carnelian, chrysoprase, steatite, and limestone have been found, especially in burials. A more detailed discussion of stone beads from various Neolithic sites in Turkey is discussed in Chapter 6.

Beyond the Near East, some of the earliest research into bead technologies and production has been conducted at the sites of Harappa, Mohenjo-daro, and Mehrgarh in the Indus Valley. Kenoyer and his colleagues (2003a; 2003b; 1997; 1994; 1992; & Vidale 1992; & Bhan and Vidale 1991) studied crafts such as agate and steatite bead making, ceramics, and shell working at Harappa and Mohenjo-daro, in order to learn about trade, craft specialization, urban segregation, and stratification at the individual sites and from a regional perspective. He and his colleagues used technological studies (traces of manufacture, micro-debitage, tools) and data from ethnographic studies (modern day bead making and use in south Asia) to form a sequence of production of stone beads. By looking at the processes of manufacture he was able to make a number of observations regarding political, social, and economic institutions. His studies in the Indus were the first comprehensive studies in bead production and the methodologies employed in them are discussed further in Chapter 2.2.

Also in the Indus, Barthelmy de Saizieu and A. Bouquillon (1994; & Duval 1994) and M. Vidale (1995; & Vanzetti 1994; 1989) have done similar work on steatite bead technology and manufacture at Mehrgarh. They were able to construct a manufacturing sequence and to determine the change in composition of the raw material over the course of Mehrgarh's occupation using manufacture trace studies and careful examination of bead assemblages and related tools.

These studies are important not only for their contribution to bead research but also for creating new methodologies by which bead technologies can be studied (see Chapter 2.2). The contributions and progress that bead technological research has made to the study of beads, especially in comparison to the days of typologies, is truly invaluable to archaeology in general, and researchers such as myself in particular.

1.4. Çatalhöyük: brief background on the settlement and previous bead research

The aim of this section is to very briefly introduce the site of Çatalhöyük and to outline previous bead research carried out at the site. A more detailed description of the areas and levels and data used within this project is found in Section 2.1. Aspects of Neolithic life at Çatalhöyük, as determined by current research, will be discussed much more extensively in conjunction with bead analyses in Chapter 2 (methodology) and Chapters 4 and 5 (discussions).

1.4.1. Chronology

It is important that regional chronology and terminology are addressed before going any further. Neolithic settlement on the East Mound at Çatalhöyük (7400-6000 B.C.) begins approximately halfway through the PPNB (8500-6700 B.C.), continues into the PPNC (6600-6250 B.C.), but ends early on in the Pottery Neolithic (6250-5300 B.C.) using Levantine chronology. Alternative Central Anatolian chronological terminology divides the occupation at Çatalhöyük into the Pre-Pottery or Aceramic Neolithic (early settlement phases of Çatalhöyük from 7400-7000 B.C.) and the Pottery or Ceramic Neolithic (majority of the settlement, 7000-6000 B.C.). It is important to emphasize the regional variation between the Levant area and Central Anatolia. The PPNC in Anatolia continues to see much expansion and transformation (Sagona & Zimansky 2009:121), akin to the PPNB in the Levant. During the PPNC in the Levant, however, we find evidence of decreased settlement sizes, population dispersal, and changes in art, ritual practices, and architecture (Twiss 2007). So in Central Anatolia, Çatalhöyük is thriving during the Ceramic Neolithic (PPNB and PPNC), whereas some important changes are occurring in the Levant. It appears that chronologically the PPNB, PPNC, and part of PN equate with the Ceramic Neolithic in Central Anatolia, but the Ceramic Neolithic is culturally analogous to the PPNB in the Levant. It must also be said that this assessment of chronology between the Levant and Central Anatolia is highly generalized, and therefore should be taken with caution.

1.4.2. Settlement

Figure 1.4.1. Location of Çatalhöyük in the Central Anatolian region of Turkey (*Source*: Carter 2007:2, Figure 1, map modified)

The site of Çatalhöyük consists of two mounds, the Neolithic East mound (7400-6000 B.C.), which is the mound relevant to us in this study, and the Chalcolithic West mound (6000-early 6th millennium B.C.) (Hodder 2006:20) (Figure 1.4.1). The site is set within the Konya Plain in central Turkey, and no other contemporary sites of similar size have been found in the region (Hodder 2006:74). J. Mellaart first excavated the site in the 1960s, and the current excavation, conducted under I. Hodder, began in 1993 (Farid 2007:45). The East mound is 13.5 ha, 21m high, and comprised of 18 levels of occupation (Hodder 2007:106). Population estimates for Çatalhöyük suggest an impressive population of 3500 to 8000 (Hodder and Cessford 2004:21; Hodder 2007:106). A number of areas on the mound have been excavated, however, the South area excavations and North Area excavations have been dug the most extensively and provide a diachronic and synchronic view of occupation, respectively (Chapter 2.1).

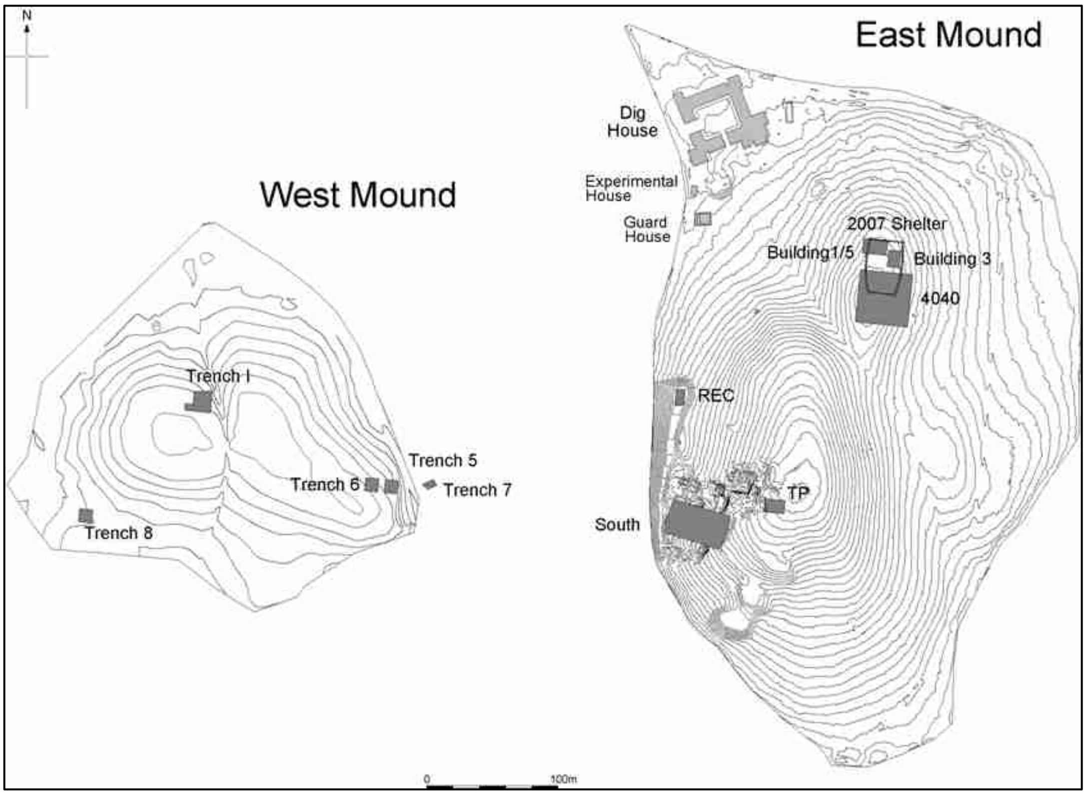


Figure 1.4.2. The Chalcolithic West mound and Neolithic East mound at Çatalhöyük. Drawing by Çatalhöyük Research Project

1.4.3. Buildings and daily life

Thus far only domestic buildings have been found at Çatalhöyük. The mudbrick houses were closely huddled together, sometimes even sharing a wall, and access to buildings was by rooftops (Figure 3.2.24). Some house clusters had adjacent open spaces, which were used as middens for all household rubbish and perhaps for activities such as lime burning. We see a great deal of continuity as houses were more or less similar in size and plan, and even rebuilt over one another repeatedly (Hodder and Cessford 2004:20) (Figure 5.2.3). In the phases of the late Neolithic, we do find some houses being categorized as "elaborate houses" due to an increased size and additional features. It is likely that between 5 and 10 people lived in each building (Hodder 2006:7).

Buildings were comprised of a main living space with adjacent rooms for storage and food preparation (Hodder 2006:7) (Figure 1.4.3). The main living space contained ovens and hearths at one end, and plastered platforms along other walls, and was sometimes decorated using wall paintings, installations, and reliefs (Hodder 2006:8) (Figure 1.4.4). Within buildings, the spaces appear to be divided; there is a clear distinction between activity areas, sometimes referred to as the "dirty" areas near the hearths, and clean plastered platforms (Hodder 2006:119).

Figure 1.4.3. Plan of Building 56 in settlement phase South.S (late Neolithic)

Buildings encompass all aspects of life at Çatalhöyük; they are living, production, and ritual spaces (Hodder 2006:110). They contain evidence for a number of functions and activities such as obsidian and flint or chert knapping, food production, storage, and art and ritual (Hodder 2007:36). Burials were located in homes, under the plastered platforms, although occasionally we find neonates or very small infants buried near hearths and ovens (Hodder 2006:123). The symbolically rich and ritually entrenched items of “art” at Çatalhöyük, such as wall paintings, figurines, wall installations, and reliefs, primarily identify 3 themes according to Hodder & Meskell (2011): the phallus, wild and dangerous animals, and human and animal skulls (Figure 1.4.4). They argue that these symbolic themes are all linked to the domestication of animals.

Figure 1.4.4. Decorative hand motif (top) and auroch horn installation within platform (bottom) from buildings in the North area

1.4.4. Previous Bead Research at Çatalhöyük

Beads at Çatalhöyük were first studied by Hamilton (until 2005) and from 2005 onwards, Wright has been coordinator of Team Ground Stone and Beads. Hamilton studied the bead materials from the 1995-1999 excavations in the South Area, which only spanned early Neolithic occupation at Çatalhöyük. She created a typology (based on Mellaart's bead typology) and made some preliminary observations on materials, manufacture, and use of beads (Hamilton 2005a). Jackson (2005:375; also Hamilton 2005a:326) visually identified a number of raw materials used in stone bead production and commented that the two types of materials most prevalently used in stone bead production were limestone and schist.

With regard to manufacture, Hamilton believed that bead manufacture took place within buildings and cited Buildings 17 and 18 in the South Area as evidence for this. She hypothesized two methods of manufacture: 1) for many of the beads the manufacturing process consisted of beads being sliced off, using obsidian blades, from prepared stone cylinders (2005a:328). These discs were then pierced biconically (from two sides) using obsidian points (Hamilton 2005a:328); and 2) some beads were first made by first roughly shaping "thin slabs of stone", they were then perforated, and then reduced to size by polishing (2005a:329). There is no distinction of material or any thorough investigation of manufacture marks. Bead production during Mellaart's levels X and IX and pre-level XII (Hodder phases South.K, South.J and South.G) indicate household production, and she believes that there is no real evidence for specialization.[2] Concerning bead use at Çatalhöyük, Hamilton (2005b:331) stresses their role as ornaments as they are also worn in burials (although grave goods are generally rare in levels X and IX, South.K and South.J, respectively). She stresses that beads are found in a variety of contexts and there is no evidence from the burials to suggest their use as status markers (2005b:331). All in all Hamilton made some basic and preliminary observations regarding manufacture and use of beads at Çatalhöyük.

Beginning in 2005, Wright created a meticulous stone bead database and a whole new typology and system of analysis and recording. As mentioned earlier (Section 1.3) she increased the scope by which the stone beads had been previously studied and emphasized their role in constructing identity and conducted a preliminary study on bead technology and specialization from stone beads from Building 3 in the BACH area (Wright 2010; 2005; 2006). Like Hamilton, Wright also believes that beads in Building 3 were being produced at a household level from local raw materials (2010). Hamilton and Wright's research on stone beads at Çatalhöyük laid the foundation for this project.

1.5. Theoretical frameworks

In order to extract the "bigger picture" from data, that is, to make observations at social, economic, or political levels, one must construct research questions and a methodology, which work under broader theoretical frameworks that provide a systematic foundation for interpretation. This study makes use of 4 areas of archaeological theory I coarsely classify as: 1) technology; 2) production, organization, and specialization; 3) identity; and 4) ritual. These four areas are not exclusive and in fact many of these frameworks overlap and complement each another.

1.5.1. Social technology: technical choices, operational sequences, techniques, habitus, and experimental studies

As previously mentioned in Sections 1.1 and 1.2, the manufacture and use of stone beads potentially pervades all aspects of Neolithic life. By looking at the various components of technology and the manufacturing process, evidence for social choices, ideologies, and beliefs can be found and interpreted within the Neolithic context. The creation, use, transformation, and value of technology within a society are all social occurrences (Dobres 2000); therefore, the act of participating in technical acts can be treated as a "medium for defining, negotiating, and expressing personhood" (Dobres 1999:129). This is done "while undertaking productive activities, [by which] individuals create and localize personal and group identities, making statements about themselves that are 'read' by others with whom they are interacting" (Dobres 1999:129). Technology was a fundamental part of society and technological knowledge became embedded with value and importance and could also be passed down to future generations (Dobres 1999:126-127).

[2] Mellaart levels and Hodder phases are discussed in more detail in Chapter 2.1 as are the various areas on the mound.

One approach to better understanding technology is by reconstructing the manufacturing process by carefully examining all the different components of an assemblage (Tite 2001:443; Miller 2007:21-23). In this case, by examining different stages in bead production (finished beads, nodules, roughouts, preforms), debitage, tools and any other possibly related artefacts. Closely examining manufacture marks on stone beads and locating both primary and secondary production contexts can help reconstruct manufacturing or operational sequences. Manufacturing sequences not only refer to the range of processes by which raw materials can be manipulated into their final product, but also the related hand and body gestures of the artisan manipulating the material (Miller 2007:30). At each stage of production, the bead maker makes a number of different decisions, from which raw material to use, to how he or she will manufacture the product (Skibo and Schiffer 2001:141), and manufacturing sequences reflect these choices. The decisions made in regard to the techniques utilized are referred to as technical choices (Lemonnier 1993). How can we explain the different choices? How do we know what choices were available and why the choices which were chosen, chosen?

According to Tite (2001:446) there are a number of factors to consider in determining technological choice (adapted for bead production): 1) the availability and properties of the raw materials, tools, and techniques used in procurement and production; 2) social and cultural influences of the bead maker and the society in which he or she lives can shape the final product, and the beads created with this particular outlook can also say something about social constructs such as identity; 3) trade and exchange influence the materials used or not used or level of bead production; and 4) the reason for which beads are made (uses) can sway technical choices, be it for ideological or practical purposes. All the above factors must be taken in to account when determining why beads were made the way they were. Factors can therefore be functional and practical and/or cultural and social (Sillar and Tite 2000:17).

At the most fundamental level of operational sequences are techniques. Techniques are defined as a "physical rendering of mental schemas learned through tradition and concerned with how things work, are to be made, and to be used" (Lemonnier 1993:3). Essentially techniques are actions that result in the production or use of an object; they become socially embedded by social relations and practices (Dietler & Herbich 1998:235). Techniques, like other forms of social actions, are formed through *habitus* (Dietler & Herbich 1998:246).

Practice theory is a theory designed to account for how and why practices are generated (Bourdieu 1977:72). The social anthropologist, Pierre Bourdieu, redeveloped the notion of *habitus*, which provides an explanation of how routines and daily practices become embedded within us, and can account for social behaviours, patterns, identities, and relationships. *Habitus* is the basic principle behind practice; it is defined by Bourdieu as:

> "systems of durable, transposable dispositions, structured structures predisposed to function as structuring structures, that is, as principles which generate and organize practices and representations that can be objectively adapted to their outcomes without presupposing a conscious aiming at ends or an express mastery of the operations necessary in order to attain them" (1990:53).

In other words, habitual actions or dispositions performed by the body are such a vital part of our social make-up that they develop and exist without any conscious effort on the part of the agent. *Habitus* is constantly producing history by producing practices, and it produces this history "according to schemas generated by history" (1990:54).

So how can we account for active agency and decision-making via technical choices and *habitus*? Technical choices co-exist with *habitus*. Dietler & Herbich (1998:247) state that:

> "while all social action is purposeful, the larger patterns that we perceive are the often unintended consequences of many choices made by social actors following different strategies but linked by certain common structurally conditioned tendencies toward action".

In addition, it must be remembered that *habitus* is a "dynamic relational phenomenon" when faced with technical or social problems, *habitus* allows for structured reasoning to find solutions, however, the solutions also influence the development of *habitus*, because it is also an agent (Dietler & Herbich 1998:247).

Stone beads are made the way they are in part due to technical choices and in part due to *habitus*. The end product reflects both the bead maker and the bead-user's social perceptions and beliefs. Manufactured objects are the product and manifestation of their makers (Gell 1998:20). In some instances, it is even possible to see individual artisans, by studying skill level, apprentices, and primary refuse (Wright *et al.* 2008). The bead maker's technical knowledge, ability, and perception, and access to materials are all direct factors that influence technical choices (Sillar and Tite 2000:7). The bead maker's sensory experience is not the same as that of the observer (Keller 2001:34) or the researcher constructing operational sequences based on manufacture traces or production contexts. The only real way to even attempt to better understand production from the producer's point of view is by participating in experimental studies.

Experimental archaeology is a useful tool in better understanding and appreciating abilities, choices, problems, and experiences during production (Coles 1979:1-2). Objects, behaviours, processes, and systems can all be replicated using controlled imitative experiments (Mathieu 2002:1-2). In this study, the goal is to replicate aspects of the bead making process, specifically marks made on unfinished beads during manufacture. By doing this, manufacture marks assessed on the original beads can also be compared and tested. This work is also essential to test validity of parts of the proposed manufacturing sequences (Miller 2007:35). Mathieu (2002:7) differentiates between experimental archaeology (process replication) and experimentation (methodological experiments used to test hypotheses pertaining to methodology). Aspects of both types are used in this study (Chapter 2.3). Although there are different degrees of control and testing, both methods are very useful in providing comparative results and allowing the author to perceive the actions from a bead maker's perspective.

1.5.2. Production and craft specialization

Recreating the manufacturing sequence is only one part of determining the life or history of an object, which consists of procurement, manufacture, use, and discard or deposition (Skibo and Schiffer 2001:141). The study of production is integral to determining the presence of craft specialization, which has been defined by Costin (1986:328) as "the regular, repeated provision of some commodity or service in exchange for some other". Craft specialization entails specialized knowledge and method of organization of craft production (Miller 2007:30). How is bead production organized at Çatalhöyük? Are the majority of people or households making beads or a select number? Is a single bead made by one person or many? These questions can be answered by assessing the organization of production, and in this project, a framework devised by Costin (1991) for the classification of production is used to help assess the level and organization of stone bead production at Çatalhöyük (see Chapter 2.4).

After assessing the presence or absence of specialization, we must determine why it is or is not present at Çatalhöyük. Traditional approaches focus on economic and political gains and the rise of elites and social stratification (for example, Halstead 1989; Stein 1996; Hayden 2007). In contrast to this traditional approach, Spielmann (2002:195), looking at ethnographic data, suggests that economic intensification is also the result of ritual participation and performance by individuals and community members. She argues that the production of ritual objects or the gathering of food for feasts are examples of ritual performance, and the demand for these, results in specialization (2002:195).

The close examination of production can also reveal differences between skill levels of bead makers or even see the work of individual bead makers. Similarly, the study of production and specifically perforation errors can help determine the presence of apprentices.

1.5.3. The construction of identities – materialization, communication, and daily practices

The creation, preservation, and fluidity of social and individual identities are multidimensional affairs, with the body taking centre stage as a means of expressing identities. The body can be used to display and communicate identity by material means such as the use of beads and personal ornaments (Meskell & Joyce 2003:10). The display of ornamentation alone is not responsible for conveying identity; performances and gestures by the body work together in conjunction with display, creating a shared or dissimilar perspective, engaging the wearer and viewer in an active interplay (Stevens 2007:83). These performances and gestures may also be related to the manufacture or use of stone beads. The body is no longer considered simply a visual vehicle by which identities are *signalled* off of, the body has embodied agency, and could be thought of as an "instrument of lived experience" by which identities can be *shaped* (Joyce 2005:143, 140). Identity is therefore a process rather than merely a group of static facts (Knapp 2008:32) and results from interactions between individuals and the societies in which they live; hence social and personal identities are intricately linked. Identity is formed in relation to the identities of others and is therefore also tied to differences (Boram-Hays 2005:38; Knapp 2008:32).

Identity, be it individual or social, is not something that just happens, it is actively created, worked on, and adhered to by the person or group (Giles 2000:8). A sense of social identity is strengthened by a collective *habitus*, that is a "shared body of generative schemes and cultural dispositions which form a collective homogeneous phenomenon uniting particular groups of society" (Jenkins 1992:80). *Habitus* plays a very important role in reinforcing one's cultural and social system by learning and socializing through "embodied, routinized, social practices" (Giles 2000:10). This means that manufacturing, wearing, using, or viewing stone beads are all types of shared visual practice that embody shared beliefs, or *habitus* (Bourdieu 1977). These shared beliefs are essential in the construction of identities.

How else can we make inferences about identity from personal ornaments in the archaeological record? One method is by assessing production and bead usage. Wright and Garrard (2003:277) argue that a great deal of diversity in a bead assemblage suggests a greater emphasis on individuality and the beads serve as "signatures" communicating information about the wearer's status and role. Could the opposite also be true? If there is a tendency for less diversity and more standardization does that suggest a focus on community and social identity? Social identity is defined by similarities within a group and if beads are consumed and produced similarly throughout a site, this suggests that the members of the group may be a part of a collective identity. Contextual data, or where and how beads are deposited can also provide possible clues to their role within Neolithic society. At Çatalhöyük, *in-situ* beads from primary contexts predominantly come from burials and placed deposits. Extracting information on identity from burials can be difficult and may not necessarily mimic adornment in real life (Pader 1982:99), but the fact that they are found in such ritualized contexts says something about the practice of depositing them in these contexts, the bead wearer, and those gifting the beads.

1.5.4. Identifying ritual, symbolism, and ideology

Stone beads are not utilitarian objects; they are created as symbolic objects materializing social and ideological beliefs within societies. Symbols, rituals, and ideological beliefs bind societies and play an important role in communicating, maintaining, and negotiating both individual and social inter and intra-group identities. Stone beads are found in ritualized contexts and manufacturing them requires much skill, time, and energy. It is therefore essential to understand how ritual practices concerning stone beads may be recognized and interpreted.

In the past, ritual was seen as being disparate from day-to-day domestic life, the result of supernatural agency and completely divorced from technical knowledge or skills (Bradley 2005:28-29). More current research describes rituals as being much more complex and part of a wider social context or system, encompassing action of course, but also communication, experience, knowledge, and emotion (Insoll 2004:10-12). Ritual permeates all aspects of daily life, beyond simply religion or the spiritual domain (Bradley 2005:33).

Identifying and analysing rituals has posed difficulties for archaeologists, as we do not have the luxury of observation and direct communication anthropologists may have in their ethnographic studies concerning ritual (Verhoeven 2002b:7). Material culture is not simply one-dimensional or static, practical and functional; it reflects and structures the social and dynamic relationships between people, materials, beliefs, and ideologies, therefore meaning as opposed to mere function can be uncovered (Verhoeven 2002b:6-7).

How can ritual be identified and meaning interpreted from materials found in the archaeological record? Verhoeven (2002a:235) has devised a comprehensive model indicating five concepts for recognizing and analysing ritual: 1) ritual framing; 2) syntax; 3) symbolism; 4) dimensions; and finally, 5) analogy.

1. Ritual framing refers to "the way, or performance, in which people and/or activities and/or objects are set off from others for ritual, non-domestic purposes" (2002a:235). Verhoeven (2002a:235) states that framing can be recognized by assessing general properties of a context such as special location, a different shape, texture and colour, size, orientation, or construction material to others, presence of any special features, different inventory within a context, association of objects is uncommon, number (single or rare), functionality (cannot be functionally interpreted), and knowledge/analogy (researcher's perspective indicating ritual). It is not only "special" objects, contexts, and deposits which may indicate the presence of ritual; everyday materials may have ritual aspects, and association to ritually framed materials can identify these (2002b:27).

2. Syntax is associated with the structural aspects of ritual and include context (spatial, chronological, and cultural), object (what objects and symbols used?), act (what happened), typology (type of ritual), and agent (who was involved?) (2002a:235). A number of anthropologists have devised typologies to differentiate between types of rituals. For example, Bell (1997) identifies rites of passage, such as marriage or death, calendric rites, rites of exchange and communion, rites of affliction, feasting, fasting, and festivals, and political rites.

3. Symbolism refers to identifying not only individual symbols, but whole systems, by contextually comparing symbols to other symbols, and looking for individual meanings, followed by the "megastatement", or bigger message (2002a:30).

4. Rituals are multidimensional and should be viewed according to various anthropological approaches; however, according to Verhoeven, only functionalism, symbolism, structuralism, Marxism, practice theory, and the ritual as performance approach can be studied in prehistory (2002a:31).

5. Analogy refers to making comparisons of ritual behaviour in the archaeological record with anthropological and ethnographic studies, in order to understand the past (2002b:235).

This model is comprised of important concepts for recognizing possible ritual activities and beliefs, and stresses the importance of context and well as approaching the data in a number of ways. More so than even identifying ritual deposits, contexts, and objects, is interpreting their meaning. Are beads ritualized objects? What is their role in Neolithic ritual? In this project, these questions and other questions regarding the significance of stone bead use are addressed.

The above archaeological, anthropological, and sociological theoretical frameworks to do with technology, production, identity, and ritual are essential to the understanding of stone bead manufacture and use at Çatalhöyük. Each theory complements the next and one cannot study beads without closely examining these interrelated theories. Each is important on its own and some concepts such as *habitus* are integral to understanding how these theories can work together to provide a basic foundation for bead studies.

This chapter provides a brief introduction to this project and to all the various components of bead studies. Beads have long been undervalued as a means to obtain valuable social insights outside the Indus. This project hopes to present a detailed case study of stone bead manufacture, use, and discard or deposition, and demonstrate the value of studying these ubiquitous yet informative objects.

1.6. Thesis structure

This thesis is divided into six main chapters. After this initial introduction to the project (Chapter 1), the following chapter outlines the materials and methodologies used in this project (Chapter 2). Chapter 3 presents the results from the various analyses conducted in this project including the study of beads based on their descriptive qualities and the contexts in which they are found (Chapter 3.1), identification of production contexts (Chapter 3.2), manufacture marks analyses (Chapter 3.3) as well as use-wear of perforating tools (Appendix D), and finally use contexts (burials and placed deposits) analyses (Chapter 3.4.). The results chapter is proceeded by two discussion chapters, the first primarily discusses the social significance of stone bead technologies at Çatalhöyük (Chapter 4) and the second discusses observations made regarding bead use at Çatalhöyük (Chapter 5). The final chapter, Chapter 6, places stone beads at Çatalhöyük within a broader Anatolian Neolithic context and some final concluding remarks are also made.

In the next chapter, the methodology used to answer the research questions posed above, within the theoretically set guidelines, and using this sampled data, will be discussed.

CHAPTER 2: MATERIALS AND METHODS

In this chapter, the materials studied and methodology devised to investigate the technology and social significance of Neolithic stone beads at Çatalhöyük is outlined. First, the materials examined and studied, sampling strategies, and limitations are introduced, followed by a brief history of past and present methods of bead technological research, which are also incorporated in this project. Some of the bead studies presented in this section were already introduced in the last chapter (Section 1.3); however, this section focuses on the methods employed by scholars conducting bead research. Third, an outline of how bead technological studies can help reconstruct the manufacturing process is presented. Finally, the role of contextual studies in helping identify and analyse production and use contexts is addressed.

2.1. Materials and sampling

Area Sampling

The East Mound consists of four main areas: South, North, Istanbul, and TP (Figure 1.4.2). The South area contains 41 buildings that have been excavated or named to date, although very few have actually been excavated from construction to abandonment by the current team (Figure 2.1.1). Many were partially excavated by Mellaart or heavily truncated, others have only been excavated to building infill levels. There is, therefore a great deal of variation in the amount of excavation that has occurred within buildings, and this pertains to both the South and North areas.

The term North area today refers to what was previously known as the BACH area (excavation of Building 3 by Berkeley Team), North area (excavation of Buildings 1 and 5), and Area 4040 (29 buildings in various phases of excavation). In this dissertation only Area 4040 from the North area was studied, and will hence be known as the North area. The Istanbul area, which consists of Building 63, was excavated by Istanbul University. Lastly, the TP area, excavated by Poznan University, consists of 10 buildings (most not fully-excavated) of Roman, Byzantine, Chalcolithic, and Neolithic occupations.

The data used in this project come from the two most extensively excavated areas on the East Mound, the South area and North area, which provide a diachronic and synchronic perspective, respectively. Both these areas were excavated by the Çatalhöyük Project in association with Stanford University and University College London. These two areas were selected for sampling due to their extensive excavations as well as their affiliation with University College London.

Figure 2.1.1. South area shelter, photograph taken facing northwest

In the South area, excavations have uncovered 14 settlement phases so far, spanning from South.G (earliest) to South.T (latest), although this sequence does not include phases South.N and South.O; these phases had not yet been excavated to occupation levels (as of final data collection in August 2010). The South area excavations therefore span from the Aceramic Neolithic to Ceramic Neolithic period. In the North area, only 3 settlement phases have been excavated over a broad area and cover settlement phases North.G (earliest) to North.I (latest). The lettered phases from both areas are not linked by letter and therefore South.G and North.G bear no relation, but these settlement phases have been preliminarily linked based on pottery analyses (Table 2.1.1). In terms of sampling, the South area and North area excavations provide an excellent view of stone bead manufacture and use over the course of the Neolithic and during contemporary phases.

Mellaart levels	South area phases	North area phases
0	TP 6 levels	
I		
II		
	South.T	North.I
	South.S	
	South.R	
	South.Q	North.H and North.I
	South.P	North.H
VI A	South.O (unexcavated)	North.G
VI B	South.N (unexcavated)	
VII	South.?M	
VIII	South.L	
IX	South.K	
X	South.J	
XI	South.I (no buildings)	
XII	South.H (no buildings)	
Pre XII	South.G (no buildings)	

Figure 2.1.1. Table linking older Mellaart levels with the new Hodder phases in the South and North areas

Building and space sampling

Excavated areas can be divided into buildings and spaces. Spaces are found both within and outside of buildings. Different areas within building are given separate space numbers and outdoor spaces such as external middens and yards are also given space numbers. In this dissertation, unless otherwise stated, spaces refer only to outdoor areas, specifically middens and yards, and indoor spaces are simply referred to by their building numbers.

The buildings chosen in the South and North areas for sampling were chosen based on, firstly, the presence of preforms or roughouts in occupation levels, since they make up such a small percentage of the assemblage but provide us with the most information. All buildings, external middens, and external yards that contained preforms and roughouts were therefore sampled in this project. The presence of roughouts and preforms are also more likely to lead us to potential production contexts that may also contain other components of bead production. Secondly, buildings and spaces were chosen if excavators and the Çatalhöyük Project considered them important "priority" buildings and spaces for data analyses, excavation reports, and all publications. The "priority" buildings and spaces were excavated to occupation levels in comparison to other buildings and spaces; therefore, all the buildings excavated to occupation levels are sampled in this study and all stone bead data associated with occupation levels have been accounted for. A total of 17 buildings and 19 spaces were sampled in the South area, and the North area is comprised of 16 buildings and 3 spaces (Table 2.1.2).

Settlement phase	Buildings	Spaces
South.G		181
South.J	23 and 18	
South.K	17, 16, and 22	
South.L	6 and 43	
South.?M	50	168, 169, and 105
South.P	75	333, 329, 132, and 140
South.Q	68, 65, and 53	299/305, 314, 260, and 261
South.R	42, 69, and 56	259 and 339
South.S	44	129, 130, and 319
South.T	10	119 and 131
North.G	58, 59, 52, 64, 51, 49, 48, 67, 57, 55, and 66	90
North.H	60, 47, 45, 54, and 46	
North.I		279 and 226

Figure 2.1.2. Buildings and spaces sampled within each settlement phase

Furthermore, within buildings, certain contexts were sampled and beads found in these contexts were analysed while others were not. Beads from building infill (infill used to fill abandoned houses) and construction (beads found within domestic construction such as plaster, mortar, bricks, benches, and ovens, for example) were not analysed, as the beads found from these contexts cannot be associated with certainty with the occupation levels of the building. The remaining contexts, floors, burials (skeletons and fill), clusters, caches, or placed deposits, middens, and pit, post and bin fills were all sampled. With regard to spaces, all types of deposits within external middens and external yards were sampled. Floors were particularly focused on in order to identify production contexts. If a preform or roughout was found on a floor, special attention was paid to those units and stone heavy residues were closely examined for evidence of bead making debitage (this will be discussed further in Section 2.4).

Sampling of stone beads and related materials

The rich stone bead assemblage at Çatalhöyük is a direct result of meticulous excavation techniques, which include heavy residue analysis and fine sieving. It includes, finished beads, preforms (unfinished beads which have been perforated but have yet to be finished), roughouts (nodules reduced and roughly shaped by chipping and/or abrasion prior to perforation), nodules (large pieces of raw material), bead making debitage (by-products of the manufacturing process), broken fragments of beads in various stages of manufacture, chipped stone tools, and ground stone tools. The bead artefacts that have provided us with the most information regarding the manufacture of beads are those artefacts that are between the stages of raw material and finished bead – roughouts and preforms (Figure 2.1.2). Roughouts are stone nodules, pieces of angular shatter, or flakes that have been worked and shaped roughly, but have yet to be perforated. Bead preforms may be closer in shape to the finished beads and are perforated, but have yet to be fully shaped and polished.

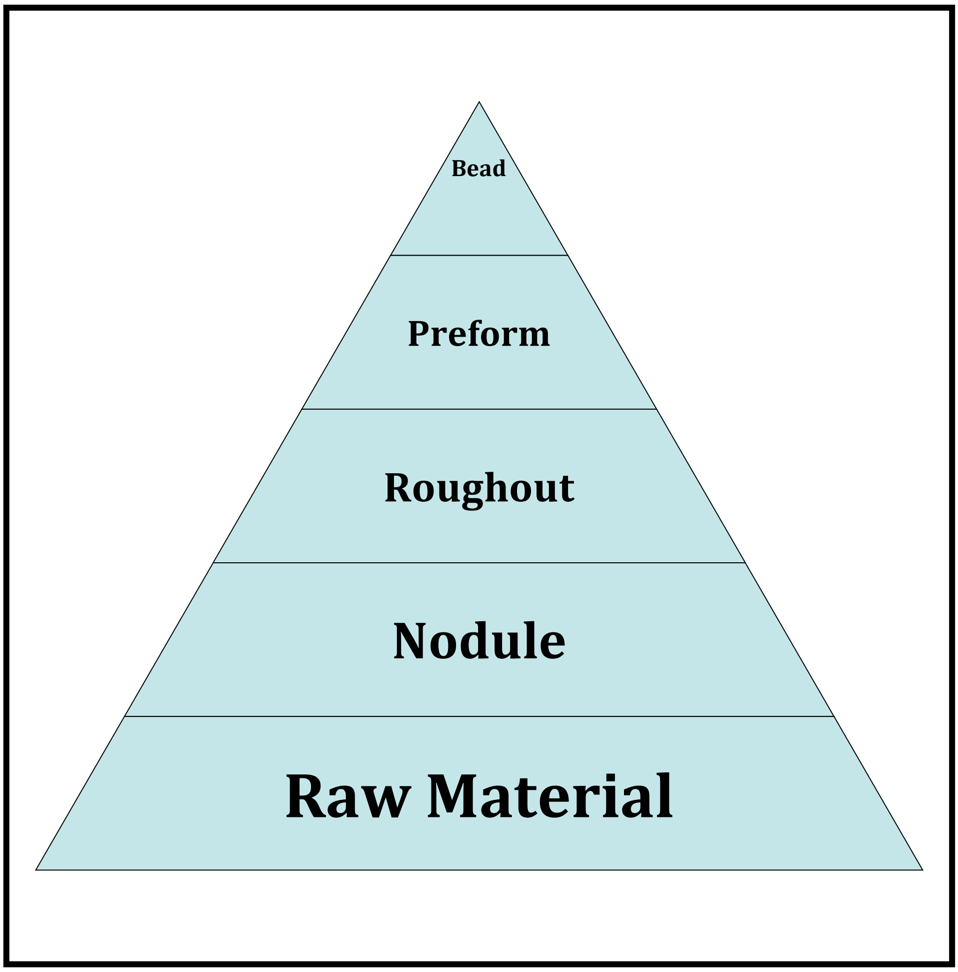


Figure 2.1.2. Typical reduction sequence of raw material into a finished stone bead

Contexts, which contain traces of bead manufacture from all or some of its stages are particularly important as they are essential in determining possible production locations and the contents of production contexts can also help produce bead making sequences (Sections 2.3 and 2.4). In the broader sense, contextual studies can reveal the transition and changes in bead technology during the span of Çatalhöyük's occupation and what these changes mean or suggest with regard to a broader social context.

A total of 5520 finished beads, preforms, roughouts, and fragments have been found and put in the Çatalhöyük stone beads database, begun by Wright in 2006. This number includes beads from all contexts, and from both the East Mound and the Chalcolithic West Mound. Of these 5520 beads and fragments, 1655 are derived from the sampled contexts (floors, burials (skeletons and fill), clusters, caches, or placed deposits, middens, and pit, post and bin fills) within the buildings and spaces sampled in this project (Table 2.1.2) and all analyses are conducted with these 1655 beads and fragments. Therefore all 1655 beads and fragments were examined and classified and recorded in the database according to its raw material, colour, typology, stage of manufacture, whether or not it is broken or complete, size, and context (see Table A2.3.1[3] for an example of a database entry).

From this sample, a total of 299 stone beads (almost all preforms and roughouts and a number of finished beads) from a total of 14 buildings and 7 spaces from the South and North areas, were analysed microscopically for manufacture marks (see Table 3.3.1 for more detail). As previously mentioned, roughouts and preforms were particularly targeted for manufacture marks analyses. Moreover, the sampling of buildings and spaces was guided by the presence of roughouts and preforms, which form only a sample percentage of the stone bead assemblage. Many buildings and spaces did not have either. Manufacture variables recorded in the database include hand or mechanical drilling, perforation type, perforation size, perforation marks, length marks, end marks, edges, freshness, use-wear, and additional technological comments (Section 2.3).

Unless otherwise stated, the 1655 stone beads and fragments are referred to as the stone bead assemblage in this dissertation. These 1655 beads and fragments are found in occupation levels that can be associated with a building or a settlement phase and therefore provide the most accurate reflection of the beads being manufactured and used within each settlement phase. Table A2.1.3reveals that of the 1655 beads and fragments, there are 23 roughouts, 73 preforms, 1525 finished beads, 6 unknown beads (stage of manufacture unknown as the existence of beads is known but could not be analysed), and 28 indeterminate bead fragments (beads too damaged or fragmented for their stage of manufacture to be determined with certainty). In the "unknown" category there must be a number of beads unaccounted for, most of which are housed in the Konya Museum and therefore could not be studied. For example, in Building 6, over a hundred beads are found in an infant burial now encased in the Konya Museum, but the exact number is unknown; therefore, it was not included in the sample (data limitations are discussed below).

Quantification: N vs. QN

Because beads are found complete and broken into fragments, it is difficult to quantify results more accurately given the state in which they are found. In order to quantify results with more accuracy, each stone bead, preform, roughout, or fragment was given a quantitative number (QN), which multiplies the

[3] The "A" before a Table reference refers to Appendix A

number (N) of beads associated with a GID (an object's unique general identification number each bead provided by the Çatalhöyük project) with how complete a bead is (whole, ½ fragment, or fragment). Occasionally, if a number of beads from the same unit/context are identical, they may be listed under one GID. Approximately a quarter of a fragment or less is quantified as 0.25, a half a bead as 0.5, and a whole bead as 1. This method is essential in making sure small fragments are not given the same weight as whole beads, and that beads which are simply found broken are not counted twice or as a number of beads. The assemblage of 1655 stone beads and fragments is equivalent to a QN of 1400.5 stone beads (Table A2.1.3). Most analyses presented in Chapter 3 are conducted with QN rather than N for more accurate results, although as you can see in Tables A2.1.3 and A2.1.4, the differences between these figures can be minimal or significant depending on the context in question.

Basic diachronic and synchronic distributions of stone beads

Within each settlement phase, a different number of buildings and spaces were sampled, based on what had actually been excavated within that phase, the location of unfinished beads, and priority contexts set by the Çatalhöyük Project. Some phases contain more buildings while others contain more external spaces (Table A2.1.4). Table A2.1.4 reveals that two contexts appear to have the most number of beads, Building 43 in South.L and Building 49 in North.G. Both these buildings contain a single rich burial that accounts for the high proportion of beads within these phases. If these burials are removed, we find that the numbers dramatically decrease and settlement phases South.P and North.I now have the highest bead percentages due to rich external midden deposits (Table A2.1.4). The presence of beads and bead materials within buildings not only depend on the presence of burials with stone beads, but also whether the building floors were cleaned prior to abandonment, as was generally the custom, and whether all the occupation levels within a building were excavated.

Data limitations

At Çatalhöyük, many of the houses had their own life cycle. They were first constructed, occupied, and then cleaned, abandoned and infilled. When these buildings are excavated today, it is important to keep this in mind. Occupational deposits within buildings and all deposits within external middens and yards are the focus of this study. Whether or not a building was cleaned before abandonment bears significance to what is left behind to study, and that is why external middens, although secondary deposits, are so useful to study at Çatalhöyük. Much of the material culture from buildings, apart from burials and construction, ends up in external middens.

As excavations are still ongoing, it is important to take into account that some buildings and spaces have only been partially excavated or affected by Mellaart's initial excavations, therefore we may not be seeing the complete picture within these buildings and spaces and subsequently, within their corresponding phases. In fact, only 10 buildings have been fully excavated from construction to closure by excavators in the current project (Shahina Farid, personal communication). Additionally, the beads studied in this dissertation were excavated, sampled, and analysed up until August 2010; however any changes concerning units or contexts for example, were updated up until September 2011.

Stone beads housed in the Konya Museum were also not studied in this project, although the Konya museum finds catalogues were thoroughly searched in order to make sure significant bead types, for example, were not omitted from the sampled contexts. The vast majority of beads in the catalogue were disc or ring beads and some pendants were also present. The raw material, colour, and size however, could not be assessed. The stone beads in these catalogues fortunately corresponded to those found on-site at Çatalhöyük, which may only minimally affect bead quantities in certain contexts (like the burial mentioned above in Building 6).

This study is also limited to beads made out of stone. Stone beads are found in conjunction with shell, clay, and bone beads on-site. It is very doubtful that the Neolithic inhabitants of Çatalhöyük divided beads according to medium within their social and daily lives. Artefacts at Çatalhöyük are found together but separated, to be studied individually, according to medium by specialists. This is particularly important in primary contexts such as burials. Beads made of shell, bone, or clay are discussed in the context of burials (Chapter 5). It is hoped that in the future, the methods used in this study will be expanded and tested on beads made from other media for a broader picture.

2.2. A brief history of methods of bead study

During the first half of the twentieth century, the focus of bead research lay in describing and categorizing beads, creating detailed and thorough typologies and stylistic sequences. This cultural anthropological approach to bead studies was indicative of its time and was pervasive throughout archaeological research. One important scholar, Horace C. Beck (1928), was instrumental in classifying and creating a working typology and definitions for terms used in bead and pendant studies. The primary goal of such a classification system was to fully describe a bead by stating its "form, perforation, colour, material, and decoration" (Beck 1928:1). Like Beck, this project also records descriptive data pertaining to colour, material, size, typology, and perforation, among many other important variables.

With the onset of processual archaeology in the 1960s, there was a major shift towards applying the scientific method to archaeological research, and concepts such as specialization, prestige goods, trade, experimental studies, and process and technology were also applied to bead research (for example Allchin 1979; Foreman 1978; Stocks 1989; Possehl 1981; Vanzetti and Vidale 1994). Bead research became more technology-oriented, although many of the studies were confined to only one or two aspects of bead technology such as use-wear analyses on drills or experimental work.

In regard to the study of bead technology, a number of researchers were vital in introducing and developing methods to study bead perforations and other manufacture marks. Gorelick and Gwinnett were two of the earliest researchers to use silicone-based dental impression material to produce moulds or casts with marks in positive relief and replicas to first view human dental remains, and later stone beads and cylinder seals under a scanning electron microscope (1981; 1989; 1991; 1999). This method is still used today and has been extremely useful in helping identify manufacturing marks and studying stone beads, in detail, accurate to the nanometre.

The use of scanning electron microscopy (SEM) has become an integral part of bead technology research. Sax and Meeks also devised this methodology as well as an experimental programme in order to determine how cylinder seals were engraved (1995; Sax, McNabb, and Meeks 1998). Sax and Meeks first studied the different marks in positive relief (moulds made by dental impression material) under a binocular microscope in conjunction with SEM (1995:27); they were able to identify four different techniques used to engrave Mesopotamian cylinder seals (1995:28), and later confirmed their results with experimental research (Sax, McNabb, and Meeks 1998:19). Their experimental work was integral to stating the importance of experimental studies to the study of manufacture marks. Other researchers such as D'Errico and Villa (1997:1) made use of SEM in order to determine whether or not the holes and grooves found in bone artefacts from the Pleistocene were made by humans and if so, what could be said about beads in terms of symbolic value and human cognition. Bar-Yosef Mayer *et al.* also used SEM imaging to study the manufacture of Chalcolithic steatite beads and its implications on trade, technology, and symbolism in the Levant (2004). Calley and Grace (1988) studied drill bits used for carnelian bead production from Kumartepe, Turkey, and found clear evidence of use-wear at magnifications of 200x. They also conducted experimental studies to supplement their archaeological observations.

Other researchers employing similar methodologies have also played an essential role in the study of bead technology and have made important strides in understanding its social implications and significance, at both individual and societal levels. The technology of beads is therefore seen within a social context, hence combining practical methods with theoretical frameworks. Kenoyer has conducted a number of studies on Harappan bead technology, production organization, trade, and specialization in the Indus Valley, encompassing a number of methods such as ethnographic research, experimental work, and manufacture marks studies (1986; and Vidale, and Bhan 1991; 1994; 1992a; 1992b; and Vidale 1992; 1997; 2003a; 2003b). When the results of all these different methods are viewed in unison, a more complete picture of bead technology and its social, economic, and political significance can be obtained. Similarly in the Indus, Barthelmy de Saizieu and Bouquillon (1994) and Vidale (1995) have done work on bead technology and manufacture at Mehrgarh employing similar methodologies to construct operational sequences.

In the Near East, two studies employed different but equally fruitful methods in the study of bead production. Wright and Garrard (2003) and Wright *et al.* (2008) demonstrated specialized production at four PPNC seasonal sites in the Wadi Jilat (in eastern Jordan) by closely examining debris, preforms, and particularly the ground stone and drills associated with the manufacture of beads made from Dabba Marble. Similarly Fabiano *et al.* (2004) also studied seasonal bead workshops, in south Jordan, where they found thousands of flint borers and beads in various stages of manufacture made from amazonite. Experimental work and careful analyses of the various components of bead production revealed complex subsistence strategies and potential interaction and exchange within the region (Fabiano *et al.*:272). Apart from the work done in the Indus, these are among the more comprehensive and notable bead studies focusing on Neolithic technology and specialization during this early period in the Near East (examples of other studies relating to stone bead research in the Near East are discussed in Chapter 1.3).

Beads can vary in size, although the vast majority are quite small. The bead research done in Jordan and Pakistan stress the importance of using archaeological methods such as fine-sieving and collecting heavy residue after flotation in order to collect even the smallest of beads, fragments, and even bead making debitage. These artefacts must then be meticulously studied, preferably microscopically. The innovative method of creating moulds from artefacts and studying them using a scanning electron microscope has been integral to the study of manufacture marks on beads and use-wear on bead making tools, and is also an essential aspect to this project. Finally, experimental studies are also incorporated into this project to compare and verify manufacture marks and use-wear analyses. The methods employed in this study are by no means novel and owe much to the bead researchers listed above, but like studies conducted in the Indus Valley, this study hopes to incorporate many different methods of bead research in order to generate a more comprehensive look at stone beads at Neolithic Çatalhöyük.

2.3. The manufacturing process: How can we determine prehistoric methods of bead manufacture?

In this section, the focus must be drawn to how we, as researchers today, can determine the methods of bead production used by the bead makers at Çatalhöyük during the Neolithic period. A number of choices were made by bead makers regarding techniques, size, style, and the particular raw materials used for production. How can these technical choices and methods of manufacture be revealed so that a life history of a bead can be reconstructed? Moreover, can a chronological study of bead technology at Çatalhöyük be produced? If so, how? In order to answer these questions, all the various elements of bead making in the archaeological record at Çatalhöyük must be closely examined.

Three main methods were used to reconstruct the bead manufacturing process: 1) the identification of raw materials used in bead production; 2) the examination of bead technology, which includes manufacture marks studies, careful analysis of use-wear on tools used in bead production, and experimental studies to verify both manufacture marks and use-wear; and 3) the identification and analysis of production contexts.

2.3.1. Raw material identification

Determining which rocks or minerals were used in stone bead manufacture is important for three main reasons:

1) The identification of raw materials can inform us on whether bead manufacturers and users had any preferences, i.e. determine what was available versus what was used, therefore possibly determining technical choices involved in the production process. Specifically, patterns and preferences can be ascertained by looking at the properties of the stones and minerals, such as hardness, toughness, workability, appearance and colour.

2) By identifying raw materials used in bead production we can also identify the same materials from stone heavy residue samples and match any bead making debitage to the bead preforms and finished beads. Once the debitage is identified, potential production contexts may also be revealed.

3) Once stones and minerals are identified, the closest potential significant sources can be located based on knowledge of local geology and with the aid of geological maps. Provenance studies for the source locations for raw materials used at Çatalhöyük are currently underway by geologist Chris Doherty from the School of Archaeology at the University of Oxford, but unfortunately are only in their initial stages, and due to the nature of the surrounding geology, there may be a number of sources for any one material. This project aims to only identify the *closest potential* sources.

Two main methods are used to identify the stone material: 1) microscopic identification with the help of a stone beads geological reference collection; and 2) scanning electron microscope (SEM) analyses for elemental composition using an energy dispersive spectrometer (EDS).

All stone beads, in various stages of bead manufacture, from the sampled contexts, were identified microscopically on-site using an optical microscope. Because of the author's limited geological background, the site geologist, C. Doherty, instructed on the geology of Çatalhöyük and its surrounding areas and moreover, he also provided invaluable training in stone and mineral identification. A stone bead geological reference collection was also created in order to help with identification.

A small sample of bead fragments were exported to the Wolfson Archaeological Science Laboratories at the Institute of Archaeology, UCL, London, to be identified by analysing their elemental composition by SEM/EDS, in order to verify identifications made on-site and also to identify those samples which could not be identified on-site. The exported bead fragments must be returned to the Turkish authorities intact and undamaged, so a special sample preparation method devised by James Lankton, UCL, was used. For SEM/EDS analyses, samples had to be embedded in a round epoxy-resin block. The blocks are first made, then drilled in the centre with an electrical drill, just enough so that the bead, bead preform, or heavy residue sample can be embedded using Paraloid B-72. The bead sample can be removed from the paraloid at any time using acetone. Once embedded and dried, the sample blocks are then finely polished. Samples are then coated with carbon in order to create an electrically conductive surface. These samples were then observed and analysed under SEM (Model S-3400N Hitachi, with both a secondary electron detector (SE) and a backscattered electron detector (BSE) and an Oxford Instruments EDS system for semi-quantitative compositional analysis using an accelerating voltage of 20 kV. The chemical data were then normalized and oxygen was added by stoichiometry.

Each of the samples were viewed and images were captured under set magnifications, using the SE detector and BSE detector, with the purpose of acquiring topographical information regarding texture, surface features, and crystallography. The BSE detector reveals disparities between minerals or phases with different atomic numbers. Those with a higher average atomic number appear brighter in comparison to the other minerals or phases also present in the image, helping to differentiate the minerals for better analysis. These data, combined with data from the EDS concerning elemental composition, were used to identify the stones and minerals.

The vast majority of beads could fortunately be identified on-site. However, some beads could not be identified or studied due to their exceptionally small size, or a lack of diagnostic properties, inability to export for chemical analyses, or their off-site location at the Konya museum, and as a result were simply labelled as being "indeterminate" if the sample could not be identified, or "unknown" if the sample itself was not available to be identified.

2.3.2. Bead technologies: manufacture marks, experimental studies, and use-wear

Once the materials used to produce beads were identified, the transformation of these raw materials, from rock to bead, could be determined. Three different methods were devised in order to study bead technology at Çatalhöyük: 1) microscopic study of manufacture marks on beads and preforms using SEM; 2) study of tools likely used in bead production, particularly perforating tools; and 3) conducting some basic bead making experiments in order to compare how experimental manufacture marks and use-wear compare to the archaeological artefacts and to understand manufacturing process from the bead maker's perspective. Each method used on its own can reveal an aspect of bead technology, but used in unison, can provide a more comprehensive picture of the manufacturing process and a means to compare and support the results obtained from all three methods.

The first method involves the microscopic study of manufacturing marks left on stone beads, particularly bead preforms (perforated unfinished bead) and roughouts (unperforated unfinished beads), to better understand the different techniques utilized by bead makers. This is done by viewing beads and preforms under SEM, which reveals topographical information regarding surface features, manufacture marks left behind by tools, and perforations. The manufacturing marks may indicate what types of tools were used in the production of the beads, specifically in regard to chipped stone and ground stone technologies. These tools can then also be examined macro- and microscopically for use-wear. For example, use-wear on chipped stone tools such as chert drills and microdrills, or sawing or pecking marks found on abrading slabs.

Lastly, experiments in bead manufacture can provide important insights to the manufacturing process from the perspective of the bead maker, and also test the validity of the analyses of manufacture marks. The goal is not to replicate the beads in their entirety, but to compare manufacturing marks made during perforation and abrasion, created on similar materials and tools found in the archaeological record. These experimental marks are compared using optical microscopy.

Manufacture marks studies

All the bead material remains from the different stages of bead production, from raw material (stone nodules or pebbles) to the finished bead, can be studied macro- and microscopically for traces of manufacture. Traces of manufacture are the result of cultural processes implemented by human action as opposed to natural processes, which occur due to environmental factors. In other words, traces of manufacture are any man-made marks left behind during the production process, and in this case, on finished and unfinished beads. The close examination of these manufacture marks can help determine how beads were made. Some traces of manufacture can be identified macroscopically, especially on larger sized objects. But most beads are generally quite small in size, and made from a number of different raw materials, which all exhibit varying degrees of manufacture marks, which depend on the geological properties of the raw materials from which they are made. In order to view even the most minute manufacturing marks, microscopic analysis is required; hence, a sample of beads, bead preforms, and roughouts all underwent SEM analyses for topographical information regarding manufacture marks. The SEM is a powerful tool that allows us to view stone beads under very high magnifications, exhibiting great detail.

Moulds and replicas

Apart from the small number of bead fragments exported from Turkey for study (less than 0.5% of the total sampled bead assemblage), the vast majority of stone beads, roughouts, and preforms analysed from the sampled contexts at Çatalhöyük are replicas. These replicas must be accurate enough to display the most minute trace details with minimum interference and problems (for example air bubbles or smudging).

It is essential to safely study the moulds used to create the replicas, particularly to examine the perforations, which appear in positive relief (Figure 2.3.1). The material used to make the moulds must also not harm or affect the beads.

One such mould material fulfils all these requirements and is commonly used to study dental remains in the field of archaeology as well as in the dental profession (see Section 2.2 for archaeological examples of its use). Coltène produces a light-bodied, low viscosity silicone dental impression material (accurate to the nanometre) called President Jet. An equal amount of catalyst and base are dispensed out of a cartridge gun. This mixture is then poured over one side of the bead and is left to set for a few minutes. Once set, the mould can be removed from the bead and stored. The mould itself can be viewed under SEM, provided it has an electrically conductive surface, such as a gold coating. In order to make replicas, a mixture of epoxy resin is created by mixing Eposet resin and hardener. The resin is poured into the moulds and left to dry overnight. The replicas can then be gently removed from the moulds. The dental impression material can coat a maximum of three quarters of a bead, therefore for each bead, two moulds must be made, one taken from each side. The replicas are also coated with gold so they can be viewed under a SEM.

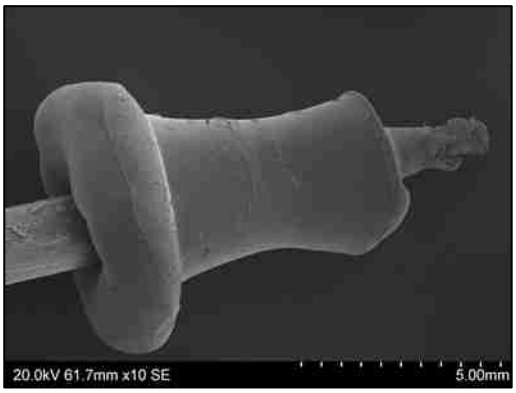


Figure 2.3.1. SEM image of a mould made of a perforation's interior, using silicone dental impression material

Although the replicas are made because the beads and fragments cannot be exported for study, this situation has been beneficial as the replicas provide even better images for study than the beads themselves (Figure 2.3.2). This is because the replicas can be completely coated in gold in order to have an electrically conductive surface, which provides superior imaging under SEM. The originals, on the other hand, cannot be coated and better image quality can be attained if viewed using the environmental scanning electron detector in VP-SEM (vacuum) mode. There is, however, one disadvantage to viewing replicas – air bubbles. The epoxy resin used to fill the moulds is very susceptible to air bubbles when being mixed. It must be mixed very gently and must be poured into the mould before it becomes too hard. For larger beads, it is possible to make sure no bubbles have been formed on the mould by the resin; however, for smaller beads this can prove to be quite difficult. The bubbles, however, are easily identified and do not interfere with interpretation.

All images shown from SEM analyses are shown using the SE detector, and are replicas, unless otherwise indicated.

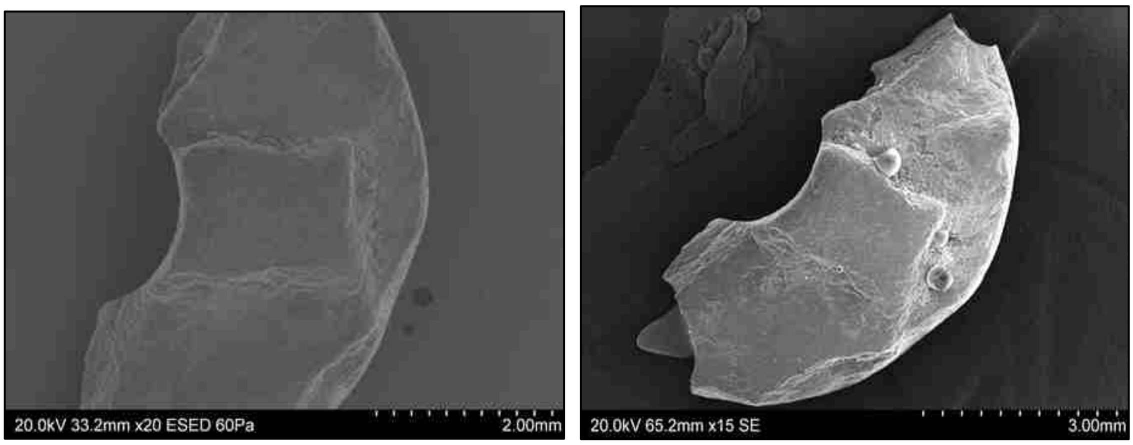


Figure 2.3.2. A) SEM image of original artefact B) SEM image of gold-coated artefact replica (note bubbles and more distinct topography)

Experimental bead making and manufacture marks analyses

A number of researchers have defined and studied manufacture marks very carefully, both at macroscopic and microscopic levels using both experimental and analytical means. These marks do not only pertain to stone bead manufacture but have also been studied in the context of cylinder seals, stone vessels, building stones, quartz tools, and other objects such as jewellery and plaques. These studies are integral to our understanding of how certain marks are created, and what these marks can tell us about the manufacturing process.

One pioneering scholar, S.A. Semenov, has performed detailed experimental studies on traces of manufacture, which still serve as a guide to those studying manufacturing marks (1973). He has outlined a comprehensive methodology for identifying different types of manufacture marks on stone, bone, and shell. A number of other researchers have also contributed to this field of study and their work has been an enormous contribution (see Section 2.2). In order to understand these marks, the properties of the raw materials on which the marks were made also need to be understood. These marks can inform on the tools that may have been used, how these tools were held, and even at what angle they were held. Many studies on micro-wear have been conducted within archaeological research, the vast majority however, pertain to use-wear as opposed to marks made during the manufacturing process.

Although the studies used as guidelines to the interpretation of manufacture marks are incredibly valuable, it is also important to compare the manufacture marks found on beads from Çatalhöyük with experiments in bead manufacture, in order to determine the validity of these analyses. The experimental work is essentially an exercise in replication of some of the manufacturing techniques used in stone bead production. The replication of the entire bead making process is beyond the scope of this project, but will be an aim for future bead research. The basis of the experimental work is to supplement and characterize as many different possibilities of manufacture traces as possible on a set number of raw materials, which are chosen due to their predominance in the bead assemblages at Çatalhöyük.

Two bow drills were constructed and replicas of perforating tools and abrading tools were used (Figure 2.3.3). The tool replicas are made from raw materials with similar compositions and geological properties as those found at Çatalhöyük. Drills and microdrills are particularly difficult to replicate; therefore a professional knapper, John Lord, was commissioned to knap flint and bone perforating tools for this project. Lord was asked to replicate a number of perforating tools, such as flint drills, flint microdrills, and bone awls present at Çatalhöyük and also used at other Neolithic sites in Anatolia and the Near East (Figure 2.3.4). Abrading materials used for bead making experiments include fine sandstone slab (in the form of a paving stone) and schist. Other materials used include a makeshift capstone, as well as fine sand, used as an abrasive in certain experiments.

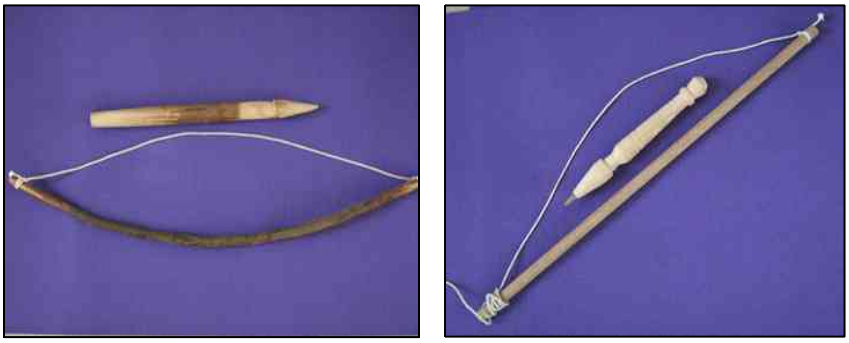


Figure 2.3.3. Bow drills constructed for experimental work

Bead manufacturing experiments were conducted on schist (Mohs 4-5), limestone (Mohs 2-3), marble (Mohs 5) and tufa (Mohs 4), all commonly used raw materials at Çatalhöyük, with some variations. A detailed description of Çatalhöyük raw materials can be found in Chapter 3.1.1. Phyllite (3-4), which is typically less hard than schist, is also more commonly used at Çatalhöyük. Similarly, the limestones used at Çatalhöyük are also harder and less chalky then those used in these experiments.

Figure 2.3.4. Examples of experimental perforating tools made by Lord (clockwise from left to right): flint drill, flint microdrill, bone awl, and flint drill

The experiments can be divided into two types: those replicating and comparing abrading marks and those related to perforation. Limestone, schist, and tufa were all abraded against sandstone and schist. Experiments regarding perforation making consisted of examining the outline, as well as the marks within the perforation, caused by one-handed drilling, two-handed drilling, or mechanical drilling (using a bow drill). Each perforation was timed and a number of practical observations were made regarding the manufacture of stone beads. The various experiments conducted are summarized below in Table 2.3.2 as are the findings, presented in conjunction with the findings from other manufacture marks studies related to beads and other stone artefacts. Experimental work regarding use-wear is presented later in this chapter under the heading of “Tools and use-wear”. Due to time constraints, manufacture marks and use-wear made experimentally could not be examined using SEM. These were examined using an optical microscope and also photographed using a macro lens.

Perforation experiments			
Material Perforated	**Perforating tool used**	**Method of perforation**	**Additional notes**
	bone awl	mechanical	no abrasive used
	flint microdrill	mechanical	no abrasive used
	flint drill	one-hand	no abrasive used
limestone (Mohs 2-3)	flint microdrill	two-hand	no abrasive used
	flint microdrill	mechanical	with abrasive
marble (Mohs 5)	flint microdrill	mechanical	without abrasive
	flint drill	one-hand	with abrasive
	flint drill	one-hand	without abrasive
	flint microdrill	two-hand	without abrasive
	flint microdrill	two-hand	with abrasive
	flint microdrill	mechanical	without abrasive
	flint microdrill	mechanical	with abrasive
	bone awl	one-hand	without abrasive
schist (Mohs 4-5)	bone awl	mechanical	without abrasive
	flint microdrill	one-hand	without abrasive
	flint microdrill	two-hand	without abrasive
	flint microdrill	mechanical	without abrasive
	flint microdrill	mechanical	with abrasive
tufa (Mohs 4)	flint drill	one-hand	without abrasive
Abrasion experiments			
Material abraded	**Abrading tool used**	**Additional notes**	
	schist	without abrasive	
limestone	sandstone	without abrasive	
	schist	with and without abrasive	
tufa	sandstone	with and without abrasive	
	schist	without abrasive	
schist	sandstone	with and without abrasive	

Table 2.3.2. Outline of experiments replicating the drilling and abrading processes (note: some experiments were repeated while others were not, at times the same perforating tool was used multiple times in order to distinguish between light and heavy use and use-wear of perforating tools was subsequently analysed)

Types of manufacture marks and their identification

There are many different types of manufacture marks that can be identified: 1) chipping; 2) abrading; 3) sawing; 4) pecking; 5) polishing; and 6) drilling. This is not an exhaustive list of all the different types of manufacturing marks which can be found on stone; these marks, however, are representative of the common types of techniques used in stone bead production, as determined by ethnographic, experimental, and bead technology studies.

The different types of manufacture marks listed below will only be present if the properties of the raw material allow it to. In other words, some raw materials because of their formation process, hardness, and grain formation may not always reveal manufacturing marks.

Chipping

Chipping is a reduction technique similar to knapping, by which a bead is given its shape (Gwinnett and Gorelick 1991:190; Kenoyer 1986:19) and a method by which a stone nodule or chunk of stone can be reduced into smaller pieces. Harder minerals, such as quartz and carnelian or rocks such as flint and obsidian are generally shaped using this method due to their concoidal fracture. Chipping in bead production is typically done to reduce the stone nodule or piece of raw material into the shape of a roughout, before it is ground, perforated and polished (Bril *et al.* 2005:55). The most common reduction technique used is "indirect percussion by rebound" where a hammer is used to strike a pointed tool detaching a flake from the point of contact between the tool and the stone (Bril *et al.* 2005:55). Flakes can also be detached by simply striking the nodule with a hard or soft hammer. The resulting flakes could be a by-product of the reduction sequence, or more likely, also used to make beads.

Abrading/grinding

Linear parallel striations are indicative of a surface that has been abraded (Figure 2.3.5). Abrasion in bead production is used to reduce, shape, smooth, and polish (Miller 2007:59). 'Faceting' is the term used when an abraded surface is created while shaping a bead (Gwinnett and Gorelick 1991:190). Each bead can be individually abraded or many can be abraded en masse (Wright *et al*. 2008:148,150). Common tools used for abrasion are ground stone tools such as hand-held abraders or abrading slabs (Wright *et al*. 2008:148). Ground stone tools made from fine-grained sandstone are one of the most widely used for abrasion (Kenoyer 1986:20; Semenov 1973:69; Wright *et al*. 2008:148). The most likely candidates for the reduction of stone beads at Çatalhöyük are fine andesite, fine-grained sandstone, and schist (Karen Wright, personal communication). To produce an even finer finish, additional abrasives such as sand with water or oil may have also been used in addition to the abrading slabs and abraders (Foreman 1978:21; Semenov 1973:69; Wright *et al.* 2008:148).

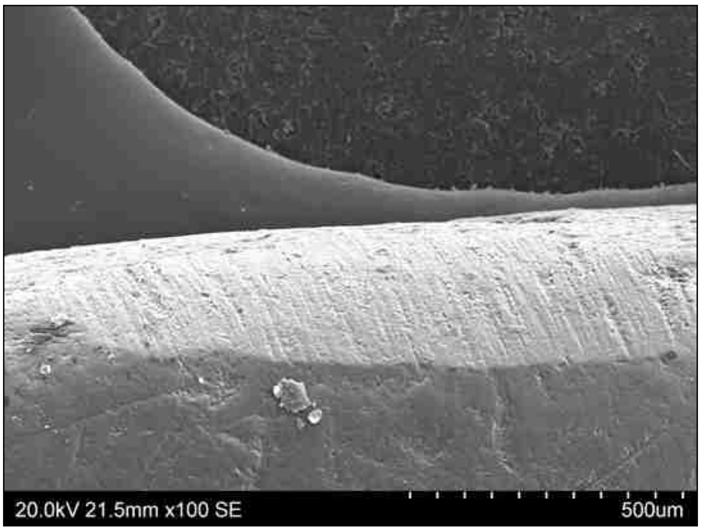


Figure 2.3.5. SEM image of an abrasion mark, also known as a "facet"

The parallel lines found on mostly unfinished beads are indicative of the raw material used to abrade them. The finer the grains of the raw material, the finer and closer together the parallel striations of the abrading marks (Figure 2.3.6). Similarly, if an abrasive is used, then prominent well-spaced linear marks are most likely the result of a more coarse-grained abrasive whereas fine closely-set marks are most likely due to a finer-grained abrasive. Experimental marks made against sandstone and schist both made fine linear parallel striations (Figure 2.3.7).

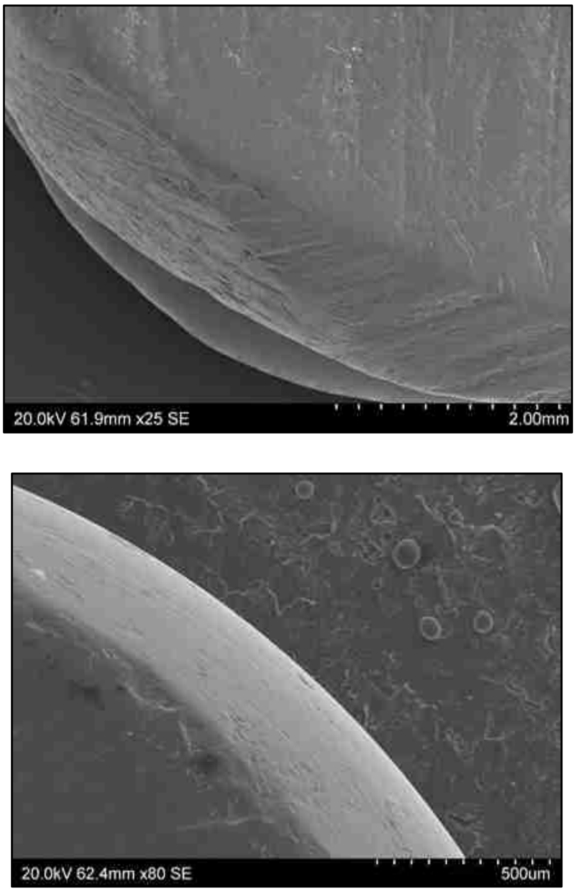


Figure 2.3.6. SEM images of abrading marks: prominent well-spaced parallel linear striations suggesting the use of a coarser abrading material (top), finer striations suggesting the use of a finer abrading material (bottom)

Figure 2.3.7. Example of fine linear striations made on tufa (experimental material) when abraded against fine-grained schist

Sawing

The act of dividing an item into separate parts using a back and forth movement along a straight line is called sawing (Sax *et al.* 2004:1419; Semenov 1973:19). Like abrasion and chipping, sawing also leaves behind traces on the tool used to saw and the object which was sawn in the form of straight striations (Kenoyer 1997:267; Semenov 1973:19), or "parallel longitudinal grooves" as described by Sax *et al.* (2004:1419). There is a difference in marks made using a hand held tool (more pronounced marks) and a string (grooves are smoother or more faint) (Sax *et al.* 2004:1419). The parallel lines made by sawing are not as regular, evenly spaced, or straight as abrading marks (Figure 2.3.8).

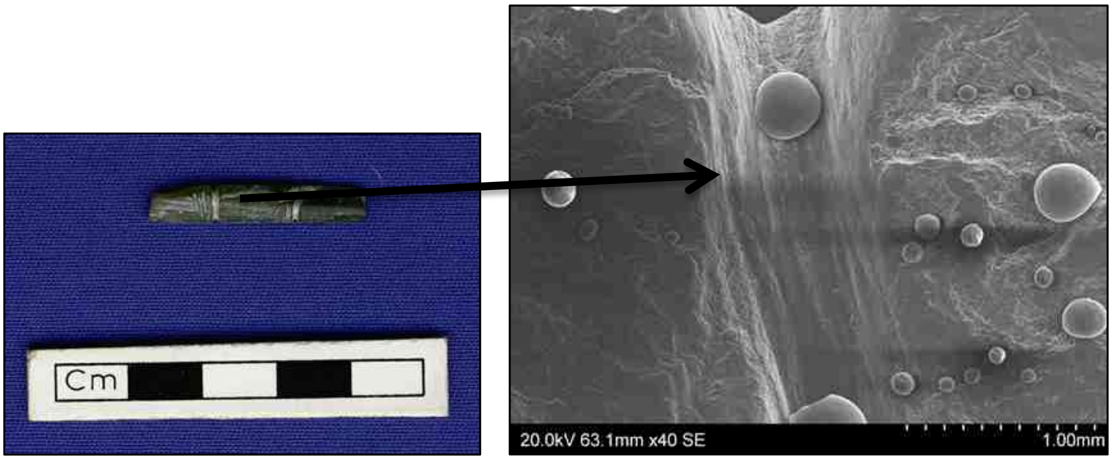


Figure 2.3.8. Steatite spacer bead preform (left, photo by K. Wright) and SEM image of saw marks (right)

Pecking

There are two manufacturing techniques associated with pecking. The first technique is used to guide the bead maker in the drilling process. When a tool is used to come into direct impact with a specific spot on a bead's surface, usually the site chosen for perforation, the resulting mark is called a peck (Miller 2007:58). Pecking or initial hand drilling is also useful at making a well on the surface of the bead in which the tip of the drill can sit prior to perforation (Figure 2.3.9). During experimental work, this method proved valuable and helped initiate the drilling process with much more ease and less slippage. When the term pecking is used in this dissertation, this is the process it is referring to. The second pecking technique refers to pecking out the remaining perforation (when a bead is drilled almost all the way), by either gently or firmly (depending on the raw material) pecking at the already made perforation to remove the remaining bit of perforation, creating a full perforation. Unless very pronounced, or depending on the raw material, it is difficult to differentiate between a natural nick or groove and one done intentionally.

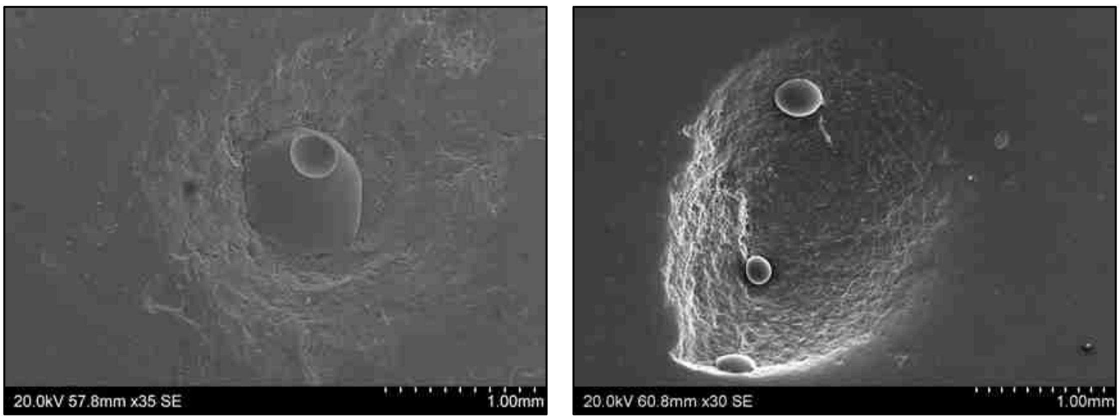


Figure 2.3.9. SEM images showing examples of pecking marks that were made in the centres of two different roughouts (the presence of bubbles in both peck marks are due to the epoxy-resin material used for bead replication)

Polishing

Polishing is generally the last stage of bead production and creates a smooth finish devoid of major marks, but this also depends on the degree of polishing. Beads can be polished individually or in a group.

Beads polished individually or on a string or stick tend to have sharp edges, whereas beads polished in a tumbling process (i.e. beads rolled around in a barrel or leather bag with abrasive) tend to have more rounded edges (Gwinnett and Gorelick 1989:163; Gwinnett and Gorelick 1991:189; Wright *et al.* 2008:150; Kenoyer 1986:20). Polishing is also responsible for removing previously made manufacturing marks, which is why it is more fruitful to study preforms and roughouts rather than finished beads.

Drilling or perforation

The perforation of a bead is essentially its defining characteristic. There are a number of ways a perforation can be made; however, much depends on the type of stone being perforated and the tool used for the perforation. Softer stones (Mohs hardness ≤4) are easier to perforate in comparison to harder stones (Mohs hardness >4). The hardness and toughness (durability) of the stone also determines how pronounced the marks of the perforation will be. Generally, the harder the stone, the more clear the concentric striation pattern created during perforation (Gwinnett and Gorelick 1991:191); in softer stones, however, the striation appears to be either smooth, rough or more faint (1991:192) and there may be greater deviation in the shape of the drilling (Semenov 1973:18).

The drilling of a bead can also tell us a lot about the technology and materials available at a site. For example, perforations can be simply made by hand or with the use of a mechanical drill, both of which are forms of partial rotary movement due to the limited number of “turns” (Childe 1954:187). Perforations can be made by four different methods: punching, gouging, piercing, or boring/drilling (Semenov 1973). One way to differentiate between perforations made by hand or the use of a mechanical drill is by closely examining the concentric wear pattern created by the rotating movement of the wrist or mechanical drill. The pattern created by one hand produces a perforation that is larger than the width of the drill itself, and also, the wear pattern is not parallel on each half of the perforation or on the drill itself (especially if a stone drill is used) (Semenov 1973).

In the two-handed method the drill or drill bit is hafted into a stick or reed and clasped between both hands (Figure 2.3.10). The hands are then rubbed together in a back and forth motion. The striations created are also not parallel but more regular in outline when compared to one hand drilling (Semenov 1973:18). The perforation making experiments revealed that in cases where there is little or no evidence of perforation marks, it is difficult to differentiate between a perforation made using two hands or a mechanical drill because in both cases the outline of the perforation is regular and therefore similar.

Figure 2.3.10. Experimental flint microdrill hafted into bamboo, used for two-handed or mechanical drilling

Bow drills or other mechanical drills on the other hand, leave perfectly parallel striations, which match the drill, and both halves of the drilling are parallel reflections of each other (Orchard 1975:40; Semenov 1973; Sax *et al.* 2004:1418; Sax *et al.* 1998:10; Kenoyer 1992:504) (Figure 2.3.11). In too soft stones, however, the drilling may appear slightly irregular in depth but still parallel in striation (Kenoyer 1992:504). This is because the drill is essentially cutting out the material. (Kenoyer 1992:504).

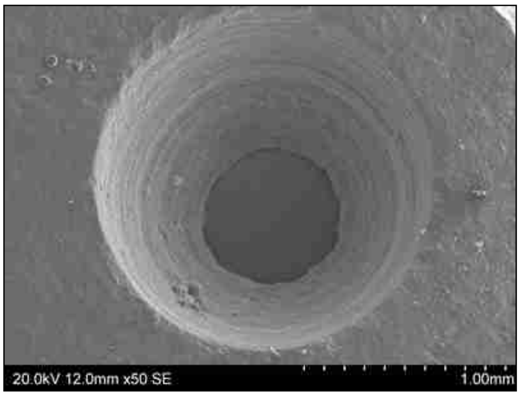


Figure 2.3.11. Concentric parallel striations and regular outline of a perforation suggesting mechanical drilling

Apart from the striation patterns made during the drilling process, a number of other characteristics can also provide clues as to how the beads were drilled and which tools could have been used to do so. Such characteristics include the size of the aperture (opening), the angle of the aperture, the uniformity of drilling or lack thereof, and the marks created by the movement of individual grains along the drilling. Perforations made by a mechanical drill are perfectly circular, regular, and perpendicular whereas those made by hand are more irregular in outline (Semenov 1973:18; Sax *et al.* 2004:1419; Gwinnett and Gorelick 1983). The hand also tends to lean while drilling and therefore the perforation may be slanted (Semenov 1973:18; Sax *et al.* 1998:7) (Figure 2.3.12).

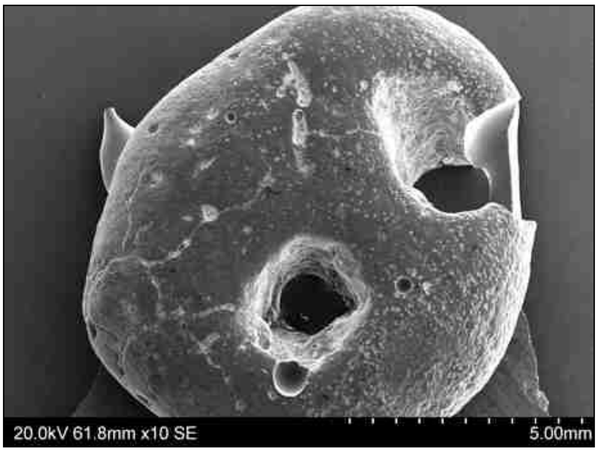


Figure 2.3.12. Perforation morphologies suggesting hand drilling (note the lack of parallel concentric striations, irregularity of the outline, and slant)

The basic experiments conducted regarding perforation techniques essentially confirmed the findings from these researchers. An example of perforation types can be seen when a perforation was made using the three different perforation methods (Figure 2.3.13). The perforation made by one hand did appear to be more slanted than the other two, and also not as regular in its outline (Figure 2.3.13a). The outline of two-handed and mechanically made perforations were much more regular and concentric striations could be found in both perforations, but those in the mechanical drilling were much more parallel and regular (Figure 2.3.13c). Similar perforation experiments were performed on limestone and tufa. The results on the tufa were almost identical to those made on the schist but the limestone was much more chalky and the perforation outlines were never as regular nor were any striations visible within the perforation.

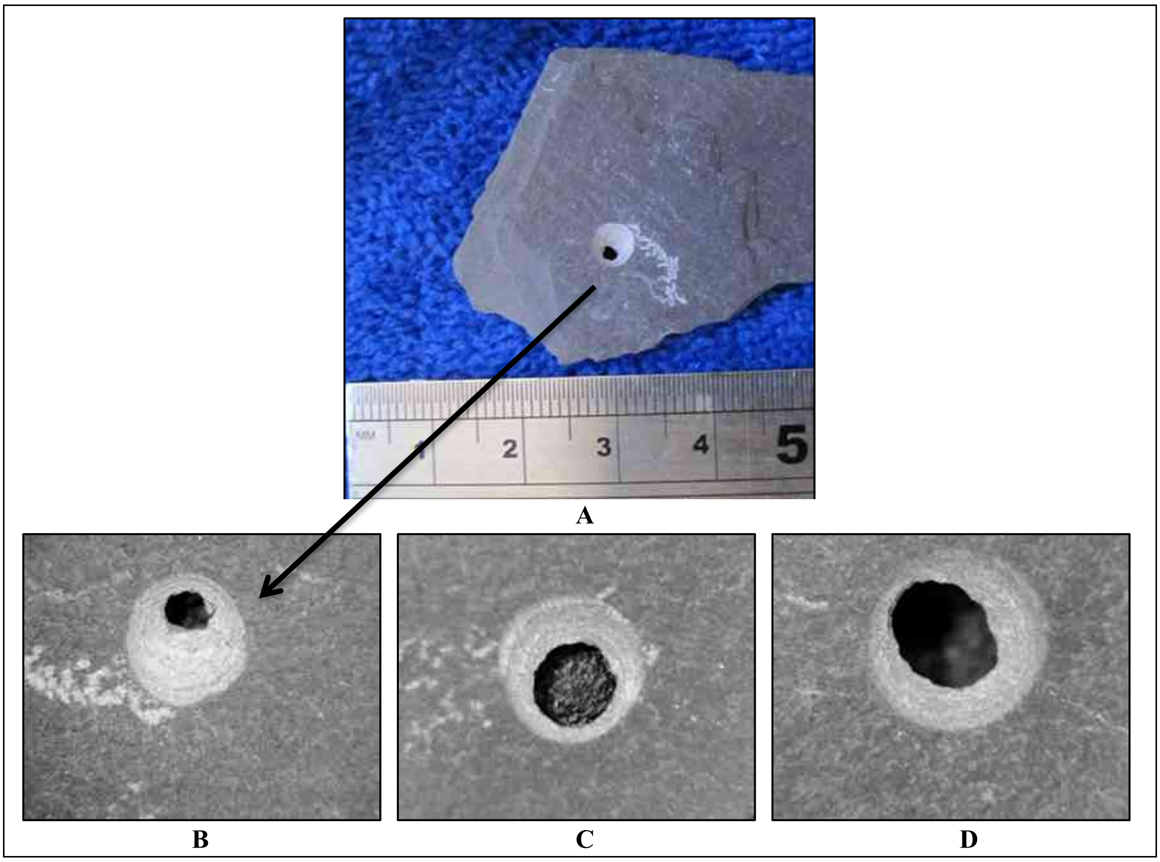


Figure 2.3.13. Experimental perforation marks and outlines made on schist using three drilling methods: A) one-handed; B) one-handed (detailed); C) two-handed (detailed); and D) mechanical (detailed)

Morphologically, there are three main types of perforations: uniform, conical, and biconical (Figure 2.3.14 and 3.3.3). Uniform perforations are straight and cylindrical in shape. They are the same diameter all the way through. They can be created in a number of ways, such as by a long, cylindrical drill bit, or can first be roughly drilled and then precisely and evenly shaped using string and abrasive. A uniform drilling can also be a by-product from the later abrasion process, where beads are strung together and rolled on an abrasive surface. This, however, depends on the stringing material used and the properties of the raw material. A bead with very little depth can also appear to have a uniform perforation.

The second type of perforation is conical-shaped. Conical perforations are wider in diameter on one end and taper off at the other end. Constant rotary movement in a circular or semi-circular motion creates this shape. The conical shape of the perforation is a reflection of the conical shape of the tool used to make that perforation. When a conical perforation is drilled only half way, and the bead is then turned around and another conical perforation is made in line with the previous perforation, meeting at the tapered part of the first drilling, this is called a biconical perforation. This method is suitable for creating deeper perforations and decreases the chances of breakage during drilling (Gwinnett and Gorelick 1991:192). Another method in producing a biconical drilling is to drill from both sides but stop before the drillings meet, and punch through the remaining part with a narrow drill called a “reamer”, thus creating a smooth gap with vertical linear striations between both drillings (Semenov 1973:78).

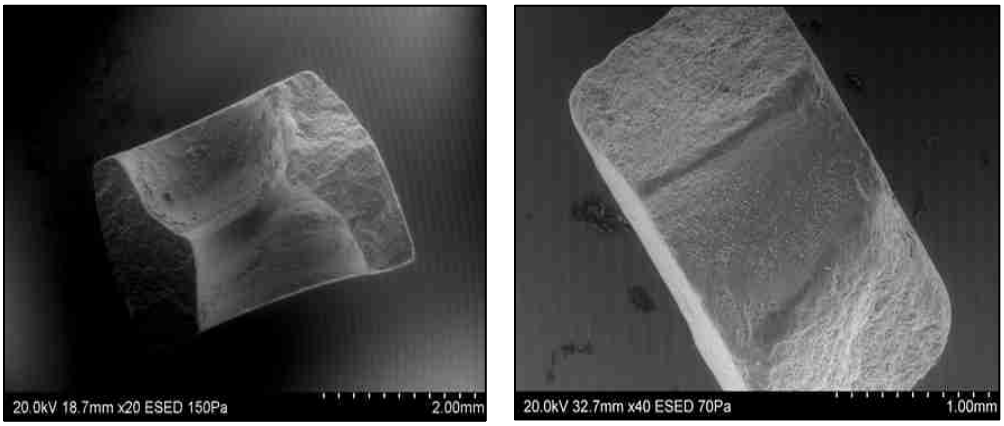


Figure 2.3.14. SEM images of original beads: An example of a biconical perforation (left) and conical perforation (right)

At Çatalhöyük, there are a significant number of bead fragments, broken during the drilling process, or during use or deposition. It is fairly easy to determine which beads were broken during perforation, by simply looking at the fragments and determining at which stage of bead production the fragment may belong to. These broken bead fragments provide us with a profile of the perforation, helping us identify the type of drilling. However, an unbroken bead is needed to provide more precise information. In order to view a drilling of a finished bead, a mould of the perforation can be made (Figure 2.3.1).

Abrasive use during drilling

A number of ethnographic and experimental bead making studies from around the world (for example, Foreman 1978; Kenoyer 1992a; 1994; Kenoyer, Vidale and Bhan 1991; Possehl 1981) indicate the use of abrasives during the drilling process in order to make drilling easier and quicker. The use of abrasives would also depend on the hardness and toughness of the raw material in question. Less hard stones and minerals most likely did not require the aid of abrasives, whereas harder stones may. Abrasives could be used with string, wood, reed, bone, or even stone. The use of sand, quartz, and emery has also been documented at other sites in western Asia. Sand alone has a hardness of 6 (Foreman 1978:21) on the Mohs scale, quartz is hardness 7 (Pellant 1992: 86) and emery is measured at 9 (Pellant 1992:82). One positive advantage of having bead fragments is that the drillings, which can now be viewed in cross section, are easily accessible to study. The use of abrasives can leave behind distinct marks within the drillings. For example hollow areas where individual grains of the stone are pulled one way, leaving behind a scratch, which is usually an indication of abrasive use. These marks can only be viewed under high magnifications using a SEM.

Abrasive use was also tested experimentally. An abrasive paste made from fine-grained sand and olive oil was used in conjunction with a mechanical drill to perforate marble (Mohs 5). Using this abrasive paste helped double the speed of the drilling process (Figure 2.3.15). Concentric parallel striations still appeared in both perforations but the large calcite grains of the marble made them more difficult to see. Abrasives could have certainly been used in stone bead production at Çatalhöyük, but considering the fine striations found in beads and moreover the general average low hardness of the assemblage (less than 4), abrasives were not necessary.

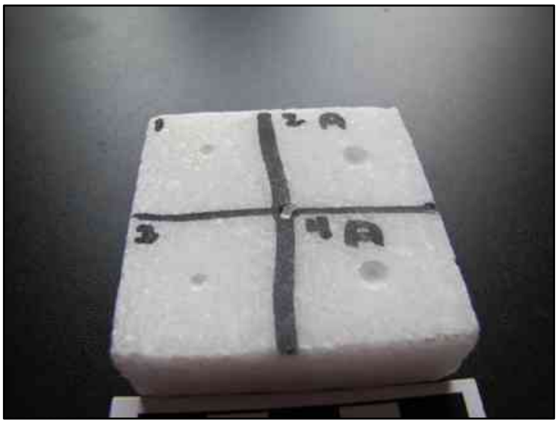


Figure 2.3.15. Experimental marble block with incomplete perforations (left side without abrasive, right side with abrasive) made using a mechanical drill within the same 2 minute set time

From manufacture marks studies to manufacturing sequences

As mentioned earlier, the bead artefacts that provide us with the most information regarding the manufacture of beads are those artefacts that are between the stages of raw material and finished bead – roughouts and preforms. Once finished beads have been polished, it becomes more difficult to find any traces of manufacture, other than those related to final polishing. Bead roughouts and preforms were left unfinished in the archaeological record and therefore prove to be important sources of technological information. If nodules, roughouts, preforms and finished beads made from the same raw materials can be found, ideally in a single production context, a potential sequence of bead production can be established. Furthermore, if these bead materials can be studied individually under SEM, then the sequence can be studied in more detail. The close examination of manufacturing marks can also reveal manufacturing preferences. Did Neolithic bead makers at Çatalhöyük prefer to perforate roughouts using a mechanical or hand drill? Were certain types of beads or raw materials more likely to be perforated in a certain way?

Were beads more likely to be abraded in groups or individually? These questions can all be answered by studying manufacture marks across a wide spectrum of beads.

Limitations to manufacture mark studies

A major concern when studying traces of manufacture is differentiating between natural processes, use-wear (for example, the wear marks caused by stringing beads), marks created during excavation and post excavation, and manufacture marks. Natural processes include water and wind erosion, and *in-situ* soil movements. There are a number of methods used to distinguish between natural and cultural traces such as looking for patterns as opposed to random markings. Although experience is the best way to learn how to differentiate both types of wear, both studies in manufacture marks as well as experimental bead making can help differentiate between marks made from natural processes, manufacturing marks and use-wear.

Recording manufacture marks

Once the manufacture marks on the stone beads are analysed and identified, the information obtained from each roughout, preform, and finished bead is recorded into the Çatalhöyük stone beads database (Table A2.3.1). This database contains descriptive, quantitative, and contextual data regarding stone beads. Table A2.3.1 also provides a brief description of each of the variables, and each of these variables are discussed further in the results chapter (Chapters 3.1 and 3.3). The database is not only a means to record data, but it can also be useful in identifying patterns in bead production and use and even identifying potential production contexts (Section 2.4).

Tools and use-wear

The manufacturing marks left behind on stone beads can help us determine which tools were used to make them. For example, a perfect circular outline of a perforation and concentric parallel striations within a perforation indicate the use of a mechanical drill. A conical-shaped perforation indicates a tool that has a conical tip, like that of a chert or obsidian drill or microdrill. The study of manufacture marks is therefore essential in determining bead making tools. Perforation is only one aspect of bead manufacture; many softer materials are reduced and shaped via abrasion with ground stone tools. Hand abraders, abrading or grinding slabs, and other potential abrading tools found in production contexts were also studied.

Contexts in which there were roughouts, preforms, or debitage from bead production were thoroughly examined for potential tools. Perforating tools in these contexts were examined for use-wear microscopically on-site. Potential tools in more obvious production contexts were studied further under SEM. Dental impression material was used to make moulds of the tips and edges of the tools (drills, microdrill and awls). Similar to the bead replicas discussed above, these moulds were filled with epoxy-resin and then viewed under SEM. These moulds and replicas were then studied carefully for use-wear, which would help support or refute their possible use in bead production. These examples were also compared to experimental drills and microdrills in order to verify whether these tools could have been used in stone bead production.

Specifically, chert, obsidian, and bone potential perforating tools were examined for use-wear (the results are found in Appendix D). The chert and bone tools were mostly found in stone bead production contexts and therefore further examined using a SEM. The vast majority of the chert microdrills were obtained from heavy residue samples obtained via flotation. Marina Milić and Tristan Carter from the Çatalhöyük chipped stone team generously gave their permission to cast moulds and analyse the chert microdrills for use-wear.

Based on the literature, chert or flint perforating tools used in stone bead production generally have either a rounded tip, circular striations, or a polish, or any combination of these three traits (Grace 1989:146). Kenoyer and Vidale (1992:504) noted that according to their research, polishing of the drill tip only occurred on the drill when the drill was perforating a harder material. They also found that initially the "distal tip of the drill is jagged but through repeated use on hard materials, such as carnelian, it becomes rounded" (ibid.). With these basic principles in mind, in addition to the use-wear examined on experimental flint drill and microdrills (see below), replicas of tips of perforating tools from Çatalhöyük were examined and categorized as having edge damage (erosion, pitting, or damage of the edge or tip), being fresh (unused, with sharp, freshly knapped tip), rounded tip (dull or blunt rounded tip from use), concentric parallel striations (use-wear marks indicating a drilling motion similar to that found in the perforation of beads that have been drilled mechanically), or random scratches (which may be from use, but cannot tell us very much). Use-wear analyses of bead making tools are not that straightforward though. The majority of rocks and minerals used at Çatalhöyük are quite soft (Mohs hardness 2-4) hence the concentric parallel striations one would hope to find on chert drills and microdrills is not likely to be present, especially since chert and obsidian, which is used to perforate these less hard raw materials, is much harder (Mohs 7 and 5 or 5.5, respectively).

Perforation experiments were therefore conducted to help determine how the tips of drills and microdrills change with use on softer stones. These basic experiments confirmed that after *heavy* use on both soft and hard materials (although less hard than the flint drills and microdrills) the tips of the drills and microdrills became rounded and there was also some edge or tip damage, regardless of whether the perforation was made using one-hand, two-hands, or mechanical method of drilling (Figure 2.3.16). Heavy use meant that the drills or microdrills made at least 3 or 4 biconical perforations. No sheen or polish was found on any of the drills or microdrills used, confirming the observation made by Kenoyer and Vidale (1992).

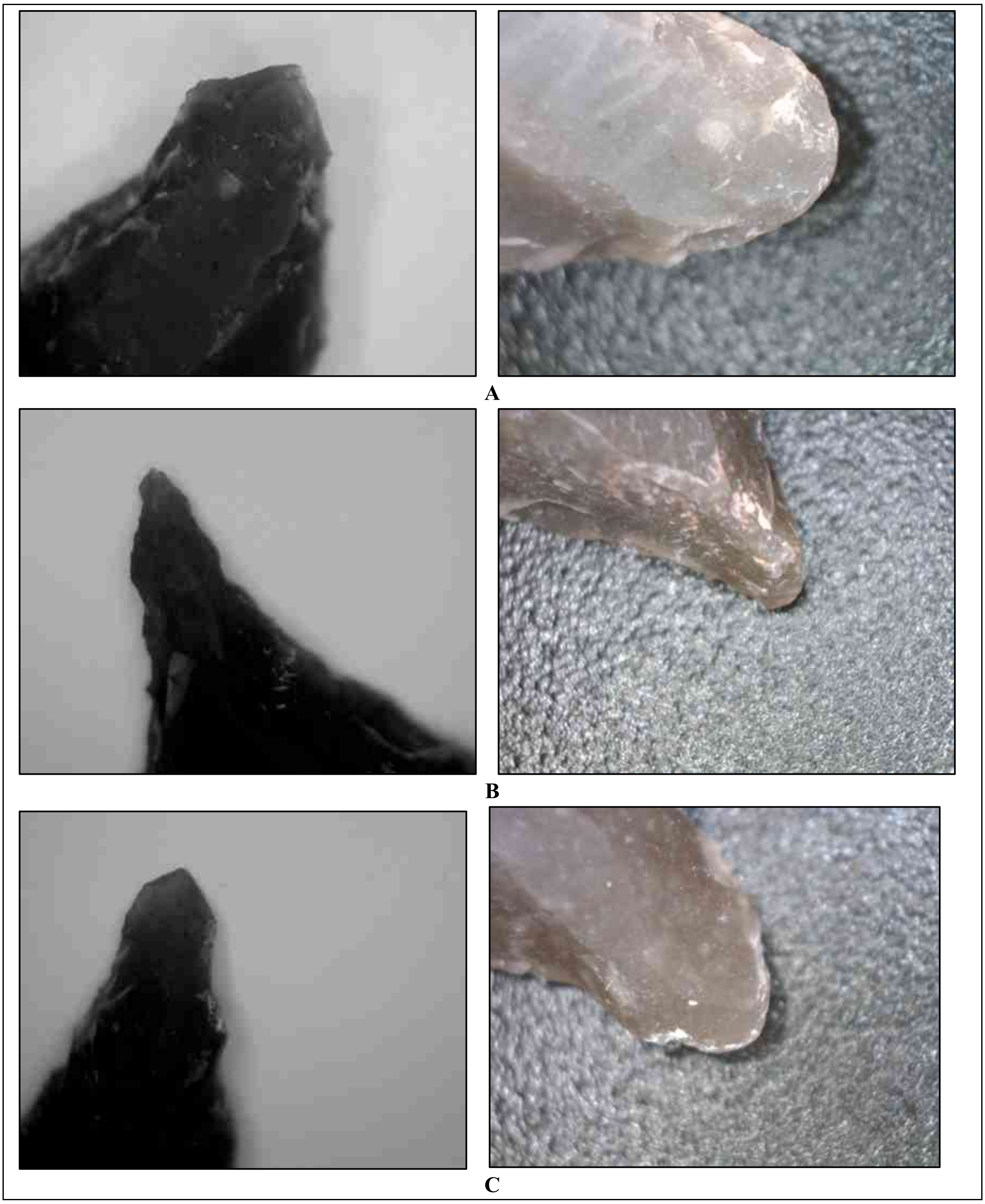


Figure 2.3.16. Photographs of experimental flint drills or microdrills before (left) and after heavy use (right): A) drill used on schist (Mohs 4-5); B) microdrill used on limestone (Mohs 2-3); and C) drill used with abrasive on hard marble (Mohs 5)

Similarly, experiments were also performed in which flint microdrills were used only once, in order to make a single biconical perforation on tufa. The used microdrills revealed that there was some edge and tip damage, in addition to some pitting, but the tips were not as rounded as those found on more heavily used flint drills and microdrills (Figure 2.3.17).

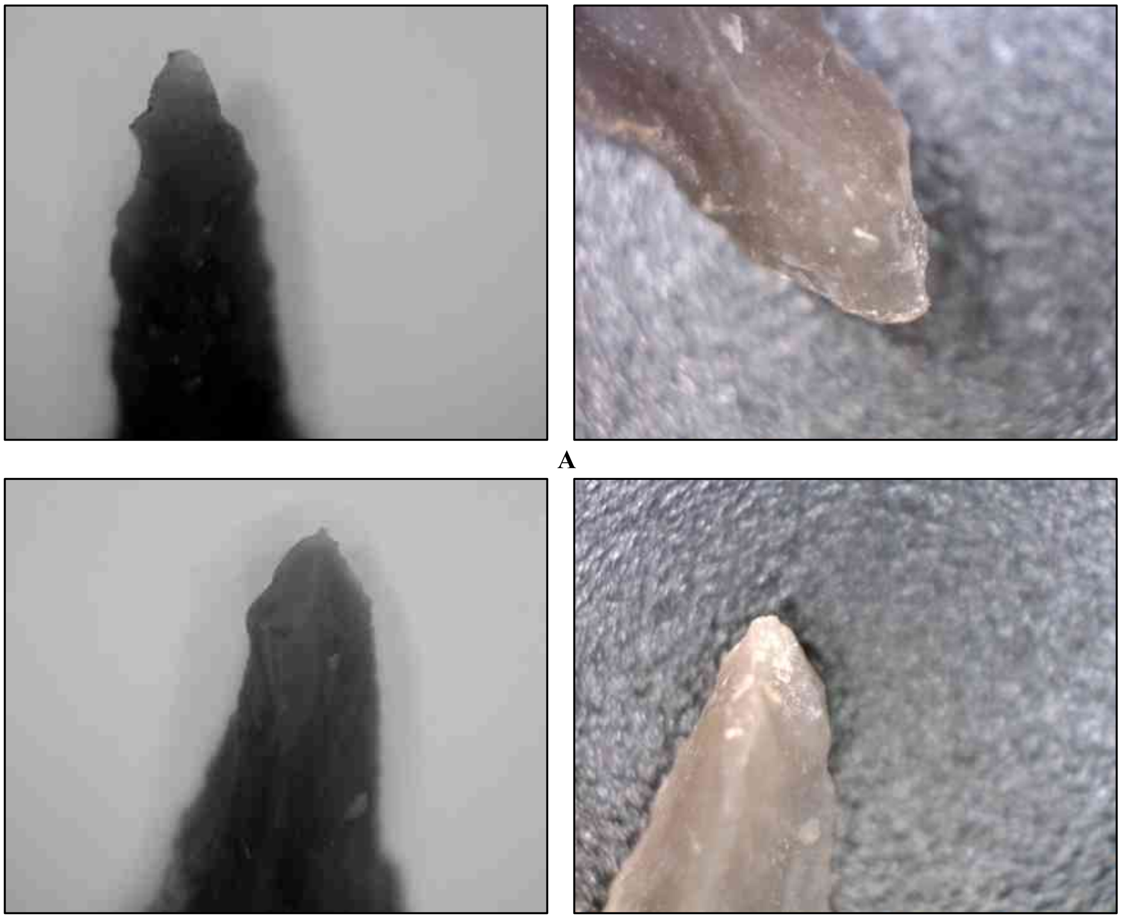

A
B

Figure 2.3.17. Photographs of experimental flint microdrills before (left) and after (right) a single use: A) microdrill used to perforate tufa (Mohs 4) using two-hand method; and B) microdrill used to perforate tufa using one-hand method

Perforating experiments were also conducted using bone awls. Regardless of the method of perforation used (mechanical, two-hand, or one-hand) even the least hard material (soft chalky limestone) was difficult to perforate. Theoretically, it is possible to perforate, as Figure 2.3.18 demonstrates, but the small indentation made in the soft limestone was achieved after many minutes of struggling. The bone, however, was completely unable to perforate the schist. The bone was simply not hard enough, and perhaps not a likely candidate as a perforating tool in stone bead production. It is possible to harden the bone by firing it (Nerissa Russell, personal communication) but experimental work needs to be done to confirm this. In addition, the bone awls found in the potential production contexts at Çatalhöyük did not appear to be hardened (Nerissa Russell, personal communication).

Figure 2.3.18. Experimental bone awl (left) used to unsuccessfully perforate mechanically soft chalky limestone (Mohs 2-3)

2.4. Contextual Studies

2.4.1. Production contexts, the bead making sequence, and craft specialization

In order to study stone bead production, it is essential to study the macro- and micro-artefacts independently, as in the manufacture marks studies described above, and also collectively, in relation to one another, so that a bead making sequence can be produced. Determining where the beads are found, and in which contexts, is also very important in understanding the process of bead making. By conducting a spatial analysis of bead making macro- and micro-artefacts it is possible to find areas where bead making took place (production contexts). These production contexts should contain traces of bead production from all or some of its stages. These contexts have the potential to demonstrate the various stages of manufacture associated with stone bead production.

Defining different types of production contexts

In Chapters 3 and 4 we find that there are two types of contexts associated with production at Çatalhöyük. The first are *primary production contexts*, which are essentially *in-situ* floor deposits containing stone bead related materials. The second are *production related contexts* or *non-primary production contexts*, which consist of discarded secondary production related debris, found in external middens. The term “production context” used in this dissertation generically refers to any context containing evidence of production, however, the terms “primary production context” and “production related context” or “non-primary production context” specify the type of context being discussed.

Identifying production contexts

Potential production contexts or production related contexts are any contexts or units which contain either: 1) at least two unfinished beads (preforms or roughouts) or more, made from the same or different raw materials; 2) beads from different stages of manufacture (roughout, preform, finished bead) all made from the same raw material; 3) at least two or more pieces of stone bead debitage (remnants from the bead making process) from stone heavy residue analyses which take the form of shatter or angular shatter during the reduction via chipping process and are matched to the raw materials of all beads, finished and unfinished in the building or space as well as matching raw material nodules found in ground stone; 4) a combination of one or more preforms and roughouts in conjunction with potential bead making tools which include perforating tools such as drills and microdrills and ground stone tools such as abrading palettes, slabs, and abraders.

As mentioned in Section 2.1, buildings containing occupation levels with preforms and roughouts were sampled along with all spaces. All the preforms, roughouts, and finished beads from these contexts were examined, analysed for qualitative data, and recorded into the stone beads database by the author (Appendix E). These were all accounted for in the database, and the database was preliminarily used as a tool to match preforms, roughouts, and finished beads made from the same raw materials within the same occupation levels on floors within buildings and in external middens and yards. Next, heavy residue samples from all the units containing preforms or roughouts were manually sifted through in order to locate any potential stone bead debitage and occasionally nodules. Potential production contexts are presented as units, and units at Çatalhöyük are generally defined as one activity of deposition. Individual units were analysed at first, followed by adjacent units (especially on floors and in external middens), and finally whole occupation phases within buildings, specifically floors, were closely examined using Harris matrices, in order to account for the possibility that bead making tools found at one end of the house could have been used to perforate or abrade the preforms or roughouts found elsewhere within the same contemporary occupation phase. Raw material nodules, roughouts, preforms, and finished beads were matched according to raw material and colours, sometimes with the help of an optical microscope. So if a preform and finished bead made from the same raw material and identical in colour were found together in a unit, or adjacent units, or on the floor of the occupation phase within a building, then it is more than likely some production activity, albeit small and a singular example, did occur within the building. For external middens and yards, we cannot say for sure which household was engaged in stone bead production but we can say that someone during that settlement phase did manufacture beads, most likely in their household and later cleaned and deposited their household refuse within the middens(s) most likely closest to their homes. No preforms or roughouts were found in burials, but they were found in all other sampled contexts.

All the relevant ground stone crates (from same area and year) were also manually sifted through in order to located any nodules of raw materials or ground stone tools that could be associated with stone bead production. Karen Wright also provided instrumental help with the identification of potential bead making ground stone tools. The author had to rely on the chipped stone team (Tristan Carter and Marina Milić) in order to find and identify potential perforating chipped stone tools. With regard to tools, perforating, chipping, and abrading tools were curative technologies and according to specialists, had many uses. Tools that are the most likely used in stone bead production are discussed, but it is important to remember that these tools were also likely to be used for other purposes and in the manufacture of other items. All these different forms of data from various contexts were combined in order to identify potential production contexts.

The units for potential production contexts were closely examined for bead making debitage or micro-artefacts, but there are two main difficulties in studying micro-artefacts at Çatalhöyük. Since initial observations suggest that much of the technology used in bead making at Çatalhöyük was abrasive in nature rather than chipped stone, consequently, there would be no micro-artefact evidence left. Also, the floors of the buildings at Çatalhöyük were kept very tidy, and much of the micro-artefacts will be from secondary contexts such as external middens. The micro-artefacts are found during fine sieving and flotation (heavy residue samples).

Identifying craft specialization

Once production contexts are identified, the level of production can be better understood (see theoretical framework for craft specialization in Chapter 1.5.2). Was stone bead production at a household level or is there any evidence for craft specialization? In order to determine this we must assess if all households were engaged in in bead production equally or whether some houses were making more beads than others and how this changes over the span of the Neolithic at Çatalhöyük. It would also be interesting to see how often buildings containing preforms and roughouts also contained the finished beads made of the same material. Furthermore, are different household making different types of beads from different raw materials from other houses? This would provide clues to whether or not households were only making beads for themselves or also for others. All these questions can be answered by looking at distribution patterns of production contexts within and between settlement phases.

In order to establish whether or not specialization existed within a society, a number of factors present within a thorough framework must be addressed. Costin (1991:8) has provided such a framework, which includes four parameters for the organization of production (context, concentration, scale, intensity) and a typology of organization (individual specialization, dispersed workshop, community specialization, nucleated workshops, dispersed corvée, individual retainers, nucleated corvée, and retainer workshop).

Each of the parameters can range anywhere from a preindustrial, independent, dispersed, kin-based, part-time situation to an industrial, attached, nucleated, labour-intensive, full-time set-up (Costin 1991:10) The first parameter, context, attached (product for elites) or independent (product for all customers), describes the relationship between producers and demand for their product (Costin 1991:11). Context can be seen in the archaeological record by examining production areas and architecture; attached production is linked to elite buildings, and is usually segregated and controlled (Costin 1991:27). Concentration refers to the distribution of specialists throughout a site, for example evenly or nucleated, and can be distinguished by the presence of production debris (Costin 1991:13, 27). Scale in production, refers to size and type of labour (individual or family vs. wage labour); it can be determined by looking at the scale of the actual context where production occurred (i.e. household or workshop) (Costin 1991:15). Intensity in production refers to the amount of time spent producing (part-time or full-time) but it is more difficult to see in the archaeological record (Costin 1991:16, 30). The most important factor in determining the possible presence of specialization is therefore finding the locations in which production occurred (such as areas containing different stages of bead production and associated tools) so all these parameters can be assessed.

Apart from looking at the production areas, the finished artefacts themselves can be studied to understand characteristics of production, which include degree of standardization, skill, and efficiency (Costin 1991:32). Rice (1991:268) defines standardization as the “relative degree of homogeneity or reduction in variability”, and in her case, within a pottery assemblage. According to Costin (1991:33-34) and Rice

(1991:268), a high degree of standardization, or uniformity is a trait found in the products of more intensive producers (less producers and therefore less variability); however, standardization may also occur because it is simply easier to produce a product one way or consumers demand a standard product. If social information is being conveyed than production is greatly affected and there may not even be any relation of specialization. Diversity, the opposite of standardization, is often associated with non-specialists (Rice 1991:273). Some of the reasons for this are the inability to replicate without imperfection, less skill, lack of controls over techniques and resources, and infrequency of activity (Rice 1991:273).

In addition, when studying craft specialization, it is also important to acknowledge the different levels of skills involved, whether there is evidence of apprentices by looking at perforation errors, and finally whether we can find individual bead makers within both production and use contexts.

2.4.2. Stone bead deposition and use

Stone beads at Çatalhöyük are contextually ubiquitous. They are found everywhere. Like production contexts, it would be important to quantify where stone beads are found and what this signifies and whether bead deposition practices change over time. It is crucial to determine whether one particular bead type is more prevalent in a particular context in comparison to others.

In terms of contexts being sampled in this project, clear indication of bead use appears to be in burials and in caches, clusters, and placed deposits. Caches, clusters and placed deposits are a group of homogenous or heterogeneous materials intentionally placed in what appear to be significant contexts such as foundations and house closing deposits. The vast majority of beads, however, end up in middens. Middens contain beads that are finished and unfinished, broken and complete, and heavily used and fresh. Statistics of beads found complete and broken in middens can inform us, in conjunction with their raw material (local or non-local) and typology (level of elaboration and time and energy needed to make a bead) how important stone beads were in Neolithic society. The deposition of beads can tell us whether they were used over a lengthy period of time or whether they had short life histories.

More ritualized deposits such as burials and special deposits may also reveal patterns and preferences, which coincide with use. In regard to burials, a separate burial beads database has also been created. It can help distinguish how many burials within a household had stone beads and correlate the characteristics of the stone beads to the sex and age of the skeletons. Beads found on skeletons are also assessed for “freshness” i.e. whether or not they were heavily used. This can perhaps tell us if stone beads were especially manufactured for that particular burial or if they may have been used during the lifetime of the individual, or if the stone beads could have potentially been heirlooms. Any correlation on where beads are found on the body and in what form (for example as a necklace, anklet, or bracelet or on its own) is also important and can shed light on ritual and beliefs.

Deposition can tell us a lot about beads. And by looking at distribution patterns of raw materials used, sizes, typologies, and colours, within and between contexts, correlations can expose social and symbolic meanings given to stone beads and the social environments in which they were produced.

This chapter provides an outline on how the social significance of stone beads technologies at Neolithic Çatalhöyük can be assessed by primarily analysing descriptive variables, conducting manufacture mark studies, and performing contextual analyses. In the next chapter, the results of bead technology and contextual studies obtained in this project, using the methodologies outlined above, are discussed.

CHAPTER 3: RESULTS

In this chapter, the results from the assessment of descriptive variables, production contexts analyses, manufacture marks studies, use-wear study of perforating tools, and use contexts analyses are presented. A discussion expanding on these results regarding bead manufacture and production follow in Chapter 4, and a discussion of bead analyses regarding consumption is presented in Chapter 5.

This chapter is divided into four main sections: 1) *results from the quantification of descriptive variables* such as raw material identification, bead type, colour, and size, all indicative of preferences and norms in bead manufacture and consumption and their distribution within the stone beads assemblage; 2) *results from production context studies* which are necessary to identify and analyse production contexts and address specialization; 3) *results from manufacture marks studies* in which beads, particularly preforms and roughouts, are carefully examined for tool marks indicating technical choices and manufacturing sequences, in addition to the analysis of use-wear of perforating tools (Appendix D); and 4) *results from distribution patterns and contextual studies regarding bead consumption*, specifically identifying variations within and between burials and placed deposits, contexts which provide the only evidence of primary bead use.

The results presented within these four sections individually provide an insight into an important aspect of Neolithic bead making, but taken in unison, provide a more thorough and comprehensive look at the choices and preferences of bead makers and wearers, why and how beads were made, and how they came to play such a socially significant role within Neolithic society at Çatalhöyük.

3.1. Results of descriptive variables

The results from the descriptive variable studies are vital in helping us determine:

1. Which raw materials were utilized for stone bead production, and why?
2. Can we see clear preferences for raw materials and colours, bead types, and sizes?
3. Are there any potential correlations between descriptive variables and the contexts in which they are found?

Each of the descriptive variables was analysed both within and between settlement phases, so patterns could be established during each phase and also during the span of Neolithic occupation at Çatalhöyük, in order to see changes through time. Differences and similarities of the results from the North and South areas were also considered under each descriptive variable. Each subsequent descriptive variable is also compared to the descriptive variable(s) discussed in previous subsections. All of the qualitative characteristics were also compared to basic contextual data in order to establish any correlations between raw material, bead type, colour, and size, with where beads were deposited. Finally, stone beads and bead fragments will be examined according to the context types in which they are found in order to better understand depositional practices of stone beads and what these practices may mean in terms of their function.

3.1.1. Raw materials

The identification of raw materials is essential in determining whether manufacturers and Neolithic society as a whole at Çatalhöyük had specific preferences or constraints in terms of raw material selection and subsequent use. Once identified, the closest potential sources can also be identified (Chapter 4.1), revealing whether these rocks or minerals were found locally or whether they had to be brought to the site from a distance. It is also important to study raw materials in order to determine which raw materials were exploited versus which were available to bead makers and not used. Patterns and preferences can also be ascertained by looking at the properties of the stones and minerals; such properties include hardness, toughness, fracture, appearance, workability, and colour.

Raw materials were primarily identified microscopically on-site using an optical microscope with guidance and training from Çatalhöyük geologist Chris Doherty. A small sample of bead fragments was also exported for elemental analyses using SEM-EDS. In this section, the general quantifications regarding raw materials usage between and within phases will be presented. Data from SEM-EDS analyses can be found in Appendix C, which were used to help identify and verify microscopic results in the field.

Summary of Raw materials used for stone bead production

Over 1600 beads and bead fragments were meticulously analysed and a variety of rocks and minerals were identified. Potential sources of these raw materials will be discussed in the next chapter; however, in this section, a brief description of the various raw materials, which displayed clear geological properties for identification, is provided. Some beads and especially bead fragments were very small in size or highly polished and therefore could not be identified with confidence. These were classified as "unidentified".

A total of 34 rocks and minerals were identified, and a few of these rocks were grouped together due to their similar characteristics or inability to differentiate between the two, for example hard limestone and soft marble or quartz and quartz vein. Table 3.1.1 provides a summary of minerals identified along with some basic information pertaining to: 1) their mineral type (based on their chemical composition); 2) their formation or occurrence within the environment; 3) their approximate hardness (based on the Mohs scale); and finally 4) a brief description of the mineral regarding visual properties such as transparency and lustre. Minerals may form in a number of habits and because very few examples of raw material nodules remain, we cannot say for sure in which habit these particular minerals were found in the environment. Colour and other aesthetic properties to do with appearance are addressed in Section 3.1.3.

Minerals used to make stone beads include calcite, fluorapatite[4], turquoise, carnelian, agate, quartz or quartz vein, hematite, gypsum, barite, galena, meerschaum, and biotite. Six of these (calcite, gypsum, barite, galena, meerschaum, and biotite) are quite soft according to the Mohs hardness scale and were therefore easier to manipulate and shape. Turquoise and hematite are hard, but carnelian, agate, and

[4] Fluorapatite beads have been identified as such due to their mineral composition; however, the blue coloured fluorapatite may have been derived from the heating of fossilized ivory, tusk, or mammal tooth (see Chapter 4.1 and Appendix C).

quartz are much more difficult to shape and perforate (harder and less tough or more brittle) and require a high degree of skill to use in bead manufacture.

Mineral group	Raw material	Description (pertaining to Çatalhöyük raw materials)	Formation/ occurrence	Mohs
carbonate	calcite	transparent to translucent mineral with vitreous or dull lustre	in many types; main component of limestone and marble	3
phosphate	fluorapatite	opaque mineral with dull lustre	in all rock types, especially calcium rich metamorphic rocks	5
phosphate	turquoise	opaque mineral with dull lustre	igneous and sedimentary rocks	5-6
oxide	carnelian	siliceous mineral, transparent to translucent, or opaque with vitreous to waxy lustre	in rock cavities of mostly lavas and other types	7
oxide	agate	siliceous mineral, transparent to translucent, or opaque with vitreous to waxy lustre	in rock cavities of mostly lavas and other types	7
oxide	quartz/quartz vein	transparent to translucent mineral with vitreous lustre	in all rock types	7
oxide	hematite	tabular or rhombohedral habit; opaque mineral with a metallic to dull lustre	iron ore; forms in all types usually as a replacement mineral	5-6
sulphate	gypsum	transparent to translucent with a vitreous to dull lustre	around hot springs and clay beds	2
sulphate	barite	translucent mineral with pearly lustre	in hydrothermal veins with other minerals	3-3.5
sulphide	galena	opaque mineral with metallic lustre	in hydrothermal veins with other minerals	2.5
silicate	meerschaum	opaque mineral with dull lustre	as irregular nodular masses in alluvial deposits	2
silicate	biotite	opaque mineral with a metallic lustre	igneous and metamorphic rocks	2.5-3

Table 3.1.1. Summary of minerals and their properties (sources: Schumann 1993; Pellant 1992)

Similarly, Table 3.1.2 provides a summary of rocks and their properties. The rocks identified in stone bead manufacture include hard limestone or soft marble, tufa, soft limestone, freshwater limestone, shale, marl, natural limestone pebbles, travertine, chert, serpentinite, phyllite, steatite, soft saccharoidal marble, metabasalt, brecciated marble, silicified limestone, diorite, olivine dolerite, and an unidentified naturally metal-rich stone. The natural metal-rich stone is mostly comprised of a natural metal that could not be identified in the field or be exported for further analysis. The vast majority of rocks used are opaque, fine-grained, and tightly compacted stones, which are polishable and relatively soft and easy to manipulate. The average Mohs hardness is 4 for most rocks, although some are softer such as soft limestone, shale, marl, and steatite, and others harder such as brecciated marble, silicified limestone, and diorite.

Rock group	Raw material	Description (as pertains to Çatalhöyük raw materials)	Formation/ occurrence	Mohs
sedimentary	hard limestone/ soft marble	fine-grained densely compact rock, highly polishable	in sea, spring deposits, calc sinter, and lakes	3-4
	tufa	composed of calcite and impurities of iron oxides; fine-grained , medium to densely packed, polishable	by precipitation of calcium carbonate; cliffs, caves, and quarry faces	3-4
	soft limestone	fine-grained, loosely compact, chalky	in sea, spring deposits, calc sinter, and lakes	2-3
	freshwater limestone	composed of calcareous mud with fossils; fine to medium grained, medium to loosely compact	in freshwater lakes with high lime content	3-4
	shale	very fine-grained, finely laminated	consolidated by diagenesis	3
	marl	loose and fine-grained clay based	in freshwater and marine conditions	2-3
	limestone pebble	natural limestone pebbles; fine-grained, and densely compact, polishable	limestone condeposits shaped by water exposure	3-5
	travertine	fine-grained, porous, compact, banded form of limestone, polishable	associated with hot springs	3-4
	chert	fine-grained, siliceous	in limestone and lavas	7
metamorphic	serpentinite	fine- to coarse-grained with veins and flecks of various serpentine group minerals, waxy lustre, polishable	by serpentinization of peridotite, in folded metamorphic rocks	3-5
	phyllite	fine-grained, laminated, micaceous sheen	forms from metamorphosed shale	3-4
	steatite	fine-grained, sheen, waxy or resinous lustre, translucent to opaque	forms from talc-schist sediments	2-3
	soft saccharoidal marble	fine-grained crystalline calcite, densely compact	recrystallized limestone under low pressure and high temperature	4
	metabasalt	fine-grained, slightly laminated, compact	metamorphosed basalt lava	4
	brecciated marble	fine- to coarse-grained rocks, densely compact, different components cemented together, polishable	in sedimentary, tectonic, igneous or hydrothermal	5-6
	silicified limestone	finely-grained, densely compact, siliceous	calcite replaced by silica	5-6
igneous	diorite	medium to coarse-grained, partially siliceous, polishable	forms as independent intrusions (dykes)	6-7
	olivine dolerite	medium-grained, densely compact, partially siliceous, polishable	form in dykes and sills	4-6
?	natural metal-rich stone	fine-grained, compact, metallic lustre	unknown	4-5

Table 3.1.2. Summary of rocks and their properties (source: Schumann 1993; Pellant 1992)

Diachronic and synchronic variations in raw material use

The stone beads at Çatalhöyük reveal a number of clear patterns pertaining to raw material selection and use. In the South area, we are able to obtain a diachronic perspective of raw material usage (Table A3.1.3). Disregarding levels South.N and South.O, as these levels were not excavated at the time of data collection, we find clear distinctions between phases. Specifically, from phases South.G to South.?M, limestone and marble (hard limestone or soft marble, soft chalky limestone, tufa and soft saccharoidal marble), serpentinite, steatite, and phyllite, are the most predominantly used raw materials from this time (Figure 3.1.1). These commonly used raw materials comprise of 90.1% of the total stone bead assemblage throughout the occupation of the South area. There are a few minute exceptions such as three calcite beads, two freshwater limestone beads, a single shale bead, and a quartz bead fragment, but the overwhelming majority of raw materials used during this early period are surprisingly limited.

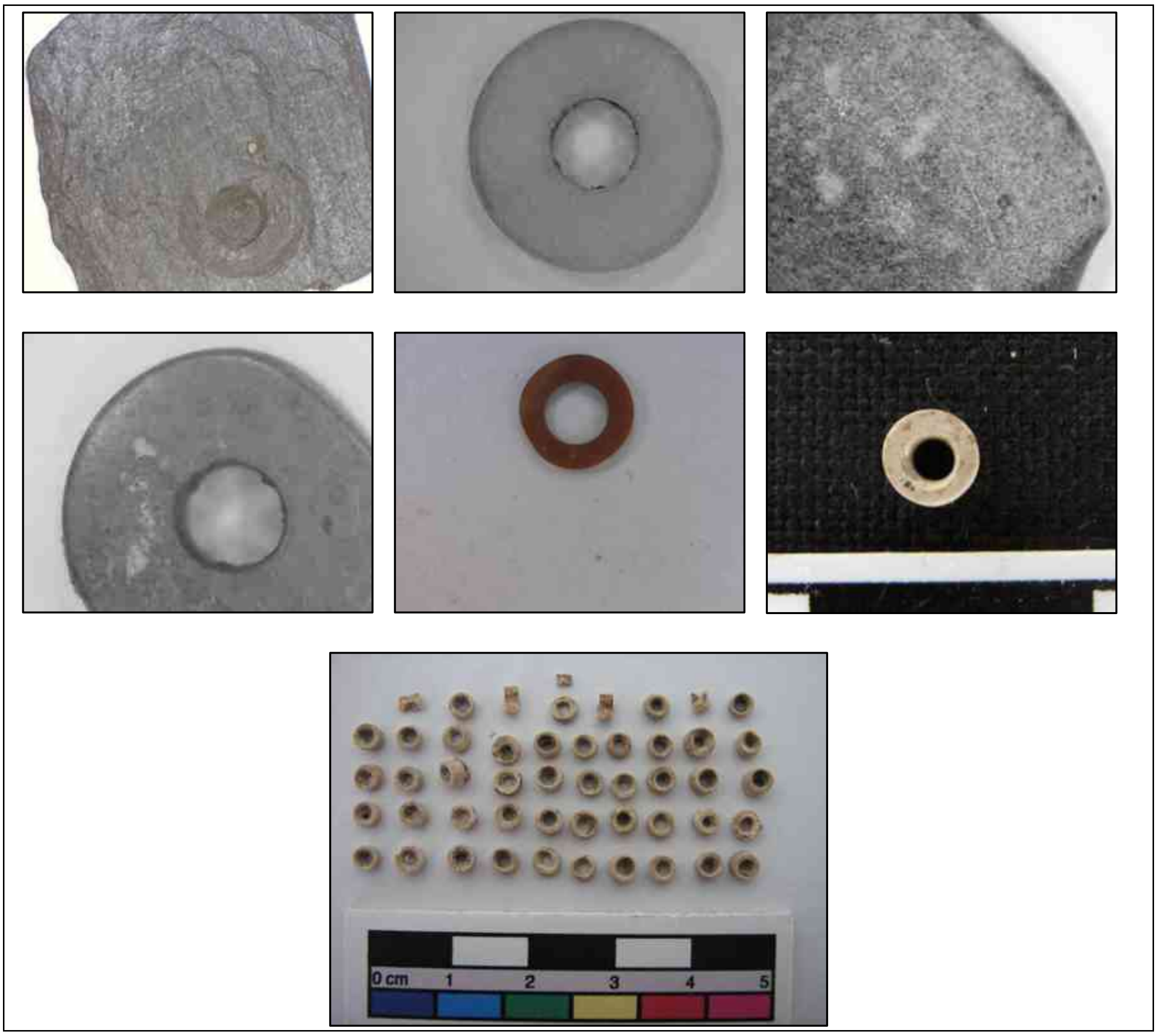


Figure 3.1.1. Photographs taken by microscope (x20) showing examples of stone beads and a roughout made from (clockwise from left): phyllite, soft saccharoidal marble, serpentinite, hard limestone or soft marble, tufa, steatite, and soft limestone (bottom, taken without microscope)

These raw materials continue to be widely exploited throughout the occupation of the site and continue to make up the bulk of the stone bead assemblage in later phases South.P to South.T (Table A3.1.3); however, there is a significant shift towards using more diverse raw materials during these later phases. Diversity in the assemblage increases significantly although the vast majority of new raw materials are present in small numbers. For example, in the South area, the more uncommon raw materials such as carnelian, galena, hematite, barite, metabasalt, turquoise, shale, and quartz, individually only represent less than 1% of the entire assemblage and together comprise of 1.6% of it, equivalent to the amount of fluorapatite (1.6%), which is also most likely introduced sometime between phases South.N and South.P (Figure 3.1.2).

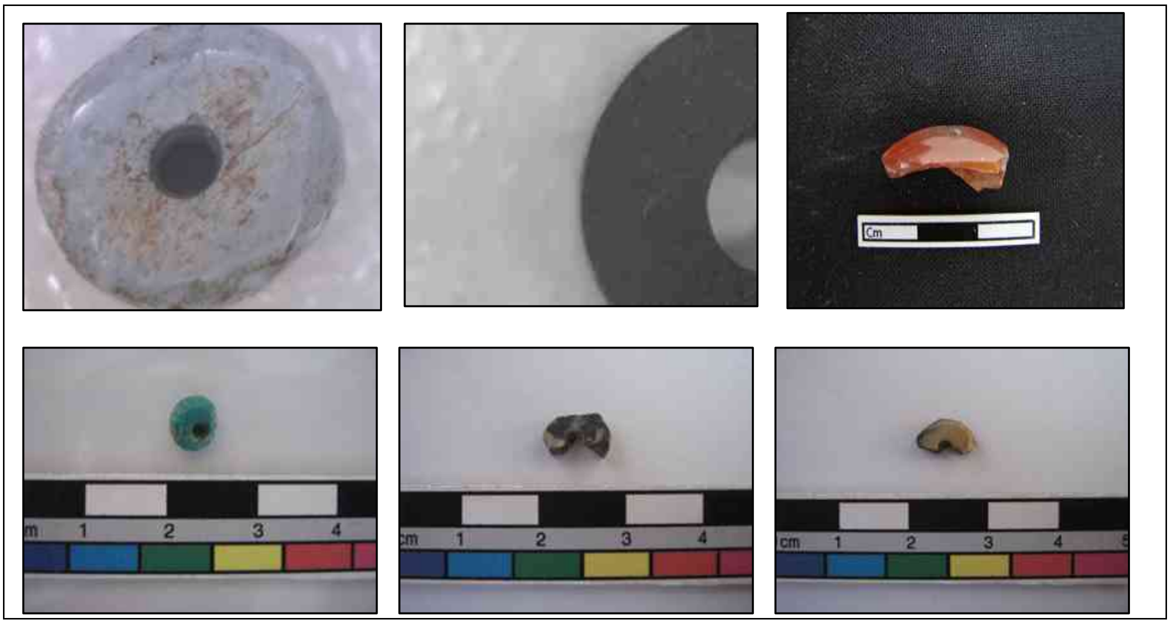


Figure 3.1.2. Examples of complete and broken stone beads and preforms made from (clockwise from left): fluorapatite (microscope x20), metabasalt (microscope x20), carnelian, quartz vein, galena and barite, and turquoise

Figure 3.1.3 charts the distribution of raw materials within the South area. The data has been divided into three main groups: 1) early South (phases South.G to South.?M); 2) early South, but without the rich burial from Building 43 (South.L) from which a total of 46.8% of all stone beads from the South area derive; this single context may therefore skew results; 3) late South (phases South.P to South.T); and finally for comparative purposes, 4) the late phases from the North area (North.G to North.I; the earliest North phase, North.G, roughly corresponds to South.N and South.O). The early South phase appears to have the least types of raw materials present and conversely, the late South and late North appear to similarly have a much more diverse raw material assemblage. Although, when we subtract the Building 43 burial from the early South total, we find that the difference between the distributions of raw materials between the early South and late South are much less drastic, although the late assemblages remain much more diverse.

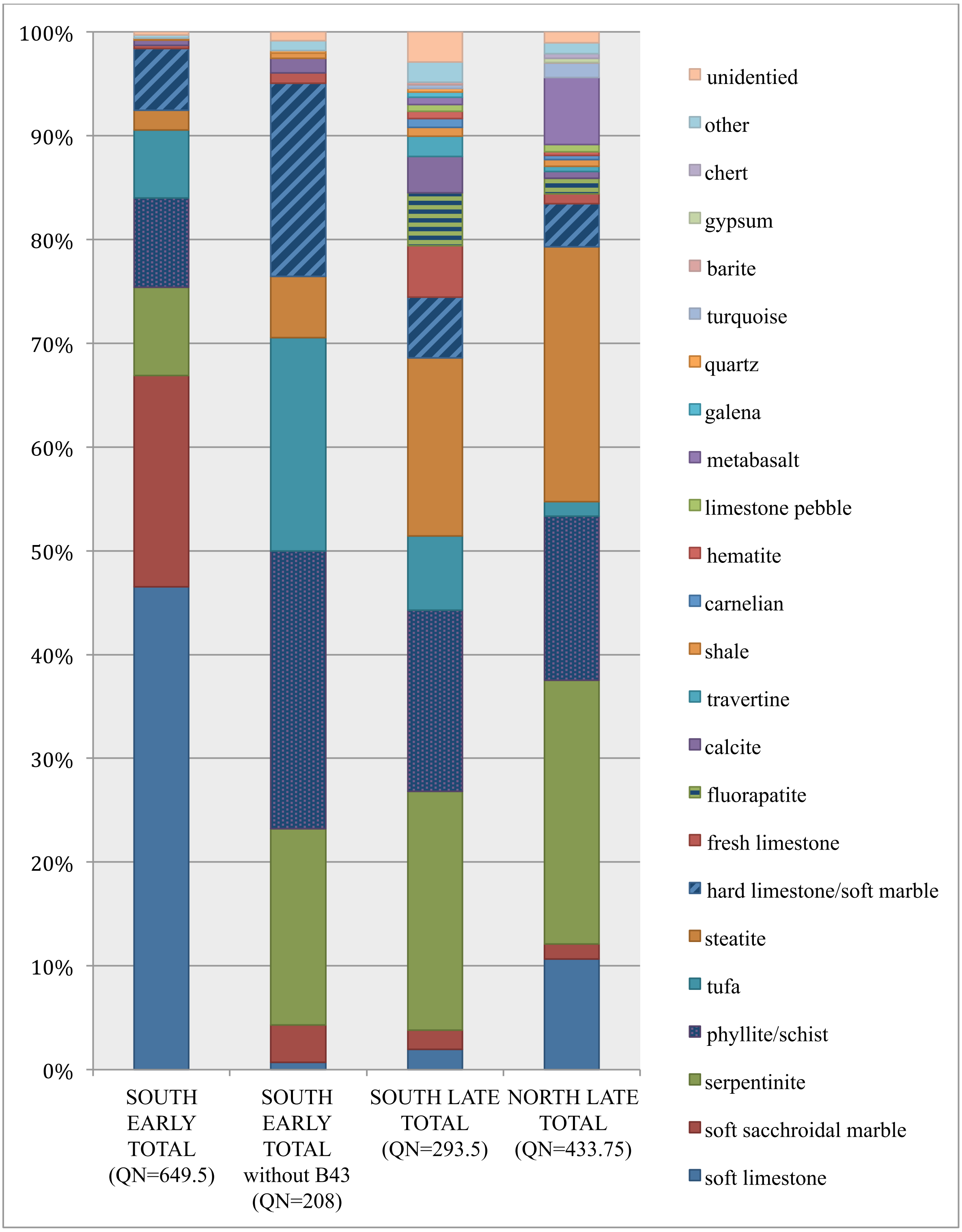


Figure 3.1.3. Percentage distribution of raw materials in the early and late phases of the South area and the late North area phase

The stone bead sample size is substantially smaller in the North area in comparison to the South area. The stone beads from North.G to North.I, which provide a synchronic view of raw material use, are similar to those found in the late South phases, in terms of the distribution of the commonly used raw materials (83.4%) and the proportions of less commonly used materials (Table A3.1.4). In the North area however, we find that the two most commonly found raw materials are serpentinite (25.4%) and steatite (24.6%), as opposed to soft limestone and soft saccharoidal marble in the South area (if we exclude the Building 43 burial, then tufa and phyllite are the most prevalent). Carnelian, hematite, freshwater limestone, travertine, calcite, barite, gypsum, and chert are individually less than 1% of the total assemblage in the North area, yet in total they make up 4.4%. There is also a higher percentage of turquoise in the North area (1.4%) than in the South area (0.1%). The majority of stone beads from the North area are found either in burials from Building 49 (North.G) or from the North.I middens (both contexts make up 83.3% of the North area assemblage). A small percentage of gypsum and chert are only found in the North area and conversely, galena and quartz are only found in the South area. Despite these small differences the late assemblages are quite similar (Table A3.1.6).[5]

In order to better see the shifts in raw material use in stone beads at Çatalhöyük, we can broadly summarize the data within settlement phases (Table A3.1.7; Figure 3.1.4). Figure 3.1.4 illustrates the changes in raw material use within the entire assemblage (North and South area data) over the course of the Neolithic. We can clearly see that in initial levels there appears to be a clear preference for seven main types of raw materials – soft limestone, serpentinite, phyllite, steatite, soft saccharoidal marble, tufa, and hard limestone or soft marble (Figure 3.1.1), but by South.P, we see that more types of stones and minerals are added to the late Neolithic assemblage. The dominant assemblage found in earlier settlement phases also remained prominent in the later phases; however, even preferences regarding the dominant raw materials change. For example, we find that in the earlier phases, steatite and serpentinite is very dark, usually almost dark grey to almost black in appearance, respectively. During the later phases, the steatite and serpentinite that is used tends to place more emphasis on the green-coloured minerals, and is generally greener in colour. This trend begins in South.L onwards. The distribution of raw materials found in the dominant assemblage also changes over the course of the Neolithic; the most marked change occurring with steatite and phyllite (Figure 3.1.4). The use of steatite increases over time whereas there is a decrease in the use of phyllite. Serpentinite at first gradually increases but then remains constant in the later phases. Other materials vary much more. Although beads made from newly introduced raw materials form only a small percentage of the sample, their use demonstrates a widespread shift in preferences and an increased diversification in the exploitation of raw materials over the Neolithic.

If we take into account the disparities in sample size between settlement phases we find that the settlement phases with the highest variability in raw material use are two late settlement phases – North.H and South.T (Table A3.1.7). South.L and North.G appear to have the least variability in raw material use. This can be explained by the fact that both these phases are mostly comprised of rich burials that contain a large number of homogenous beads that make up a necklace or bracelet, for example.

[5] A small percentage of the stone beads (0.8%) are listed under "other" in Table A3.1.5. This category contains raw materials that were not often used as such as an important but unidentified natural metal rich stone, brecciated marble, agate, diorite, meerschaum, biotite, silicified limestone, marl, and olivine dolerite. With the exception of two examples, these raw materials are found in the late Neolithic assemblage and divided between the South and North areas.

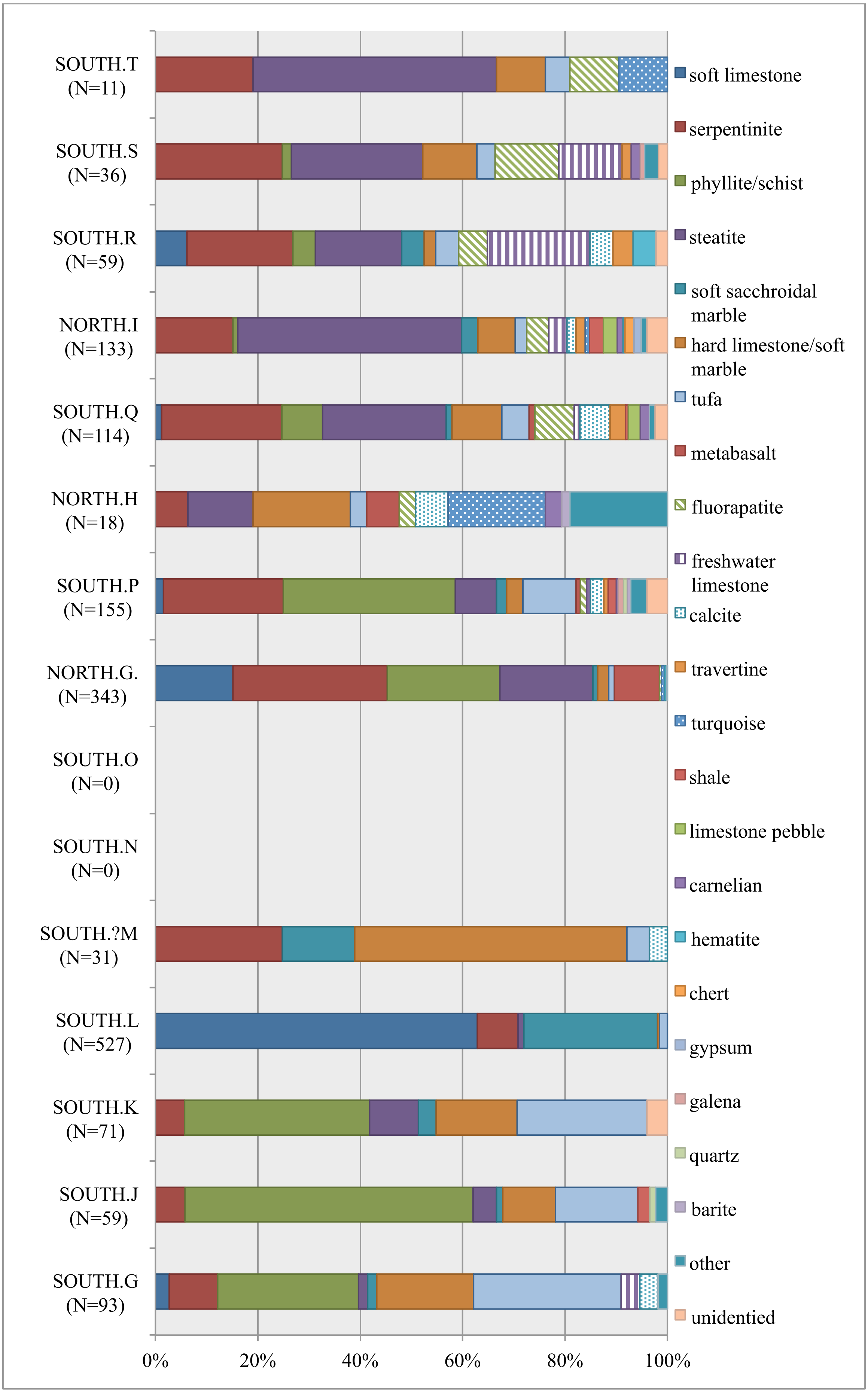


Figure 3.1.4. Percentage frequency of raw materials from North and South areas by settlement phase

The most dominant raw materials found in the assemblage are similar in that they are not very hard according to the Mohs scale of hardness. They generally fall between Mohs hardness 2 to 4, and occasionally 5. These raw materials are tough (or durable) enough to withstand abrasion and perforation, and other manufacturing methods used in stone bead production. They are staples of stone bead production throughout the occupation of the site and one potential reason why they are so widely used may be because they exhibit properties which make them easy to work with in comparison to the other raw materials found at Çatalhöyük which are far fewer in quantity. Many of the variant raw material types are harder and difficult to work with, which may be one of the reasons why they may not have been utilized as much.

Raw material and context

Raw materials were also analysed contextually, in order to determine whether certain raw materials were found or used in one particular context over another. As discussed in the previous chapter, there are seven categories of contexts from where beads are analysed: 1) floors within buildings; 2) on skeletons in burials; 3) within caches, clusters, or placed deposits; 4) middens and external areas; 5) pit, post or bin fills from within buildings; 6) within burial fill; and 7) activity areas and surface areas of external middens. Numbers 4 and 7 both refer to external midden spaces but number 7 specifically deals with areas in middens in which activities such as lime-burning occurred or surfaces of middens which were trampled on by humans.

In regard to raw material usage within these contexts, the most commonly used raw materials in the South area (soft limestone, soft saccharoidal marble, serpentinite, phyllite, tufa, and hard limestone or soft marble) are generally present in most context types, especially floors, middens and burial fill, regardless of whether or not the Building 43 burial data is included (Table A3.1.8). Table A3.1.8 reveals that most raw materials, with the exception of hematite, polished limestone pebbles, gypsum and chert, can be found in external middens, which make up a total of 25.0% of the stone bead sample. The contexts with the least amount of beads are clusters, caches, and placed deposits, pit, post, and bin fill, as well as external activity areas within middens and yards. The majority of beads, however, are retrieved from skeletons (34.3%), but this number is based on one very rich burial from Building 43 in phase South.L. If we omit this burial, we find that external middens contain the most number of beads (47.2%) followed by building floors (22.6%). The presence or absence of the large burial does not affect the contexts with the least amout of beads, their percentages remain low in comparison to the other contexts.

Some observations regarding contexts in the South could be made. The only raw materials found with skeletons in the South area are soft limestone, soft saccharoidal marble, serpentinite, hard limestone or soft marble, calcite, fluorapatite, and hematite (Table A3.1.8). The only examples of hematite in the South area are two pendants found on a skeleton. Remarkably, other commonly used raw materials such as phyllite and tufa are not found on skeletons, they are present within burial fill as are the other commonly used raw materials. Some raw materials that are less common within the stone beads assemblage, such as turquoise and barite, are only found in middens. Galena, quartz, and carnelian are only found on building floors and middens and there is also one example of carnelian within burial fill.

Interestingly, fluorapatite, a bright blue-coloured mineral found only during and after phase South.P, is found in all contexts except for in fills, such as pits, posts or bins or burials.

In the North area, most raw materials are represented within external middens (27.1%), apart from barite, which is only found on a building floor, galena, which is found in a cluster or placed deposit, and metabasalt, which is found on a building floor and within a burial, and post, bin, or pit fill (Table A3.1.9). Although the most types of raw materials are found within external middens, the most number of beads come from burial fill (55.7%).

The most commonly used raw materials are present in most contexts, especially floors, external middens, post, bin, or pit fills, and burial fill. In addition to the most commonly used raw materials, fluorapatite (1.7%) is found in all contexts with the exception of skeletons and activity areas within external middens. A large quantity of metabasalt (6.4%) from burial fill also significantly increases the total percentage within the assemblage. There are fewer burials in the North area in comparison to the South area, but a fragment of a gypsum bead is the only type of bead found on a skeleton. Gypsum itself, however, is also found within external middens. Interestingly, only three raw materials are represented in caches, clusters or placed deposits, and these are fluorapatite, turquoise, and galena. Other less common raw materials such as carnelian are found on building floors and external middens, whereas the only hematite bead fragment is found in an external midden.

We do find some similarities and differences regarding raw materials and contexts within the South and North areas, but many of the sample sizes of certain raw material types are so small that it is difficult to find any patterns. On a more general level, there are more examples of travertine, tufa, and calcite in the South area, whereas there are more examples of chert, gypsum, and metabasalt in the North Area. Less commonly used raw materials, some of which may be deemed as semiprecious today such as carnelian or turquoise, came from long distances to Çatalhöyük (Chapter 4.1) and are more difficult to work with in comparison to the raw materials that dominate the assemblage. These more uncommon raw materials are just as likely to be found on house floors or burial fill as they are in external middens. Fluorapatite in the south area seems to be found in all contexts apart from fills, however this is not the case in the North area. The same can be said for hematite, galena, and barite, three other rare and visually different minerals. They are each found in different contexts within the North and South areas.

Irrespective of whether the Building 43 burial is omitted or not, the context categories with the highest variability of raw materials (including both the North and South area data) are activity areas within external middens and yards and clusters, caches, and placed deposits, and those with the lowest variability are also those contexts with the most beads – external middens, burial fill, and skeletons (Tables A.3.1.10a and A.3.1.10b). If we only look at the number of variants within each context category, external middens always have the most types of raw materials present.

3.1.2. Bead types

The manufacturing process consists of manipulating raw materials into a finished bead or pendant using reduction techniques of chipping and/or abrasion and by also making a perforation, so that beads or pendants could be strung or attached. Stone beads at Çatalhöyük were manufactured into a variety of different shapes and sizes and using a range of manufacturing techniques. So far, 16 major types and 6 subtypes of beads (variations of major types) have been identified, indicating a great deal of variation in bead preferences (Figure 3.1.5 illustrates the 16 major types of stone beads). The typology created to analyse and compare stone beads is of course arbitrary and divisions made today are made simply for classification purposes, and may not necessarily reflect how the Neolithic bead makers and consumers perceived these different types of beads.

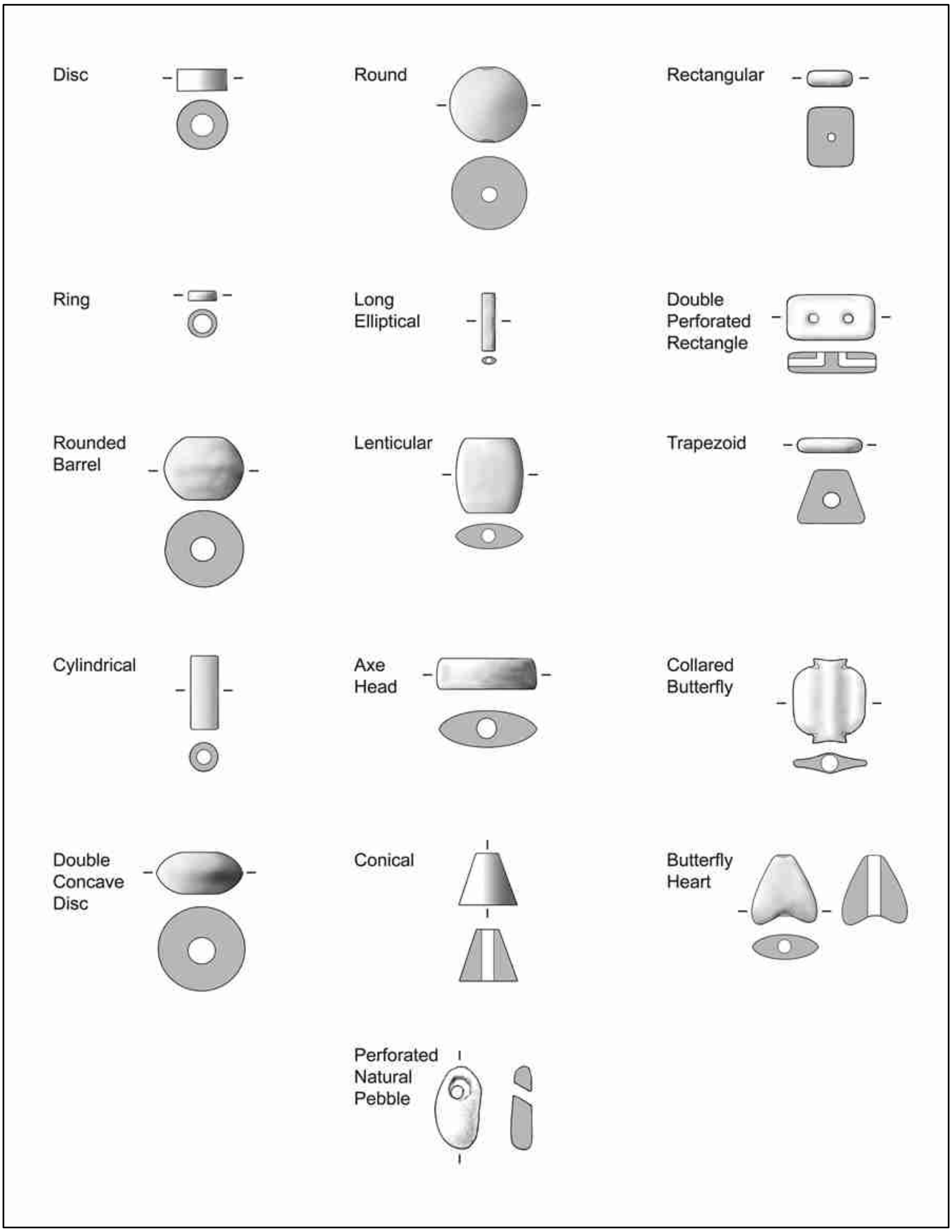


Figure 3.1.5. Çatalhöyük major bead types. Illustration by Lyla Pynch-Brock, Çatalhöyük Research Project

Before the various bead types are described and discussed, basic bead terminology should be addressed. The perforated end of a bead is referred to as the end or face of the bead (Figure 3.1.6). The area between the two perforated ends is called the height or the length of the bead. The edges of the bead are the point where the end meets the height of the bead.

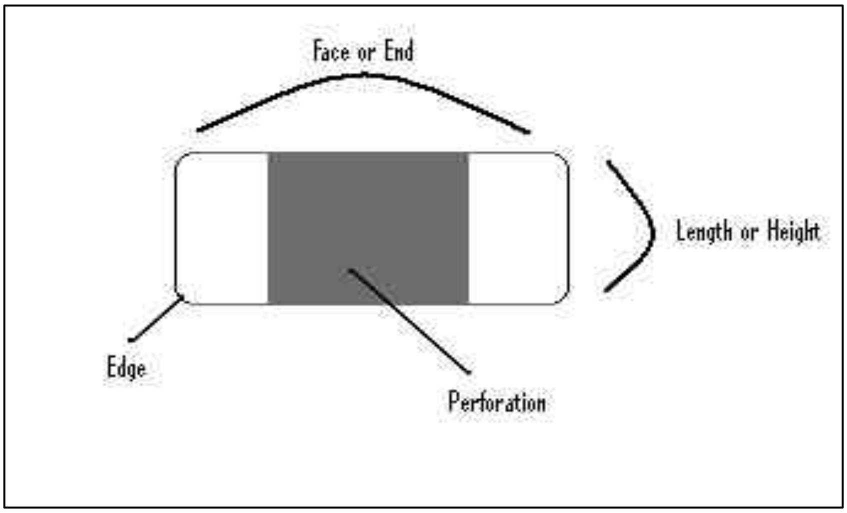


Figure 3.1.6. Diagram of a bead in profile

Types of Beads and their defining characteristics

Disc and ring beads are essentially disc- and ring-shaped beads that are perforated in the centre of their ends, and have a flat end and height (Figure 3.1.5). Disc and ring beads are differentiated by the size of the perforation relative to the diameter of the bead. The perforation of a ring bead is equal to or more than half the diameter of the entire bead, whereas a disc bead is classified by a perforation being smaller than half its entire diameter. These beads are divided arbitrarily, in order to see if any differentiating patterns exist, but they are essentially two ends of a continuum.

Barrel beads have flat, centrally-perforated ends, and rounded heights. There are four types of barrel beads: cylindrical barrel, rounded barrel, barrel disc and barrel ring. Barrel ring and barrel disc beads are essentially ring or disc beads but their height is rounded as opposed to being flat as in disc and ring beads. Rounded barrel beads are basically globe-shaped round beads, but with flat ends (Figure 3.1.5). Cylindrical barrel beads are barrel-shaped but more elongated, so that they have a more rounded cylindrical shape along their height and flat ends (Figure 3.1.7).

Figure 3.1.7. Meerschaum cylindrical barrel bead (16554.H1) from Building 75, South.P

Cylindrical-shaped beads have flat ends with a centre perforation and elongated flat heights (Figure 3.1.5). The perforation can be either small (similar to a disc bead) or large (as seen in ring beads). The height of cylindrical beads is generally at least two times the size of the diameter of the end for the bead to be classified as a cylindrical bead as opposed to a disc- or ring-shaped bead.

A double concave disc bead can be defined as two convex lenses facing each other, forming the height of the bead, but with flat ends and a central perforation (Figure 3.1.5). Double concave disc beads can at times be slightly irregular in shape and are differentiated by the lens or conical shape of the height.

A round bead is perfectly circular- or globe-shaped and has no edges and a perforation right through the centre (Figures 3.1.5 and 3.1.8).

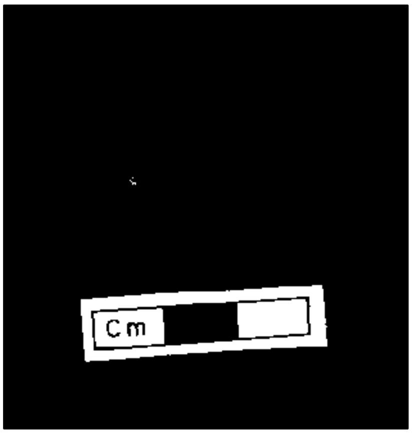


Figure 3.1.8. Two examples of round turquoise beads (10264.X15 and 10264.X17). Photo by K. Wright

The end of a long elliptical-shaped bead is shaped like a lens with a perforation going through the centre and along the height of the bead, which is straight and flat (Figures 3.1.5 and 3.1.9). The height of the bead is also lens-shaped but with more rounded edges. These beads are always long and narrow.

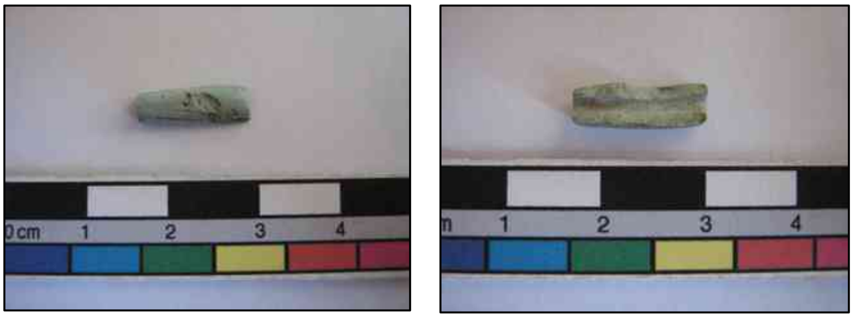


Figure 3.1.9. Long elliptical bead (16570.X1), showing the exterior of its length (left) and the interior (right)

Lenticular-shaped beads have an end that is exactly the same as long elliptical bead (lens shape) but the height is rounded as opposed to being flat like long elliptical bead, and lenticular beads are much wider (Figure 3.1.5). Lenticular concave beads are similar except that they are more rounded and wider in comparison to lenticular beads. The lenticular square bead is essentially the same, but it is slightly squarer in shape along the height in comparison to the basic lenticular bead (Figure 3.1.10).

Figure 3.1.10. Fluorapatite lenticular square bead (16534.H1) found in Space 319, South area

The plano-convex bead and axe head bead are made in a lens shape, basically the shape of the ends of elliptical and lenticular beads (Figure 3.1.5). The difference is that the plano-convex bead has a more plano-convex shape in perimeter (shape along the length of the bead viewed from the end), forming more straight edges at the tips of the lens (Figure 3.1.11), whereas an axe head bead forms an exact lens shape in perimeter (Figures 3.1.5 and 3.1.17).

Figure 3.1.11. Serpentinite plano-convex bead (10829.X8) found on a skeleton in Building 50

Conical-shaped beads are a rounded cone shape but with centrally perforated flat ends, the top end smaller in diameter to the bottom, hence forming the cone shape (Figures 3.1.5 and 3.1.12).

Figure 3.1.12. Broken galena and barite conical bead (16234.H3)

The rectangular bead refers to a flat (small height) rectangular shaped bead with a perforation in the centre of the rectangle (Figures 3.1.5 and 3.1.13).

Figure 3.1.13. Steatite rectangular bead (13140.X13). Photo by K. Wright

The rectangular double perforation bead is also rectangular in shape but it differs from the rectangular bead due to its double perforation. There are four perforations in total (two on the ends and one on either side of the height that converge to form two L-shaped perforations (Figure 3.1.5).

The trapezoid bead is defined as a flat (small height) trapezoid shape with a perforation in the centre of the trapezoid (Figures 3.1.5 and Figure 3.1.14).

Figure 3.1.14. Steatite trapezoid bead (12988.H4). Photo by K. Wright

The next two bead types have similar names but differ in shape. The collared butterfly bead mimics the shape of a butterfly (Figures 3.1.5 and 3.1.17). It has a central cylindrical perforation running down its height and on either side of the perforation are two flattened rounded lenses forming wings. There is also a collared rim forming at each of the ends of the cylindrical tube. The butterfly heart bead is also butterfly shaped with a central cylindrical perforation along its height, although on either side of the central perforation is a rounded semi-heart shape, forming the wings of the butterfly (Figure 3.1.5).

Natural pebbles or stones that were naturally or intentionally perforated also have their own category (Figures 3.1.5 and 3.1.15). It is sometimes impossible to distinguish between pebbles that were naturally perforated to those which were manually perforated due to the properties of the raw material, which is generally limestone or freshwater limestone. These beads are usually irregularly shaped and can be perforated anywhere or even have multiple perforations.

Figure 3.1.15. Freshwater limestone perforated pebble (16536.H3)

Pendants are differentiated from beads by the off-centre position of their perforation (Figure 3.1.16). Within the analyses all beads with off-centre perforations are included as pendants, although one could also argue that more prominent beads such as the butterfly heart, collared butterfly, or even the naturally or manually perforated pebbles can all be categorized as pendants. It is hard to ascertain whether or not the inhabitants of Çatalhöyük made such distinctions but for the purposes of analysis, these categories have been kept separate. This issue will be discussed in greater detail in the next two chapters (Chapters 4 and 5).

Figure 3.1.16. Three examples of pendants: 11315.X4 from Building 42 (left), 14059.X1 from Space 119 (right), South area, and 13127.X6 (bottom) from Space 279, North area. Photo on right and bottom by K. Wright

The Beck typology has been used in a number of bead studies and Table A3.1.11 attempts to convert the bead types stated above into the Beck classification system (1928). His system is very descriptive but too detailed for the beads found at Çatalhöyük. Some of the beads such as the axe head bead or long elliptical bead proved to be too challenging to convert to the Beck system and no equivalent bead or description could suffice in categorizing these Çatalhöyük beads. In fact, only a handful of beads could be easily converted, so the closest possible conversion was made. The bead system created by the author is much simpler and comprehensive, and therefore better suited to the purposes of this study.

Diachronic and synchronic variations of bead types

When examining bead types in relation to other descriptive variables and context, a number of patterns can be observed. All the analyses regarding bead types were conducted on beads which were at least partially complete (half a bead to a full bead) and finished.

In the South area, which provides us with a diachronic view of bead type preferences, we find that the majority of beads are disc- (24.1%) and ring- (58.6%) shaped, and in total, comprise of 82.7% of the stone beads assemblage (Table A3.1.12). Disc and ring beads are the most prevalent type of stone beads within and between the different phases and regardless of whether or not we omit the large Building 43 burial. The third largest category is cylindrical beads which are 2.9% of the assemblage, followed by naturally or manually perforated stones or pebbles which form 2.4%, and the fifth most common bead type in the South area are the axe head beads which make up 1.6% of the assemblage. Of course, if we omit the Building 43 data, we find that there are no more axe head beads in the assemblage and the number of cylindrical beads decreases drastically but are still the third most common bead type, tied with the double concave disc. The dominance of the top three basic bead types is most likely due to the fact that they are the most simple beads to manufacture, can be made in great numbers, and require the least amount of manufacturing steps, especially in comparison to the remaining 10% of beads (Chapter 4.3).

The remaining bead types, individually, only make up 1% or less of the stone beads assemblage. Although we have a total of 16 types and subtypes of stone beads found within all sampled contexts, we find that the manner in which these beads are distributed amongst the assemblage is very similar to raw materials. The main types of raw materials (limestone, marble, serpentinite, steatite, phyllite, and tufa) made up the vast majority. The remaining raw materials were each equal to or less than 1% of the assemblage. Five different bead types make up the vast majority of the sample and the remaining beads appear in very small numbers. In both instances, the majority of beads being manufactured or used are disc or ring beads made from the main types of raw materials. So although there is variation in bead types within the assemblage, it is not evenly distributed.

As with raw material selection, a diachronic view between phases indicates a similar situation in which stone beads from early phases, South.G. to South.K (Table A3.1.12), only feature disc and ring beads. There is a clear period where variations in bead types are first introduced and the socially accepted norm, the standard ring and disc bead, ceases to be the only type. Variant forms of bead types are first introduced in a single burial context in Building 43 in settlement phase South.L (F.1860/unit 10529) (Figure 3.1.17). This context is therefore the earliest example of variation in regard to bead types we have so far. This context includes cylindrical beads, a group of axe head beads, and a single collared butterfly bead. The raw materials used to make these "new" types of beads remain the same as in previous phases, although the steatite and serpentinite used is more green in colour (outcrops with more green minerals within the composition of the stone were chosen), suggesting that the raw materials used to make these variant bead types were deliberately chosen to be different and perhaps bolder.

Figure 3.1.17. Cylindrical, axe head, ring, disc, and collared butterfly beads from burial F.1860, Unit 10529, Building 43, South area

Non-disc and ring bead type variants are introduced in South.L, become more common in South.?M, and continue to be used throughout the occupation of the site. South.L and South.?M both primarily contain beads from burials and may be transition phases in which new bead types are introduced. Perhaps the need for beads to use in burials stimulated the production of new bead types (Chapter 5). The potential transition period was followed by two unexcavated phases, making it difficult to see how this transition occurred. The late phases contain a number of bead types. Taking into account disparities in sample size, if we assess the variability of bead types used throughout the occupation of the South area, we find that there is a gradual increase in variability over the South phases, peaking in the final settlement phase, South.T (Table A3.1.15; Figure 3.1.18). Variability within bead types and other descriptive variables is assessed using the variability index (%) in order to ensure differences in samples sizes are taken into account. The variability index divides the total number of variants by the sample size (for example, with regard to bead types, the total number of bead types within any given settlement phase are divided by the number of beads found within that settlement phase).

The North area provides a more synchronic view of bead types at Çatalhöyük. Beads are concentrated within two buildings (Buildings 49 and 64) and two spaces (Spaces 279 and 226) accounting for 93.3% of the total stone beads assemblage in the North area (Table A3.1.13). Disc and ring beads make up 88.8% of all finished beads, followed by barrel disc and lenticular beads, which are 2.1% and 1.1% of the bead sample, respectively. The remaining bead types individually account for less than 1% of the total sample. In terms of variability of bead types within settlement phases in the North area, North.H appears to have the highest and North.G the lowest (Table A3.1.15; Figure 3.1.19).

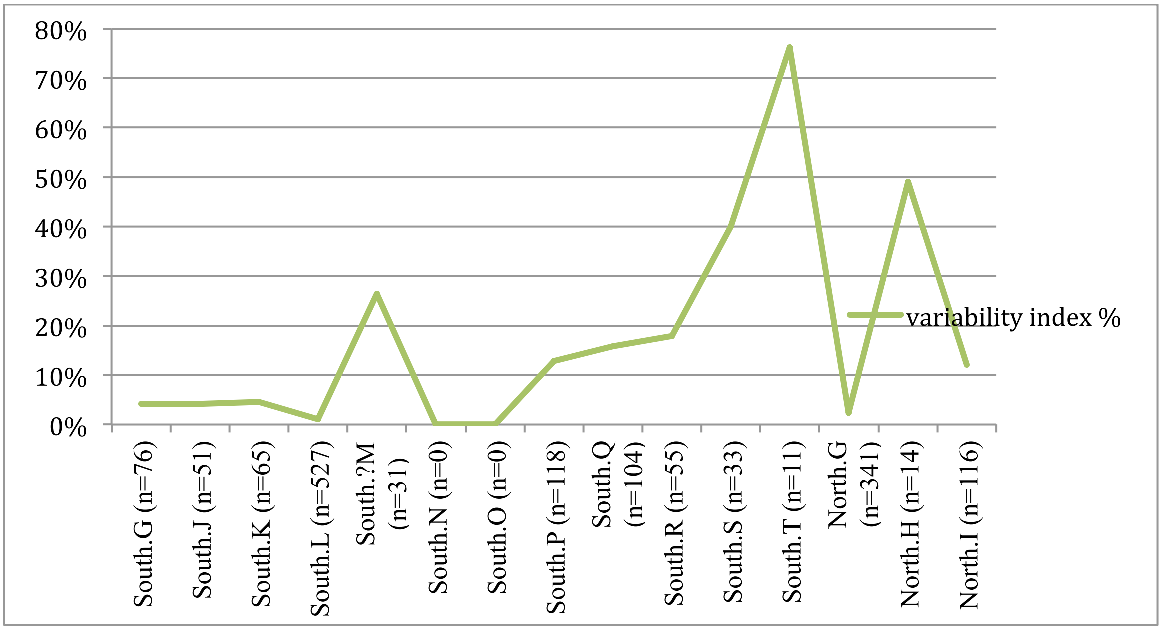


Figure 3.1.18. Variability of bead types found within settlement phases over the course of the Neolithic

By combining the South and North area data (Table A3.1.14), we can identify bead types that are only found in the South area, such as the collared butterfly, butterfly heart, rectangular double perforation, lenticular square, plano-convex, axe head, lenticular concave, and cylindrical barrel. In contrast, the trapezoid and rectangular beads are only found in the North area. The specific contexts in which these beads are found are discussed in greater detail later in this section. Six pendants in total made up only 0.5% of the entire stone beads assemblage. This figure can be combined with the more prominent looking and more varied bead types such as the butterfly heart or collared butterfly beads, which could also be worn as pendants. Regardless, these beads and pendants would still only make up approximately 1% or less of the total stone beads.

Bead type and raw material

A number of observations can be made by assessing bead types according to the raw materials used to manufacture stone beads. The most common bead types are ring and disc beads and both bead types are made from the most number of different raw materials (Table A3.1.16). In Figure 3.1.19 the variability of bead types made from raw materials is compared to the abundance of raw material types. It reveals that although limestone and marble, serpentinite, steatite, and phyllite are the most abundantly used raw materials, we can see preferences for the bead types made from these raw materials. For example, soft limestone and phyllite are quite abundant but show very little variability. In fact, they are only used to make ring or disc beads. In contrast, soft saccharoidal marble, serpentinite, steatite, and hard limestone or soft marble are quite abundant but show more variability than other commonly used raw materials, and used to make a number of bead types. This may be due to an adherence to specific technological traditions or symbolic preferences, but more likely due to the properties of these rocks (for example schistosity, less tough and durable, also too soft) which may make manufacturing more complex bead types more difficult or impossible.

Less commonly used raw materials on the other hand, such as fluorapatite, calcite, travertine, and carnelian are quite rare, but they show a large typological variability (Figure 3.1.19). Fluorapatite beads are never featured as rings or discs; instead they commonly take the form of lenticular (30.3% of fluorapatite), long elliptical beads (15.2%), and rectangular double perforation beads (13.6%). There is single example of a broken carnelian disc bead, but all remaining examples are more variant bead types.

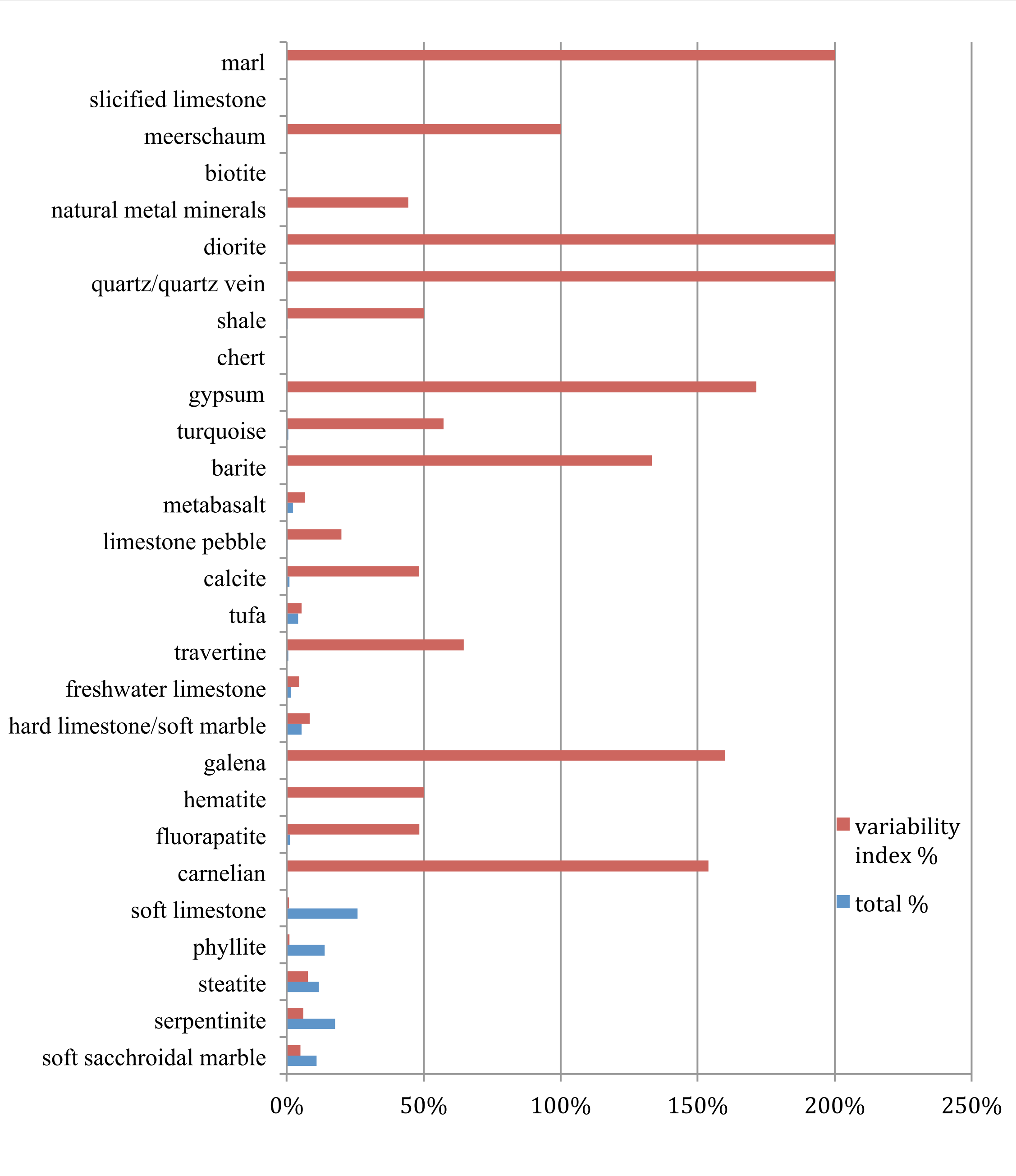


Figure 3.1.19. Variability of bead types within raw materials compared to abundance of raw materials (QN=1307.5)

There are numerous single examples of bead types that can only be associated with a single raw material type. For example, our only example of hematite is of two pendants which are elongated with an off-centre perforation. Freshwater limestone and limestone pebbles are all found in a naturally or manually perforated state, and hence classified as such. The only almost complete and finished example of barite is a conical bead. The only quartz vein to be found is fashioned into a disc bead. The lone diorite example is of a ring bead. The single example of meerschaum is in the form of a cylindrical barrel bead. The only example of a marl bead is in the shape of a rounded barrel. Finally, the one instance of an unidentified naturally metal-rich stone is manufactured into one of only two collared butterfly beads (the other is made from serpentinite). So apart from the quartz vein disc bead, each of these examples of less common raw materials correlates to a more variant (non-disc or ring) type of bead. Similarly, if we study bead types which only appear once, such as butterfly heart, trapezoid, plano-convex, lenticular concave, and long elliptical, each of these is also made from a less common or aesthetically different variation of a common raw material. The butterfly heart is made from a dark red carnelian; the trapezoid bead is made from a green steatite; the plano-convex bead is a green serpentinite; the lenticular concave bead is an orange brown calcite; and final, the long elliptical bead is made from bright blue fluorapatite.

There appears to be a general pattern in regard to the relationship between raw materials and bead types. The more elaborate the bead type, the more colourful or aesthetically different and generally less common the raw material (Table A3.1.16). In both the South and North areas, blue fluorapatite only appears in bead types which are individually made and therefore more labour intensive, such as lenticular, long elliptical, rectangular double perforation, barrel disc, round, rectangular, cylindrical, rectangular, and barrel ring (ordered from greatest to least in regard to presence). The same can also be said for the only other blue coloured raw material, turquoise, which occurs as round, barrel disc, rounded barrel, barrel ring, and conical beads. Not one fluorapatite or turquoise ring or disc bead has been found. Many of the non-disc or ring steatite and serpentinite beads also show similar patterns. The more green the raw material the more likely it is used to produce more varied types. Apart from one small ring bead fragment found in the North area, carnelian beads also follow this pattern. One of the most complex bead types to manufacture is the butterfly heart bead. Our only example of this type of bead is made from carnelian. These preferences could have to do with the properties of the raw material; however, it could be that these beads are made individually and with much more time and effort due to their colour or raw material type (Chapter 4.1 and 4.3).

Bead type and context

Only two types, ring and disc beads, were found in all contexts (Table A3.1.17), once again confirming that ring and disc beads are the universal bead types at Çatalhöyük. Barrel disc beads, which are essentially like disc beads, except that they have a rounded height, are found in all contexts apart from pit, post, or bin fill in buildings. Cylindrical beads are found in all contexts including external middens, although they are not present in any external midden activity areas or surfaces, or in caches, clusters, or placed deposits.

A number of bead types are found only once. The only single examples of lenticular concave, trapezoid, and butterfly heart beads are all found in external middens. The lenticular concave and butterfly heart beads are found in Space 329 and Space 333 respectively, in South area, but the trapezoid bead is found in Space 279 in the North area. There are three examples of rectangular beads in Space 279 in the North area. In contrast, the single example of a plano-convex bead is found with a skeleton, as are the 14 and a half axe head beads. Both examples of the collared butterfly beads are also found associated with burials, one on a skeleton alongside the axe head and plano-convex bead and the other in the burial fill of another burial. Each of these three types of beads are only associated with burials, and specifically with one elaborate child burial (F.1860/unit 10529) in Building 43, in the South area. The second collared butterfly bead is found in burial fill in Building 65, in the South area. Burials and external middens equally appear to contain beads that are less common in terms of bead types and even singular examples of bead types.

The earliest examples of pendants are first found in the late Neolithic. Of the 6 examples of pendants, 3 are found associated with burials, whilst the other remaining 3 are found in external middens. Four were found in the South area (3 in Building 42 burials and 1 in Space 119 external midden) and 2 in the North area, both in external midden Space 279.

In regard to North and South area divisions, a number of bead types are only found in the South area, such as the cylindrical barrel, lenticular concave, lenticular square, butterfly heart, plano-convex, axe head, rectangular double perforation, and butterfly heart, and collared butterfly beads. Only two bead types are solely found in the North area – trapezoid and rectangular beads. These rare bead types correspond to the more variant raw material divisions also found between the North and South areas in Section 3.1.1.

Table A3.1.17 reveals that the context category with the most number of bead types is external middens, skeletons, followed by floors. If we take into account the sample sizes within each context category we find that similar to raw materials, the variability index reveals that external activity areas and caches, clusters, and placed deposits contain the highest variability according to their sample size, whereas both burial contexts, skeleton and fill show the least amount of variability (Table A3.1.17 and Figure 3.1.20). The contexts, which show more variability, do not contain as many elaborate bead forms. For example, caches, clusters and placed deposits contain disc, ring, naturally or manually perforated pebbles and stones, cylindrical barrel, barrel disc, and round beads. If only the variability of elaborate bead types within context categories is assessed, we find that floors and external activity areas contain the highest variability and skeletons and burial fill again show the least variability.

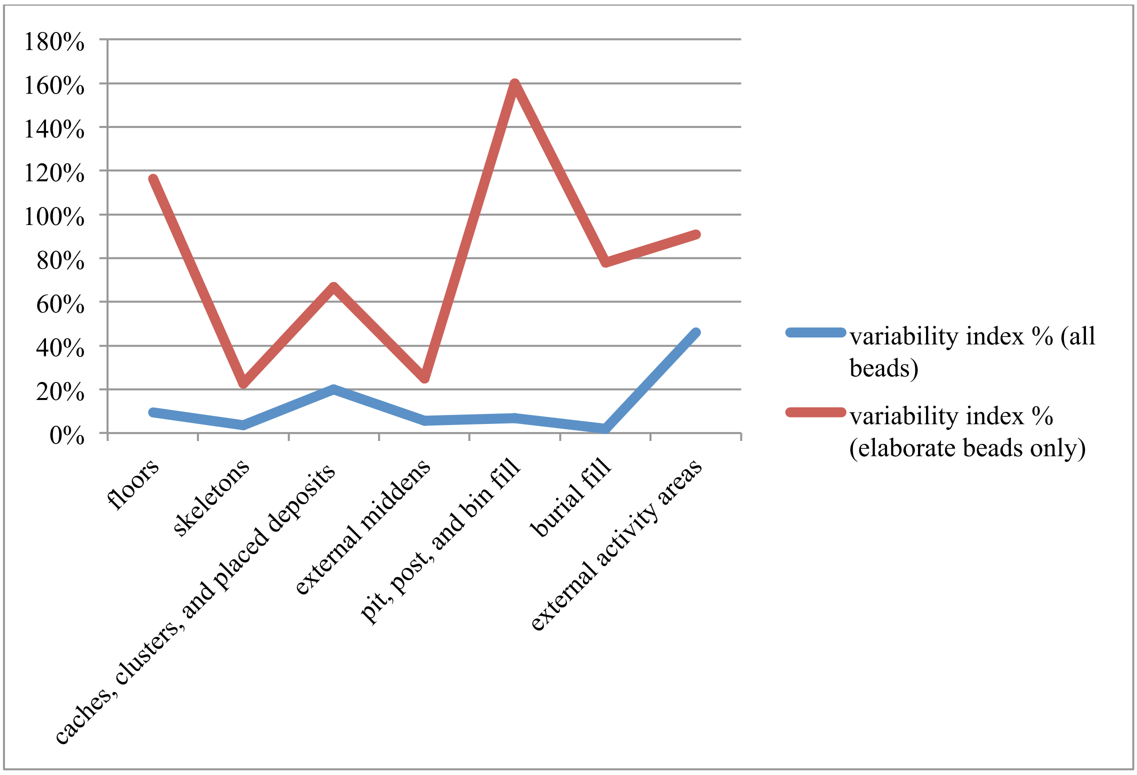


Figure 3.1.20. Variability index of bead types within context categories of all beads and elaborate beads only

3.1.3. Colour

Colour is a direct attribute of the raw materials selected and used in stone bead production. For example, dark grey/black coloured beads are most likely made from phyllite or metabasalt. Soft saccharoidal marble beads are always white or off-white in colour. The raw materials were just as likely, if not more, selected for their colour, as much as their practical and other aesthetic properties. We were introduced to the raw materials used in stone bead production in section 3.1.1 and Table 3.1.18 provides a list of these raw materials and the colours and other aesthetic properties associated with them. This is not an exhaustive list of all the potential colours of rocks found within the natural environment, but instead this lists summarizes the colours of rocks and minerals specifically used at Çatalhöyük for stone bead production.

Rock/ mineral	Colours	Other aesthetic properties
soft saccharoidal marble	off white to white	saccharoidal crystal structure
serpentinite	black with faint to prominent flecks of green, black with green tint, or dark green in colour with prominent flecks or veins of black	smooth texture, polishable, coarse to medium-grained therefore crystals can be seen with naked eye
steatite	black with possible green tint, or various shades of green with or without brownish tint, or beige or brown with prominent green tint	either a waxy, pearly, or greasy texture
phyllite	dark grey to black, or dark grey with green tint	micaceous sheen, fine-grained, and finely-laminated
carnelian	dark red/brown to orange/red	vitreous to waxy texture, transparent or translucent
hematite	metallic grey	metallic lustre
galena	metallic grey	metallic lustre
hard limestone/ soft marble	white or beige or beige/pale pink or pale pink/brown or pink/brown or dark red/brown	smooth and polishable, fine-grained
freshwater limestone	beige	fine-grained, naturally perforated
fluorapatite	bright blue or blue/green or blue/grey or pale blue or pale green	smooth, sometimes slightly banded
travertine	beige or banded beige or banded beige and brown or off-white	banding, smooth fine-grained texture
tufa	dark pink/brown or dark red/brown or pale pink/brown or pink/brown	fine-grained and smooth texture
calcite	white or orange or yellow or green	smooth, translucent or transparent, with vitreous or pearly or dull lustre
limestone pebble	beige or light grey	smooth, naturally or manually perforated
metabasalt	black or dark grey	very fine-grained
barite	white	saccharoidal crystalline structure, translucent with pearly lustre
turquoise	blue/green or bright blue	smooth texture, vitreous or dull lustre
gypsum	off white or white translucent or beige/brown	translucent with either pearly or dull lustre
chert/flint	red/brown or yellow/brown	smooth, siliceous with greasy lustre
soft limestone	beige or beige and light brown or brown or beige/pale pink or dark red/brown or pale pink/brown or pink/brown	fine-grained and chalky texture
shale	black or dark grey/black or black/brown	slight micaceous sheen, fine-grained and finely-laminated
quartz/ quartz vein	brown or black (vein) and beige	smooth, siliceous, and translucent
diorite	grey/green or green and brown/grey	medium-grained, polishable, can see individual minerals
natural metal rich stone	metallic grey	metallic lustre
biotite	black and brown	metallic lustre
meerschaum	off white with dark inclusions	smooth texture
olivine dolerite	dark green and light green	siliceous with waxy lustre
marl	grey/green	fine-grained and chalky texture

Table 3.1.18. Summary of colours and aesthetic properties of raw materials used to make stone beads at Çatalhöyük

It is very difficult to ascertain exactly how the Neolithic inhabitants of Çatalhöyük perceived colour, and what these colour preferences meant to them. In this study, colour has been categorized and differentiated according to the author's cultural perception.[6] So although the author differentiates between blue and green, or even dark grey and black, it is entirely possible that these same distinctions may not have been made at Neolithic Çatalhöyük. Taking this into account, all analyses regarding colour were conducted at two distinct levels, one detailed, differentiating between for example the various tints and shades of blue, and the other grouping the colours into broader colour categories, for example all forms of blue under one category (Table 3.1.19). The results from both levels are also compared to see if the summarized results reflect the detailed results and vice versa. These divisions are of course solely arbitrary and serve to categorize colour as efficiently as possible and correlate colour with the other qualitative variables.

Colour (detailed)	Colour (group)
white	whites to beiges
beige	
beige/brown/green with some black	
black	blacks
black with green tint or flecks or veins	
dark grey/black	
light to dark brown	browns
brown/black or brown/grey	
brown/green	
light to medium grey	greys
grey/green	
pale to dark blue	blues
blue/green	
green	greens
pale green	
dark red/brown	reds to pinks
red	
pale pink/brown	
pink/brown	
pale pink/beige	
yellow	yellow
orange (pale to dark)	orange
metallic	metallic

Table 3.1.19. Detailed and summarized or grouped categories of colour

When assessing colour, both finished and unfinished, and fragments and whole beads were analysed. Some stones are comprised of two or more colours, usually due to the individual minerals that form the stone. These stones were quantified by dividing the quantitative number amongst the colour so that for example one whole barite and galena bead (QN=1) was divided between white (QN=0.5) and metallic (QN=0.5). Colours that are divided by a forward slash are predominantly the first colour with an underlying tone of the second colour.

[6] Initially, the Munsell rock colour chart was used to classify colours into colour categories. This system proved to be difficult as sometimes the closest match on the colour chart was very different. Upon much frustration, the chart was abandoned a new colour classification system was devised.

Diachronic and synchronic variations in colour

In the South area, the detailed colour analysis reveals that in terms of sheer quantities, the most common colours are pale pink/beige (32.3%), followed by white (18.7%), and then dark grey/black (11.1%) (Table A3.1.20). The majority of pale pink/beige coloured beads are essentially derived from one context, burial fill in Building 43 in South.L. If disregard this burial, we find that dark grey/black (20.7%), black with green (12.4%), white (10.4%), and red/brown (10.3%) are the most prevalent colours in the assemblage (Table A3.1.20). In addition, six colours make up less than 1% of the assemblage, and these are green, true red, yellow, orange, metallic, and beige/brown/green with black.

With or without the large burial, if we group the individual colours into more general colour groups, the South area data once again confirm that the most commonly found colours are reds to pinks (41.9%), blacks (24.4%), and whites to beiges, (20.9%), which when combined, these form 87.2% of the assemblage (Table A3.1.21). Browns (4.6%), greys (3.4%), blues (2.4%), and greens (1.9%) are each less than 5% of the assemblage, and metallic, orange and yellow together once again make up less than 1% of the assemblage combined.

The most prevalently found colours (red to pinks, blacks, and whites to beiges) of course correspond to the most commonly used raw materials discussed in Section 3.1.1. In contrast, the least commonly found colours are associated with more uncommon raw materials such as carnelian and chert.

In the late phases of the North area, according to the detailed colour quantification, the most common colours are black with green (24.9%), black (13.9%), and the third most common colours, green (11.0%) and pale pink/brown (11.2%), are almost equally proportionate (Table A3.1.22). In contrast to the South area, there are far more colours which individually represent less than 1% of the assemblage, such colours include light to medium grey, blue/green, dark red/brown, pale pink/beige, yellow, orange, metallic, and beige/brown/green with black.

If we place the individual colours into groups we find that the five most common colours in the North area are blacks (45.5%), reds to pinks (14.5%), browns (13.6%), greens (10.4%), and finally whites to beiges (8.3%) (Table A3.1.23). Like the South area, blacks and reds to pinks are found in higher numbers, although this does seem to be the case for white to beige coloured beads.

Both the detailed colour and the grouped colour quantifications revealed similar results when the North and South area data is combined (Tables A3.1.24 and A3.1.25). When colours were put into groups, reds to pinks (33.5%), blacks (30.9%), and whites to beiges (17.0%), were the most predominant colours (Table A3.1.25). In terms of colour presence between buildings and spaces, yellow and orange coloured beads are concentrated in a small number of contexts, but the rest of the colours are distributed throughout a number of buildings and spaces (Table A3.1.24).

In order to see changes between settlement phases, both Tables A3.1.25 and A3.1.26 indicate a clear pattern. During the earliest settlement phases South.G to South.M, there is an absence of green, pale green, pale to dark blue, blue/green, red proper, yellow, orange, and metallic coloured beads. There are, however, two exceptions. There are 3 green coloured beads in a burial in Building 50, phase South.?M and there are black and green serpentinite beads in the large burial in Building 43, South.L. After South.L or South.?M, we have an absence of data from two phases, South.N and South.O, but in South.P, we find a major change in the assemblage. During South.P we find that colours that were previously absent are now a part of the assemblage, and although they may not be the most commonly used colours (reds to pinks, blacks, and whites to beiges are prevalent throughout the phases and the span of occupation) they form a consistent presence during the Late Neolithic at Çatalhöyük (Figure 3.1.21). This scenario is very similar to what we saw with the raw materials and the use of more variant bead types. We find that in each case, there came a time when the early Neolithic bead making repertoire underwent substantial changes widening the use of raw materials, bead types, and colours.

Specifically, over the course of the Neolithic, we find a decrease in red to pink coloured beads in the assemblage, and a slight increase in brown coloured beads. The other colour groups remain more or less constant, especially in the late phases of the Neolithic.

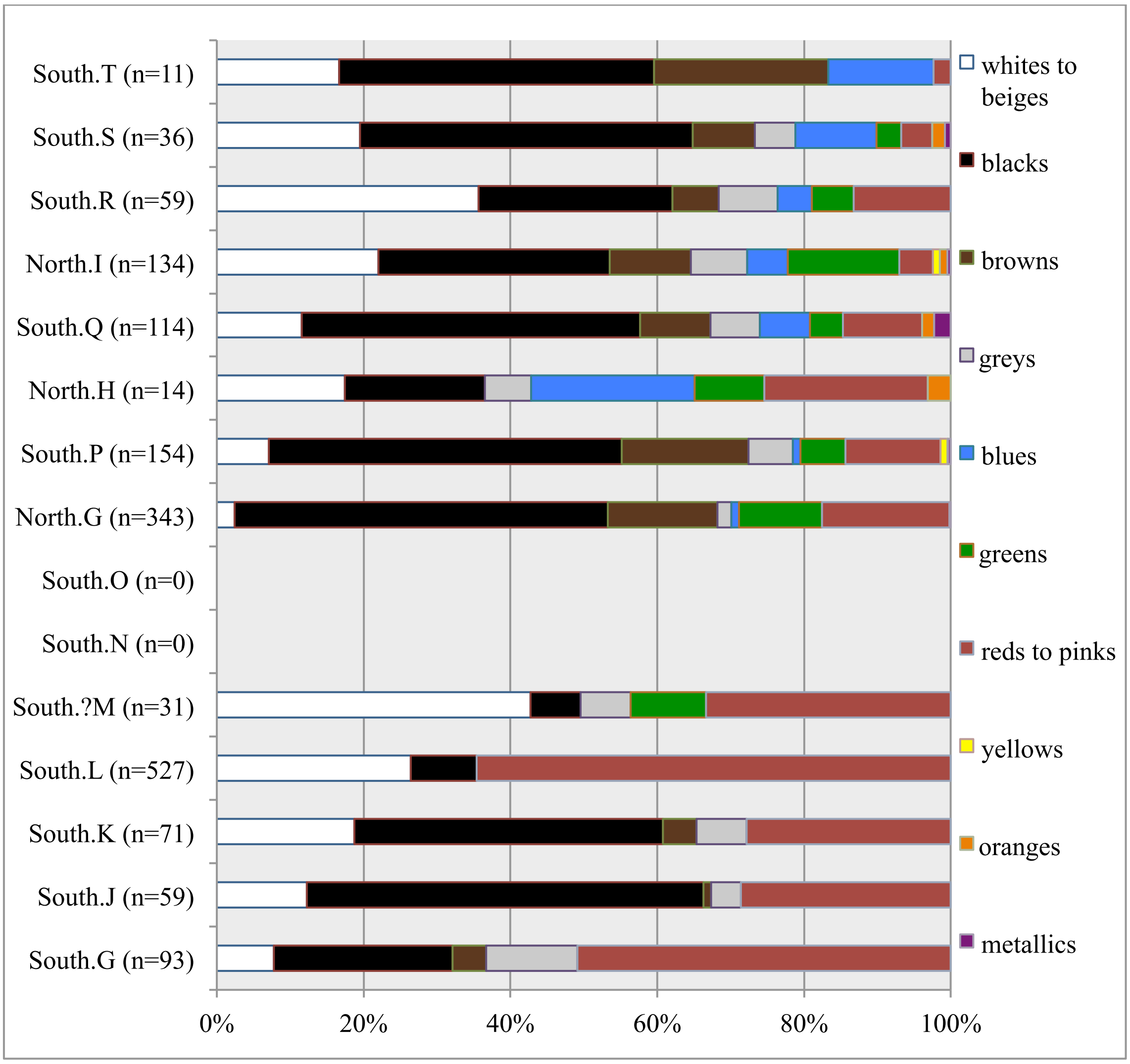


Figure 3.1.21. Percentage distribution of colour groups used in the North and South areas over the span of the Neolithic (QN=1384)

If we only observe the late Neolithic, and combine the North area data with that of South.P to South.T (Table A3.1.27), the detailed colour quantification reveals that black with green (20.5%), black (14.2%), and dark grey/black (9.6%) are the most prominent colours, followed by green (7.2%), pale pink/brown (7.2%), and white (6.5%). Surprisingly there are an equal number of green and pale pink/brown beads, moreover, there are more green coloured beads than white beads. Black beads are much more prevalent in the late Neolithic, which is compatible to the results from the North area. This is also reflected in the results when colours are grouped together (Table A3.1.28). Black (44.3%) coloured beads make up the vast majority, followed by brown (13.1%), red to pink (12.9%), and white (10.6%) coloured beads. If we were to group blue and green coloured beads together, they would be the third most common coloured beads in the late Neolithic, after black and brown, which is an interesting notion, as these colours are related and both introduced during the late Neolithic.

Colour and Bead type

Reds, blacks, and whites to beiges, which correspond to the most commonly used raw materials, are the most prevalently used colours in stone bead production and these colours remain prevalent during the duration of the Neolithic. In order to compare colour and bead type more accurately, only beads which were at least partially complete (half fragment to full bead), and finished (in final form of production), were analysed.

Given that the overwhelming majority of beads are ring beads and disc beads, these two bead types contain the highest variation of colours. All colours with the exception of blue/green, pale green, yellow, and metallic are used to make ring beads (Table A3.1.29). Disc beads are made from all colours except for blue/green. Cylindrical beads are the next most common bead types but only blues, greens, blacks, or whites are used to make them. Interestingly there are no red to pink coloured cylindrical beads, despite reds to pinks being such prominent colours in stone bead manufacture (Table A3.1.30).

There are some examples of bead types that are only made in certain colours; many of these, however, are only single examples that only occur once in the assemblage. The single example of the carnelian butterfly heart bead is dark red/brown. The only trapezoid bead and plano-convex beads are green in colour. There are two examples of the collared butterfly bead, one is black with prominent green flecks and veins, the other is grey/green in colour. There are two and a half long elliptical beads, and they are only pale to dark blue in colour and always fluorapatite. Round beads are only found in black, green or blue. Lenticular concave beads are blue or orange. Lenticular square beads are either white, black with green flecks or veins, or blue/green in colour. Axe head beads are only white or black with prominent black flecks and veins. Rectangular double perforation beads are pale green or pale to dark blue. In this long list we see a repeated pattern. It appears that more variant and less common bead types (non-disc or ring) are also found in more variant and less common colours. The colours black, white, and red are still a part of the assemblage, but may be more special, such as the black veins and flecks in the green serpentinite beads or that the white axe head beads are only made from soft saccharoidal marble where you can see the shiny sugar-like crystalline structure.

Pendants are white, black, brown/green, grey/green, yellow, and metallic (Table A3.1.29). Aside from the colours black and white, the remaining colours form approximately 2% or less of the assemblage. This suggests that pendants were made using less common colours, and moreover, if we account for larger beads mentioned in the previous paragraph as potential pendants, then this statement still rings true.

With regard to the variation of bead types within grouped colours (Table A3.1.30), we find that disc and ring beads are present in the most colour categories. The single examples previously mentioned are of course found in the least colour categories. If we look at individual colour groups, such as blue, we find that only one of over 20 beads are ring or disc beads, but an overwhelming 95.1% of blue coloured beads are less common bead types. In contrast, in the green colour group, 79.8% of green beads are disc or ring beads, and the remaining are less common forms. In the metallic colour group, however, there are two pendants and only a half a disc bead. There is one yellow pendant but half a disc bead. In the orange bead group, 68.3% of beads are non-disc and ring beads. Apart from the green colour group, the rest of the less common colour groups also suggest that they were used to make less common bead types.

Colour and context

The contexts which contain the highest number of colour categories are house floors and external middens (Tables A3.1.31 and A3.1.32). This may be reflective of the refuse from buildings, which is later deposited in the external middens. Floors do not contain any blue/green coloured beads and middens do not have any true red coloured beads, but they contain all other colours. If we take into account sample sizes, we find that as with raw materials and bead types, the contexts with the highest variability are external activity areas and yards as well as caches, clusters, and placed deposits.

Similarly, as previously found, the contexts with the lowest degree of variability are skeletons and burial fill. This limited choice in colours may indicate burial preferences in terms of adornment. The only colours used on skeletons are white, black with green flecks, veins, or tint, grey/green, green, pale to dark blue, pale green, pale pink/beige, and metallic. Apart from white, pale pink/beige and black with green flecks, veins, or tint, most of these colours are less common within the stone beads assemblage, and therefore their presence within a secure burial context suggests that beads with less common colours were more likely to be used in burials than other contexts, or even that deliberate choices in colours were made in one context over others.

Figure 3.1.22 demonstrates that contexts that contain the most abundant amount of beads generally have the least amount of variability due to their large samples sizes.

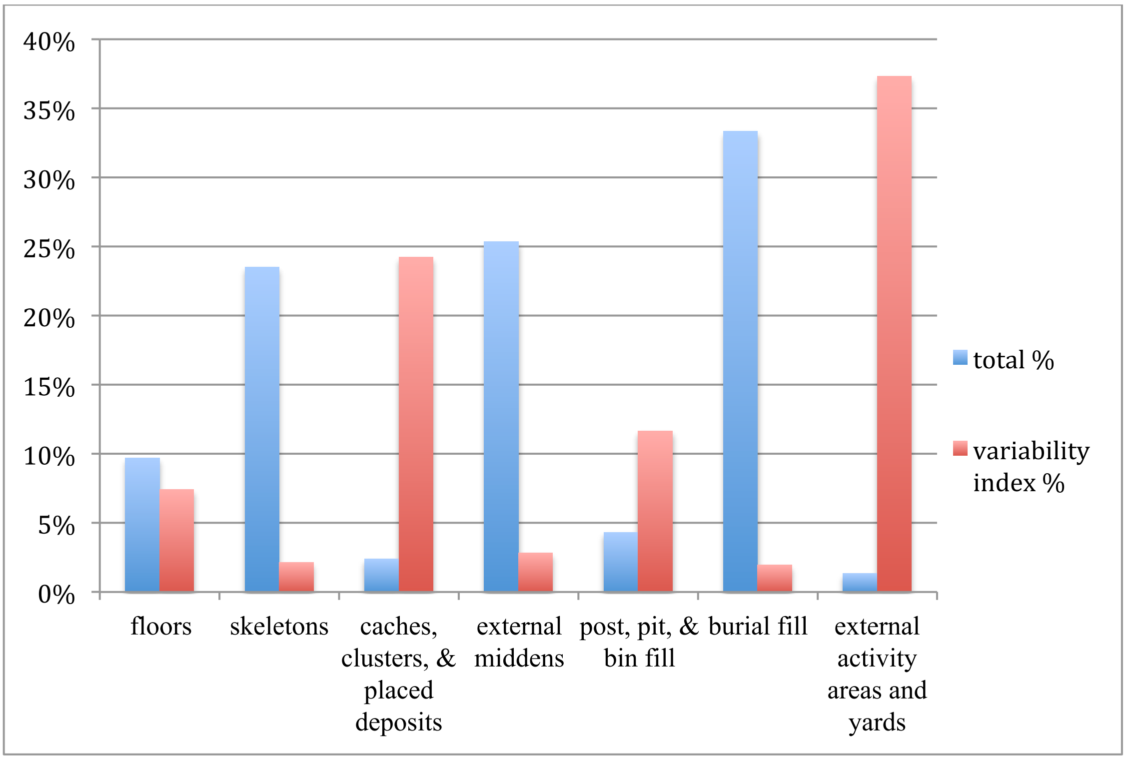


Figure 3.1.22. Variability of colour groups compared to the abundance of beads in contexts (QN=1386.5)

If we look at individual colour categories, we find that only three colours are found in all types of contexts – white, black with green, and pale to dark blue (Table A3.1.31). It is surprising that pale to dark blue beads are such a small proportion of the assemblage but they are found in all the different context categories. A small number of colours are only found in certain contexts, for example a lone red carnelian fragment is found on a building floor. Blue/green beads are found in middens and burial fill. The colour yellow is found on house floor and middens. Because they are such limited amounts of these colours, no real correlations can be made.

Many of the colours are also found in all types of contexts with metallic, orange, and yellow being found in the least number of contexts. No real patterns can be observed when we combine colours into broader groups. Just over 70% of reds to pinks are found in burial contexts (both skeleton and fill). Other less common colours, such as blues, seem to have no significant contextual relationship either although the majority do seem to come from middens.

3.1.4. Size

All finished stone beads, which were at least a half fragment to a full bead, were measured and placed into numerical size categories from 1 to 20. This system was devised in order to make bead measurement in the field easier, as well as to organize, analyse, and quantify sizes with much more simplicity. The goal of analysing size as a qualitative variable was not to measure each surface of the bead, but to account for general visibility by determining whether different beads were smaller or larger in size to the average size and whether size was affected by raw material, bead type, colour or context. Each size represents regular increments of 2.4mm after the first of 2.5mm, so that for example bead size 1 is 0-2.5mm in diameter, or across the longest or widest surface, and size 2 beads are 2.6 to 5.0mm (Table 3.1.33). The longest or widest surface of a disc bead would be the diameter of its ends (the sides which are perforated) and a long elliptical bead would be measured along the length of its height (area between perforated ends). Size categories 1 through 10 are individually presented although size categories 11 to 20 have been grouped together to form a single size category essentially representing beads which are a lot larger than average. Figure 3.1.23 illustrates the relative differences in size from smallest size (size 1) to largest sized beads (sizes 11 to 20). Beads categorized as indeterminate in size are finished and at least half fragments, but their size is still undeterminable.

Size Category	Measurements (mm)
1	0 – 2.5mm
2	2.6 – 5.0mm
3	5.1 – 7.5mm
4	7.6 – 9.0mm
5	9.1 – 11.5mm
6	11.6 – 13.0mm
7	13.1 – 15.5mm
8	15.6 – 17.0mm
9	17.1 – 19.5mm
10	19.6 – 21.0mm
11-20	21.1 – 43.0mm

Table 3.1.33. Summary of size categorizes and their corresponding measurements

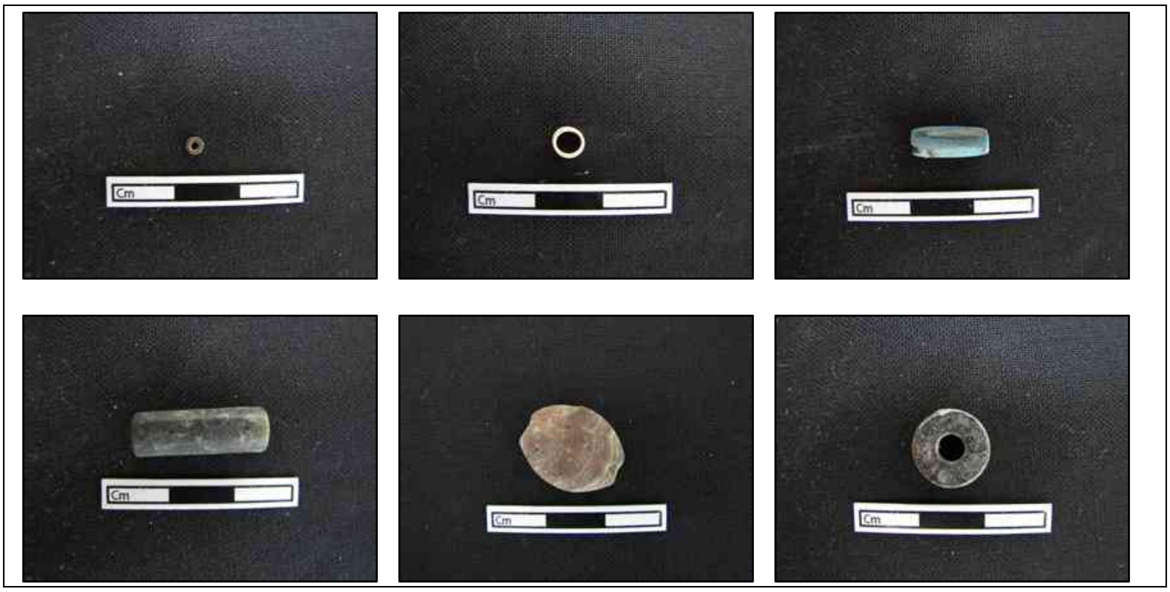


Figure 3.1.23. Examples of stone beads from size 1 to 11 to 20 (clockwise from left), taken from set distance on tripod using the same scale

Diachronic and synchronic variations in Size

In the South area, more than half the beads are size 2 (52.8%), followed by sizes 3 (14.6%) and 1 (14.1%), which are approximately represented equally, forming 81.5% of the total South area assemblage (Table A3.1.34). The majority of beads are therefore 0mm – 7.5mm in size. In terms of actual measurements, however, the smallest measuring bead is a ring bead, which is 2mm in diameter. A more accurate reflection of measurement would therefore be that 81.5% of beads in the South are 2mm – 7.5mm, and sizes 1 to 3 are the most common sizes. If we omit the large burial in Building 43, we find that size 2 is still the most abundant (37.2%), but the proportion of size 1 beads double to 28.5%, but size 3 beads remain at a similar proportion (15.9%).

As with the other qualitative variables, raw material, bead type, and colour, there are also obvious changes through time in terms of bead size preferences. A frequency distribution histogram reveals that in both the early and late phases of the South area, most beads (mainly ring and disc beads) fall into the size 2 category (Figure 3.1.24). In the late South assemblage, there are far more larger sized beads, and the largest sizes, sizes 10, and 11 to 20 only appear in the late phase.

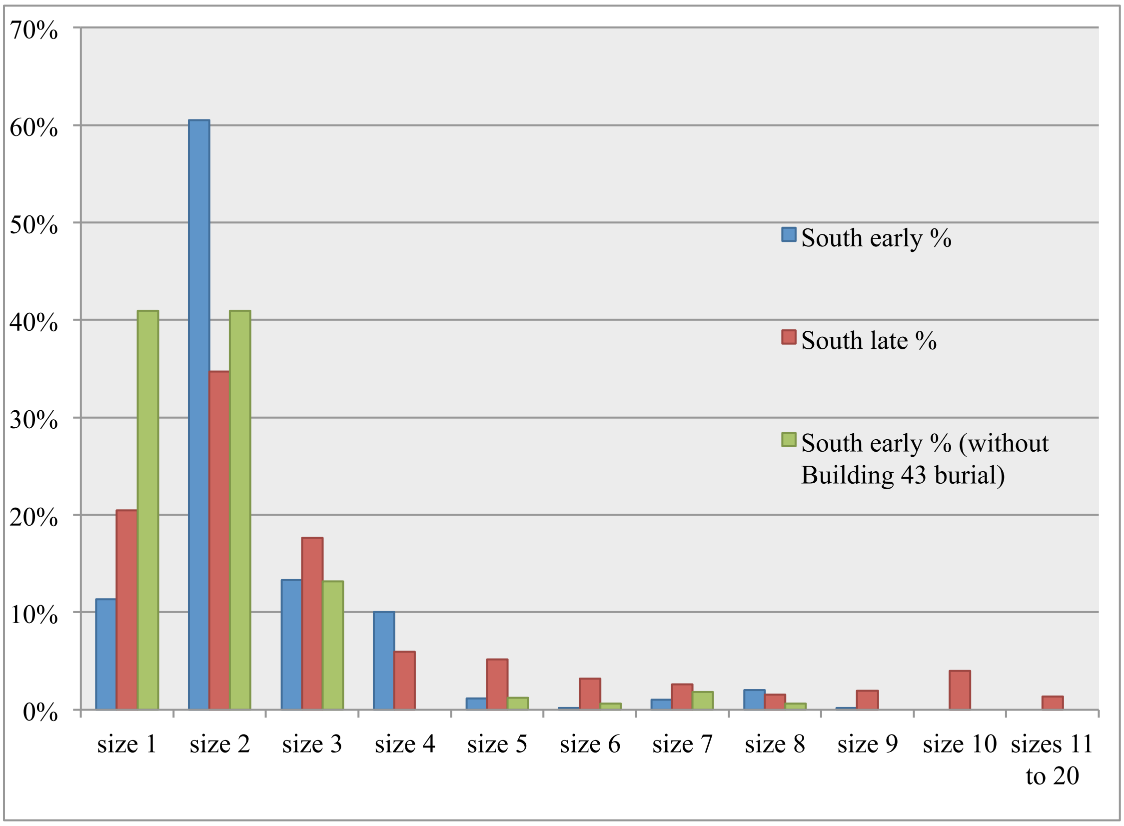


Figure 3.1.24. Frequency distribution of bead sizes within the South area, comparing the early and late assemblages

In South.L, we find that there is a significant change in not only the most common bead size, but also the number of size categories increase, so that beads now appear in a more variety of sizes than previously seen in South.G to South.K (Table A3.1.34). Two buildings in South.L, Buildings 43 and 50 are the first contexts in which sizes other than 1, 2, and 3 are present in significant numbers. Within both buildings, these beads, which are between sizes 4 and 9, are found in burial contexts, which feature newly introduced bead types that are not disc or ring beads. These new bead types include cylindrical, lenticular, axe head, and collared butterfly beads.

In South.N and South.O we have an absence of data due to a lack of excavation, but from South.L, South.?M, and on to South.P and owards, we find that the previously most common size of size 1 in South.G to South.K, is replaced with size two (Figure 3.1.26). It is not until South.P that we find a bead that belongs to the largest size category of 11 to 20. This is the half fragment of the butterfly heart bead in external midden Space 333.

The North area represents a synchronic view over just a few phases during the late Neolithic. The results from the North area are concentrated over only a select number of contexts that have a concentration of beads. The majority of beads are size 2 (54.7%), followed by size 1 (21.8%), and finally size 3 (10.8%), which differs from the South area where we find the second and third most numerous types of beads are approximately equal (Table A3.1.35 and Table A3.1.34). Another surprising difference is that within all the buildings and Space 90 in the North area there are no beads greater than and including size 6, although there are numerous examples in Spaces 279 and 226 (external middens) in North.I. Figure 3.1.25 compares the size distributions between the North area and South late assemblage. On the whole, the late assemblages are similar but there are far more size 2 beads in the North area, most likely due to a rich double burial found in Building 49, in North.G, which slightly skews the data.

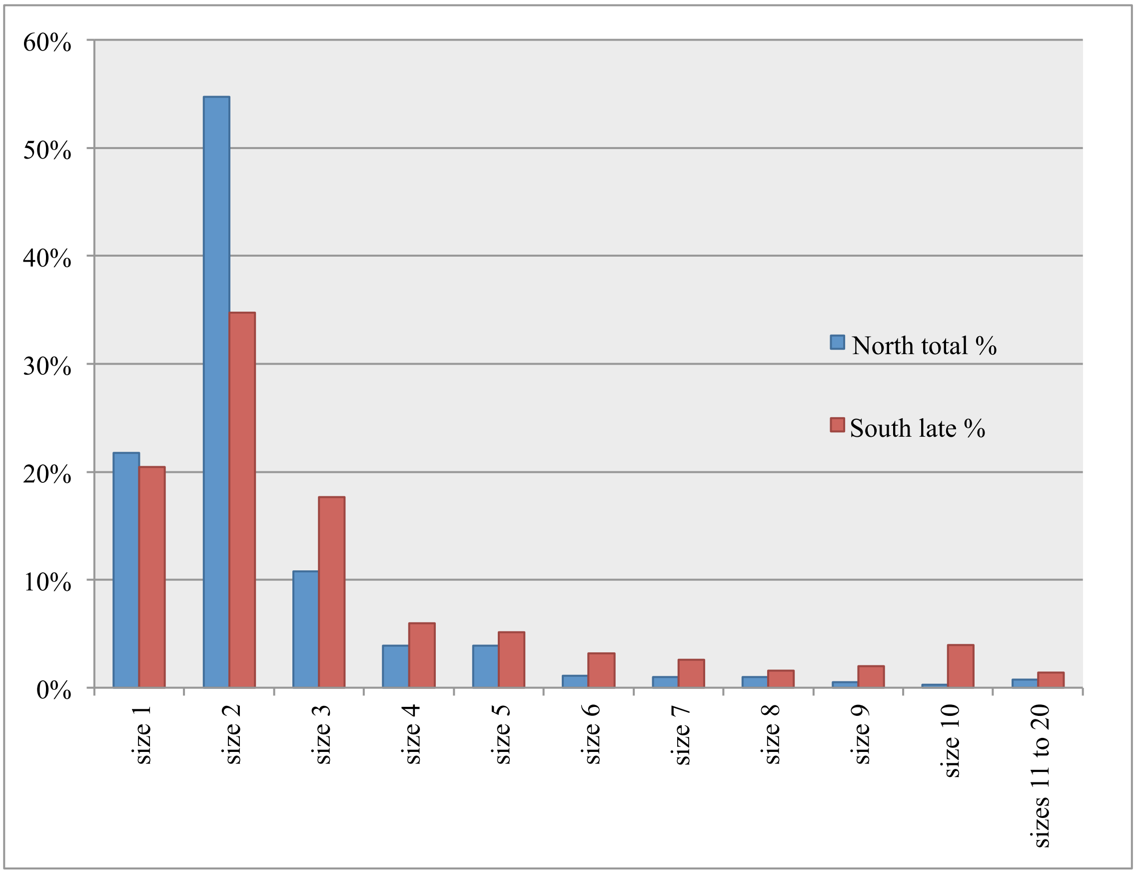


Figure 3.1.25. Frequency distribution of beads according to size in the North area and the contemporary later phases of the South area

The settlement phases which had the most variability within their sample size were all from the late Neolithic – South.T, North.H, and South.S, although two of these phases do not contain any beads that are size 6 or above (Table A3.1.36). The two phases with the least amount of variability were North.G and South.L. This could be explained by the fact that both these contexts contain large burials that show very little variability and are comprised of many beads, but most of these are quite similar.

Preferences in size do indeed change over the course of the Neolithic. The greatest change occurs in South.L where we find that the majority of beads which were previously very small (size 1) are now slightly larger (size 2), and moreover, a number of larger sized new bead types (non-disc and ring) are introduced in burial contexts (Table A3.1.36 and Figure 3.1.26). Late Neolithic phases tend to show more variability in bead sizes in relation to their sample sizes.

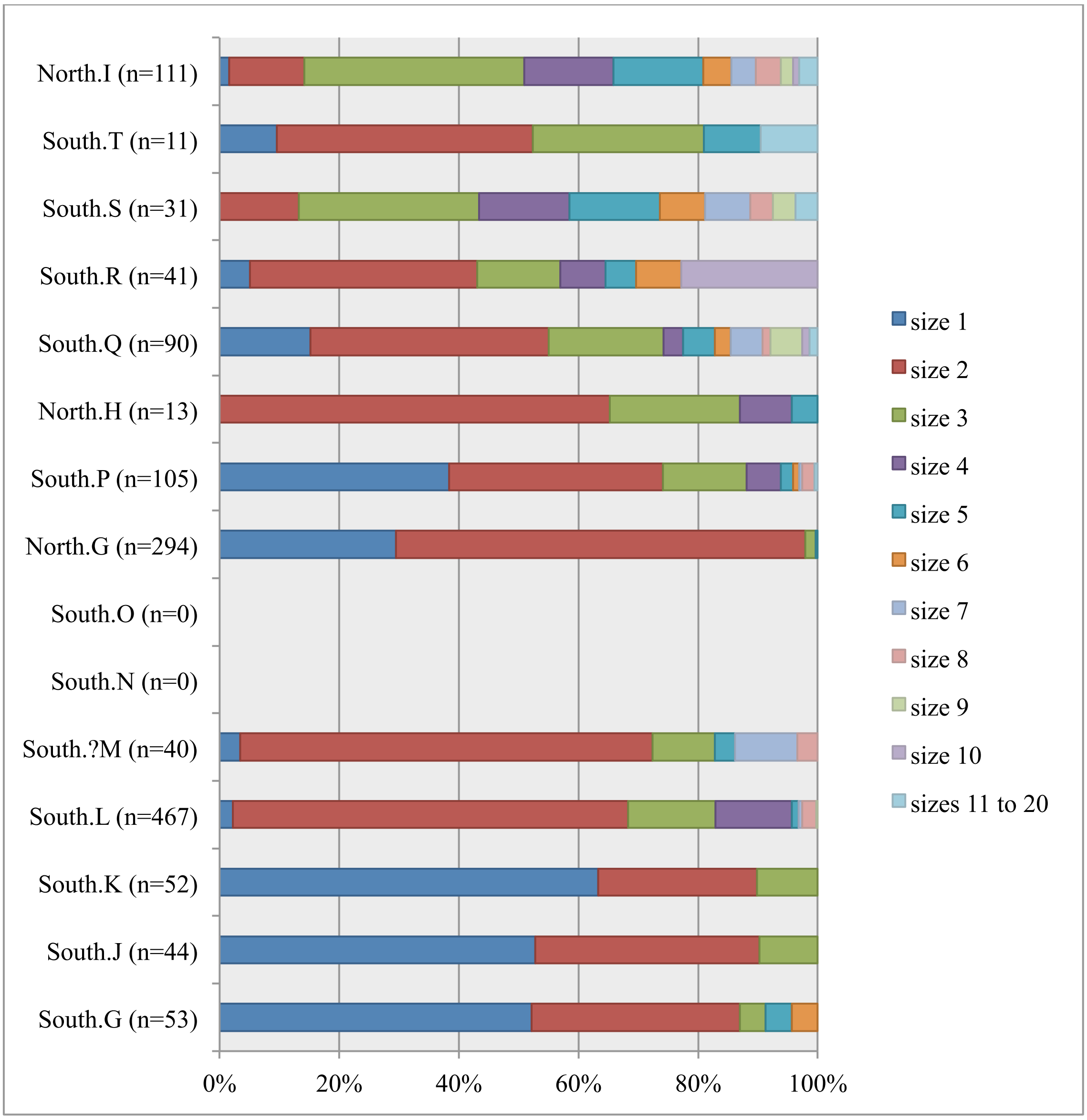


Figure 3.1.26. Distribution of bead size categories according to settlement phase (QN=1242.25; N=1352)

Size and raw material use

Sizes and raw materials were compared in order to determine whether some raw materials were more likely to be made smaller or larger and also which raw materials were manipulated to make the most variety of sizes (Table A3.1.37). Soft saccharoidal marble, steatite, and serpentinite contain the highest number of size categories; therefore, these three raw materials are the most versatile in terms of size, and used to make both large and small beads. It is not surprising that these raw materials are the raw materials used to make the most sizes of beads, as they represent raw materials that are commonly used within and between settlement phases at Çatalhöyük. These raw materials, in comparison to the other most commonly used raw materials (hard limestone or soft marble, soft chalky limestone, tufa, and phyllite) have properties which make them much more suitable to make larger sized beads, such as more toughness or durability and hardness. Beads made from tufa and phyllite tend to be smaller in size (sizes 1-3), in comparison to the other most common raw materials. The samples of soft limestone and phyllite contained the least variability in bead size, most likely due to their concentrated presence in large burials (Table A3.1.37). Some versions of steatite and serpentinite can also be very green, and it appears that larger beads are generally more green or black with more pronounced green flecks, or a very white and sparkling soft saccharoidal marble.

Freshwater limestone, limestone pebbles, travertine and fluorapatite are also found in a number of size categories, despite not being commonly used raw materials. Freshwater limestone is generally found in the form of a pebble and naturally perforated. Blue-coloured fluorapatite, however, is a much more difficult mineral to work with in terms of hardness, in comparison to the freshwater limestone, or other commonly used raw materials. Each of these raw material types has a small sample size, but the variability within that small sample is quite interesting (Table A3.1.37).

The largest size category of 11 to 20 contains 2 steatite pendants and 1 bead, half of a carnelian butterfly heart bead, 1 freshwater limestone bead, 1 naturally or manually perforated limestone pebble, and 1 unknown bead. The next largest size, size 10, consists of only naturally or manually perforated limestone pebbles and freshwater limestone. Size 9 similarly consists of naturally or manually perforated limestone pebbles and freshwater limestone, but in addition to these, soft saccharoidal marble, hard limestone or soft marble, fluorapatite, and travertine are also present.

Less commonly used raw material	Size categories
hematite pendants	4 and 5
carnelian	3, 5, and 11 to 20
galena	3
fluorapatite	2, 3, 4, 5, 6, 7, and 9
turquoise	2, 3, 4
gypsum	5 and 8
quartz	3
meerschaum	4
natural metal rich stone	7
diorite	2

Table 3.1.38. List of size categories for less commonly used raw materials

Seven out of ten of the less commonly used raw materials appear in sizes 4 and above (Table 3.1.38). This list illustrates that uncommonly used raw materials on average tend to be larger in size in comparison to the average size of 2 (52.2%) and second most frequent size of 1 (17.3%). This suggests that visibility is related to the limited use of uncommon and unusual raw materials. These materials were used to make larger sized beads, not simply because of their raw material properties, but more likely, these materials which were different to the norm in terms of appearance and colour, were deliberately manufactured into larger sizes so that they could be better seen, or if not worn, then perhaps used for a more special purpose than size 2 and 1 beads made from more common raw materials.

Size and bead type

Potential correlations between size and bead type were also closely examined in order to determine whether some bead types were more likely to be made larger or smaller, in comparison to the majority. Disc and cylindrical beads appear to be present in the most size categories (Table A3.1.39). The bead types which contained the least amount of variability in relation to their sample size were disc and ring beads, which is expected as likely a result of the manufacturing methods used to produce these bead types. After perforation, edges of preforms were likely to have been abraded to make them more rounded before mass abrasion (when a number of beads are abraded together into their final form). Both bead types were made in the exact same way (Chapter 4.3). The discs were reduced in size and the degree of abrading needed would have determined whether the finished beads were ring or disc beads. Secondly, the drill used for perforation could have also varied in size creating a larger (ring) or smaller (disc) perforation. So the larger the initial size of the roughout, which is perforated into a preform, the more likely it will remain a disc bead rather than a ring bead. It is doubtful that Neolithic inhabitants of Çatalhöyük even differentiated between disc and ring beads, and these different categories are arbitrary and simply used for classification purposes.

The variability index of bead sizes within bead types also revealed four more interesting results. The first is that there are seven rounded barrel beads and all seven belong to different size categories. Similarly, pendants, barrel ring, and conical bead types also demonstrate a high degree of variability within their sample sizes. All four of these bead types are not as frequently found, but when they are, they vary in size greatly.

In order to make more elaborate bead types, generally, more raw material is needed. According to Table A3.1.39, for many elaborate bead types, such as cylindrical barrel, barrel disc, long elliptical, lenticular, and lenticular square, size 3 is the smallest size they can be manufactured into.

The smallest size category is size 1, and this category contains only three types of beads – numerous ring and disc beads and a single example of a round bead (Figure 3.1.5). Once again this is most likely for practical reason as these bead types are the most simple to make, and perhaps therefore why we only find them being made *en masse* into a very small size (2-2.5mm in diameter). But this is not to say that is easier to make smaller beads. It is much easier to work with larger sizes and make larger (size 2 and up) disc- and ring-shaped beads than these tiny beads (Chapter 4.3).

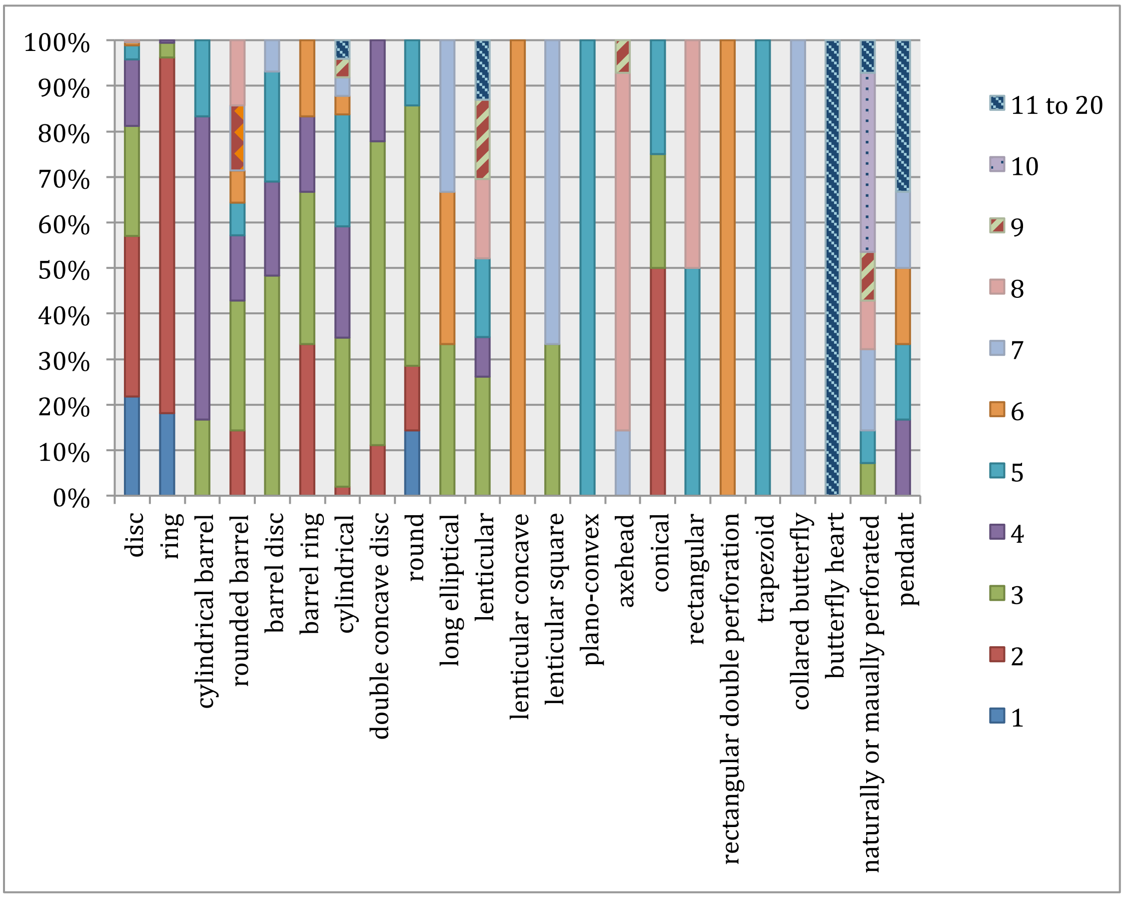


Figure 3.1.27. Distribution of size categories according to bead type (N=1351; QN=1267.75)

On the other end of the spectrum, size 11 to 20 beads consist of cylindrical, lenticular, butterfly heart, pendants and perforated limestone pebble beads, all of which are not common types. The largest disc bead is a size 8, and as previously mentioned, the largest ring bead is size 4, with the average being size 2. The next largest size is size 10, which solely consists of perforated limestone pebbles. Size 9 beads vary much more and consist of cylindrical, lenticular, axe head, and perforated limestone pebbles. The bead types that make up the 3 largest sizes tend to be more uncommon forms. In general, we find that more variant bead types tend to be larger in size than the most common size 2 disc and ring beads.

In summary, we find that beads that are manufactured into more elaborate bead types are also made larger in size. This could very well have to do with a practical reason. More raw material is required to make a more elaborate bead; however, it is suspected that these beads are also made larger for purposes of visual display and to perhaps add value (Chapters 4 and 5).

Size and colour

Bead size and colour were closely examined in relation to one another to determine patterns between specific colours and sizes. Colour data was analysed on two levels – detailed (different colour tints and shades were differentiated) and within broader colour groups. In Section 3.1.3, we found that the most commonly used colours within the stone bead assemblage (in order) were pale pink/beige, white, and black with green tint, flecks, or veins. When colour data was analysed and placed into broader colour categories, the most prevalent colours were blacks, reds to pinks, and finally whites to beiges.

When we compare colour (detailed) to size, we find that the colour that appears in the most number of sizes is beige (Table A3.1.40). Beige coloured beads are present in every size category (11 size categories). White and black with green are the second most prevalently used colours featured in the most size categories. The black with green and white colours both reflect the most commonly used colours on-site. The next group of colours are each present in 7 size categories: black, light to dark brown, grey/green, green, and pale to dark blue. This reveals that both common and not so common colours, such as pale to dark blue, are used to make a variety of different sized beads, although colours associated with reds and pinks are surprisingly absent even though they make a significant proportion of the assemblage. When these colour groups were compared in order to determine which group had the highest degree of variability of bead sizes, in relation to sample size, the blue colour group had more variability than reds to pinks, blacks, whites to beiges, and greens (Table A3.1.41).

At the other end of the spectrum, the least variation between size categories are found in beads of pale pink/brown, pale pink/beige, and beige/brown/green with black flecks, each being only 2 sizes. Grey/brown, blue/green, pale green, and dark pink/brown coloured beads are each found in 3 size categories. Two things account for this small degree of variation, the first being that many of these colours represent beads that were produced *en masse* such as soft limestone ring beads, and second, there are a smaller proportion of beads made from uncommon colours such as pale green. This may be why the red to pink colour group showed the least amount of variability in relation to its sample size (Table A3.1.41).

In summary, as expected, the most common colours of blacks and whites to beiges are used to make beads in a variety of sizes, both large and small, however, the third most common colour group, reds to pinks, only appears in beads sized 1 to 4. Because uncommon colour groups make up such a small proportion of the stone beads assemblage, we would not expect them to be featured in so many size categories, but they are, due to the fact that so many of the larger sized beads are made from less common raw materials and therefore less common colours.

Size and context

Within the South area, external middens appear to contain beads with the most variation in size, and are present in 10 of the 11 size categories, followed by skeletons and hoards, each present in 8 size categories (Table A3.1.42). Pit, bin, or post fill, midden surfaces, and house floors are less represented according to size. All three of these contexts primarily contained beads that were size 5 or smaller, with the exception of a single size 6 bead in context 5 (pit, bin, or post fill).

When we closely examine burial contexts, we find that there are no size 1 beads found on skeletons although 10 exist in burial fill. Burial fill only contains 2 beads (from a total of 204 beads) that are size 5 or larger, whereas skeletons contain 31 (from a total of 318.5 beads).

The three contexts which contain the most beads size category 5 and larger are external middens (present in 6 of 7 size categories), skeletons in burials (5 size categories), and clusters, hoards, and placed deposits (4 size categories). Larger beads are therefore just as likely to be placed in burials and placed deposits as end up in external middens. If we only take into account beads which are size 5 and larger (QN=77.5), and add their totals within each context, we find that the largest sized beads are found on skeletons within burials, followed by external middens, and finally caches, clusters, or placed deposits (Table 3.1.43).

Context	**Beads in South area sizes 5 and larger** (QN=77.5)
floors within buildings	1.3%
skeletons in burials	40.0%
caches, clusters, or placed deposits	19.4%
external middens	35.5%
pit, post, or bin fill from buildings	1.3%
burial fill	2.6%
activity areas and surface areas of external middens	0.0%

Table 3.1.43. Distribution of beads sizes 5 and larger according to context

In the North area, external middens are once again the most varied contexts in which bead sizes are present in all size categories and the only contexts to contain beads larger than size 5 (Table A3.1.44).

As with previous analyses of contexts with descriptive variables, both contexts related to burial had the least amount of variability, both in the South and North areas (Tables A3.1.42 and A3.1.44). The contexts with the highest variability in bead size were external activity areas as well as caches, clusters, and placed deposits, in each of the areas, as well in the combined assemblage (Table A3.1.45).

In summary, the vast majority of beads are size 2 beads, but changes through time can be seen. The average sized bead becomes slightly larger and much larger sizes are also introduced in phase South.L. Commonly used raw materials are used to make both smaller and larger beads although more uncommon raw materials are generally used to make larger beads. In addition, beads which were made into more elaborate bead types were also generally larger in size. In terms of colour use and size, like with raw materials and bead types, the most common colours, apart from reds and pinks, were present in all sizes, but more variant coloured beads are made larger in size. The greatest variations in bead sizes are found within external middens, in both the North and South areas. Beads that are size 5 or less are essentially found in all contexts, however larger sized beads are more likely to be found in external middens, burials (on skeletons), and in caches, clusters, and placed deposits.

3.1.5. Stone beads and bead fragments according to context

Stone beads were found both complete and in fragments. The qualitative variables analysed above all take into account whether the bead was found whole or the specific size of the fragment in order to create a more accurate picture of bead preferences and use at Çatalhöyük. But could the fact that a stone bead is broken or not and the context in which it was found tell us anything about how Neolithic bead users engaged, used, or viewed stone beads? In addition, it is also interesting to know how many beads are found intact and how this may relate to preservation. A total of 1534 finished beads (QN=1319.75), were closely examined according to the type of context in which they were found in order to determine this. First, the stone beads were analysed according to the area in which they were found, followed by a summary of both areas.

In the North area, we find that only a small fraction of the beads (6.3%) were found broken, whereas the vast majority (93.7%) were still found complete and intact (Table 3.1.46). No broken stone beads were found in caches, clusters, or placed deposits, or in activity areas or surfaces of external yards or middens, and only a quarter fragment of a bead was found on a skeleton (the remaining burials in the North area did not appear to have any bead on the skeleton). Floors contained the highest percentage of broken beads, as 28.2% of beads were found broken and 71.8% were found complete.

Burial fill contained the highest percentage of complete beads (97.4%), indicating that stone beads buried with individuals were not broken, and those broken may have to do with preservation or movement of burials during an occupation of a building. This also indicates that beads found in burial fill in and around a skeleton were intentionally placed there, perhaps originally on the skeleton or not, but beads from burial fill are not just the result of accidental mixing of floor debris, for example.

Another interesting observation is that 89.2% of beads discarded into external middens were still complete and not broken. This could simply be a reflection of house floors, (albeit higher) as it was refuse from buildings that ended up in middens. Only 10.8% of stone beads from external middens were broken.

Context	Broken (QN)	Broken %	Complete (QN)	Complete %	TOTAL (QN)
floors	5.5	28.2%	14	71.8%	19.5
skeletons	0.25	100.0%	0	0.0%	0.25
caches/clusters/placed deposits	0	0.0%	3	100.0%	3
external middens	11.5	10.8%	95.25	89.2%	106.75
pit/post/bin fill	3	6.4%	44	93.6%	47
burial fill	6.25	2.6%	237	97.4%	243.25
activity areas in, or on surfaces of external yards or middens	0	0.00%	2	100.0%	2
TOTAL	26.5	6.3%	395.25	93.7%	421.75

Table 3.1.46. Distribution of broken and complete finished beads according to context type in the North area (QN= 421.75; N=477)

In the South area, the bead sample is larger and we find similar results as the North area. Table 3.1.47 reveals that only 11.5% of stone beads were found broken, and the remaining 88.5% were found whole, or complete. Floors again had the highest percentage of broken beads (31.3%) and skeletons had the least (2.8%). Activity areas or surfaces of external yards or middens also had a higher breakage rate (21.3%) but in external middens 17.0% of the sample was broken. The inhabitants at Çatalhöyük would have spent a lot of time and conducted a number of activities on the floors of the buildings and in the activity areas and surfaces of middens, hence one possible reason from the substantial number of broken beads in these contexts. But this still does not compare to the 83.0% of complete beads found in external midden deposits. A large percentage of complete beads were being discarded at Çatalhöyük.

Context	Broken (QN)	Broken %	Complete (QN)	Complete %	TOTAL (QN)
floor	30.5	31.3%	67	68.7%	97.5
skeleton	9	2.8%	317	97.2%	326
cache/cluster/placed deposit	5	18.5%	22	81.5%	27
external midden	34.5	17.0%	169	83.0%	203.5
pit/post/bin fill	1.5	13.0%	10	87.0%	11.5
burial fill	19.25	8.9%	198	91.1%	217.25
activity area in, or on surface of external yard or midden	3.25	21.3%	12	78.7%	15.25
TOTAL	103	11.5%	795	88.5%	898

Table 3.1.47. Distribution of broken and complete finished beads according to context type in the South area (QN=898, N=1057)

Both skeletons and burials have the highest percentage of complete beads, 97.2% and 91.1%, respectively. These numbers reflect the fact that individuals were buried with whole beads and that the beads interpreted as being from fill were also either scattered into the burial by mourners, found on unpreserved fibers, represent dislodged jewellery, or simply mixed when room was made for subsequent burials beneath the floor of the building.

When the data from the North and South areas are combined, we find that the results mimic those found individually in the two different areas (Table 3.1.48). The vast majority of beads, 90.2% are found complete and unbroken. Once again, floors (30.8%) and activity areas in yards and middens (18.8%) contain the highest percentage of broken beads, and both burial contexts, skeletons (2.8%) and burial fill (5.5%) contain the least. Skeletons (97.2%) and burial fill (94.5%) contain a significantly higher proportion of whole beads in comparison to the total unbroken percentage of beads (90.2%) within the stone beads assemblage.

Context	Broken (QN)	Broken %	Complete (QN)	Complete %	TOTAL (QN)
floors	36	30.8%	81	69.2%	117
skeletons	9.25	2.8%	317	97.2%	326.25
caches/clusters/placed deposits	5	16.7%	25	83.3%	30
external middens	46	14.8%	264.25	85.2%	310.25
pit/post/bin fill	4.5	7.7%	54	92.3%	58.5
burial fill	25.5	5.5%	435	94.5%	460.5
activity areas in, or on surfaces of external yards or middens	3.25	18.8%	14	81.2%	17.25
TOTAL	129.5	9.8%	1190.25	90.2%	1319.75

Table 3.1.48. Distribution of broken and complete finished beads according to context type in the North and South areas (QN=1319.75, N= 1534)

Surprisingly, caches, clusters, and placed deposits and external middens are contexts with roughly the same percentage of complete beads, which leads one to question whether these deposits, which have been deemed different from other deposits by excavators, are in fact special in some way (Chapter 5). The proportion of beads found complete in middens is also significant and does not necessarily reflect the floors of buildings, the main source of external midden deposits. Table 3.1.49 specifically takes a closer look at beads found in external middens. We find that there are only minor discrepancies between beads made from variant raw materials, bead types, or larger beads and those that are smaller, ring or disc beads, or made from more commonly used raw materials.

Qualitative variable	Broken (QN)	Broken %	Complete (QN)	Complete %	TOTAL (QN)
Raw material – common	49.75	17.8%	230	82.2%	279.75
Raw material – variant	16	26.7%	44	73.3%	60
Bead type - disc/ring	33.5	14.4%	199	85.6%	232.5
Bead type – variant	7.5	12.8%	51	87.2%	58.5
Size small (1 to 4)	37.75	15.4%	208	84.6%	245.75
Size large (5 and up)	5.5	8.8%	57	91.2%	62.5

Table 3.1.49. Distribution of broken and complete finished beads from external middens only, according to raw material, bead type, and size

There does not appear to be much difference between results in the North and South areas. A large percentage of beads are finding their way into middens, regardless of raw material, type, size, or colour, as we found earlier in the qualitative variable analyses above.

3.1.6. Results summary of descriptive variables

The descriptive variables of raw material, bead type, colour, and size provide valuable insight into manufacturing preferences and can help determine why certain raw materials were chosen to be shaped and constructed into their final forms. A number of interesting observations were made in Section 3.1;

- Stone beads did indeed change over the span of the Neolithic at Çatalhöyük.
- A staggering proportion of stone beads at Çatalhöyük are small, black, red, and white coloured disc or ring beads, made from limestones and marbles, serpentinite, steatite, and phyllite, and feature prominently in all settlement phases throughout the Neolithic.
- During South.L we find that these same raw materials were now being utilized to produce larger and more variant bead forms, which appear to have been first used in mortuary contexts. It was sometime during South.N to South.P that we first find other raw materials being used to produce common and variant forms of stone beads, but in fewer numbers.
- Effectively, as bead types became more elaborate and larger in size, the more colourful or aesthetically different and generally less common the raw material was which was used to make them.
- With regard to contexts, the most prevalently used raw materials, bead types, and colours, appear to be consistently found within all context categories. External activity areas and caches, clusters, and placed deposits, show the greatest degree of variability whereas mortuary contexts show the least amount. Beads that are size 5 or less are essentially found in all contexts, however larger sized beads are more likely to be found in external middens, burials (on skeletons), and in caches, clusters, and placed deposits.
- In general, late Neolithic settlement phases, particularly South.S, South.T and North.H, contained the highest degree of variation with regard to all descriptive variables.
- Approximately only 10% of beads in the stone beads assemblage are found broken and the vast majority are still intact. As one would anticipate, burial contexts contain the least breakage

percentages, whereas as activity areas on house floors and those in yards and middens contain the most.

In the next section, contexts relating to stone bead production will be closely examined, in order to determine for what types of beads we have production evidence, and where and to what extent stone beads were being produced at Çatalhöyük.

3.2. Results from production context studies

In this section, the results from distribution patterns and contextual studies regarding production are presented and aim to help determine:

1. Where were stone beads manufactured?
2. Can production contexts for bead manufacture be identified?
3. How was production organized?
4. Were some households more engaged in stone bead production than others?
5. Is there evidence for craft specialization of stone bead production?

In the next related section (Section 3.3), results from manufacture marks studies are presented which can help determine:

1. How were stone beads manufactured?
2. Can manufacturing sequences can be recognized for the various types of stone beads?
3. What technical choices and preferences were made during the manufacturing process? Can we explain these choices?

These questions regarding manufacturing techniques and production contexts, which are derived from the research questions presented in Section 1.2, are inextricably linked, as how and where beads were made and to what degree, are all connected. Production contexts contain two or more stages of bead manufacture, including unfinished beads, which provide the most information on manufacture techniques; therefore, first results from production contexts will be presented, followed by the results from manufacture marks analyses. The methodology devised to identify production contexts and definitions of different types of production contexts are found Chapter 2.4.

When contextual data regarding stone beads, roughouts, preforms, nodules, perforating and abrading tools, and debitage were combined, 42 units with potential examples of production ranging from a single example containing a preform or roughout and tool to a concentration of unfinished beads, debitage, and bead making tools were revealed (Table A3.2.1). These production contexts are found within 6 buildings and 9 external spaces (7 external middens and 2 external yards). External middens primarily contain household refuse deposits, but external yards may also show evidence of activities in addition to refuse such as animal penning, trampling, and fire spots. Each sampled building and space is discussed below and the results are organized according to settlement phases South.G to South.T in the South area, and North.G to North.I in the North area. Each unit described below is likely to contain any number of finished beads but only nodules, roughouts, preforms, finished beads, and tools to do with potential production contexts are discussed. Only contexts which appear significant from the preliminarily identified 42 units with production related elements are described in-depth. Although if there are any significant finds in nearby units or within occupation phases, they will be acknowledged. As mentioned in Chapter 2, units are the most fundamental level of contexts and essentially constitute a single depositional activity, feature, or part of a feature, as identified by excavators.

Production contexts within the South area

South.G

The earliest settlement phase excavated so far, South.G, consists of external midden Space 181. The units are comprised of deposits of household refuse. Space 181 contains 18 preforms or roughouts within 6 units, although only 4 units contain any evidence of production: Phase A units 4838, 4839, 4842, and 4868 all indicate evidence of production.

In unit 4838, there is evidence of bead making of two raw materials, hard limestone or soft marble and tufa. There is essentially one-coloured group of hard limestone or soft marble used for stone bead production, which is pale pink/brown in colour. This group consists of four preforms (4838.H10, 4838.H13, 4838.H22, and 4838.H23) and three finished ring beads (4838.H14, 4838.H16, and 4838.H25).

Two different coloured tufa raw materials were used, one a dark red/brown (can also be described as terracotta in colour) and the other a dark pink/brown. The dark red/brown tufa group consists of one preform (4838.H9) and four finished beads (4838.H11, 4838.H32, 4838.H36, and 4838.H8) (Figure 3.2.1). The dark pink/brown coloured tufa group is comprised of three preforms (4838.H29. 4838.H38, and 4838.H39), and one finished ring bead (4838.H17).

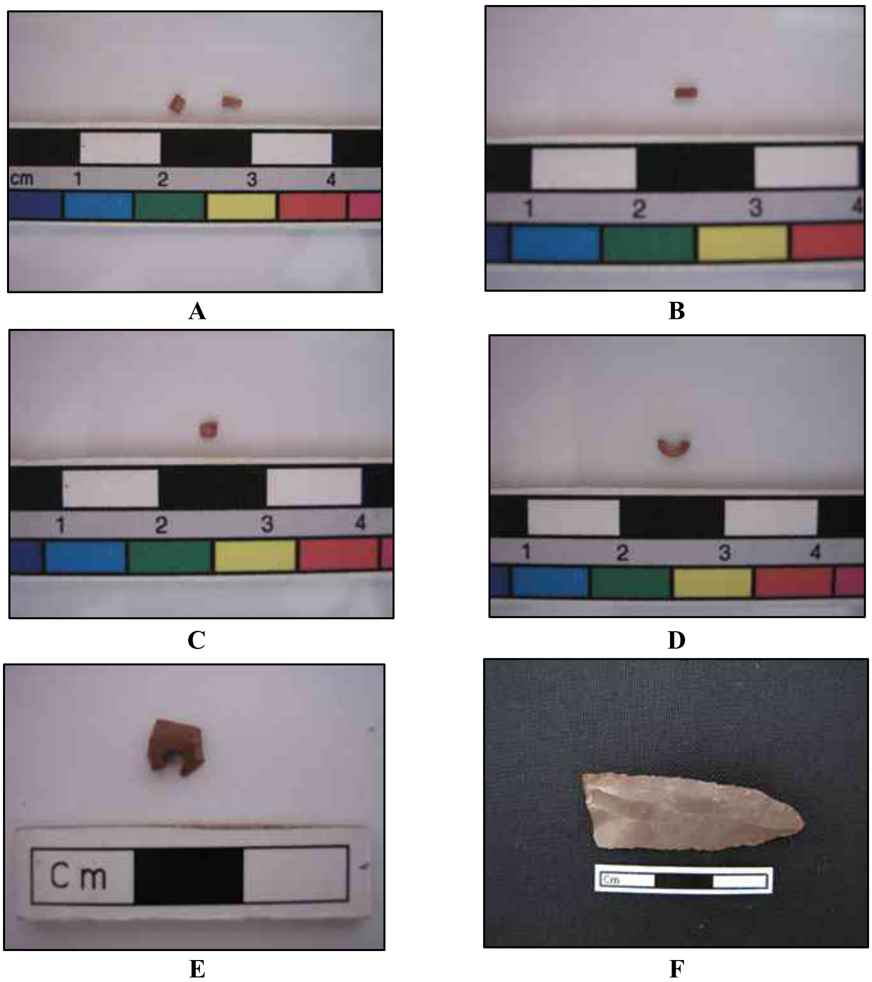


Figure 3.2.1. Dark red/brown tufa group in unit 4838: A) 4838.H8; B) 4838.H36; C) 4838.H11; D) 4838.H32; E) 4838.H9; and F) drill 4838.A11

In total there are three separate examples of bead making in unit 4838 consisting of two different raw materials. Significantly, there was no evidence of hard limestone or soft marble or tufa debitage from this unit or any surrounding units. This unit did however contain a chert drill (Figure 3.2.1F), a schist abrading palette, and a sandstone abrading slab, tools likely to be used in stone bead production.

Unit 4839 also contains the same two raw materials as unit 4838, and is situated directly below unit 4838. There is a pale pink/beige hard limestone or soft marble group, which is comprised of three preforms (4839.H10, 4839.H7, 4839.H9) (Figure 3.2.2). Four tufa finished ring beads (4839.H15, 4839.H17, 4839.H4, and 4839.H8) match the dark red/brown tufa group found in unit 4838, but no preforms or roughouts were present so there is no evidence of production. The second tufa dark pink/brown group, however, does contain one preform (4839.H18) and one finished ring bead (4839.H5).

Figure 3.2.2. Three pale pink/beige hard limestone or soft marble preforms in unit 4839 (from left to right: 4839.H7, 4839.H10, and 4839.H9). Photo by K. Wright

There are therefore two examples of bead production using two different raw materials in unit 4839. As in 4838, there is no presence of debitage, however, three bone points were found in this unit but no other drills, perforation tools, or ground stone tools were present.

Unit 4842, contains four preforms, but only three of them (4842.H11, 4842.H7 and 4842.H1) are made from the same material. These beads are made from pale pink/brown coloured hard limestone or soft marble (Figure 3.2.3). No finished beads, debitage, perforating or abrading tools were found within this unit.

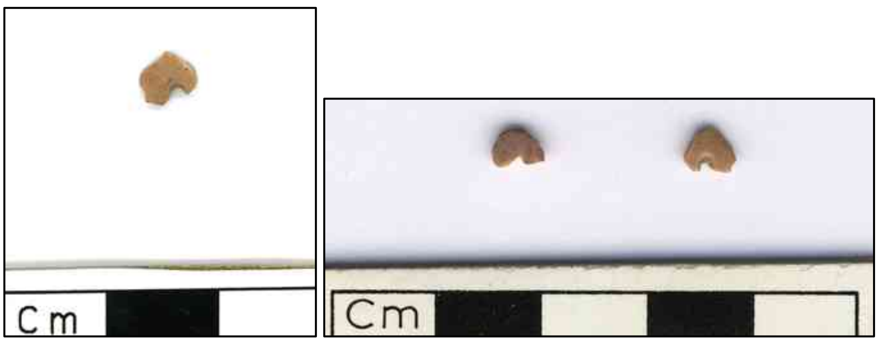


Figure 3.2.3. Three pale pink/brown hard limestone or soft marble preforms from unit 4842 (from left to right: 4842.H7, 4842.H11, and 4842.H1). Photos by K. Wright

Lastly, unit 4868 contains one preform (4868.H9) and three finished beads (4868.H4, 4868.H5, 4868.H6) made from dark red/brown tufa, similar to that found in unit 4838. There does not appear to be any debitage within the unit, nor are there any tools which could have been utilized during the bead making process.

In summary, external midden Space 181 in South.G contains four units with seven examples of discarded bead production, of essentially two types of raw materials, tufa and hard limestone or soft limestone, with beads being made into ring beads. Apart from one exception, all preforms found in Space 181, whether found in conjunction with other stages of bead manufacture or on their own, are made from these two raw materials. No roughouts were found in Space 181. In other units of Space 181, we do find evidence of chert microdrills. Units 4878, 5281, 5290, and 5318 each contain chert microdrills that may be contemporary examples of the types of perforating tools used during this early settlement phase. Units 4290 and 4884 also contained sandstone abrading slabs or slab fragments as well as limestone or marble polishing slabs or slab fragments in units 4844, 4879, 5326, and 5329, which also broadly belong to the same time period and similar tools may have been used for stone bead production.

South.J

South.J consists of two buildings, Buildings 23 and 18. Building 23 contained two different preforms, in terms of raw material, in two separate units and therefore no potential production contexts could be identified. Building 18 on the other hand, which was partially excavated during the 1960s excavations undertaken by Mellaart, contains a deep sounding in the middle of it, and has a total of six preforms within three units: 4530, 4540, and 4539 (Figure 3.2.4).

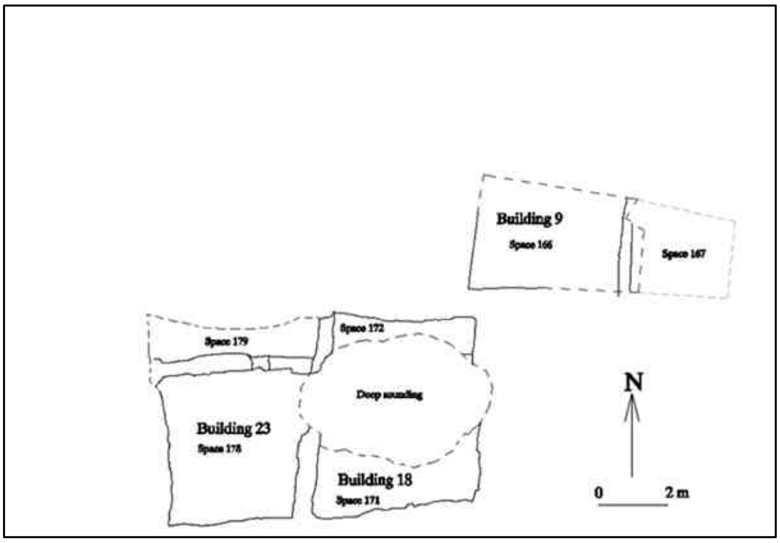


Figure 3.2.4. Plans of Buildings 23 and 18 in South.J. Illustration by Çatalhöyük Research Project

Unit 4530 is situated in the southeast part of Space 171 within Building 18 and associated with oven feature 473 during occupation Phase 2. Unit 4530 has been interpreted as a "dirty floor context" comprised of oven rake outs, which are most likely deposits of household refuse that were also trampled over within the vicinity. A dirty area is defined as an activity area near ovens and hearths that contains ashy deposits, hence "dirty" in comparison to the generally "clean" white plastered platforms found at the other end of the building.

Unit 4530 contains one phyllite roughout (4530.H3) and five finished ring beads (4530.H10, 4530.H11, 4530.H2, 4530.H5, and 4530.H9) made of the same dark grey/black coloured phyllite. This unit also contained lithic debris and a number of bone tools (including points), fragments, and bone debitage (Farid 2007:133). In addition, a number of bone preforms were also found in this unit, suggesting that beads from different media were being made together and perhaps even by the same person. No debitage from bead production was found in this unit, although that is expected as phyllite is reduced and shaped via abrasion, which would not leave any evidence behind. Apart from the bone points, no other possible perforating tools or ground stone abrading tools were found in this unit.

Unit 4540 is associated with oven feature 477, and precedes unit 4530 and oven feature 473, which was constructed to replace oven feature 477 in occupation Phase 2 in Building 18. As with unit 4530, unit 4540 also represents an oven rake out and trample within a dirty floor context. Three preforms were found, all made from dark grey/black coloured phyllite (4540.H3, 4540.H4, and 4540.H5), similar to that later found in unit 4530 (Figure 3.2.5). One finished phyllite bead was found but after microscopic examination the structure of the phyllite appeared slightly different to the phyllite used to manufacture the three preforms, hence no matching finished beads were found. No bead making debitage or tools were found in this unit.

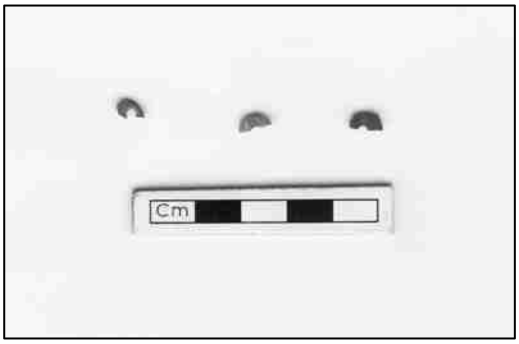


Figure 3.2.5. Phyllite preforms found in unit 4540 in Building 18. Photo by K. Wright

Just above unit 4540 is unit 4539, also associated with oven feature 477 and a dirty floor context comprised of trampled oven rake out. It too contains a preform made from dark grey/black phyllite (4539.H10) and a finished bead also made from dark grey/black phyllite (4539.H9). No debitage was found in this unit although a bone preform and a number of bone points were found. This again indicates that beads made from both bone and phyllite were being made in Building 18. The bone points could potentially have been used as perforating tools, although unlikely (see Appendix D). In addition, no ground stone tools were found in this unit.

Building 18 provides three examples of phyllite stone bead production. Only one roughout and a number of preforms made from phyllite were found within Building 18, specifically in the three units mentioned above. Finished phyllite ring beads were also found in units from preceding oven phases all within Space 171. One chert drill was found within bin fill in the same occupation level as unit 4530. No ground stone tools that could be associated with stone bead production were found in Building 18. Notably, within the household unit of Building 18 bone bead manufacture was occurring congruently with phyllite ring bead production, and possibly even by the same person.

South.K

South.K consists of sampled buildings 17, 16, and 22. Buildings 16 and 22 both contain no preforms, roughouts or bead making tools. Building 17 on the other hand contains a number of beads, although only two preforms (5229.H2 and 5339.H3) both in unit 5229 (Figure 3.2.6). Unit 5229 represents building infill just above the floor in the northwest part of Space 182 in its final occupation Phase B. This context may be associated with the floor, but the similarity of the deposit to the infill within the building suggests that this may not be the case. The two preforms are made from hard limestone or soft marble, but differ in colour. The first, 5229.H2, is pale pink/beige in colour, but the second, 5229.H3, is a darker colour and categorized as pale pink/brown colour. No bead debitage or tools were found in this unit.

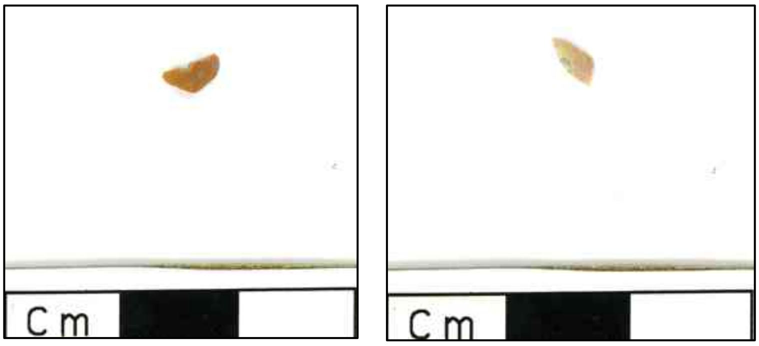


Figure 3.2.6. Hard limestone or soft marble preform fragments found in unit 5229 (from left to right: 5229.H3 and 5229.H2), Building 17. Photos by K. Wright

Unit 5229 cannot be associated with the occupation of Building 17 with certainty; therefore, we cannot say that there is good evidence for bead manufacture in Building 17. In other units of Building 17, we do find a chert drill and bone point, but these are within building infill and posthole fill, respectively, and again not in contexts which can be directly associated with an occupation phase.

South.L

Within South.L there are two sampled buildings, Buildings 43 and 6, both which contain only finished bead and therefore no evidence of production can be identified.

South.?M

One building (Building 50) and three spaces (Space 105, 169, and 168) were sampled in settlement phase South.?M. All 4 of these contexts were partially excavated in the 1960s by Mellaart and none contained any unfinished beads, bead making debitage, or perforating, chipping, or abrading tools. Building 50 does, however, contain a very interesting find which the lithics team at Çatalhöyük and the author believe may have been a bead making toolkit (unit 10835) within an adult male burial (skeleton 10813, burial feature 1709). This potential bead making toolkit was placed on the right side of the body between the chest and the abdomen. The toolkit contains 4 chert perforating tools, specifically drills (10835.X1, 10835.X2, 10835.X3, 10835.X4, and 10835.X5) (Figure 3.2.7). Apart from these drills, which represent potentially very interesting evidence for tools used in bead manufacture, there is no evidence to suggest any type of stone bead production in settlement phase South.?M.

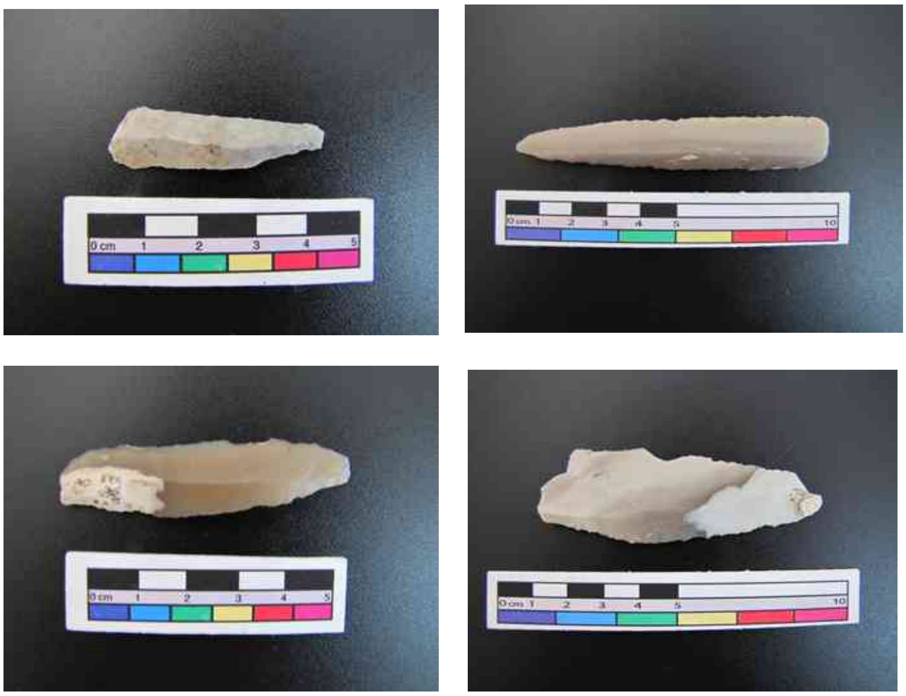


Figure 3.2.7. Potential bead making toolkit containing 4 chert drills (unit 10835) in adult male burial in Building 50

South.P

South.P contains one building (Building 75), two external yards (Spaces 333 and 329), and two external middens (Spaces 132 and 140). Spaces 140 and 132 do not contain any contexts that may demonstrate stone bead production. External yard 333 is both an activity area due to the presence of external ovens as well as an external midden containing deposits of household refuse. There is no stone bead production related materials apart from a large group of microdrills, found associated with oven feature 2639, in the northeast corner of Space 333. In unit 16505, which is the on the worn floor of oven 2639, the second in the sequence of six oven floors, we find 19 microdrills and associated chert debitage, which lithics specialists from Çatalhöyük and the author agree, based on experiments (Chapter 2.3), use-wear analyses (Appendix D), and examples from other production contexts, were most likely used in bead manufacture (Figure 3.2.8).

Figure 3.2.8. Chert debitage found in unit 16505 in Space 333

Unit 16261, which was a midden deposit of household refuse just east of the oven, also contained potential bead making debitage made from phyllite. There were a total of 23 pieces of debitage, but it is possible that this could be debitage from other production activities, especially since no matching phyllite beads were found in Space 333 (Figure 3.2.9). Close to the oven were two more units with ground stone tools that may have been used for stone bead production. In unit 16267 there was a sandstone abrader and in unit 16289 a schist abrader was found. Both these units are defined as ash spread close to the oven and could very well have been used in activities performed in proximity to the oven.

Figure 3.2.9. Potential bead making phyllite debitage from unit 16261, Space 333

Building 75 and external yard Space 329 are quite unique spaces at Çatalhöyük as they contain the largest example of bead production to date under the current excavations. Building 75 has only been partially excavated and unfortunately, due to truncation, no platforms have survived. Luckily, the area that survives is what is generally deemed the dirty area or activity area of a Çatalhöyük building, near the oven and the hearths. It is in this area we find evidence for the production of stone beads from two different raw materials – serpentinite and tufa.

A total of thirteen preforms and roughouts were found in Building 75, within five units. All five of these units, in addition to two more, contained evidence for stone bead production: 16565, 16567, 16544, 17030, 17043, 16571, and 16276. Building 75 is however, divided into five main phases: Phase 1 (construction), Phase 2 (baby burials and construction of Space 332), Phase 3 (early oven), Phase 4 (later oven), and finally Phase 5 (abandonment). The data concerning production in Building 75 will be presented from the earliest phase to the latest phase.

The vast majority of production occurs on the floors of Phases 3 and 4. In Phase 3, six units provide examples of production: 16567, 17043, 17030, 17055, 17074, and 16571. Unit 16567 contains one preform (16567.H2) made from pale green serpentinite with black flecks. No other finished or unfinished beads match this preform. This unit does, however, contain one microdrill and piece of tufa debitage (Figure 3.2.10). Unit 16567 is defined as the white marl plaster surface that sealed most of the western side of the room. It is difficult to determine how much of this material was mixed within plaster or plastered over, but more likely this material was embedded into the plaster surface.

A B C

Figure 3.2.10. A) Serpentinite preform; B) chert microdrill; and C) tufa debitage, all found in unit 16567, Phase 3, Building 75

Unit 17043 is a white marl plaster floor making up the dirty floor area northwest of the oven. 17043 contains two dark red/brown tufa preforms (17043.H1) and one roughout (17043.H2). This unit also contains one microdrill and 11 pieces of the debitage made from the same tufa (Figure 3.2.11).

A B C

Figure 3.2.11. Tufa bead making contents from unit 17043: A) two preforms and 1 roughout; B) chert microdrill; and C) debitage

Unit 17030 represents a residual floor surface in the northeast corner of Building 75. It contains one dark red/brown tufa roughout (17030.H2) and 7 pieces of debitage, similar to what we found in other units of Building 75.

Units 17055 (make up layer on the western side of the building) and 17074 (rich dump near eastern wall) each contain one chert microdrill, but contain no other tools or debitage. Lastly, in Phase 3, seven pieces of dark red/brown debitage were found without any beads or tools in unit 16571. In general, there is a major lack of ground stone tools in Phase 3.

The next oven phase, Phase 4, consists of three important production units: 16565, 16544, and 16276. In unit 16565, which is at the northern end Building 75, is comprised of a large surface and make-up layer associated with the final use of oven feature 2637. There are a total of 8 preforms and roughouts in this unit alone. Two roughouts (16565.H2B and 16565.H2C) were made from serpentinite, similar to that found in earlier unit 16567 in Phase 3. There is one biotite preform (16565.H6), which may have been perforated naturally, and two dark red/brown tufa preforms (16565.H3 and 16565.H4,) and three dark red/brown tufa roughouts (16565.H8, 16565.H5, and 16565.H7)(Figure 3.2.12). No finished beads made from serpentinite, biotite, or tufa are found in this unit.

Figure 3.2.12. Tufa preforms, roughouts, and debitage in unit 16565

The four tufa preforms and one roughout were found with the second largest deposit of debitage, approximately 105 pieces (Figure 3.2.12). This unit also had a large cache of chert microdrills (19 in total amongst other chert tools) and one chert flake (Figure 3.2.13). No ground stone abrading tools or finished beads were found in or around this unit.

Unit 16544 similarly contains a tufa roughout (16544.H1), two chert microdrills, and four pieces of debitage but no finished tufa beads or ground stone abrading tools were found in this context.

Unit 16276, a plastered floor area contained four chert microdrills. Also in this unit was what appeared to be nine pieces of debitage, which may have been produced from tufa bead production No tufa finished or unfinished beads or ground stone tools were found in this unit.

Figure 3.2.13. Chert microdrills found in 16565, Building 75

Building 75 contains a number of units with evidence of bead making, a limited amount of serpentinite bead production, and to a greater extent, tufa bead production (Figure 3.2.14). A distribution map (Figure 3.2.14) illustrates how widely distributed the bead making materials were along the eastern side of Building 75. The examples of tufa bead production are essential in better understanding the manufacturing process, despite having no examples of finished tufa beads within or near the building. The size and preforms indicate that disc or ring-shaped beads were most likely being produced. The roughouts, preforms and debitage, nonetheless, resemble and mimic the same methods of manufacture used in earlier levels such as those in Building 18 (phyllite beads in unit 4530, South.J) or discarded in Sp.181 (hard limestone or soft marble beads in Unit 4839, South.G). This will, however, be discussed in more detail in the next chapter.

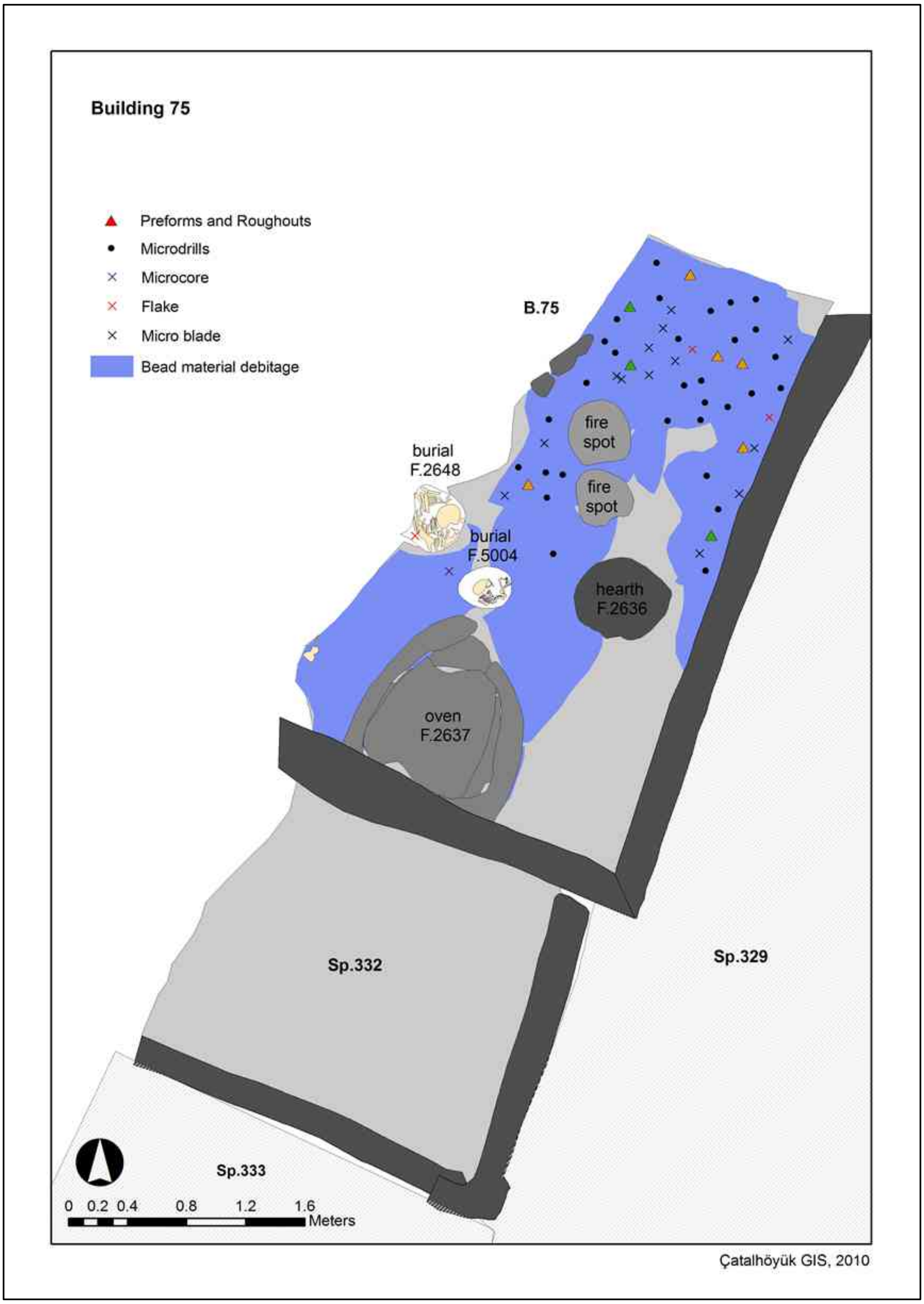


Figure 3.2.14. Distribution of bead materials and production in Building 75. Distribution map produced by Camilla Mazzucato, Çatalhöyük Research Project

South 329, which is adjacent to Building 75, also contains numerous examples of bead making similar to and contemporary with Building 75. South 329 was likely to be an open area or yard area located just east of Building 75. There are 5 phases within Space 329: 1) terracing; 2) open area and fire spots; 3) hearth use; 4) post hearth use; and 5) quarrying and midden dumping. Bead production contexts are concentrated in Phases 3 and 4. There are a total of fourteen preforms and roughouts within six units in Space 329.

Unit 17048, interpreted as a trampled dump in Phase 2 (open area and fire spots), contains one dark red/ brown tufa roughout (17048.H2) but no other tufa beads, finished or unfinished. No perforating tools are present in this unit but we do have some debitage – tufa (approximately 13 pieces, and one may potentially be another roughout, but cannot be confirmed as the contents of this unit were not exported to London) and pale green serpentinite (three pieces of angular shatter).

Phase 3 has a number of significant units with evidence of stone bead production: 16555, 16535, 16541, 16550, 16508, 16553, and 16530. Unit 16535, 16541, 16550, 16508, 16553, and 16530 are all associated with external hearth feature 2640. Unit 16555, however, like unit 17048, is a burnt ashy layer located just above unit 17048, which is partially under hearth 2640 and partially under surface floor 16541.

Unit 16555 contains six half fragments of preforms (16555.H1, 16555.H2, 16555.H3a, 16555.H3b, 16555.H3c, and 16555.H3d). This unit also contains five chert microdrills (one broken) along with chert debitage, so bead production and lithic knapping may have been occurring at the same time and perhaps by the same person (Figure 3.2.15). This unit also had 16 pieces of tufa debitage.

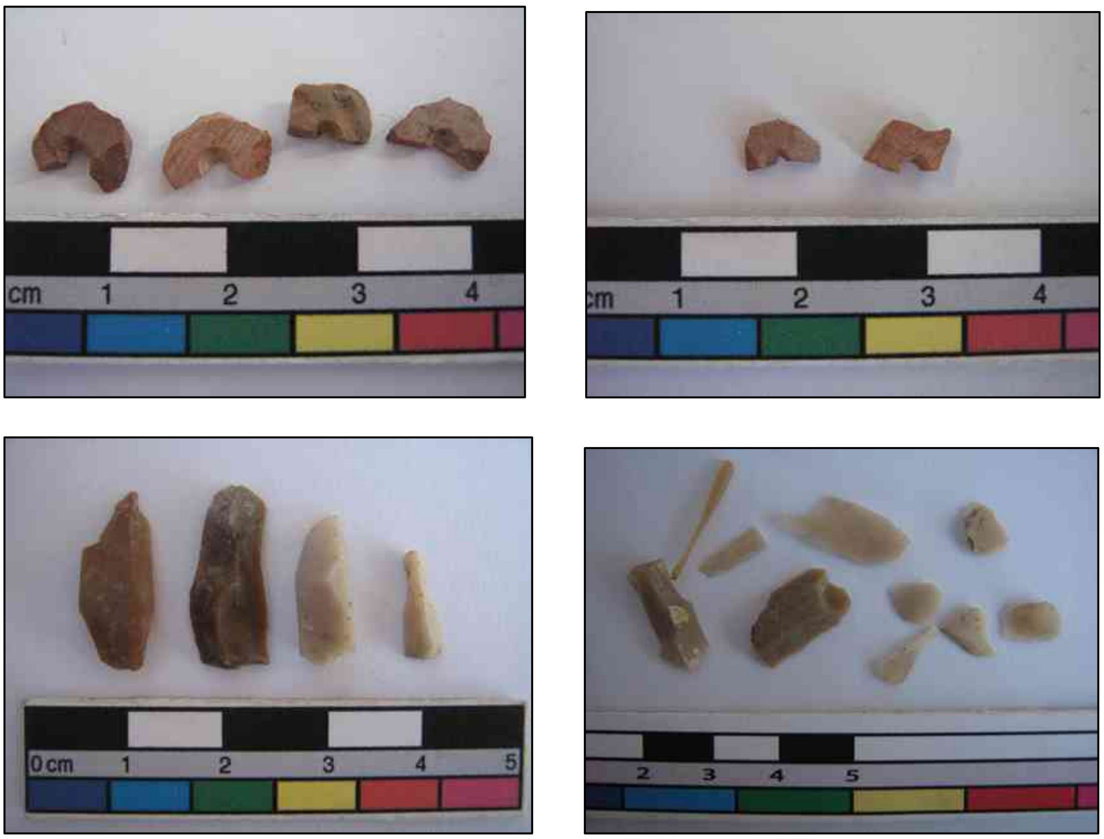


Figure 3.2.15. Bead making evidence from unit 16555, Space 329. Top: six preforms; and bottom: chert microdrills and associated chert debitage

Unit 16535 is a floor surface located next to a large central hearth (feature 2640) in the southern half of the space. It contains no stone beads, finished or unfinished, as well as no perforating or abrading tools, but it does contain 22 pieces of tufa debitage, similar to that found in Building 75.

Unit 16541, which is also a floor surface located next to hearth 2640, similarly also contains dark red/brown tufa debitage (13 pieces of debris and shatter), but two chert microdrills were also recovered in this unit (Figure 3.2.16). No beads were found in this unit.

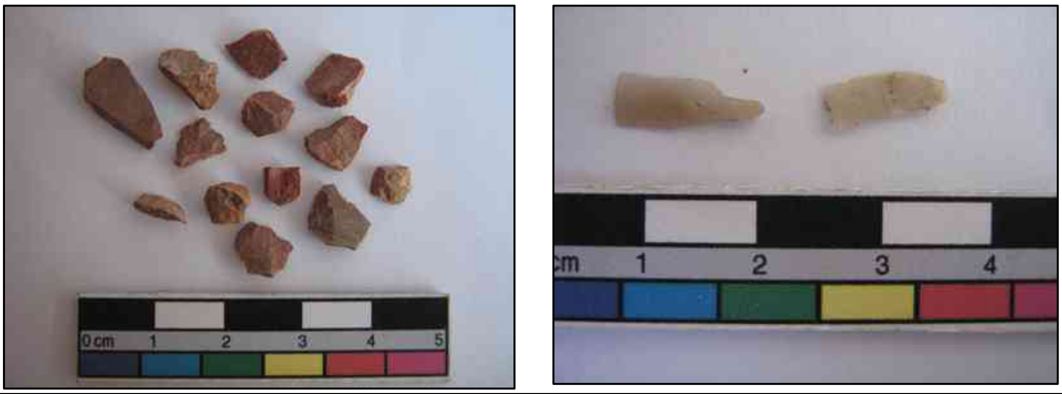


Figure 3.2.16. Tufa debitage and two chert microdrills in unit 16541, Space 329

Unit 16550 is also a part of the same floor surface as 16541 and 16535 and these units are located side by side and make up the floor surface near hearth feature 2640. Two roughouts (16550.H1 and 16550.H2) and two preforms (16550.H3 and 16550.H4) have been found in unit 16550 (Figure 3.2.17). This unit also contains nodules of raw material (tufa) two chert microdrills (but one is broken) and a significant amount of tufa debitage (approximately 150 pieces, the most found in any unit at Çatalhöyük). This is the first context we have found that contains every stage of bead manufacture, with the exception of a finished bead, along with perforating tools. No abrading tools were found in this unit.

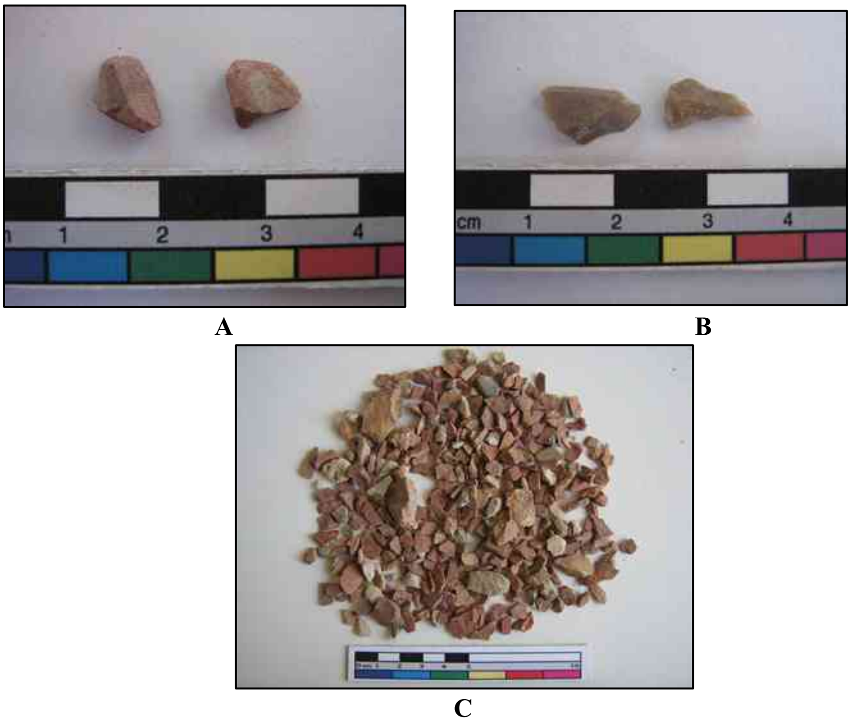
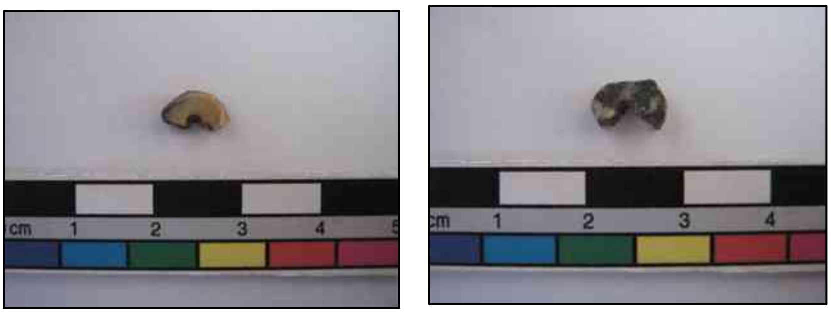


Figure 3.2.17. Tufa bead making materials found in unit 16550, Space 329: A) roughouts 16550.H1 and 16550.H2; B) chert microdrills; and C) debitage from bead making

Units 16508 and 16530 are also associated with oven feature 2640, but do not contain as much bead making material. Unit 16508, which is the floor inside the hearth, has a single piece of tufa angular shatter. Unit 16530 has eight pieces of tufa debitage and one broken chert microdrill.

Phase 4, of Space 329, represents the period after the hearth is no longer in use. Units with beads or bead-related material include 16238, 16237, 16236, 16235, and 16234. Unit 16238 is a levelling deposit over the no longer used hearth. In this unit is a single chert microdrill along with a large matching chert flake from knapping. No finished or unfinished beads, debitage, or other potential bead making tools were found within this unit, but the ashy dump above it contained half a fragment of a galena and barite preform (16237.H1) (Figure 3.2.18b). A fire spot above this ashy dump had one roughout (16236.H2) and five tufa preforms (16236.H5a, 16236.H5b, 16236.H5c, 16236.H5d, and 16236.H5e). Unit 16235, which is a levelled surface above 16236 had one preform (16235.H1) made from a quartz vein (Figure 3.2.18a). Finally, a phytolith and bone rich dump deposit in unit 16234 (above 16235) contained a single tufa preform (16234.H1). Within these units in Phase 4, no finished beads, debitage, or abrading tools were found, and apart from the single chert microdrill in unit 16238, no other perforating tools were excavated from these units which generally consist of deposits of refuse, most likely from nearby buildings, such as Building 75. These units only demonstrate single examples of preforms, with the exception of 16236, and therefore cannot be considered units demonstrating stone bead production.



A B

Figure 3.2.18. A) Quartz preform, 16235.H1; B) Barite and galena preform, 16237.H1

Space 329, like adjacent and contemporary Building 75, contains a number of stone bead production contexts. The majority of these production contexts provide evidence for the manufacture of dark red/brown tufa disc and ring beads. There is an absence of abrading ground stone tools in Space 329. The floor area around the hearth in Phase 3 may have been an *in-situ* bead making area but the unfinished beads, which were derived from the dumps in Phase 4, were most likely from household refuse. The distribution map in Figure 3.2.19 illustrates the concentration of finished and unfinished beads and other related bead making materials in conjunction with Building 75. In both contexts, bead making activities were concentrated in areas in the vicinity of ovens and hearths.

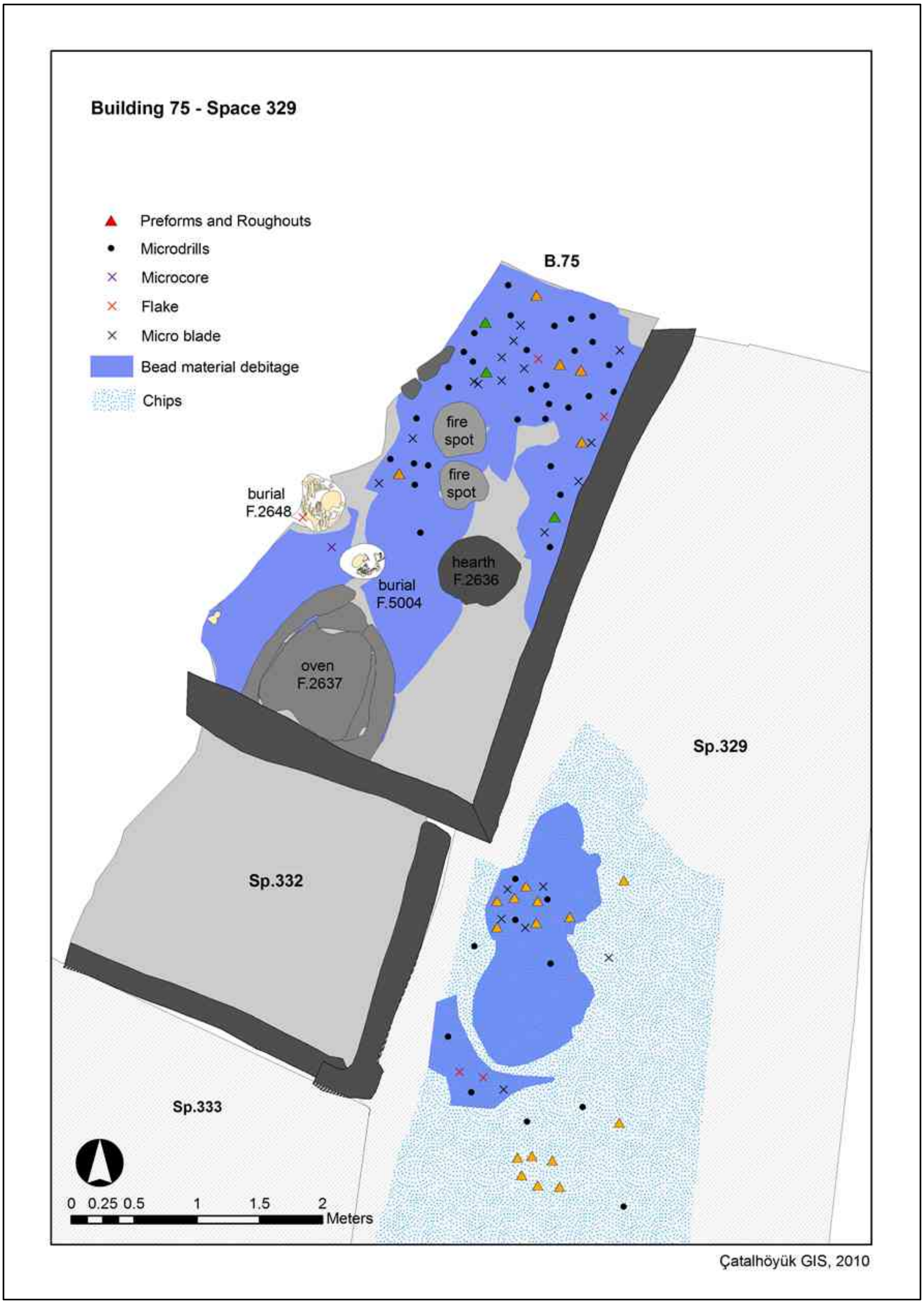


Figure 3.2.19. Distribution of bead materials and production in Space 329 and Building 75. Distribution map produced by Camilla Mazzucato, Çatalhöyük Research Project

South.Q

Settlement phase South.Q is comprised of three buildings (Buildings 68, 65, and 53) an external yard, Space 314, and three external middens (Space 299/305, 260, and 261). Building 68, which was constructed over Building 75, contains no beads within the sampled contexts. In the fill of the base of a foundation cut, however, is a cache of six chert microdrills, a number of flakes, and assorted chert tools.

Within this unit were also three pieces of tufa debitage. These items may have intentionally been placed in the foundation cut or more likely came from the levelling and digging up of Building 75 below. Building 53, external middens Space 260 and 261, and external yard Space 314 did not contain any contexts related to production.

A single steatite preform (14019.X76) was retrieved from Building 65 from unit 14019. No other finished or unfinished beads or associated debitage was found in any of the sampled contexts. Within this unit were also three limestone polishers, which may be related, but are unlikely to be used in stone bead production. Schist palettes, which were likely to have been used to manufacture stone beads were found in units 13365 and 14078 (same occupation phase), although only 14078 could be associated with the same occupation phase as preform 14019.X76. Unit 14012, appears to have a significant amount of bead materials, however, it cannot be associated with the occupation of Building 65 with certainty.

Space 299/305 is a sequence of middens south of Building 65. One carnelian preform, 17308.H2, was found in Phase 2 (Figure 3.2.20). This phase also included a number of other potential bead making tools, but most of these items were found in different units within the same phase, so each representing separate refuse deposits, which may have come from Building 65. One significant find is a group of 4 obsidian perforators or microdrills, three of which are broken. One remains intact, and use-wear on the tip indicates a preserved drilling motion (Appendix D)(Figure 3.2.21). Very few such examples have been found by the lithics team at Çatalhöyük.

Figure 3.2.20. Carnelian preform found in unit 17305, Space 299/305

A worn and perhaps broken microdrill was also found in unit 15724, along with 4 finished beads. This unit also contained the remains of a neonate, feature 2620. The neonate was placed in the deposit rather than buried as no burial cut was found. Whether the microdrill and finished beads are found in conjunction with the neonate is difficult to say as the neonate was placed with other household refuse. A schist palette and abrader were found in unit 16247 and another abrader was found in unit 15743, all midden deposits within the same phase.

Figure 3.2.21. Obsidian perforators and microdrills from unit 15717 in Space 299/305 (second to fourth in picture from left to right). Photo by Çatalhöyük lithics specialist M. Milić

In summary, no real evidence of contexts with stone bead production could be found in South.Q, a stark contrast to the settlement phase, South.P, just before it.

South.R

Within settlement phase South.R, three buildings (Buildings 42, 69, and 56) and two external middens (Spaces 259 and South 333) were sampled. Building 69 had no beads, finished or unfinished. Building 42 contained one steatite preform, 5427.H1, but no finished steatite beads. In Building 56, on the other hand, two preforms, one of an unknown stone or mineral (12872.H1) the second made from fluorapatite (12826.H2) were found, but no finished beads of the same raw material were present. Space 259 did not contain any production contexts.

Space 339 contains a number of tools that could have been involved in stone bead production, although no unfinished beads were found in this unit. Three units in Phase 2 appear to demonstrate the significance of this space: to a lesser degree, unit 17047 and 10758 (found close together) and to a greater extent, unit 16590 (found a number of units above hence later in time, but still within the same phase). A broken obsidian perforator was found in unit 17047 alongside a fine andesite abrader. In unit 10758 there are two schist palettes and fine textured andesite abrader. Unit 16590 contained a sandstone abrader, schist abrader knife, and a schist palette. Calcite and steatite raw material was also found in this unit, and the calcite appears to be similar to that used to make finished ring bead 16590.H2. These units represent midden deposits and cannot be securely associated with a building but these items were disposed of together sometime during South.R, and the units in Space 339 also contain broken tools that could have been used as a complete toolkit and subsequently disposed of together as a group.

South.S

South.S consists of Building 44 and three external middens to the south of it – Spaces 129, 130, and 314. All three of these spaces are the same space and contemporary with the construction and occupation of Building 44, but are differentiated according to the purpose they served. The earliest is Space 314, which was first constructed (Phase 1) at the same time as Building 44. Soon after construction it was used as a midden and contained a large fire pit (Phase 2). Next, Space 130 is differentiated by the building of a wall and later again the space was used as a midden and during this phase the space has been labelled Space 129. Both Spaces 319 and 130 did not contain any bead production materials.

Building 44 is comprised a total of six phases, one construction, four occupation phases, differentiated by the construction of a new oven in each phase, and finally closure and abandonment. Despite all these different occupation phases, only one roughout was found (in Phase 3) and no other unfinished beads were present in this or any of the other occupation phases. The roughout is a piece of galena, which may just be a piece of galena, and not necessarily even a roughout. Due to the structural properties of galena, we cannot say for certain that it was abraded into its rough oval shape, or if it is naturally this shape.

Space 129, in contrast, had one fluorapatite preform (16253.H4), and half of a finished lenticular square fluorapatite bead (16253.H3), both likely made from the same raw material (Figure 3.2.22). In this unit, two sandstone abraders and three schist abrader knives were also present, which could have been used for stone bead production.

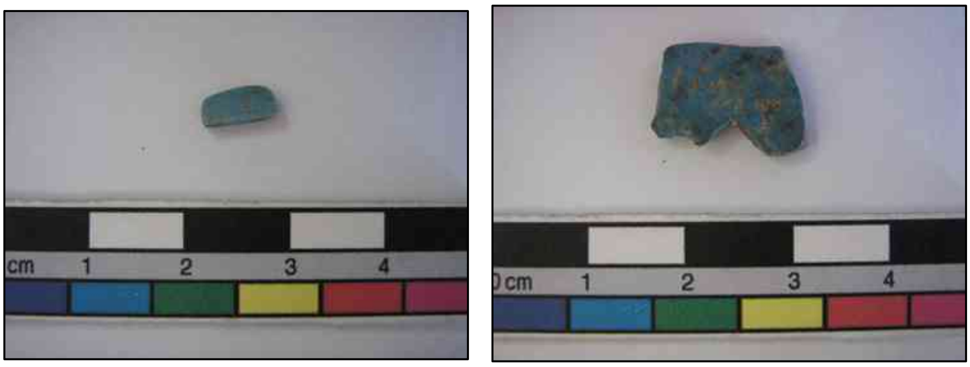


Figure 3.2.22. From left to right: Half fragment of a finished lenticular square fluorapatite bead (16253.H3) and fluorapatite preform (16253.H4)

Unit 14572, which is next to unit 16253, contains three finished beads, but more importantly, contains what may be an example of a discarded ground stone toolkit that could have been used in stone bead production. There are fragments of a schist abrader, basaltic andesite abrader, and a schist palette. Another schist palette fragment is found in unit 14587.

In unit 16262, we find an obsidian drill that could have potentially been used to perforate very soft raw materials (due to its brittle nature). A few obsidian drills show concentric parallel striations indicating a drilling action (this will be discussed in greater detail in Section 3.2b), and therefore could have been used to perforate beads and other objects.

South.S may contain a few small examples of preforms and roughouts, but is important because we find a number of examples of abrading tools and perhaps even discarded toolkits, which were largely absent in the past couple of settlement phases. These potential toolkits, however, come from secondary midden deposits and may very well be from Building 44, but this is not for certain. What is for certain is that these tools are similar to the ones previously used in stone bead production and are associated with this settlement phase.

South.T

The latest settlement phase in the South area is South.T and it consists of Building 10 and to the east of it, Space 119, a truncated space consisting of midden deposits, and to the south of Building 10 is external midden Space 131. All three of these contexts contain no finished or unfinished beads, debitage, or lithic tools. Building 10 also does not have any ground stone tools that may pertain to stone bead production. In contrast, Spaces 119 and 131 both contain ground stone tools that are very likely to have been used in stone bead production. A broken schist grooved palette was found in unit 14028 (Figure 3.2.23). Grooved palettes are the most ideal abrading tools for the reduction and shaping of stone beads.

Figure 3.2.23. Schist grooved palette fragment in unit 14028 (left, top view; right, side view)

In Space 131, however, we find that unit 14533 contains two schist palette fragments, a schist abrader knife, and marble polisher. This could be another example of a possible toolkit found discarded in an external midden.

South.T provides us with examples of ground stone tools which were likely to have been used in stone bead production; however, these examples are derived from secondary refuse deposits and are isolated from bead materials such as beads and debitage, hence although important, they cannot be considered production contexts.

Production contexts within the North area

North.G

The North area is divided into three main settlement phases. The earliest phase, North.G is comprised of eleven buildings, Buildings 58, 59, 52, 64, 51, 49, 48, 67, 57, 55 and 66, and external Space 90 (Figure 3.2.24).

Building 58 contains one hematite roughout (11930.H1) and one serpentinite preform (13237.H1). These two beads are the only two unfinished beads found in North.G. The hematite roughout is located with a cluster of large animal bones in front of a bench along the west wall. Whether this was a part of room fill or an intentionally placed deposit cannot be determined. The serpentinite preform was found in a floor pit. No matching finished beads, debitage, or perforating tools were found in these units or other adjacent units. Other notable units contain ground stone materials that may be significant to stone bead production. Unit 10359 appears to have a number of ground stone tools. These tools were found amongst others as a cluster placed on the floor in the SW corner of Building 58. Five schist palettes were found in this unit along with a broken sandstone abrading slab, and a limestone polishing slab; all integral abrading tools used in stone bead production, amongst other uses. Within the fill of Building 58 was also a grooved abrader, although this essential bead making tool cannot be associated with occupation levels. Despite the presence of bead making materials and even ground stone tools, no production contexts could be located in Building 58 with confidence.

Buildings 64, 51,48, 67, 55, 66, and Space 90 of North.G contain absolutely no unfinished beads, no debitage, perforating or abrading tools in any of the sampled contexts.

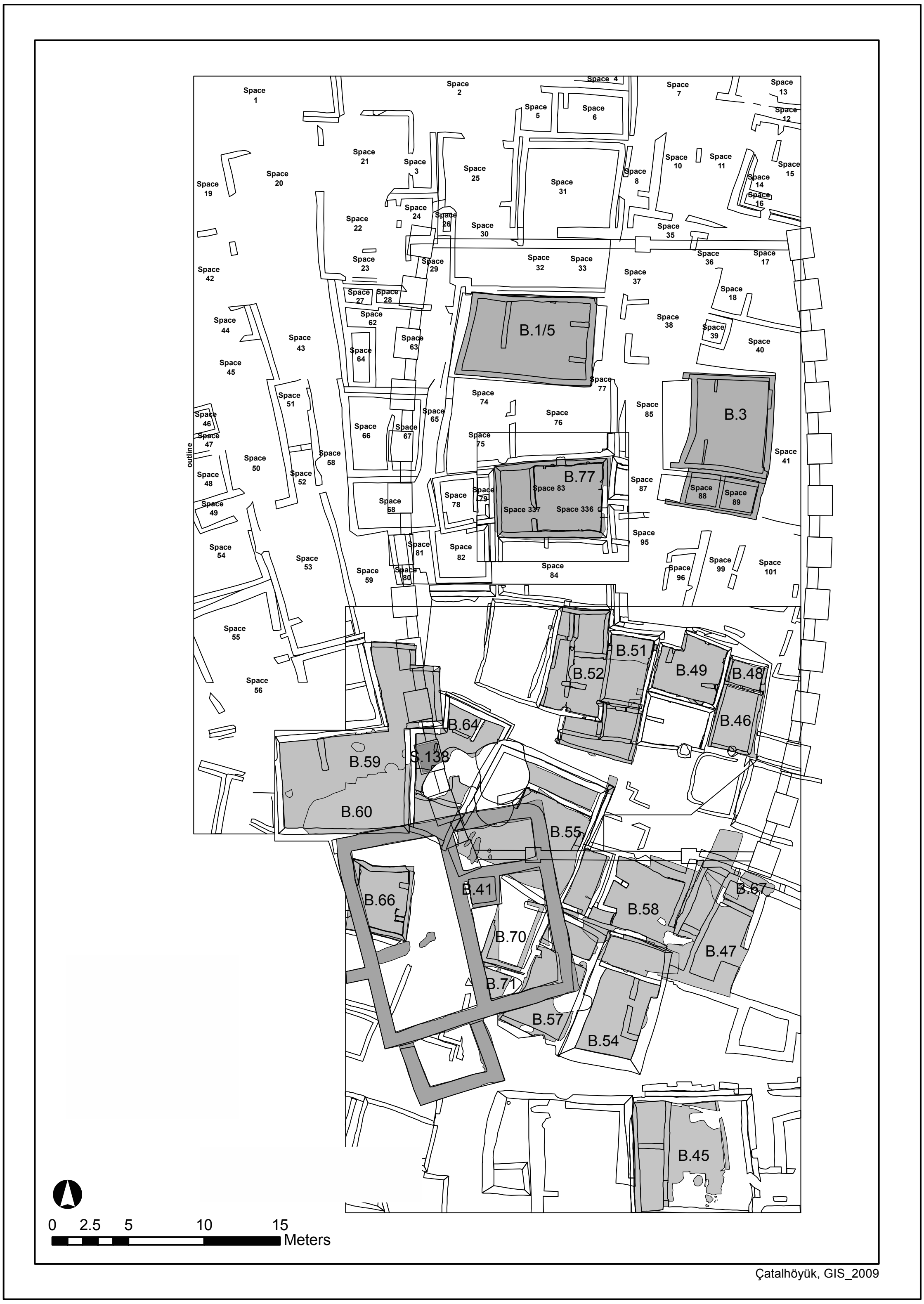


Figure 3.2.24. Building plans from the North Area. Map created by Çatalhöyük GIS Team

Remaining Buildings 59, 52, 49, and 57 contain ground stone implements that could have been used in stone bead production but due to the lack of bead materials, cannot be considered production contexts.

Building 52 is an important building at Çatalhöyük due to evidence of fire, which destroyed the building and resulted in its abandonment. It is uncertain whether this building was intentionally (as a closure event) or accidentally burned. The fire occurred in Phase F and much of the ground stone tools were found on the floor, in the southeast corner of the building (Unit 11968). This ground stone tool group was comprised of an abrading slab, and two clusters of objects represented by units 10304, 11965, and 11928. Unit 10304 consisted of a sandstone abrading slab and sandstone abrader. Unit 11965 contained two sandstone abraders and one sandstone abrading slab. Lastly, unit 11928 had a single schist palette and a sandstone abrading and cutting slab. These tools represent a multipurpose toolkit and had tools that could have been utilized in the production of stone beads.

In Building 49 we find a schist abrader and a schist abrader-knife on the floor. In addition to these tools, there is a V-shaped grooved abrader in unit 16645, which like most grooved abraders found at Çatalhöyük so far appears to be found in fill. Similarly, Building 57 also has a U-shaped grooved abrader in unit 10326, a unit also interpreted as building fill.

In summary, North.G provides us with ample examples of ground stone toolkits within its buildings, however, no evidence of stone bead production was found during this phase. There were generally less finished and unfinished beads within the sampled contexts in this settlement phase, in comparison to the settlement phases in the South area, with the exception of Building 49, which had a number of burials with beads.

North.H

North.H consists of 5 buildings, Buildings 60, 47, 45, 54, and 46. These buildings have very little finished beads, let alone unfinished, debitage, or bead making tools. Only Building 45 contains a single olive diorite preform (10229.H1) and three potential roughouts (round brecciated marble balls, 10243.H1). The combination of a lack of brecciated marble finished beads, debitage, and associate bead making tools, casts doubt to whether these are indeed roughouts. Hence, no stone bead production contexts were found in North.H.

North.I

Settlement phase North.I overlies North.H and consists of surface eroded structures and two rich external midden sequences (Spaces 226 and 279). These spaces represent refuse deposits and any bead making materials found within these spaces are non-primary production related contexts that can only be associated with the settlement phase in which they are found.

Space 226 is an external midden sandwiched between North.H Building 47 to the north, and Building 45 to the south. All the units discussed pertaining to this space are found it its latest phase, Phase A. There is one soft saccharoidal marble roughout (14122.X1) in unit 14122, but there are no soft saccharoidal marble preforms, finished beads, or debitage. Significantly this deposit did contain a V-shaped grooved abrader and what appears to be a silicified steatite stone, which has distinguishing saw marks. The contents of unit 14122 suggest that the source of this deposit was likely to have been a production context.

Unit 8854 has one preform (8854.H5) present in it, and unit 8864 contains two preforms (8864.H1 and 8864.H2). Preform 8854.H5 is made from steatite and the unit does contain two other steatite beads but they do not appear to be matching in colour and texture. No other bead-related tools or debitage were found in this or any nearby units. Unit 8864, in contrast, has two preforms, one made from steatite and the other hematite. It too had one other bead, a steatite finished bead but it also differed in colour and texture. No other bead-related materials were found in this unit, but this context does contain evidence for stone bead manufacture due to the presence of more than one unfinished bead, although obviously not *in-situ*.

Space 279 similarly contains a number of units with evidence of bead production. Space 279 is formed over Building 64 after its abandonment. It is divided into three phases, the earliest being Phase C (quarrying), followed by Phase B (specifically Phase Bi is midden formation and Phase Bii is midden deposition in quarried pits) and Phase A (late midden formation). In total there are 9 preforms and roughouts found in the sampled contexts, within 6 units. As in other buildings in the North area, many of the units contain significant ground stone tools.

In Phase Bii, there are four units with interesting finds: 12972, 13129, 13140, and 13127. Unit 12972 contains a number of finished beads and also two potential preforms (12972.H1 and 12972.H7), which may be a perforated knapped chert flake (Figure 3.2.25), and possible preform for a lenticular bead made from fluorapatite (Figure 4.3.7B), respectively. No stone bead debitage or perforating tools were found in this unit, although a schist palette fragment was recovered from the unit.

Figure 3.2.25. Beads from unit 12972: (from left to right) 12972.H1, 12972.H5, 12972.H6, 12972.H11, 12972.H3, clay bead, and pendant 12972.H8). Photo by K. Wright

Unit 13129 contained three finished beads only and a few assorted palettes and palette fragments. Similarly unit 13140 also only had one finished bead and two palette fragments. Unit 13127, on the other hand, had a finished bead and pendant, along with what the author believes to be a steatite bead spacer preform (13127.H1). Bead spacers were decorative items used to create rows of beads for a single piece of bead jewellery, such as bracelets or necklaces. Also in this unit were four fragments of schist palettes (Figure 3.2.26). Unfortunately this unit did not contain any abrader-knives or other sawing tools (axe or celt), which can account from the sawing marks found on the spacer preform, although obsidian blades could have also been used.

Figure 3.2.26. Broken palettes and bead spacer preform in unit 13127, Space 279. Photo on right by K. Wright

In Phase Bi, unit 10396 had a fine andesite abrading slab and a schist palette within it. It cannot, however, be considered a stone bead production context as no bead material was found in and around this unit.

The remaining units from Space 279 are from Phase A and concentrated in two areas. The first group of units (12988, 13103/12971, and 10369) are on the eastern side of Space 279. The second are concentrated on the western side and these units include 13142, 13143, 13159, 13174, 14120, and 14134.

Unit 12988 contains one roughout (12988.H9) made from fluorapatite and a second olivine dolerite object which may be a roughout or debitage fragment from stone axe production (12988.H8). Six other finished beads were also found in this unit although none matched the raw materials the roughouts were made from. No bead debitage was present but a number of tools were found in this unit. One microdrill fragment and one drill fragment a part of this unit. In terms of ground stone tools, there are a number of palettes (whole and fragments and hand abraders (whole and fragments) made from schist, andesite, and sandstone, and even pumice, raw materials which represent different grades of abrasion, as if a part of a complete abrading toolkit (Figure 3.2.26). This unit could represent a bead production related refuse deposit.

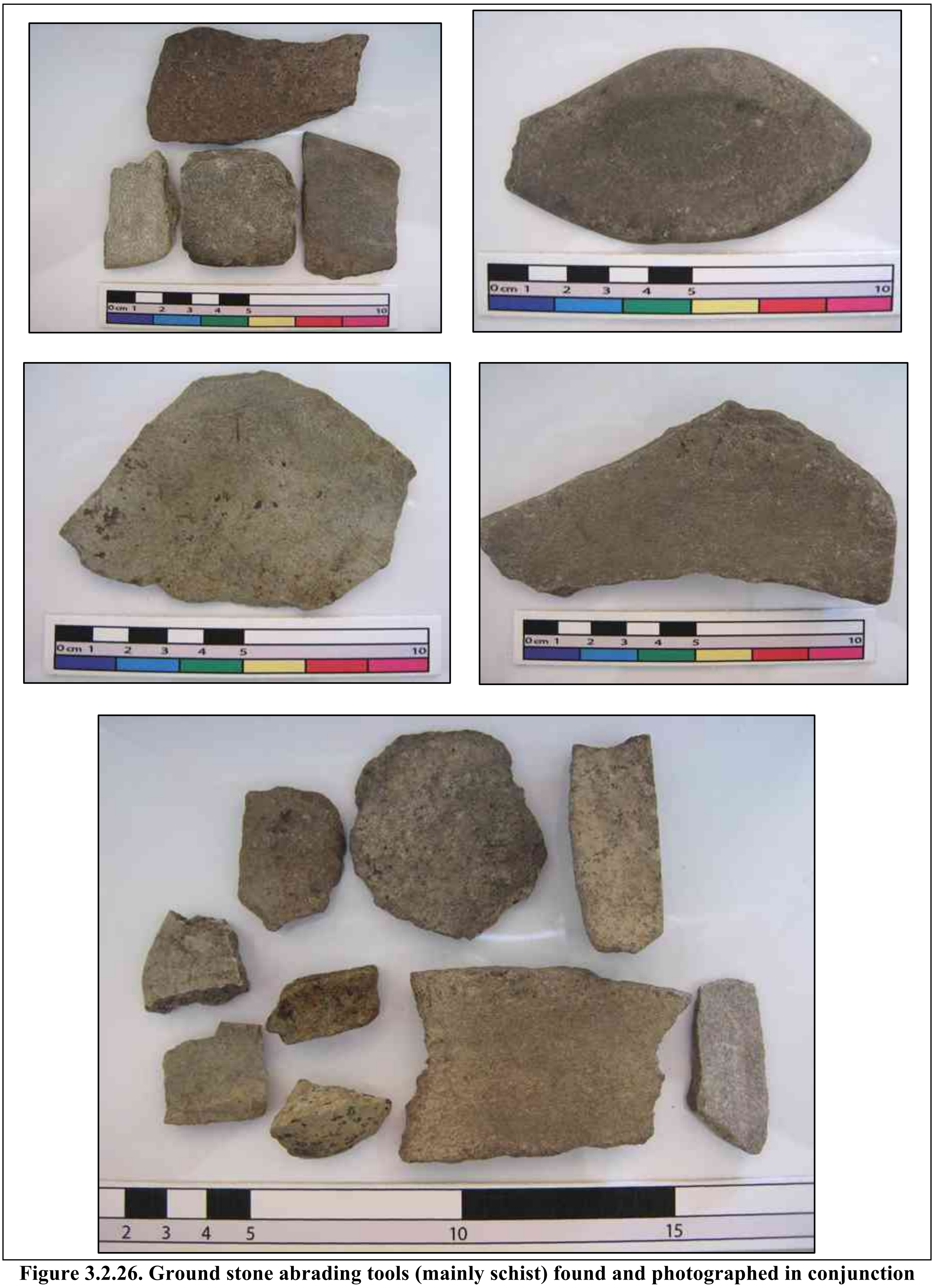


Figure 3.2.26. Ground stone abrading tools (mainly schist) found and photographed in conjunction other assorted tool fragments in Unit 12988, Space 279

Similarly, units 13103 and 12971 (which are essentially the same deposit, according to the excavators) also contained one chert roughout (13103.H4) and an array of ground stone abrading tools (Figure 3.2.27). Unit 13013 contained an entire abrading toolkit consisting of abrasion materials forming differing grades. This toolkit contains a pumice abrader, sandstone abrader, two schist abraders, a fine andesite palette and a schist abrading palette. No debitage or perforating tools were found, although nine finished beads were present, but none made from chert. Adjacent unit 10369 also had a schist palette.

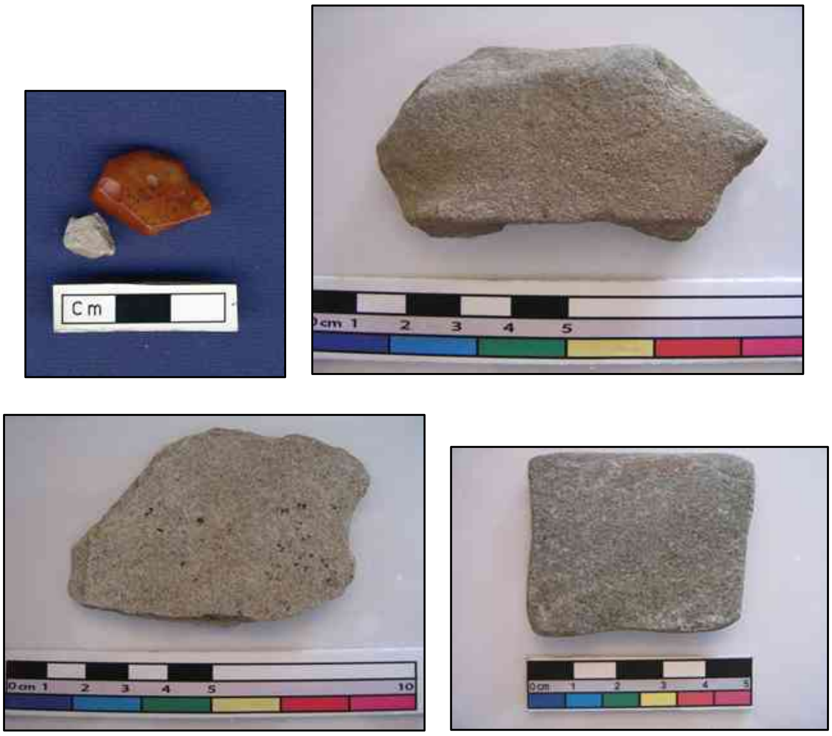


Figure 3.2.27. Clockwise from top left: chert roughout, sandstone bead abrader, schist palette, and fine andesite palette

Unit 13142, which is a part of the second group of units in Phase A, contained a schist grooved abrader but no other bead-related materials were present. Unit 13143, in contrast, which is below unit 13142, had one steatite preform (13143.X9) and one freshwater limestone finished bead. In addition, ground stone tools were also found in this unit (Figure 3.2.28), including an abrading slab fragment and a fine andesite abrading palette which also had abrading marks on it. No other significant bead-related materials such as abrading tools or debitage were found.

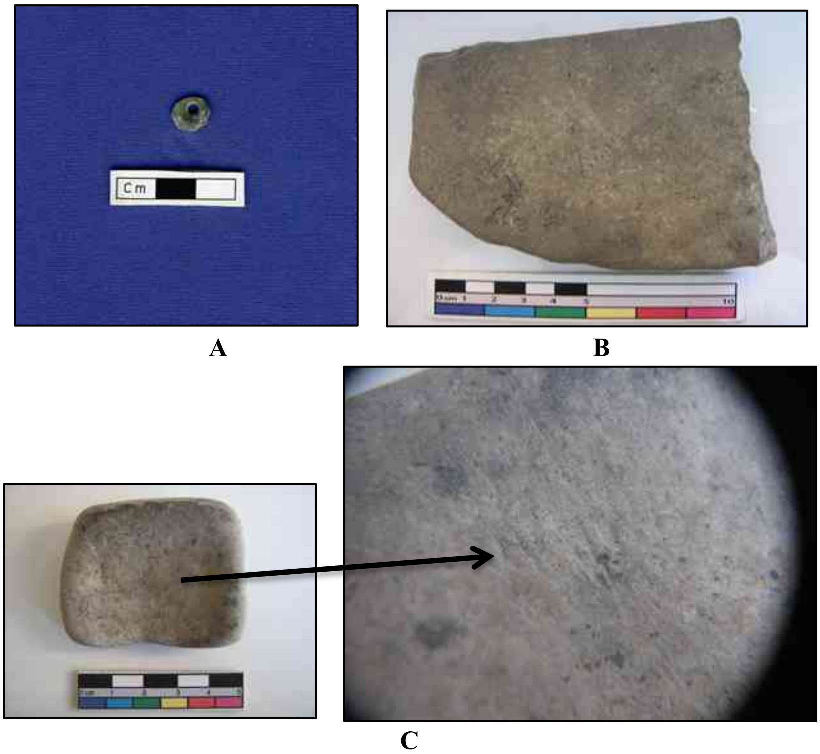


Figure 3.2.28. A) Steatite preform from unit 13143; B) abrading slab fragment; C) fine andesite palette with abrasion marks

There is a single fluorapatite preform in 13174 (13174.X4), but no other bead-related materials. In contrast, unit 14120 could be considered a production related context as one fluorapatite roughout (14120.H7) and one steatite preform (14120.H4) were found alongside chert flakes and sixteen finished beads (Figure 3.2.29). No debitage was found, but a fine textured abrading slab fragment was retrieved from this deposit. In unit 14134, a schist abrading palette was found, but no other bead-related materials were present.

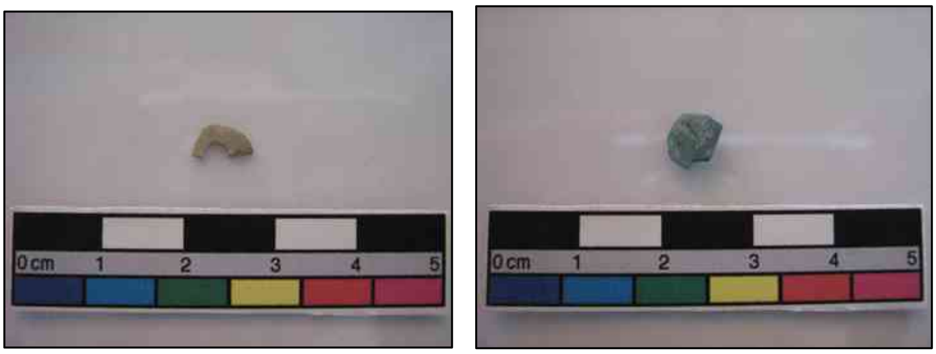


Figure 3.2.29. From left to right: steatite preform fragment (14120.H4) and a fluorapatite roughout (14120.H7) in unit 14120

In Summary, North.I contains eight units of midden deposits which represent non-primary production related contexts that provide evidence of steatite, fluorapatite, chert, soft saccharoidal marble, and hematite bead production. It appears that most of these examples are precursors to ring and disc beads.

Summary of production contexts and distribution patterns

A number of production contexts, both primary and secondary, were located in the South and North areas at Çatalhöyük. Some production contexts could be identified with more conviction than others, because these contexts contained a number of bead-related components (the different stages of bead manufacture, tools, and debitage) while others only had one. There are basically five middens, two yards, and two buildings that have substantial evidence for stone bead production out of a total of 22 external spaces and 33 buildings. These are (from earliest to latest) Space 181 (external midden), Building 18, Space 333 (external yard), Building 75, Space 329 (external yard), Space 339 (external midden), Space 129 (external midden), Space 226 (external midden), and Space 279 (external midden). Within these buildings and spaces, there are 37 examples (37 contexts identified upon closer examination from the original 42) of stone bead production in a total of 32 units, as some units indicate multiple examples of production of different raw materials.

A summary of potential production contexts, not including those that only had a concentration of bead making tools present (which are presented in Table 3.2.3), can be found in Table 3.2.2. In this table, finished beads are only listed if there are other matching components such as unfinished beads or debitage. For each unit, the individual components of bead production are listed, quantified, and categorized according to the "production level" of the unit. The presence of each stage of bead manufacture (nodule, roughout, preform, finished), tools (perforating and abrading), and debitage, is given a point each so that a unit with only 3 preforms is given a single point (for the presence of one component), and a unit with a microdrill, preform, and debitage is given three points (for the presence of three components). There can therefore be single component to a maximum of seven components present in a single unit. The column on the far right provides the total production level number for that building or space. By quantifying production contexts we can better understand the degree to which buildings and spaces were engaged in stone bead production, and this quantification also provides a means of comparison.

South.P contexts, Building 75 and adjacent Space 329, have the highest production levels, in terms of individual units and in total. Fortunately, both these contexts provide us with primary examples of production in activity areas around fire installations, be they ovens or hearths. In fact, only two buildings and a single external yard provide us with primary examples of stone bead production, the remaining contexts are all middens, such as the next two contexts with high production levels. Space 181 (South.G) and Space 279 (North.I) are external middens and provide us with discarded production related deposits, mostly comprised of household refuse. These contexts remain valuable, as a unit within a midden represents a single depositional activity, therefore these items if found in the same unit could have come from the same household and occupation phase. Moreover, these items could have potentially been used together, and cleared and discarded from the same floor or area of the building.

Table 3.2.2 clearly indicates that no unit contains all 7 components of bead production; in fact, the highest production level within a unit contains 5 components, in Space 329. Many units contain ample evidence of unfinished stone beads, microdrills and debitage, for example, but no ground stone tools, such as those in Building 75, but in other contexts, such as Space 279, we find numerous examples of tools which were likely used in stone bead production in conjunction with preforms and roughouts, but there is no evidence of microdrills or debitage. If these examples are considered together, however, a clearer picture of Neolithic stone bead production at Çatalhöyük can be formed.

From Table 3.2.2, we find that a number of raw materials were utilized in stone bead production, the majority being dark red/brown coloured tufa, which is present throughout the occupation of the mound. Almost all the evidence for stone bead production indicates the manufacture of simple ring or disc shaped beads at Çatalhöyük.

Phase	Building/ space	Unit	Context	Nodule	Roughout	Preform	Finished	Micro-drills	Debitage (pieces)	Ground stone	Bead type produced	Prod. level	Total prod. level
S.G	S181	4838	midden	-	-	4	3	1 chert?	-	2	hl/sm ring	4	18
		4838	midden	-	-	1	4		-		tufa ring	4	
		4838	midden	-	-	3	1		-		tufa ring	4	
		4839	midden	-	-	3	-	-	-	-	hl/sm ring	1	
		4839	midden	-	-	1	1	-	-	-	tufa ring	2	
		4842	midden	-	-	3	-	-	-	-	hl/sm ring	1	
		4868	midden	-	-	1	3	-	-	-	tufa ring	2	
S.J	B18	4530	floor	-	1	-	5	bone points	-	-	phyllite ring	3	6
		4540	floor	-	-	3	-	-	-	-	phyllite ring	1	
		4539	floor	-	-	1	1	-	-	-	phyllite ring	2	
S.P	S333	16261	yard midden	-	-	-	-	-	23	-	phyllite -	1	1
	B75	16567	floor	-	-	1	-	1 chert	31	-	serp ring/disc tufa debitage	3	23
		17043	floor	-	1	2	-	1 chert	11	-	tufa ring/disc	4	
		17030	floor	-	1	-	-	-	7	-	tufa ring/disc	2	
		16571	floor	-	-	-	-	-	7	-	tufa	1	
		16565	floor	-	2	1	-	19 chert & deb	-	-	serp and biotite disc?	4	
		16565	floor	-	3	2	-		105	-	tufa ring	4	
		16544	floor	-	1	-	-	2 chert	4	-	tufa	3	
		16276	floor	-	-	-	-	4 chert	9	-	tufa	2	
	S329	17048	surface dump	-	1	-	-	-	13	-	tufa	2	18
		17048	surface dump	-	-	-	-	-	3	-	serpentinite	1	
		16555	just under surface	-	-	6	-	5 chert & deb	16	-	tufa ring	3	
		16535	surface	-	-	-	-	-	22	-	tufa	1	
		16541	floor	-	-	-	-	2 chert	13	-	tufa	2	
		16550	floor	5	2	2	-	2 chert	150	-	tufa ring	5	
		16530	hearth floor	-	-	-	-	1 chert	8	-	tufa	2	
		16236	ashy deposit	-	1	5	-	-	-	-	tufa ring	2	
S.R	S339	16590	midden	2	-	-	1	-	-	3	calcite and steatite ring/disc	3	3
S.S	S129	16253	midden	-	-	1	1	-	-	5	fluorapatite disc	3	3
N.I	S226	14122	midden	-	1	-	-	-	-	1	soft saccharoidal marble disc/ring	2	3
		8864	midden	-	-	2	-	-	-	-	hematite D/R or broken pendant & steatite D/R	1	
	S279	12972	midden	-	-	2	-	-	-	3	chert & fluor. lenticular?	2	13
		13127	midden	-	-	1	-	-	-	4	steatite spacer	2	
		12988	midden	-	2	-	-	2 chert	-	9	fluor. & dolerite	3	
		13103	midden	-	1	-	-	-	-	6	chert	2	
		13143	midden	-	-	1	-	-	-	2	steatite disc/ring	2	
		14120	midden	-	-	2	-	-	-	1	fluor. lenticular & steatite D/R	2	

Table 3.2.2. Summary of production contexts, by unit, in the North and South areas showing primary production contexts (floors and surfaces) and production related discarded contexts (middens and ashy deposit)

Table 3.2.3 lists all the sampled contexts that contained potential bead making toolkits, but very little evidence of finished or unfinished beads or debitage. These tools could have been used for a number of purposes, but experiments and research indicate that tools such as these could have and were likely to have been used in stone bead production. The majority of these toolkits are found within midden deposits, with some tools being found in fragments while others only minimally used. Two buildings, Buildings 58 and 52 from phase North.G have large ground stone clusters on floors. These toolkits contain tools for perforating or abrading and reducing stone beads. Many units with ground stone contain raw materials made from at least two textures providing two different grades of abrading, some however, such as unit 10359, 12988, and 13103, contain at least three or four grades of abrasion.

Phase	Building/ Space	Unit	Context	List of tools
S.?M	B50	10835	burial (skeleton)	5 chert drills in burial
S.P	S333	16505	near oven of external yard	19 microdrills and chert debitage
S.Q	S299/305	15717	midden	2 obsidian perforators and 2 obsidian microdrills
S.R	S339	16590	midden	sandstone abrader, schist abrader knife, and schist palette
		17047	midden	obsidian perforator and fine andesite abrader
S.S	S319	16534	midden	microdrill and other chert tools, abrading palette fragments, and schist abrader knife
	S129	14572	midden	fragments of schist abrader, basaltic andesite abrader, and schist palette
S.T	S131	14533	midden	2 schist palette fragments, schist abrader knife, and marble polisher
N.G	B58	10359	cluster on floor	5 schist palettes, broken sandstone abrading slab, and limestone polishing slab
	B52	associated with 11968	cluster on floor	abrading slab, sandstone abrading slab, sandstone abrader, schist palette, sandstone abrading and cutting slab
N.I	S279	12988	midden	schist, andesite, sandstone, pumice abraders and palettes (whole and fragments)
		13103	midden	pumice abrader, sandstone abrader, 2 schist abraders, fine andesite palette, and schist abrading palette

Table 3.2.3. Potential bead making toolkits found in the North and South areas

There are a number of production contexts at Çatalhöyük, which are not evenly distributed throughout the settlement phases or areas of the site, and indicate different levels of production. Examples of production are also limited to a small number of the most commonly used raw materials, although other examples also exist. The unfinished beads found in most of these production examples indicate the manufacture of simple disc or ring stone beads. The results from the study of production contexts are discussed in Chapter 4.2. In the next section, these unfinished beads along with finished beads within production and non-production contexts will be studied more closely in order to determine how stone beads were manufactured.

3.3. Manufacture marks studies

The identification of production contexts and production related contexts is the integral first step in studying stone bead manufacture. By carefully examining the various components that make up these contexts at a microscopic level, both individually and in relation to one another, manufacturing sequences can be produced. Beads from the various stages of stone bead manufacture (nodules, roughouts, preforms, and finished beads made from the same raw material) and specifically unfinished beads such as roughouts and preforms were carefully examined for manufacture marks using a scanning electron microscope. Roughouts and preforms provide us with the most information regarding the manufacturing process, as any potential manufacture marks, such as chipping, abrading, sawing, pecking, polishing, and drilling, are still present during this stage of manufacture. Aside from preservation issues, some raw materials are unable to show any manufacture marks due to the properties of the raw material, such as a chalky texture or loosely compacted grains. In addition to unfinished beads, a sample of perforating tools, specifically bone points and flint microdrills, were analysed for use-wear, in order to look for evidence for their use in stone bead production (Appendix D).

Bead sample for manufacturing marks studies

A total of 299 beads, both finished and unfinished, were analysed microscopically for manufacture marks. These analyses were based on experimental and technological research studies discussed in Chapter 2.2 and 2.3. The methodology related to manufacture marks analyses can be found in Chapter 2.1 and 2.3. A summary of roughouts, preforms, and finished beads sampled for manufacture marks studies is presented in Table 3.3.1.

Phase	Context	Roughouts (# sampled/ total)	Preforms (# sampled/ total)	Finished (# sampled/ total)	Total beads sampled	% of unfinished beads sampled	% of finished beads sampled
South.G	S181 (n=93)	0	15/19	16/74	31	79.0%	21.6%
South.J	B18 (n=34)	1/1	5/5	18/28	24	100.0%	64.3%
	B23 (n=25)	0	2/2	21/22	23	100.0%	95.5%
South.K	B16 (n=9)	0	0	9/10	9	N/A	90.0%
	B17 (n=61)	0	2/2	31/59	33	100.0%	52.5%
South.P	B75 (n=33)	5/8	1/5	12/20	18	46.2%	60.0%
	S333 (n=20)	0	1/2	8/18	9	50.0%	44.4%
	S329 (n=55)	2/4	12/16	12/24	26	70.0%	50.0%
South.Q	B68 (n=1)	0	0	1/1	1	N/A	100.0%
	B65 (n=31)	0	1/1	7/30	8	100.0%	23.3%
	S299/305 (n=22)	0	0/1	8/17	8	0.0%	47.1%
South.R	B69 (n=3)	0	0	2/3	2	N/A	66.7%
	B56 (n=21)	0	1/2	11/18	12	50.0%	61.1%
	S339 (n=13)	0	0	10/13	10	N/A	76.9%
North.G	B58 (n=6)	1/1	1/1	0/4	2	100.0%	0.0%
	B49 (n=270)	0	0	6/269	6	N/A	2.2%
North.H	B60 (n=8)	0	0	8/8	8	N/A	100.0%
	B47 (n=7)	1/3	0/1	2/3	3	25.0%	66.7%
	B45 (n=1)	0	0	1/1	1	N/A	100.0%
North.I	S279 (n=91)	2/4	5/5	51/79	58	77.8%	64.6%
	S226 (n=43)	0/1	4/5	3/36	7	66.7%	8.3%

Table 3.3.1. Summary of roughouts, preforms, and finished beads sampled for manufacture marks studies (N=299, QN=242.5)

The last two columns of Table 3.3.1 reflect the percentage of unfinished and finished beads sampled for manufacture marks studies within each context. A conscious attempt was made to sample at least 50% of the unfinished beads, if not all, within each context. On average, 68.9% of unfinished beads were sampled for manufacture marks analyses, but this percentage increases to 74.2% if we discard the single perform not studied in Space 299/305. Many finished beads, especially disc or ring beads, are likely to have identical beads present within the same context, such as building or space. These finished beads are identical in terms of appearance and the manufacture marks present; therefore, it was not necessary to spend valuable time and lab resources on finished beads which were essentially indistinguishable and provided identical results. Finished beads are also less likely to have remnants of manufacture marks due to the final polishing process and subsequent use. The average percentage of finished beads studied for manufacture marks analyses is 56.9% within the sampled building or space. Seven of the contexts sampled only contained finished beads, which is not unusual as roughouts and preforms form a very small percentage of the stone bead assemblage.

Results of manufacture marks analyses

In Chapter 2.3, a description of potential manufacture marks and their methods of identification and analysis were outlined, which form the basis of all the analyses conducted in this chapter. In summary, roughouts were examined laterally along their faces or ends (side which would have been perforated), the area from end to end, along their lengths or heights, and if applicable, their edges. These three parts of beads were also examined for the analyses of preforms and finished beads, but in addition, perforations were also closely studied for the regularity of their outline, perforation size and width, marks within the perforation, and finally, method of drilling.

In total, seven manufacture marks variables were assessed: drilling, perforation morphology, perforation size, perforation marks, length marks, end marks, and edges. The results of the manufacture marks analyses are presented under each manufacture mark category and summarized in Table 3.3.2 below according to settlement phase. The results for manufacture marks analyses are also presented in greater detail in Table A3.3.2. The results from these analyses are discussed in the next chapter, Chapter 4.

		South.G (N=31)	South.J (N=78)	South.K (N=42)	South.P (N=53)	South.Q (N=17)	South.R (N=24)	North.G (N=8)	North.H (N=12)	North.I (N=65)	Total (N=299)	Total %
Drilling	Hand	1	2.5	2.5	3.5	3.5	1.25			8	22.25	9.2%
	Mechanical	18.5	28.5	23.75	33.25	7.5	11.75	3.25	9.5	50.75	186.75	77.0%
	Ind. or N/A	0.5	5	3.5	6	3.25	4.25	4	3	4	33.5	13.8%
Perf morph	Bicon/Straight	12	23.75	15.5	26.75	12.5	13.75	5.25	7	50.75	167.25	69.9%
	Bicon/Slanted		2	6	1.5	0.5			1.5	3	14.5	6.1%
	Unicon/Straight	5.25	2.75	4	6					3	21	8.8%
	Unicon/Slanted	1	1.5		2		0.25			1	5.75	2.4%
	Uniform/Straight	1.5	4	3.25							8.75	3.7%
	Pecking	0.75			0.5		1	1		2	5.25	2.2%
	Ind. or N/A	0.25	2		6	0.25	1.25	1	4	2	16.75	7.0%
Perf size	Narrow/Short	0.5	0.5							4	5	2.1%
	Narrow/Long				1.5					3.5	5	2.1%
	Wide/Short	8.5	28	15.5	5	1.5	1	2	4	2.75	68.25	28.4%
	Wide/Med	9	6.5	12.75	19	6	7.25	2.25	1.5	17	81.25	33.8%
	Wide/Long	1.75	1	1.5	12.25	5.75	5.75	3	4	31.5	66.5	27.7%
	Ind. or N/A	0.25			5	1	1		3	4	14.25	5.9%
Perf marks	Smooth	4.75	5.5	1	10.25	4.5	5		1	10	42	17.4%
	FLS	7.5	23	13.25	18	4	3.75	4.25	4	30.75	108.5	45.1%
	CPS	6.5	1	6.25	4.5	2	3		3	9.5	35.75	14.8%
	Rough	1	6.5	9.25	3					3.5	23.25	9.7%
	Pecking	0.75						1		2	3.75	1.6%
	Ind. or N/A	0.25			7	3.75	3.5	2	4.5	6.5	27.5	11.4%
Length marks	Abrasion				14.5	1	2.25	1		14.25	33	13.7%
	FLS	10.5	28.75	23.5	17.5	7.5	7.25	6.25	11	39.75	152	63.1%
	Smooth	1.25		3.25	4.75	4.75	4.75		0.5	7.5	26.75	11.1%
	Rough	1	5.25	1.25	3						10.5	4.4%
	Sawing								1	1	2	0.8%
	Indeterminate	7	2	1.75	3.25	1	1			0.5	16.5	6.9%
End marks	Abrasion	1.75	1	1.75	15	0.5	0.25			8.75	29	12.1%
	Smooth	10.75	16.75	22.5	22	11.25	12	5.75	7	37.5	145.5	60.6%
	Scratches				0.5	1	1	1.5	0.5	14.75	19.25	9.3%
	Rough	7	18	5.5	5.5		1		1		38	15.8%
	Indeterminate	0.5	0.25			1.5	1		4	1	8.25	3.4%
Edges	Sharp	11.25	29	26	20.75	4.5	7	3.25	5	29.75	136.5	56.9%
	Round	2	1	3.25	7	7.75	5.75	3	7.5	12	49.25	20.5%
	Sharp and Round				2.5		0.25			4	6.75	2.8%
	Indeterminate	6.25	6	0.5	12.5	1	3	1		17	47.25	19.7%

Table 3.3.2. Percentage distribution of manufacture marks according to manufacture mark category and settlement phase (summarized)

Drilling

The manufacture mark category of drilling aims to address whether beads were drilled by hand or mechanically by using a bow drill, for example. This is determined by examining the regularity of the outline of the perforation as well as the marks inside the perforation, if present. A regular circular outline and concentric parallel striations within a perforation suggest the use of a mechanical drill. Experimental work conducted in this study (Chapter 2.3) also confirm this; however, when a roughout is made from a relatively soft raw material (Mohs ≤4) which is not very deep (approximately 3mm or less), as found with most ring or disc beads, for example, perforating the roughout with two hands can also create a regular outline, although if the raw material is capable of exhibiting manufacture marks, their alignment within the perforation is distinguishable from those caused by a mechanical drill. The rotary motion caused when rubbing a microdrill hafted onto a stick is essentially a small back and forth hand movement (less than the total length of the two hands) whereas a single spin of a bow drill causes a much longer continuous rotation. Unfortunately the manufacture marks within the perforation were not always present, and in these cases, the only evidence for hand or mechanical drilling was derived from the outline of the perforation, so for a number of beads it was extremely difficult to distinguish between perforation by a two-handed or mechanical drill.

Finished and unfinished beads were divided into two main categories. The first is the "hand" category which is comprised of beads drilled using one hand. This category also contains the few more concrete examples of two-handed drilling. The second category is comprised of perforations made by mechanical means. We are unable to determine which specific method, if any of these, was used, but what could be said for certain is that some sort of mechanical device was used to speed up and aid the perforation of stone beads. A third category of "indeterminate or not applicable" was created for perforations that could not be assessed due to damage for example, or roughouts (as they are not yet perforated).

Based on the data presented in Table 3.3.2 and Figure 3.3.1, the vast majority of beads appear to have been drilled mechanically (77.0%), whist only 9.2% were drilled by hand. Table 3.3.2 also reveals that both within and between phases, the majority of beads appear to be drilled mechanically. It appears that from the mechanical drill was used from the earliest settlement phase excavated to date to the end of the Neolithic.

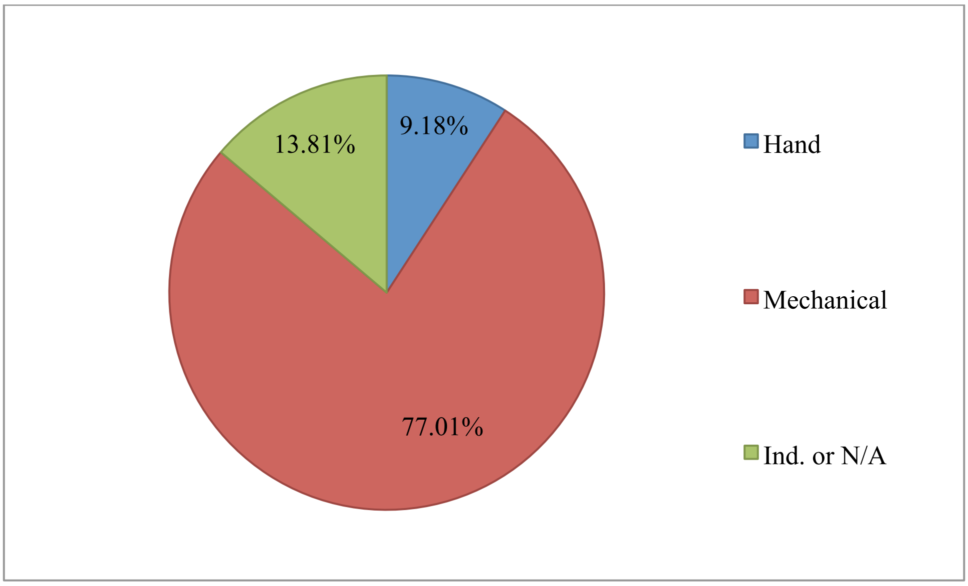


Figure 3.3.1. Distribution of beads drilled by mechanical drill, hand, or indeterminate (QN=242.5)

In order to determine whether certain bead types are more likely to be drilled by hand or mechanically, bead types were compared to methods of drilling (Table 3.3.3). Four bead types were not a part of the manufacture marks bead sample due to their location (the building or space in which they were found was not sampled) or due to their raw material properties or difficulties making a mould from within the perforation due to the shape of the bead. These bead types are the double concave disc, lenticular square, plano-convex, and axe head.

Bead Type	Hand	Mechanical	Ind. or N/A
disc	5	50.25	0
ring	6.25	88	6
cylindrical barrel	0	1	1
rounded barrel	0	4	1
barrel disc	0	7.5	1
barrel ring	1	2.25	0
cylindrical	0	2	1
round	0	1	0
long elliptical	0	1.5	0
lenticular	0	1.25	0
lenticular concave	0	1	0
conical	0	3	0
rectangular	1	0	0
rectangular double perforation	0	0	0.25
trapezoid	1	0	0
collared butterfly	0	1	0
butterfly heart	0	0.5	0
perforated pebble	11	2	2
pendant	0	2	0
indeterminate	5.25	23.75	13

Table 3.3.3. Summary of bead types and method of drilling employed (QN=242.5)

A small number of bead types were drilled either mechanically or by hand, although examples of hand drilling are fewer in number. Bead types which appear both mechanically and hand drilled are disc, ring, barrel ring, and perforated pebble beads, although the sample sizes for some bead types are quite small, especially non-disc and ring beads, and this may account for why only a few bead types were drilled both mechanically and by hand (Figure 3.3.2). Figure 3.3.2 also reveals a number of bead types that were only drilled mechanically or only by hand.

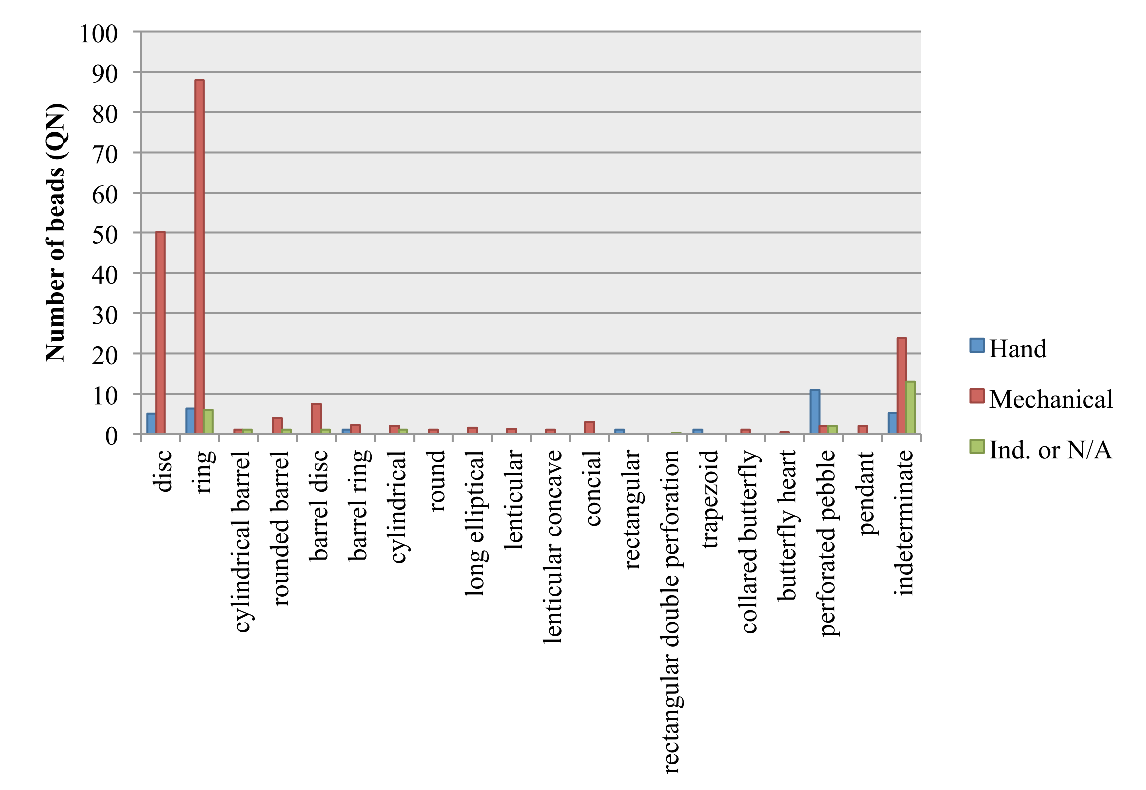


Figure 3.3.2. Distribution of hand vs. mechanical drilling according to bead type (QN= 242.5)

Twelve bead types, the cylindrical barrel, rounded barrel, barrel disc, cylindrical, round, long elliptical, lenticular, lenticular concave, conical, collared butterfly, butterfly heart, and pendant, all appear to be only drilled mechanically. Many of these bead types are present in very small numbers and vary in raw material. Most however, have perforations that are quite long in comparison to other bead types, and by using a mechanical drill, the drilling process would speed up considerably, as found in experiments (Chapter 2.3), regardless of raw material hardness.

In contrast to the twelve bead types that were only found to be drilled mechanically, two other variant bead types, rectangular and trapezoid beads, both made from steatite, appear to be hand drilled with a conical-shaped drill. The relatively soft steatite material and the short length or height of the bead makes drilling by hand through this material much easier than other raw materials. Although we also have numerous examples of other bead types made from steatite, and they all appear to be drilled mechanically.

By carefully examining the relationship between bead types and method of drilling, it becomes apparent that a number of important factors play a role in determining whether beads were drilled by hand or mechanically. Although most of the beads sampled indicate mechanical drilling, the limited presence of some bead types makes it difficult to attribute a particular method of drilling to a specific bead type. In addition to small numbers of certain bead types, it appears that other variables such as the hardness and toughness of the raw material were also taken into account by Neolithic bead makers at Çatalhöyük. Many variant bead types (non-disc and ring) are larger in size and made from harder materials in addition to also being made from more commonly used raw materials. More variant bead types are also prone to have longer perforations. For these reasons, it makes much more sense to mechanically drill perforations.

But of course we also find that the majority of disc and ring beads were also drilled mechanically, although hand drilled examples are also present. There are no concrete rules to drilling method, but drilling via mechanical drill seems to be the preferred method.

Perforation morphology

By studying the shape of the perforation, we can ascertain whether the finished bead or preform was perforated from one side or both sides, what the shape of the perforating tool is likely to be, and at what angle the bead was being drilled. Perforations can either be cone-shaped and drilled from one side (uniconical), cone-shaped and drilled from both sides (biconical), or cylindrical (uniform) (Figure 3.3.3). Roughouts may also have pecking or gouging marks made in preparation for drilling. Experimental studies conducted in this project confirmed that by creating a small peck, gouge, or initially perforating using a hand drill, before actually completing the perforation, allows the drill to sit comfortably in a well so that the tip does not slip during the drilling process (Chapter 2.3).

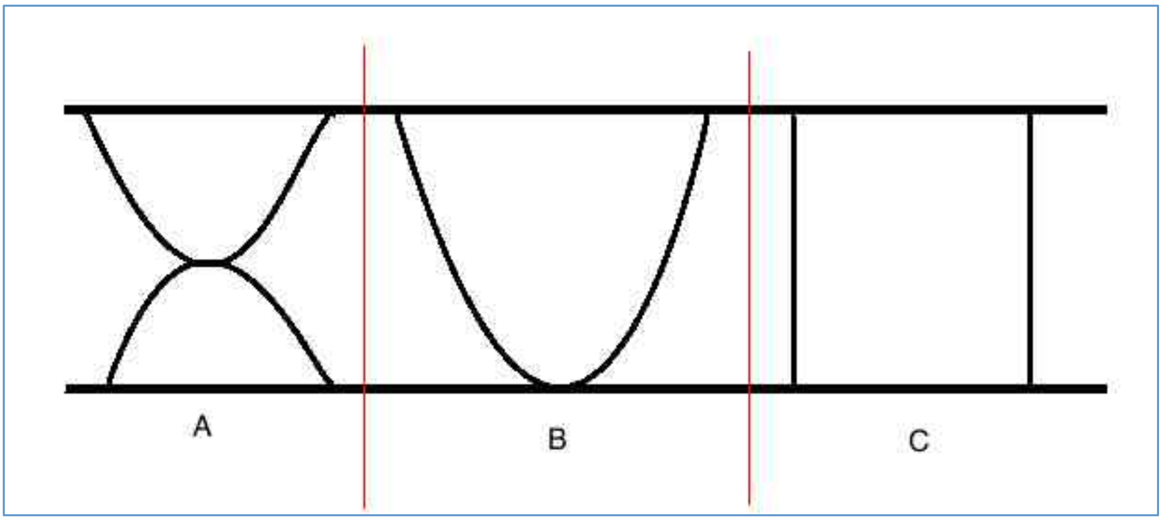


Figure 3.3.3. Diagram of perforation morphologies in profile: A) biconical perforation; B) uniconical perforation; and C) uniform perforation

Beads could be drilled straight down, perpendicular to the surface of the bead (straight), indicating the use of a mechanical drill or at an angle (slanted), indicating drilling by hand.

With these variables in mind there are seven categories that beads fall into: biconical/straight, biconical/slanted, uniconical/straight, uniconical/slanted, uniform/straight, pecking, and indeterminate (Figure 3.3.4). In the indeterminate category are roughouts and those perforations that could not be assessed, generally because the bead was not broken (hence no profile of the perforation) or that the perforation opening was too narrow to make a secure identification.

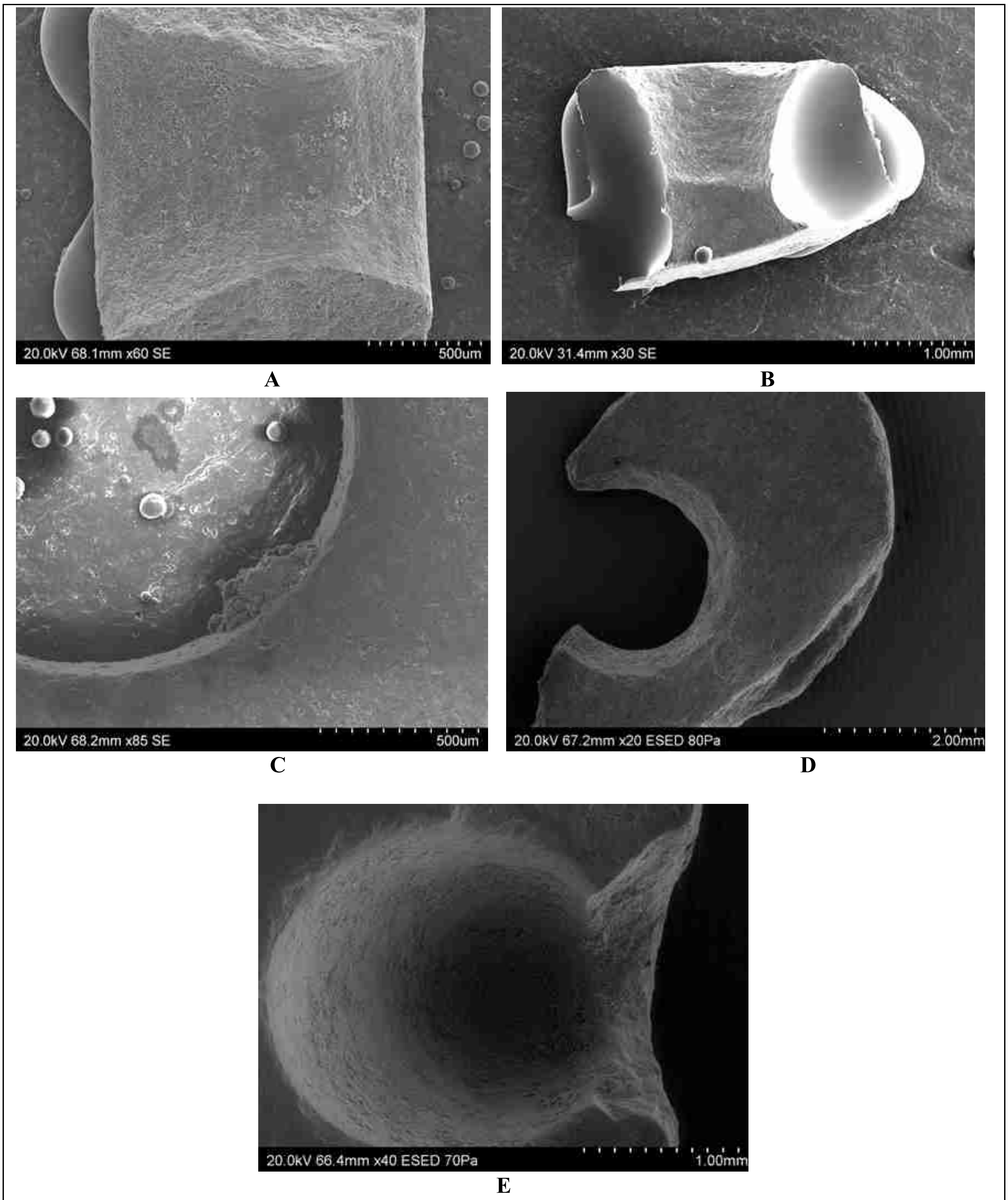


Figure 3.3.4. Types of perforation morphologies: A) biconical/straight; B) biconical/slanted; C) uniform/straight; D) uniconical/straight; E) uniconical/slanted

The greatest proportion of beads (69.9%) had a biconical and straight perforation morphology (Figure 3.3.5). The perforation was a conical shape and the finished bead or preform was drilled from either side (end of bead) so that the perforation was first drilled halfway to three quarters of the way through, then turned around and perforated from the other side, completing the perforation. Beads and preforms were drilled straight down, instead of at an angle indicating that the conical tip of the drill was perpendicular to the bead, which is most likely possible to maintain throughout a perforation by mechanical or two-handed drilling.

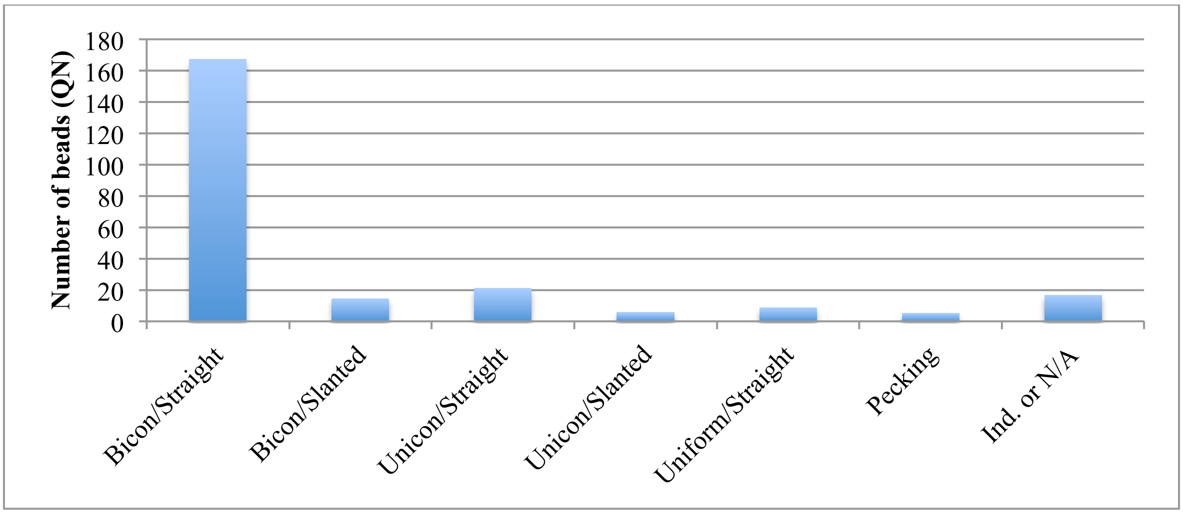


Figure 3.3.5. Frequency distribution of perforation morphology categories (QN= 239.25)

Figure 3.3.5 illustrates that the second most frequent category of perforation morphologies are beads with a conical perforation, which was made by perforating straight down and on one side only (uniconical). This type of perforation makes up 8.8% of the total bead sample. Some of these beads are in fact preforms that were only perforated from one side before they snapped. Perhaps some of these would have have been perforated biconically if they had not broken, which would make the proportion of biconical perforations even higher.

The third most frequent types of perforations are those that are indeterminate or not applicable, followed by biconical shaped perforations, which have been perforated at an angle (6.1%) which suggests that these beads and preforms were most likely perforated by one hand. Perforations which are uniform in shape and perforated straight down comprise 3.7% of the bead sample. The majority of beads in this category are made from phyllite and exhibit schistosity, a geological trait where horizontal plates break off the bead, along the phyllite's natural plates, forming more beads. These plates are very thin and the perforations appear uniform in shape although the original bead may have been perforated uniconically or biconically. It is also possible that some of these beads may have been perforated using a long cylindrical-shaped drill, although in the case of the phyllite beads, that is most likely not the case.

Beads and preforms which were perforated uniconically (from one side) and on a slant, are few in number (2.4%). These beads and preforms were also most likely to have been perforated by hand. Finally, pecking marks make up the remaining 2.2% and are only found on a few examples of roughouts.

In summary, the majority of beads appear to be perforated from both sides, by a conical-shaped drill tip, followed by drilling on one side only, but also with a conical-shaped drill. In both cases, the perforation is made straight down, suggesting the use of a mechanical drill. These findings are in line with the results of the mechanical versus hand-drilled variable discussed earlier.

Perforation size

Perforation size refers to the depth and width of a perforation. This manufacture mark variable is used to determine preferences in drilling; specifically, the approximate depth of the roughout during the time of perforation (short, medium, or long) and the width of the perforation (wide or narrow), which directly coincides with the width and shape of the perforating tool. The depth of a perforation is arbitrarily classified as short (equal to or less than 2mm), medium (between 2.1 to 3.9mm), or long (equal to or greater than 4mm). The perforations were also differentiated qualitatively according to the width of the perforation opening which was classified as either wide or narrow based on macroscopic observation and also due to the width and shape of the perforating tool.

Perforation sizes are divided into six categories: narrow opening with an either a short or long depth, or a wide opening with a short, medium, or long depth. The final category is reserved for indeterminate or non-applicable beads such as damaged beads, beads whose perforations could not be assessed, or roughouts.

Table 3.3.2 reveals that the most frequent type of perforation size has a wide opening with a medium-sized depth (33.8%). Next, in almost similar percentages are wide openings with a short depth (28.4%) and wide openings with a long depth (27.7%). All three of these variables confirm that a wide conical-shaped tool was used to perforate the roughouts, which correspond to the chert microdrill and drills found in and around production contexts (as seen in the previous section) rather than thin bone points or needles, for example. The depths of these three categories are in line with the most prevalent bead types, disc and ring beads, the vast majority being approximately between 1 and 5mm.

Perforations with a narrower opening are found to be either long or short in terms of depth in equal proportions (Figure 3.3.6). Only 4.2% of the manufacture marks sample had a narrow and long (2.1%) or narrow and short (2.1%) perforation size. The majority of these narrow perforations are from Space 279 (North.I). The remaining perforation size category of indeterminate or non-applicable beads made up the final 5.9%.

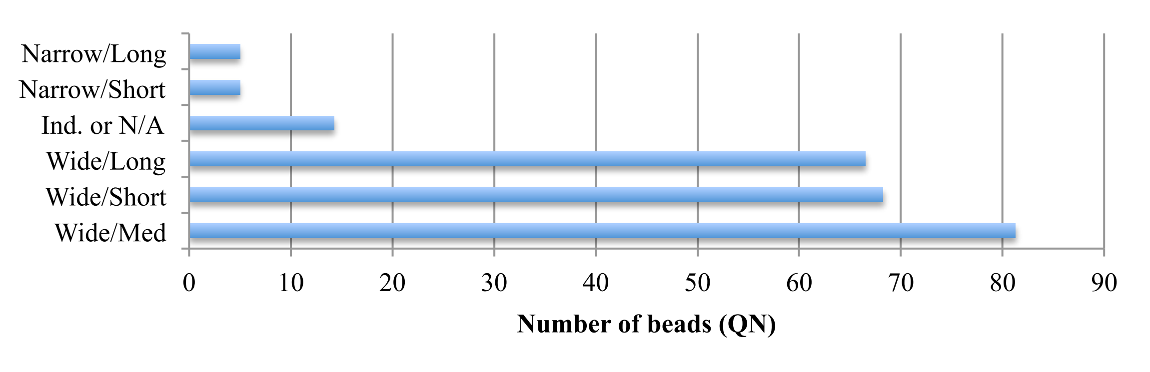


Figure 3.3.6. Frequency distribution of perforation size categories (QN=240.25)

In summary, it appears that the depth of the perforation is dependent on the final bead type of the bead being manufactured. The more common ring and disc beads were easier to perforate as they were made from more soft and tough raw materials and their disc shapes made the perforations smaller in depth. The less the depth of a bead, the faster and easier it is to perforate, as determined by experimental beadwork. These beads are represented by the short and medium variables, and also by a proportion of the long variable.

In contrast, more variant bead types are likely to be larger in size and made from less common raw materials (Section 3.1), and therefore the perforation depths of these variant bead types are more likely to be greater, making the perforation process of the roughout more difficult both in terms of the properties of the less common raw materials and the variant bead form type.

Perforation marks

Perforation marks refer to the marks made within the perforation, which are created by tools, during the drilling process. These marks provide valuable insight as to whether a mechanical drill was used to make the perforation (a pump, bow, or strap drill used to propel the rotary motion of the hafted perforating tool) or whether the perforation was made by hand (using a perforating tool with one hand, or using a perforated tool hafted onto a stick and rubbed back and forth between the palms of both hands, or by simply pecking or gouging a hole to make a perforation).

Perforation marks were categorized into six categories: smooth, faint linear striations, concentric parallel striations, rough, pecking, and indeterminate or non-applicable (Figure 3.3.7). Smooth and rough perforations both contained no marks but the surface of the perforation was either very smooth or rough, largely depending on the properties of the raw material used. A surface that appeared to be chalky, uneven, or irregular (basically unsmooth) was defined as being rough. Concentric parallel striations refer to continuous, horizontal, circular striations along the surface of the perforation, providing strong evidence for the use of a mechanical drill. Faint linear striations are not as clearly presented as concentric parallel striations. The marks within the perforation may or may not be concentric and continuous but this cannot be determined, due to the low visibility of marks on the raw material. Pecking or gouging marks are indentations made on the surface of the bead end, prior to drilling. Indeterminate or non-applicable beads again refer to beads whose perforations could not be assessed, damaged beads, or roughouts.

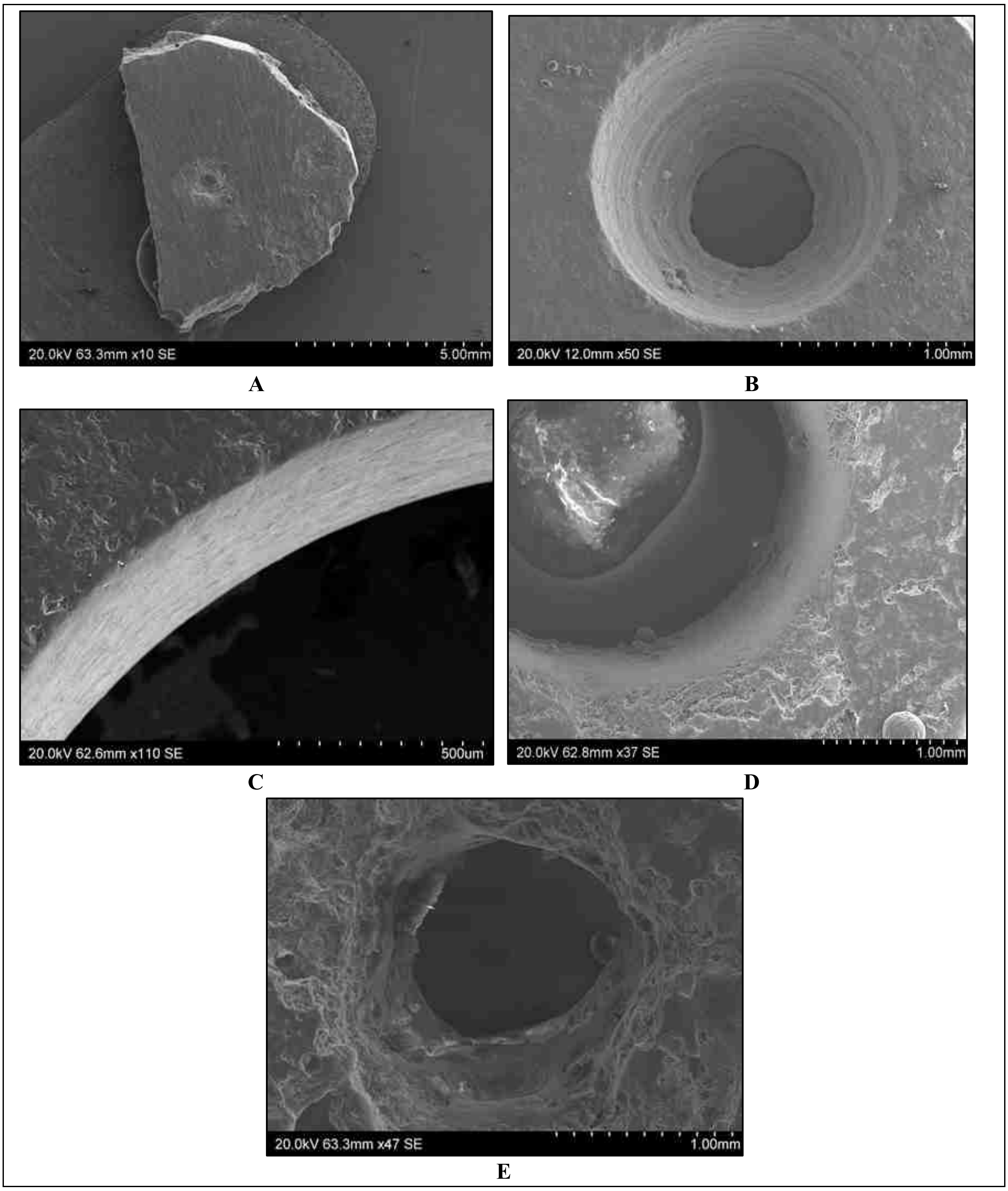


Figure 3.3.7. Perforation mark types: A) pecking; B) concentric parallel striation; C) faint linear striation; D) smooth; and E) rough

The majority of sampled beads had faint linear striations (45.1%) in comparison to the more pronounced concentric parallel striations, which make up 14.8% of the total sample (Table 3.3.2; Figure 3.3.8). Smooth perforations account for 17.4% of the sample and rough perforations 9.7%. Pecking marks on roughouts were quite rare and are found in only 1.6% of the sample. The final perforation marks category of indeterminate or non-applicable beads makes up the remaining 11.4%.

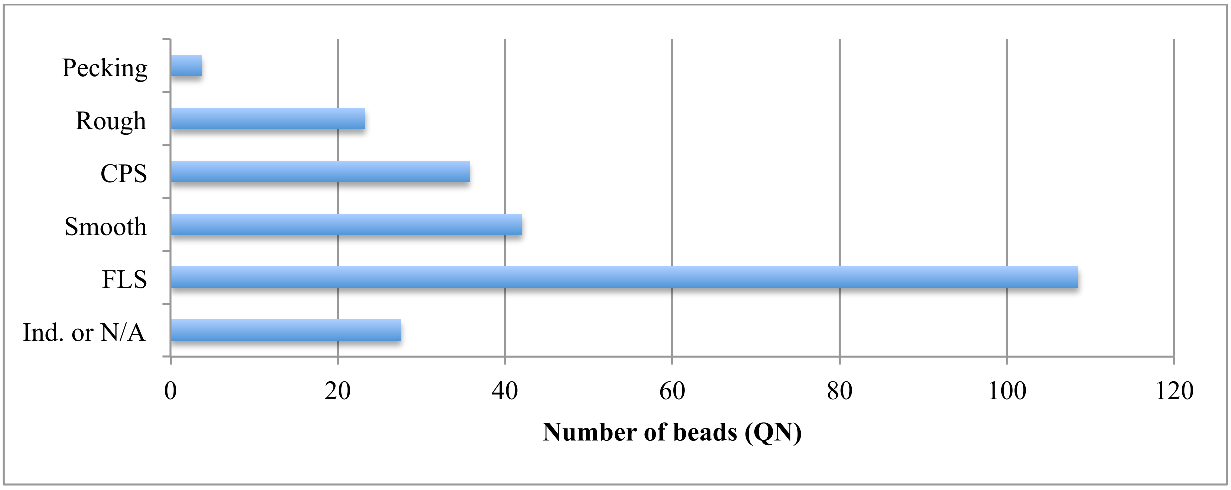


Figure 3.3.8. Frequency distribution of perforation mark types (QN=240.75)

As seen with other manufacture marks, perforation marks are dependent on the properties of the raw material on which they are made and the properties of the raw material of the tool used to perforate them. Perforation marks are only present if the raw material allows the marks to be exhibited. At a general level, harder and tougher (more durable) stones present more clear concentric striation patterns (Gwinnett and Gorelick 1991:191) but marks also depend on how fine-grained and compact the raw material is. In softer or chalky raw materials, perforations may appear smooth or rough (no striations visible) or some faint striations may be present (Gwinnett and Gorelick 1991:192).

With regard to tools, if the tool's hardness exceeds that of the hardness of the roughout, marks will be made on the roughout, but there will be no distinct marks present on the tool (also confirmed by experiments presented in Chapter 2.3). Use marks on tools are presented in Appendix D.

Figure 3.3.9 illustrates the distribution of raw material types against the types of perforation marks found on them. When comparing geological samples one must remember that any particular rock or stone can be different in terms of the properties of the raw material including the compactness of grains, colour, presence or absence of certain minerals, all which result from varied formation processes. Even rocks from the same outcrop or source can vary in terms of composition and geological traits. Certain raw materials used in stone bead production tend to exhibit more perforation marks, both concentric parallel striations and faint linear striations. These raw materials include turquoise, metabasalt, tufa, steatite, serpentinite, hard limestone or soft marble, fluorapatite, travertine, and to an extent, phyllite. The raw materials that are more likely not to exhibit perforation marks are calcite, chert, quartz, freshwater limestone, limestone pebble, and meerschaum.

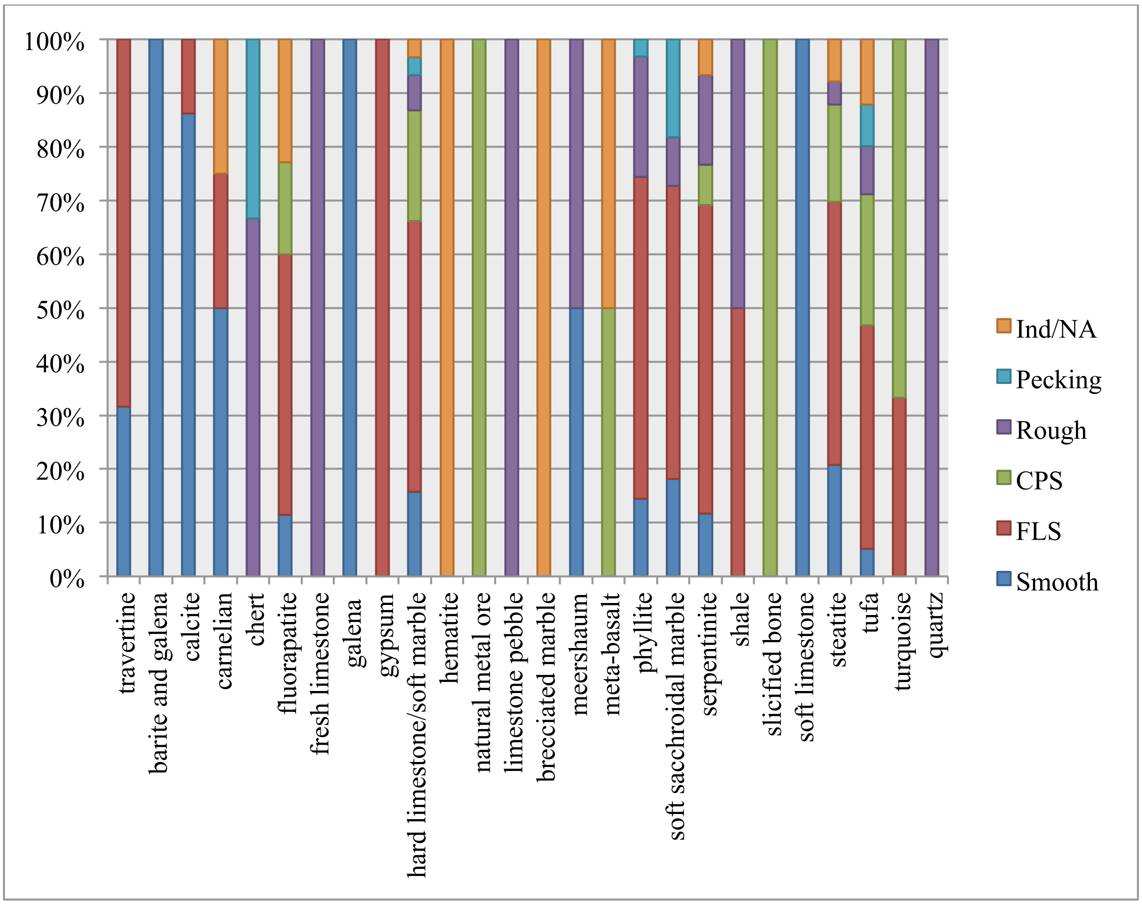


Figure 3.3.9. Frequency of perforation marks present on different raw materials

In summary, perforation marks reveal that most beads had some evidence of drilling marks within the perforations, although some were more obvious (concentric parallel striations indicating the use of a mechanical drill) while others were more difficult to interpret. Pecking marks on roughouts also provide an example of the use of a specific manufacturing technique used in the perforation process, albeit small.

Length marks

Length marks refer to the marks made on the length or height of a bead (area between the perforated sides) during bead manufacture (Figure 3.3.10). Six categories of length marks were observed: abrasion facets, faint linear striations, smooth, rough, sawing, and indeterminate (Figure 3.3.11). Abrasion facets are small sections of the bead that have been abraded by ground stone tools, as indicated by parallel linear striations (Figure 3.3.11a). Rubbing roughouts or preforms back and forth in order to shape and reduce creates abrasion marks. These can be found perpendicular to the bead end or face or on an angle (on the edge) depending on the angle the roughout or preform was held during abrasion.

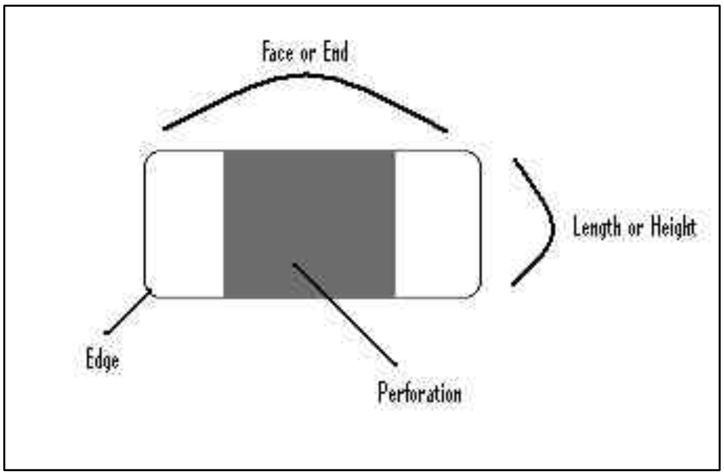


Figure 3.3.10. Bead diagram (in profile)

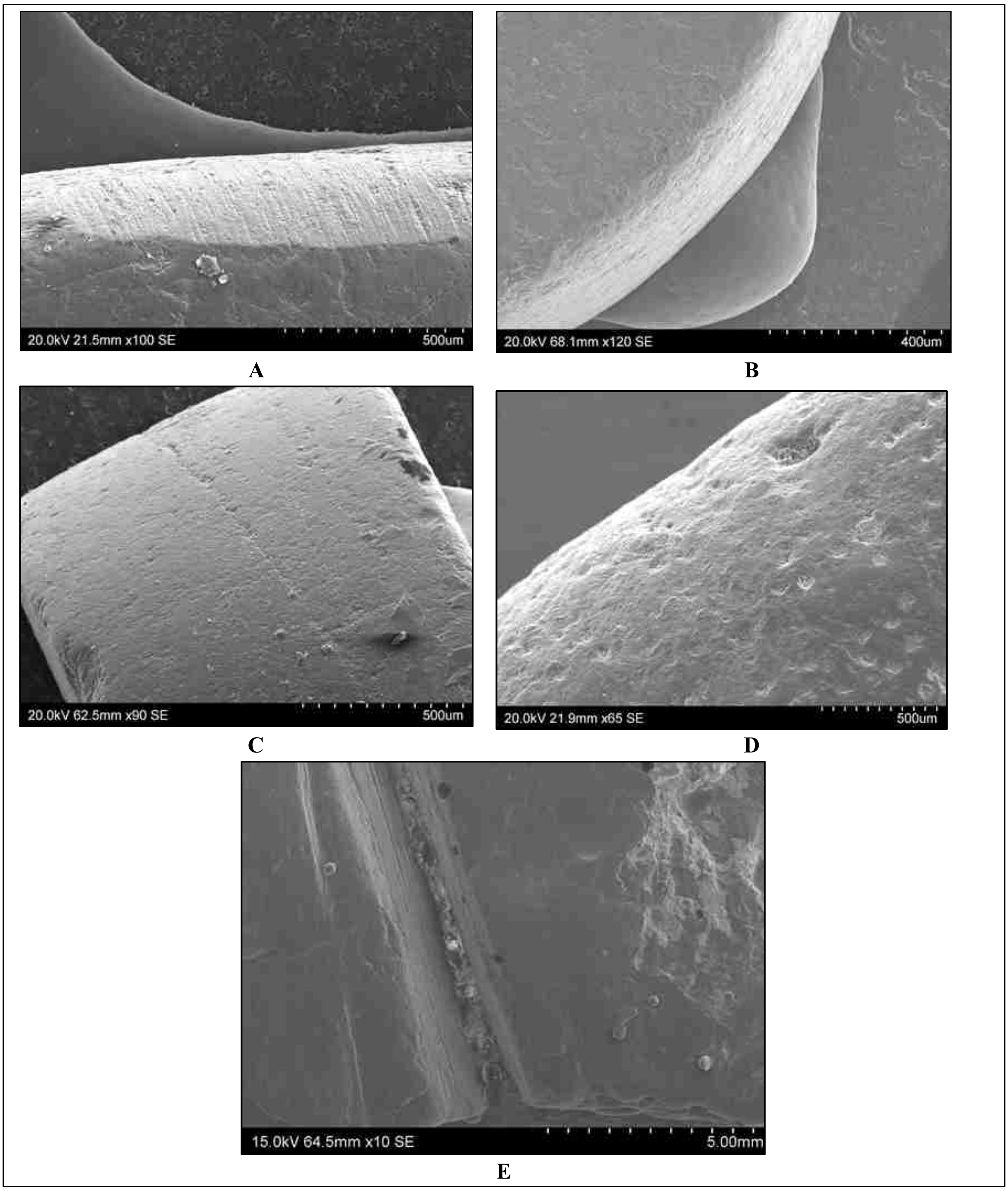


Figure 3.3.11. SEM images of examples of different length marks: A) abrasion; B) faint linear striations; C) smooth; D) rough; and E) sawing

Faint linear striations (FLS) on the other hand are faint linear striations that run horizontal to the bead end or face and are predominantly found on finished beads. For ring or disc beads they are the result of finely abrading the preform into a finished bead, either individually or in a group.

Smooth length marks indicate an absence of marks on the length or height of a bead. Smooth marks may be indicative of the final polishing process or may result from the properties of the raw material on which they are featured. In contrast, rough length marks also do not exhibit any diagnostic marks but the surface is not smooth which may be due to preservation, the properties of the raw material, or perhaps lack of final polishing.

Sawing marks are created by using either a hand held tool or string and creating a division using a back and forth movement along a straight line (Sax *et al.* 2004:1419; Semenov 1973:19). Sawing marks were quite rare in the Çatalhöyük stone beads assemblage. They are only found on three different beads, two of which are spacer beads.

The indeterminate length marks category refers to beads that may be broken or are shaped so that the length may not be visible, for example.

The majority of beads have faint linear striations as marks on their lengths (Figure 3.3.12). Beads with faint linear striations account for 63.1% of the beads sampled for manufacture marks analyses (Table 3.3.2). This figure is roughly equivalent to those beads that exhibited faint linear striations and concentric parallel striations within their perforations (combined percentage of 59.9%). Abrasion facets, which were only found on preforms and roughouts, were found on 13.7% of beads and the absence of marks on a smooth surface made up 11.1%. Beads on which length marks could not be seen or determined made up 6.9% of the sample. The absence of marks and a rough surface of the length or height area of the bead accounted for 4.4% whereas sawing marks were only present on a few examples totalling 0.8% of the manufacturing marks sample.

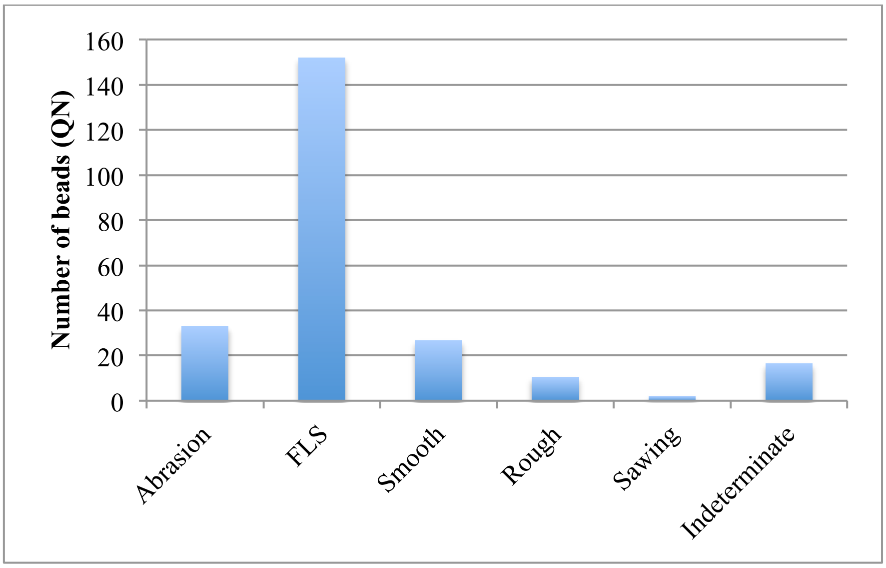


Figure 3.3.12. Distribution of length mark types (QN=240.75)

As with other marks, the visibility of length marks corresponds directly with the visibility of perforation marks. The same beads that showed concentric parallel striations in their perforations also showed distinct linear horizontal striations along the length of the bead. A number of fine-grained phyllite beads have some marks but the majority of them reveal linear platy laminations (geological property of phyllite) instead, which appear as faint linear striations (Figure 3.3.13).

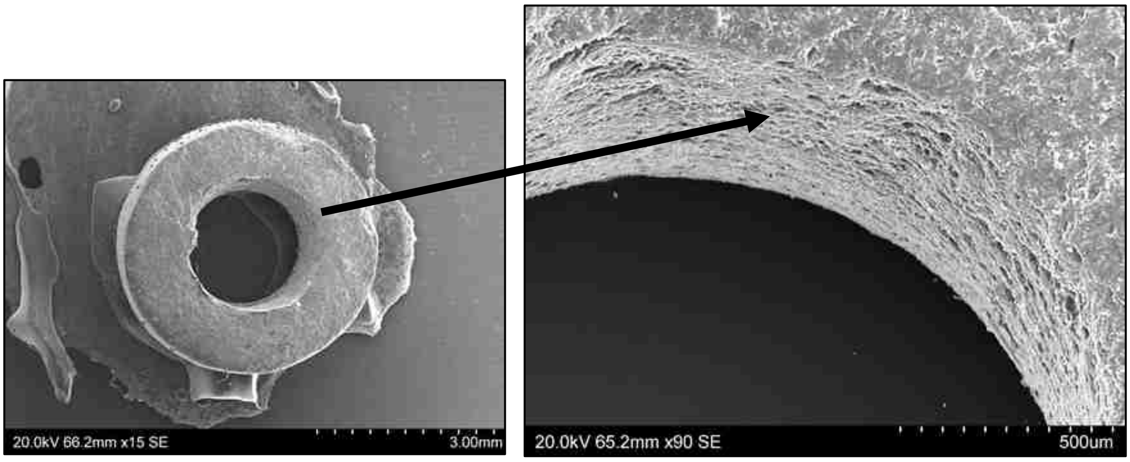


Figure 3.3.13. Perforation of phyllite bead (4589.H.1) from Building 18 showing linear striations caused by schistosity

In summary, most finished beads sampled appear to have faint linear striations running horizontally along their length or height, specifically disc- or ring-shaped beads. Other bead types are generally smooth due to polishing. Roughouts and preforms are more likely to have one or more abrasion facets.

End marks

End marks refer to marks found on the end or face of a bead (Figure 3.3.10). Only five types of potential manufacture marks were present and subsequently recorded: abrasion, smooth, scratches, rough, and indeterminate (Figure 3.3.14). These marks are identical to those found on bead lengths, with the exception of faint linear striations, which are absent. Abrasion marks are clear parallel striations, which are created by rubbing the end or face of the preform or roughout back and forth against a ground stone surface in order to reduce and smoothen the surface of the unfinished bead. As with length marks, abrasion marks are only found on preforms and roughouts. If the surface of the bead end appeared smooth and had no marks, it was categorized as being smooth, and similarly, if the bead end surface did not appear smooth and had no marks, it was categorized as being rough. A number of bead ends also had some scratches present and were classified as so. These scratches were recorded but most likely occurred after manufacture, during use or after disposal. The final category is indeterminate, which refers to ends of beads that could not be assessed or were damaged.

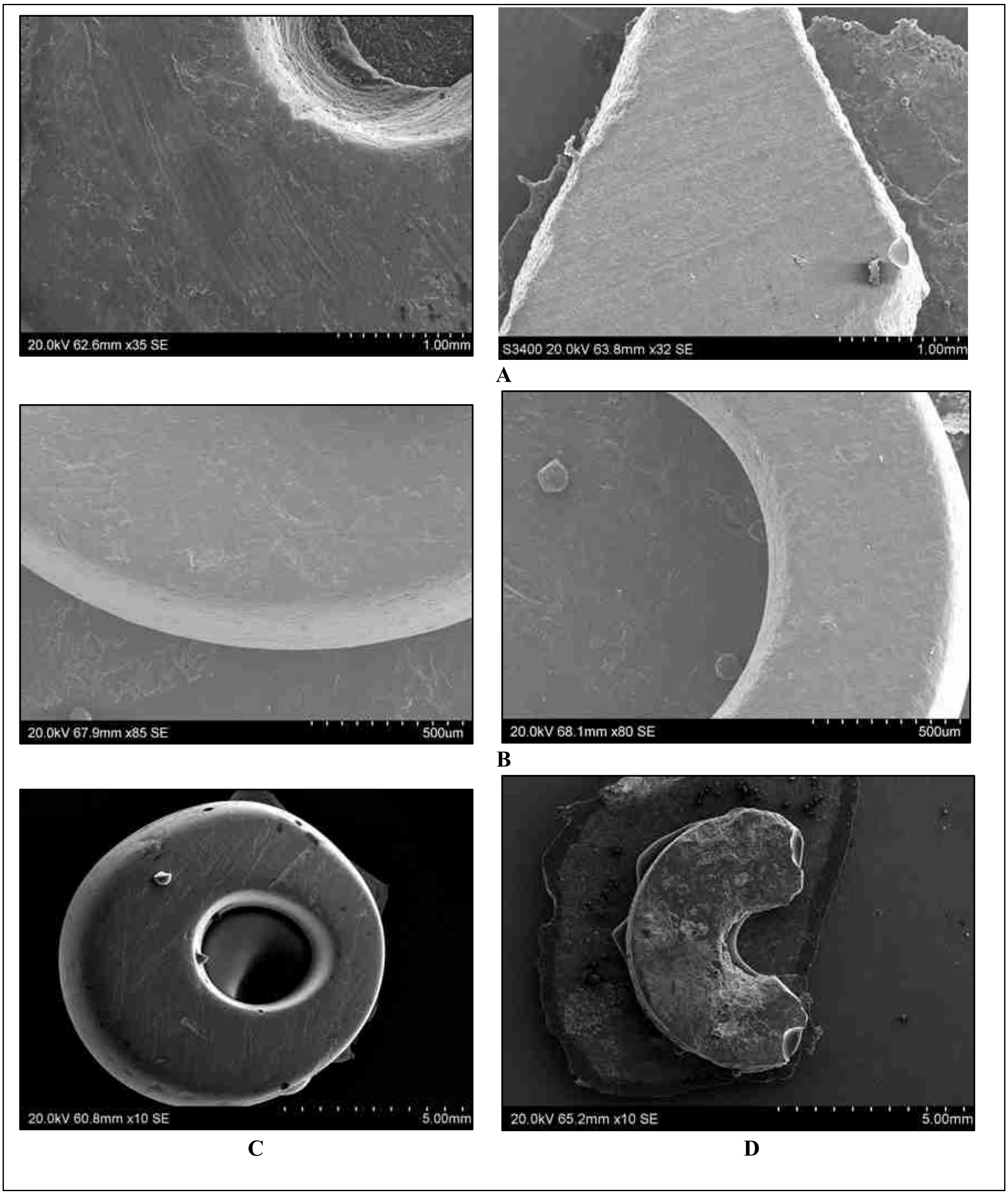


Figure 3.3.14. SEM images of the various types of end marks: A) abrasion; B) smooth; C) scratches; and D) rough

Just over 60% of bead ends were smooth and did not have any discernable marks made during manufacture (Table 3.3.2 and A3.3.2). This could be due to the final polishing process and also during use, specifically in regard to disc and ring beads. If manufactured within a group, when a number of perforated preforms have been strung together using twisted fibers and abraded along their lengths on an abrading slab, the bead ends would rub up against one another and result in smooth ends. Similarly, if beads are worn as anklets, bracelets, or necklaces, and the beads are tightly compressed together, the friction may cause the bead ends to become smooth, and perhaps even polished to an extent.

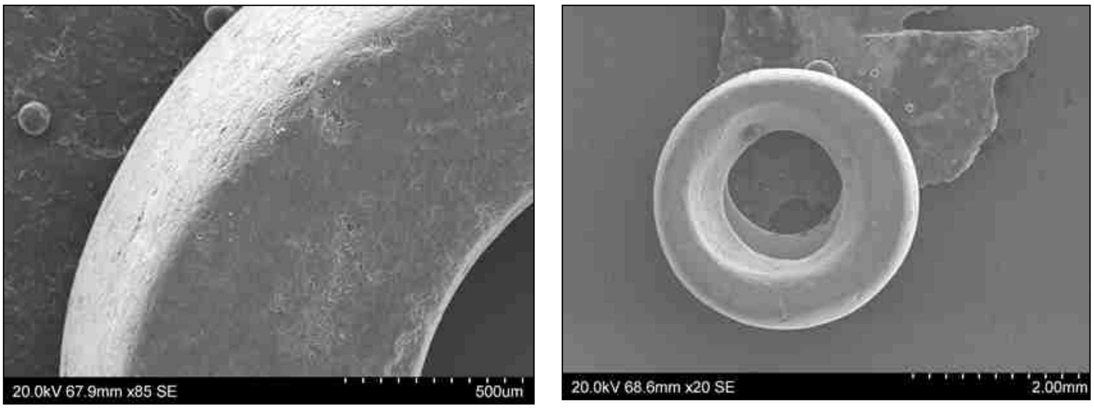
Rough ends, which also show no marks, account for 15.8% of the manufacture marks bead sample. The surfaces of these beads were quite flat, but due to erosion, damage, or the properties of the raw material in question, the surface became rough and pitted.

In almost equivalent proportions to bead lengths with abrasion marks are bead ends with abrasion marks (12.1%), which are present on preforms and roughouts. Finished beads with scratches account for 9.3%. And finally, indeterminate beads are represented by 3.4% of the sample.

In summary, most bead ends do not appear to have any marks, apart from abrasion marks found on preforms and roughouts.

Edges

The final type of manufacture marks analysis was conducted on bead edges. The type of edge, especially in regard to disc or ring shaped beads, can help determine how finished beads were polished during the final stage of manufacture, whether *en masse* via a tumbling process (round edges) or individually or in groups via fine abrasion against a abrading slab (sharp edges) (Figure 3.3.15). Only finished beads can provide us with this information.



A B

Figure 3.3.15. A) Example of finished bead with a sharp edge; B) Example of finished bead with a round edge

Bead edges are divided into four categories: sharp, round, sharp and round, and indeterminate. Sharp bead edges are quite square in shape, whereas round edges form a curve and rounded. Over half the sampled beads appear to have sharp edges (56.9%), and 20.5% have round edges (Figure 3.3.16).

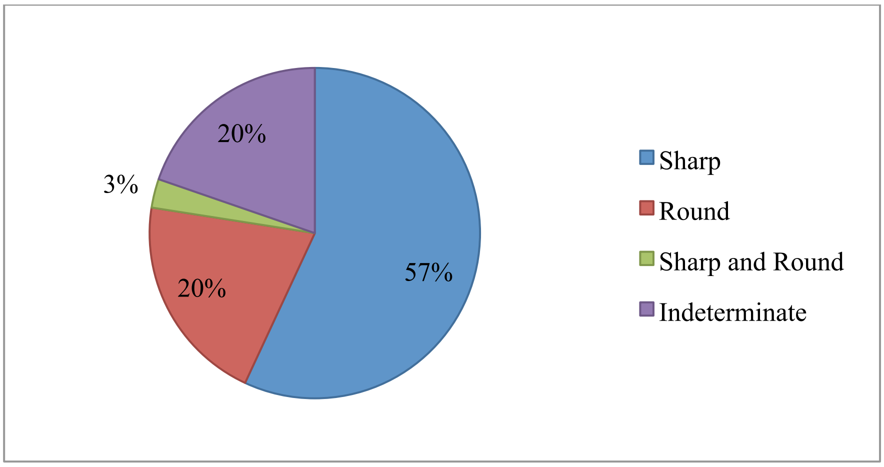


Figure 3.3.16. Percentage distribution of bead edge types (QN= 239.75)

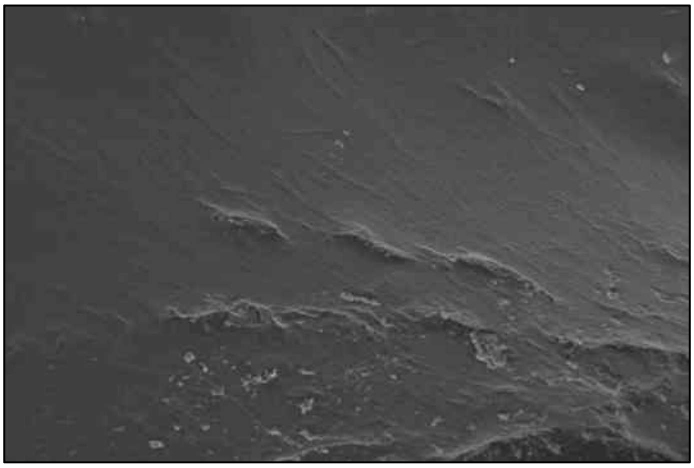
A small sample of beads have both square and round edges. These beads are non-disc or ring beads, and more elaborate in shape, and have more complex manufacturing sequences in comparison to disc and ring beads. These beads make up 2.8% of the manufacture marks bead sample.

Indeterminate beads are essentially roughouts and preforms, beads which are unfinished and therefore this variable does not apply. In addition to unfinished beads, some damaged or eroded beads may also be a part of this category. This category is 19.7% of the bead sample.

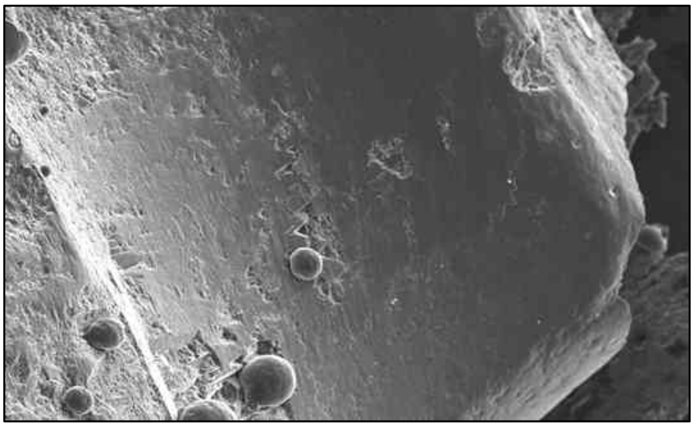
In summary, most disc and ring beads have sharp edges, indicating that the final polishing process was performed on individual beads or in groups by abrading them against a fine-grained abrading slab or palette.

Other distinctive marks

Close examination of perforations also revealed that some marks were likely to have been caused during use, as opposed to manufacture. Approximately 29% of finished beads sampled for manufacture marks studies exhibited use-wear. The very fine linear vertical striations or vertical scratches running opposite to the striations found circling the perforation were most likely to have been caused by the string used to tie the bead. If the bead or string was able to move back and forth even slightly, the friction caused by this movement would cause the fibers of the string to loosen the grains of the rock or mineral (especially if it is not as hard, Mohs ≤4) leaving behind vertical lines and scratches in the perforation of the bead (Figure 3.3.17). These same use-wear marks can also be seen when examining the inverted moulds of finished beads (Figure 3.3.18).



A



B

Figure 3.3.17. SEM image of vertical use marks within perforation of two replicas of finished beads most likely created by being strung: A) 12652.H1 and B) 16261.X1

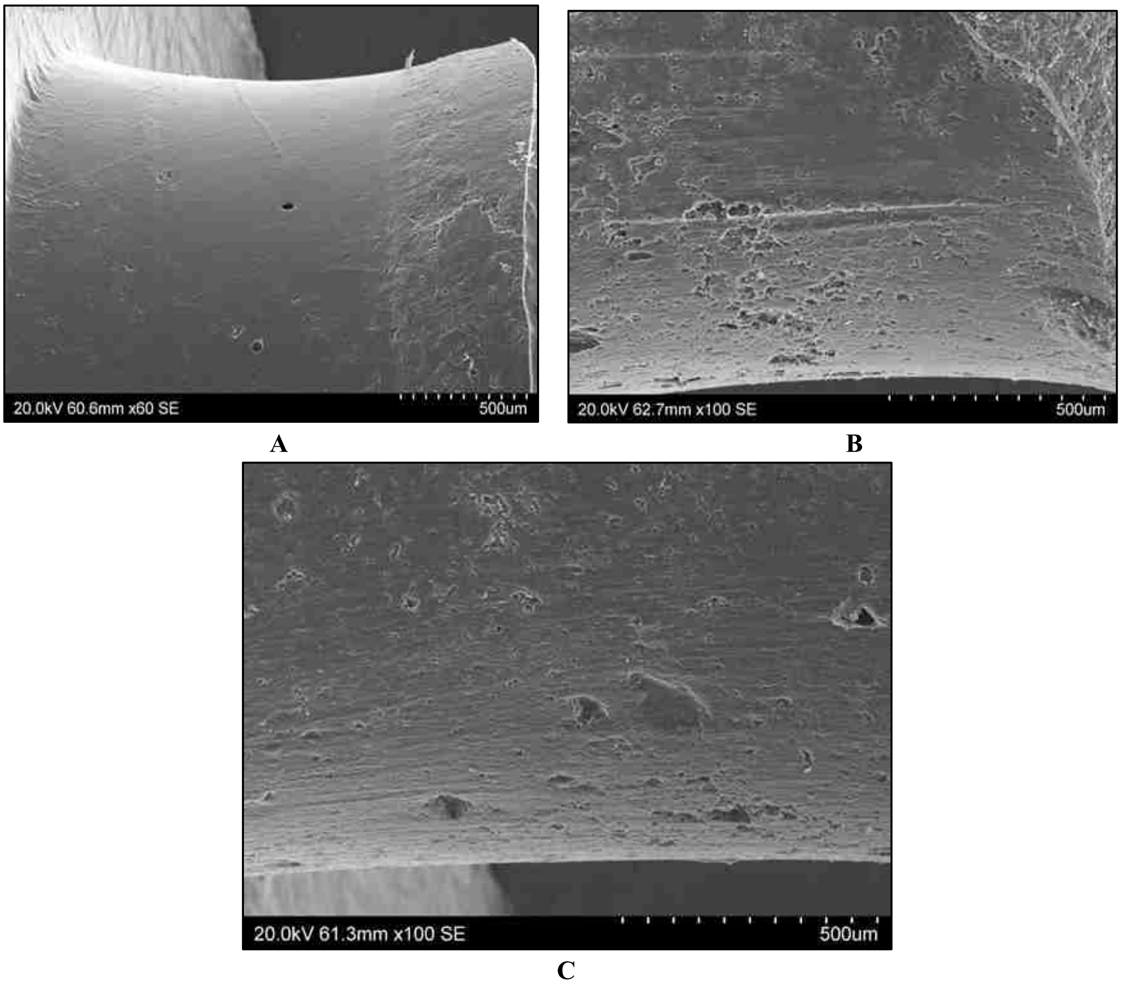


Figure 3.3.18. SEM images of vertical striations on the moulded perforation from three finished beads in Space 279: A) 12971.H2; B) 14120.X11; and C) 14100.X1

One finished bead, 12988.H5, has a teardrop shaped perforation that has linear striations at the bottom of the teardrop but is smooth at the tip of the teardrop (Figure 3.3.19). This may have been caused by the bead being strung and knotted tightly, so that the smooth tip of the teardrop represents the area of the perforation that was tied. The string dug into the soft steatite bead. This beads could have been worn as jewellery or been attached to clothing.

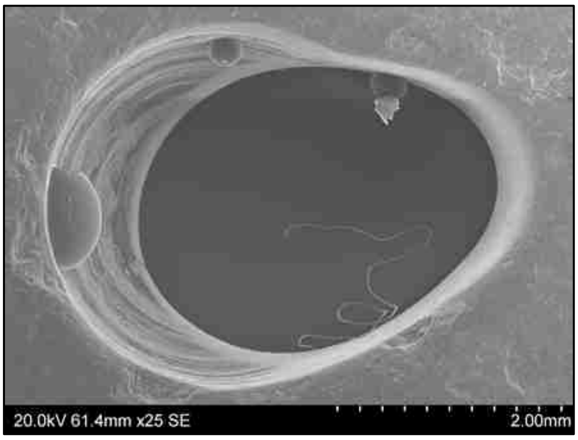


Figure 3.3.19. Teardrop perforation of steatite bead 12988.H5 in Space 279

Beads were most likely strung or bound together by twisted fibers made from sedge (Philippa Ryan, personal communication) and some evidence of this was found preserved within an unstratified Neolithic burial (Figure 3.3.20).

Figure 3.3.20. Microscopic photograph of a stone bead strung by twisted sedge fibers. Photo by Çatalhöyük conservation team

Summary of manufacture marks analyses

The various types of manufacture marks found on beads, specifically on preforms and roughouts, in conjunction with the study of production contexts, can help determine manufacturing sequences (see Chapter 4.3). Unfinished beads provide the most information, and the study of production contexts (Section 3.2) indicates that all preforms and the vast majority of roughouts are precursors to disc and ring beads; therefore the majority of information amassed regarding manufacture marks has to do with the manufacture of disc or ring beads. The results from the study of manufacture marks indicate that:

- Most beads were drilled straight down and from both sides using some sort of a mechanical drill, such as a pump, bow, or strap drill. The perforations were mostly conical in shape indicating that roughouts were perforated using a conical-shaped drill. The presence of concentric parallel striations and faint linear striations also indicates that the drill or microdrill used to perforate the raw material was harder than the raw materials on which marks were being left behind.
- There are many types of perforation marks, but many had either faint linear striations present within the perforation, which may or may not be indicative of mechanical drilling, or continuous concentric parallel striations, which do suggest the use of a mechanical drill. A number of perforations were also quite smooth. Perforation marks although extremely informative, their presence and prominence depends greatly on the properties of the raw material on which they are featured. Some stones and minerals exhibit marks quite clearly while others do not. Drilling ability is also dependent on the toughness and hardness of the raw material being perforated.
- The surface of beads reflect the length of the beads mostly have either abrasion facets (on preforms and roughouts) or fine linear striations which suggest that they have been finely abraded vertically, most likely in a group if disc or ring beads, either on a V-shaped or U-shaped bead abrader, regular abrader, palette, or abrading slab. End marks also suggest that the face or end of a bead was levelled via abrasion prior to perforation.
- The various manufacturing techniques used to manufacture stone beads do not appear to change much over time. The manufacture marks left behind on roughouts and preforms and occasionally

on finished beads indicate that bead types and other descriptive preferences may have changed over time, but manufacture marks analyses reveal that chipping, abrading, drilling, sawing, pecking, and polishing techniques of manufacture are present from the earliest levels to the end of Neolithic occupation at Çatalhöyük.

Manufacturing marks analyses and production contexts

In Section 3.2, nine buildings and spaces appeared to have substantial evidence for stone bead manufacture in either *in-situ* production contexts or evidence of production from secondary midden deposits (Table 3.2.2). Of these nine contexts, the unfinished and finished beads from eight of these contexts were analysed for manufacture marks. By microscopically examining the finished and or unfinished beads from a single production context, the different stages of manufacture can be examined together, making it possible to create a sequence of manufacture. Information obtained regarding manufacture marks on other roughouts, preforms, and finished beads help supplement the information retrieved from production contexts.

Manufacture marks analyses of finished and unfinished beads located in production contexts are presented below by unit, and building or space within the phase.

South.G

External midden Space 181 (South.G, earliest excavated settlement phase to date) had four units with evidence of bead manufacture. Unit 4838 had three examples of production. The first was the production of hard limestone or soft marble ring beads. Four preforms and three finished beads were found together. Of these seven beads, two preforms and two finished beads are presented in Figure 3.3.21.

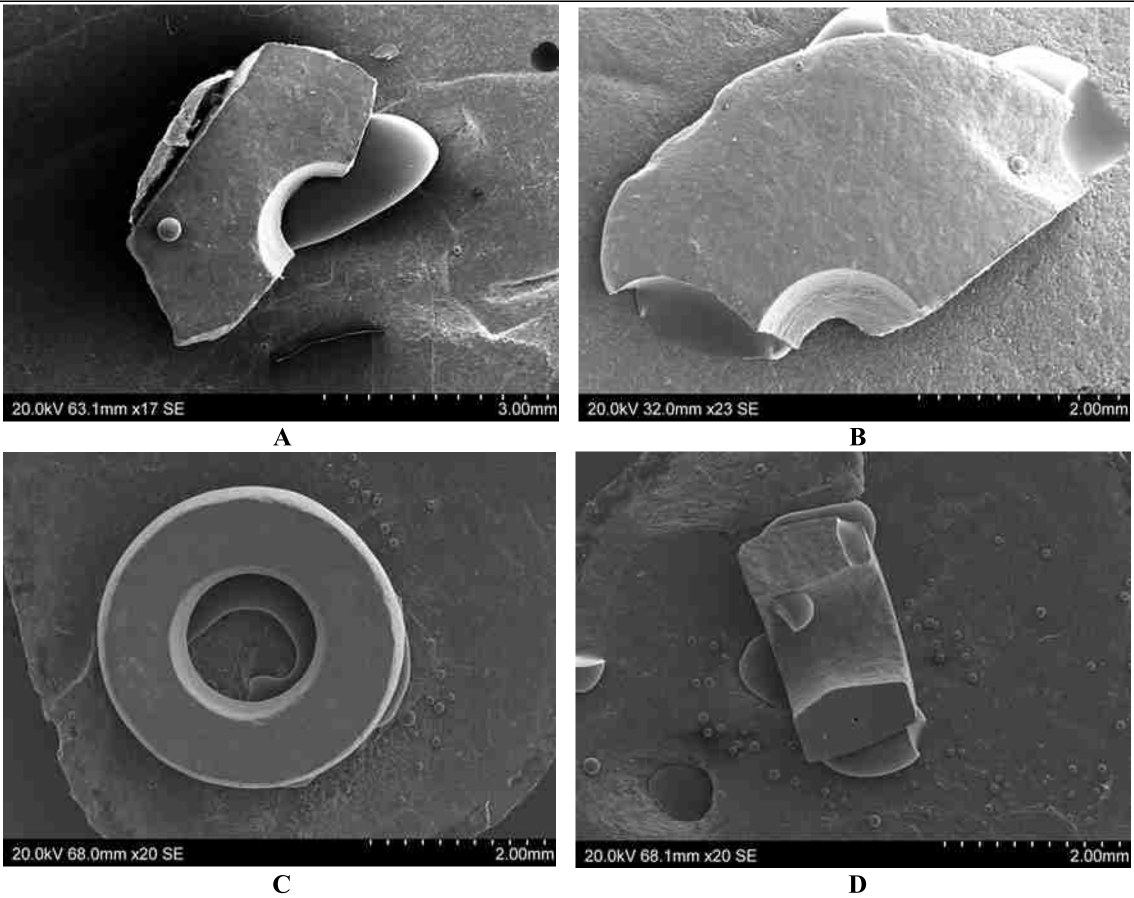


Figure 3.3.21. Production context in unit 4838 of hard limestone or soft marble ring beads: preforms A) 4838.H10 and B) 4838.H22; and finished beads C) 4838.H14 and D) 4838.H16

Both preforms are uniconically perforated and have concentric parallel striations and a regular outline, suggesting mechanical perforation. The second preform (Figure 3.3.21b) appears to have a rounded length whereas the length of the first preform (Figure 3.3.21a) is much more angular and subrounded. This shape is most likely the result of abrading the different sides of the length, in order to reduce the size of the bead, prior to perforation. Interestingly, both preforms, 4838.H10 and 4838.H22 have very distinct perforation marks but one of the finished beads made from the same raw material has faint linear striations within its perforation, and the perforation of the second finished bead is smooth and contains no marks. We know that this raw material is capable of exhibiting detailed marks, so their lack of presence on the finished beads suggests that the marks were erased by something. It is suspected that during final abrasion or during use, the beads were strung and the friction between the twisted fiber string and the preform dislodged the fine grains of the raw material creating a smooth perforation.

Figure 3.3.22 illustrates the second example of stone bead production in unit 4838. One dark red tufa preform and four finished beads made from the same raw material were found together. The preform (4838.H9) and a single example of a finished bead (4838.H32) are featured in Figure 3.3.22. Like Figure 3.3.21a, the preform in Figure 3.3.22 has unfinished subrounded lengths, and close examination of the length of the preform shows abrasion marks which were most likely made prior to perforation. The regularity of the outline of the perforation and the marks within the perforation all suggest a uniconical mechanical perforation. The length of the finished bead shows faint linear striations that suggest that the bead was finely abraded in a back and forth vertical motion, either individually or in a group.

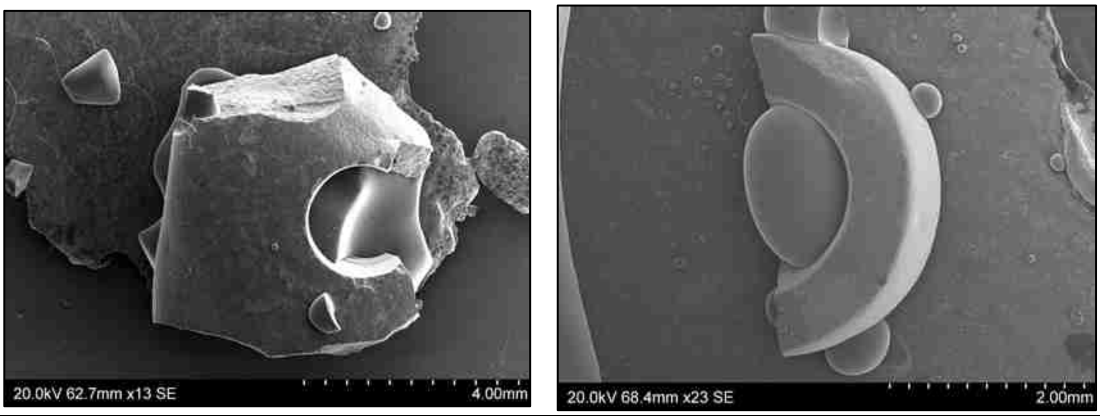


Figure 3.3.22. Production context in unit 4838, tufa preform 4838.H9 (left) and finished bead 4838.H32 (right)

The third example of evidence of stone bead production in unit 4838 is also for the manufacture of tufa ring beads (Figure 3.3.23). There are three preforms (4838.H29, 4838.H38, and 4838.H39) and a single finished bead in this unit, all made from the same raw material. The three preforms are quite similar in shape in size. They are again subrounded in shape. The perforation marks indicate concentric parallel striations and the outline of the perforation is circular. These preforms are very small in size and it appears that the roughouts must have also been very small when they were perforated. A smaller roughout would make drilling more difficult. A smaller roughout means more precision and control of the drill. These preforms, however, most likely did snap during perforation, and according to the perforation morphology, they were only drilled from one side (uniconically).

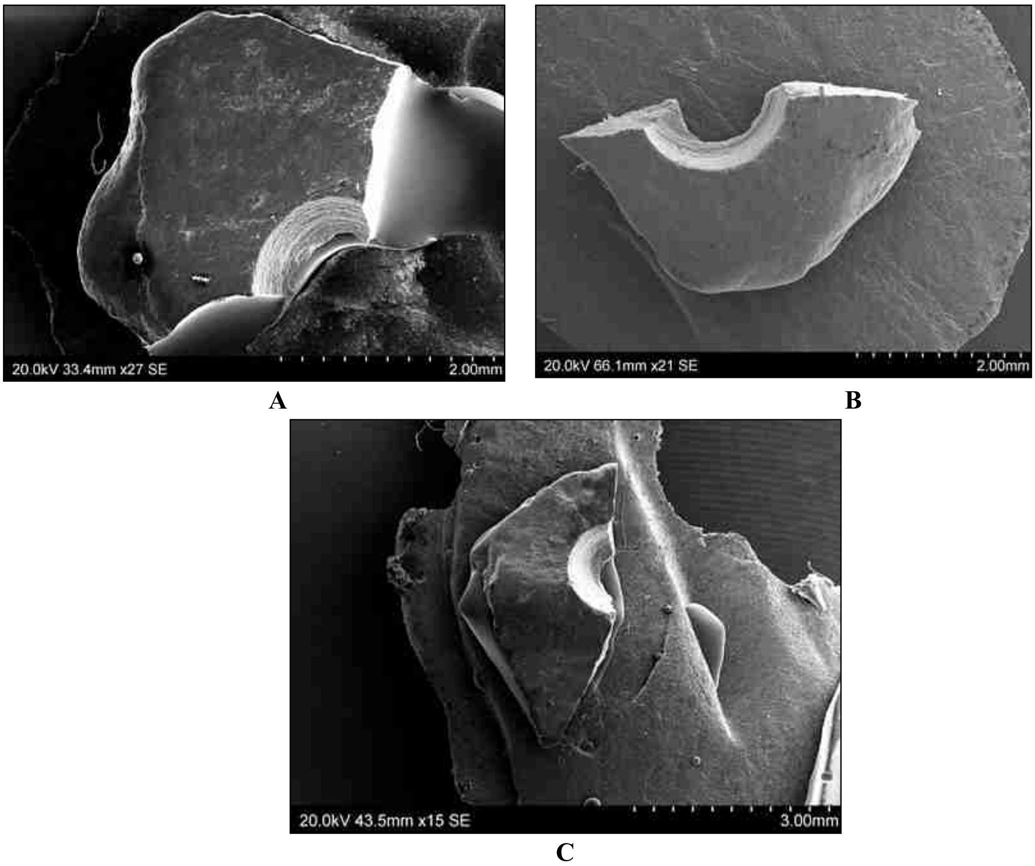


Figure 3.3.23. Tufa preforms from unit 4838: A) 4838.H.29; B) 4838.H.38; C) 4838.H.39

In unit 4839 there are two examples of production. The first contains three hard limestone or soft marble preforms as seen in Figure 3.3.24. One preform, 4839.H9 is one of only a few non-fragmented preforms, as most appear to have snapped during perforation (Figure 3.3.24c). The outline of the perforation is regular and the marks within the perforation again suggest the use of a mechanical type drill with the actual drill or microdrill having a conical shape, like those made from chert and the two examples made from obsidian (seen in the previous section and summarized in Tables 3.2.2 and 3.2.3). The general shape of the preforms appears to be quite square and angular, like those found in unit 4838.

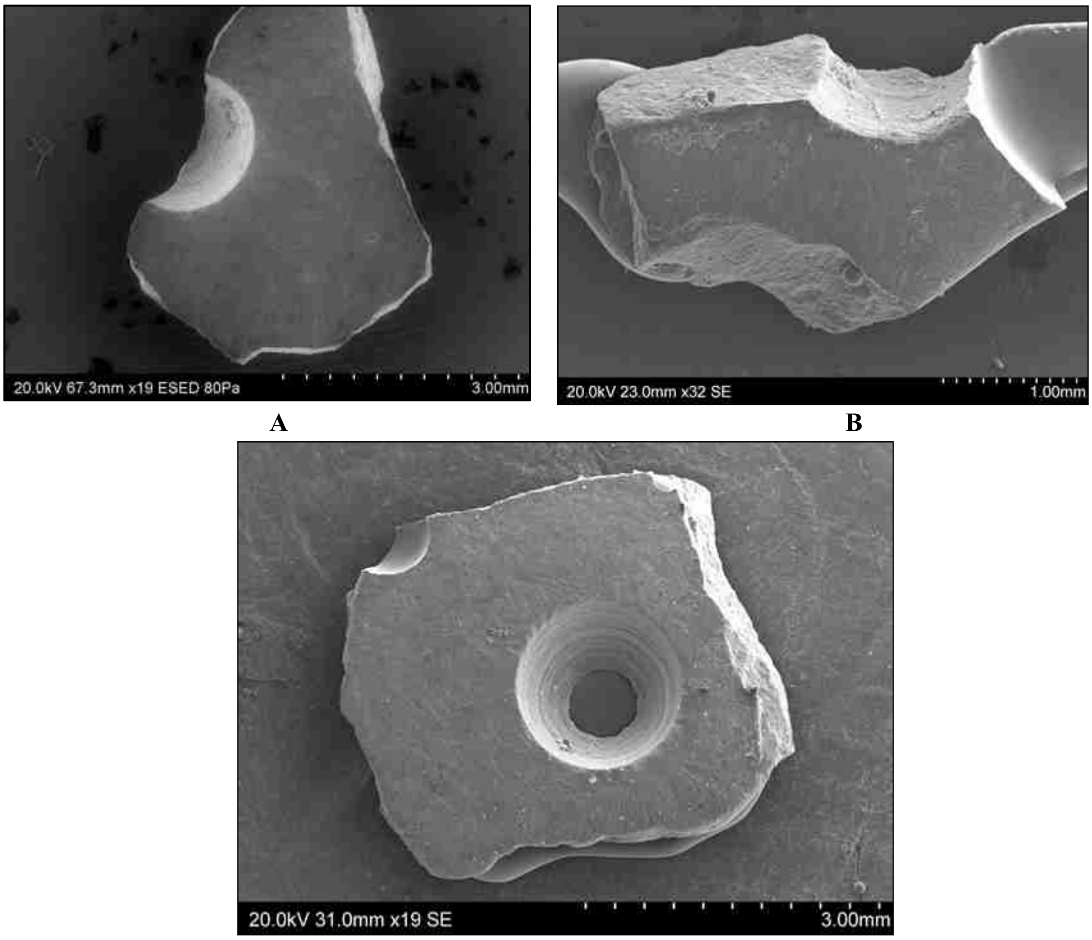


Figure 3.3.24. Hard limestone or soft marble preforms from unit 4839: A) 4839.H10; B) 4839.H.7; and C) 4839.H.9

The second example of production found in unit 4839 is similar to the previous examples made from tufa (Figure 3.3.25). There is one tufa preform (4839.H18) and one tufa finished bead (4839.H5). The preform like others previously discussed has a flat face or end and is also angular in shape. The finished bead was drilled biconically and also had a regular outline, however the perforation was smooth and contained no distinct manufacture marks. The lack of perforation marks suggest that the original marks may have been erased during the final manufacturing process or during use. The perforation of the preform, on the other hand, had concentric parallel striations and a regular outline, indicating perforation via mechanical drill.

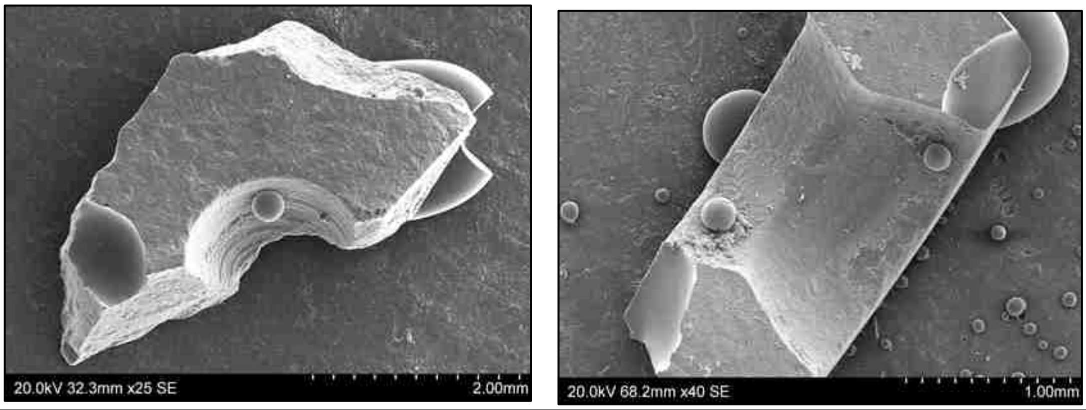
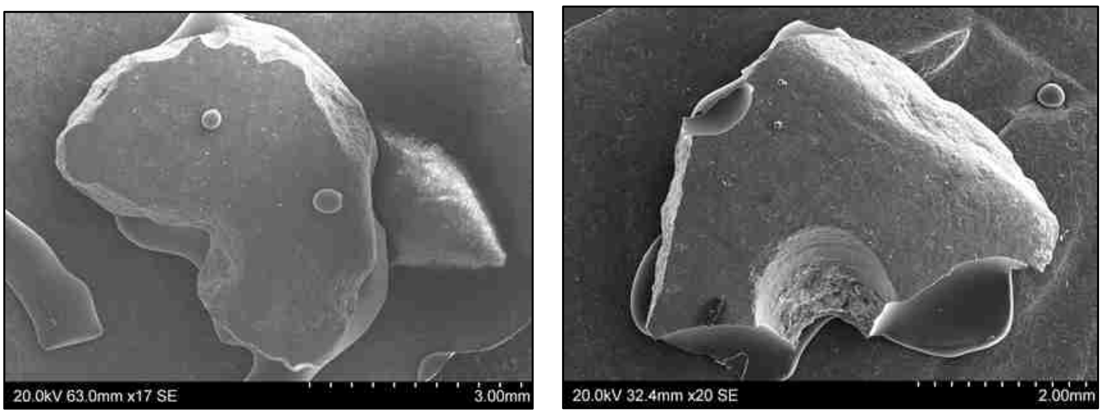


Figure 3.3.25. Tufa preform 4839.H18 and finished bead 4839.H5 from unit 4839

Unit 4842 contains three preforms made from hard limestone or soft marble. These like most of the previous examples are broken preforms, and precursors to ring beads. Two of these preforms, 4842.H11 and 4842.H7, were analysed for manufacture marks (Figure 3.3.26). One preform is rounded in shape while the other remaining preform is more angular in shape. As with previously mentioned preforms, both appear to have uniconical perforations and appear to have snapped into two fragments during perforation. The perforation marks consist of concentric parallel striations (Figure 3.3.26a shows the non-perforated side of 4842.H11) and suggest the use of a mechanical drill.



A **B**

Figure 3.3.26. SEM image of 2 hard limestone or soft marble preforms in unit 4842: A) 4842.H11 and B) 4842.H7

Unit 4868 contained one tufa preform (4868.H9) and three tufa finished beads, two of which were analysed for manufacture marks (4868.H5 and 4868.H4) in addition to the preform (Figure 3.3.27). The preform is subrounded in shape, with evidence of abrasion along one side of its length. The perforation is uniconical and the marks and outline suggest the use of a mechanical drill. The finished beads have been perforated biconically and the marks within the perforation are faint linear striations as opposed to the more pronounced concentric parallel striations seen in the perforation of the preform.

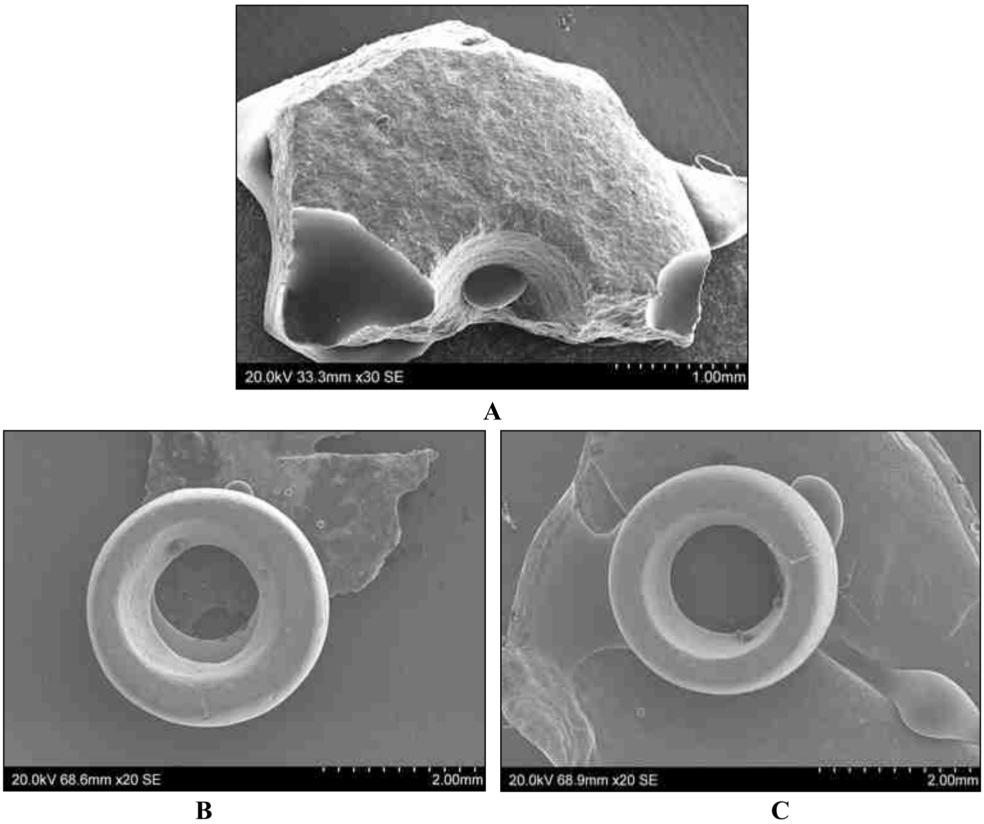


Figure 3.3.27. Tufa beads from unit 4868: A) preform 4868.H9; B) finished bead 4868.H5; and C) finished bead 4868.H4

South.J

There are three units in Building 18, settlement phase South.J, which contain evidence for stone bead manufacture: 4530, 4540, and 4539. All three examples demonstrate the production of phyllite disc or ring beads.

Unit 4530 contained one roughout and five finished beads made from the same material. Manufacturing marks analyses were conducted on the roughout (4530.H3) and four finished beads (4530.H10, 4530.H11, 4530.H2, and 4530.H5).

The roughout appears to be perforated by hand from both sides but not all the way through (Figure 3.3.28). The reverse side has two perforations (Figure 3.3.28b). The bead maker began perforation on one side and then unsuccessfully attempted to align the perforation from the other side twice. The outline of the drill on the obverse side is quite circular indicating a mechanical drill, however, the perimeter of the outline coincides with the repeated rotation of a hand with a chert drill or microdrill, as seen in Building 75, for example (Figure 3.3.29). The drill appears to have tapered perpendicularly which accounts for the marks surrounding the perforation. It may be that this roughout was meant to be perforated by hand, although there is a possibility that pecking, gouging, and initial hand drilling may have occurred prior to mechanical drilling. Experimental work conducted by the author has also shown that creating a well within the face or end of a roughout helps keep the tip of the drill in place, so that drilling can be more precise and that the hafted drill does not slide along and off the roughout (Chapter 2.3).

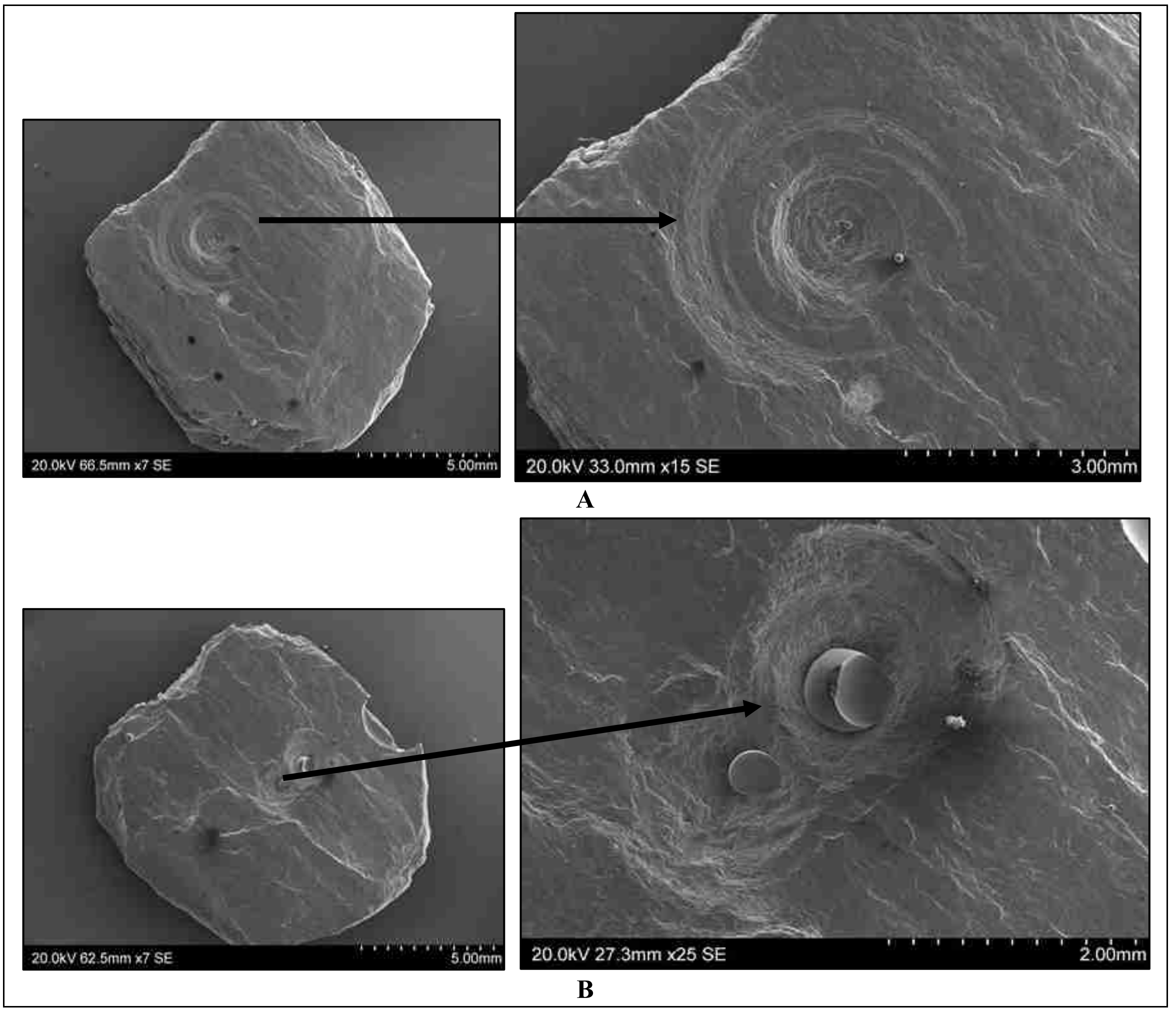


Figure 3.3.28. Phyllite roughout from unit 4530, Building 18: A) side one with potential drill marks; and B) reverse side with hand pecked or drill marks

Figure 3.3.29. Type of chert microdrill which could have been used to initially hand drill phyllite roughout 4530.H3

There are 5 finished phyllite beads from unit 4530, all of which could be the resulting product of a roughout like 4530.H3 (Figure 3.3.30). The perforation outline from two of the finished beads (4530.H.2 and 4530.H.10) suggest they were drilled by hand although the raw material is quite platy and brittle and the outline could simply be the result of damage. Two of the finished beads have very regular outlines suggesting the use of a mechanical drill. So it is possible that a well was made initially in the phyllite roughout prior to mechanical drilling. They were all perforated straight down and biconically. Within the perforation itself, there are faint striations, which may simply be the result of the platy structure of the phyllite. The lengths of the finished beads appear to be finely abraded along their lengths and they are all roughly the same size in terms of width, but vary in depth or along their length. A thick roughout made from phyllite could have easily been drilled and due to the geological characteristic of schistosity, the face of the bead could have broken off, forming a number of beads.

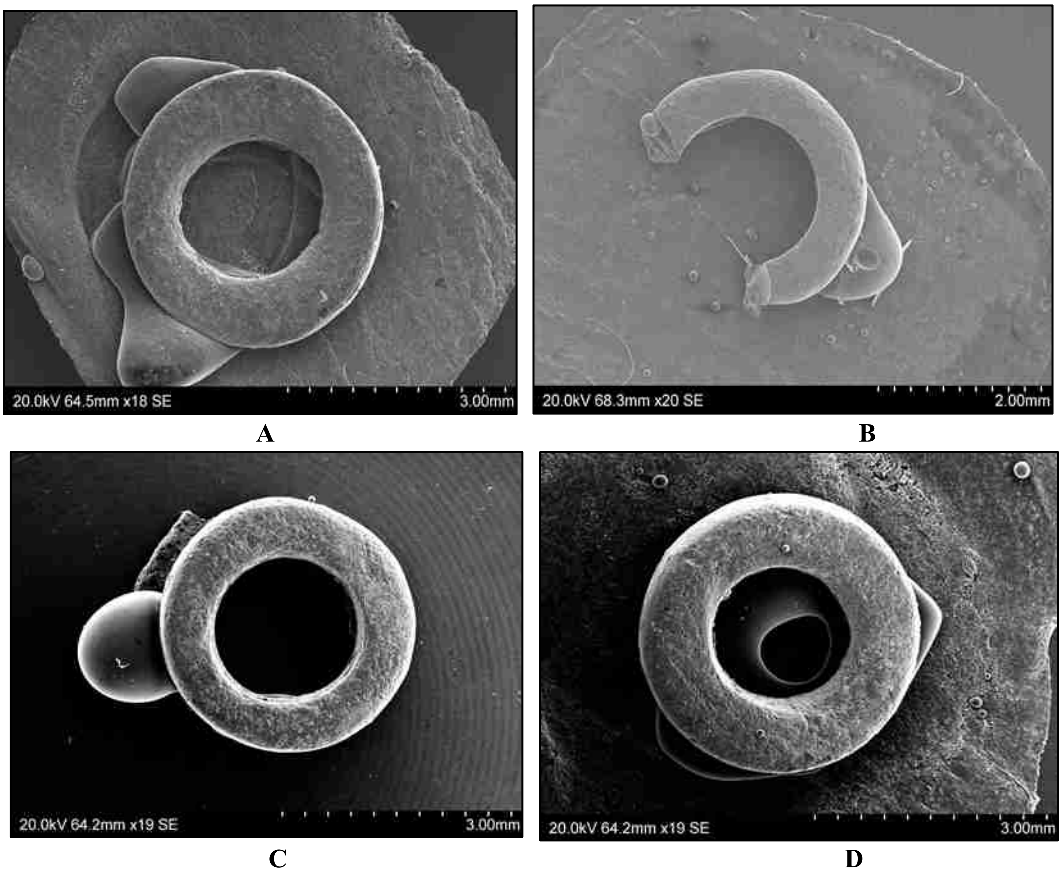
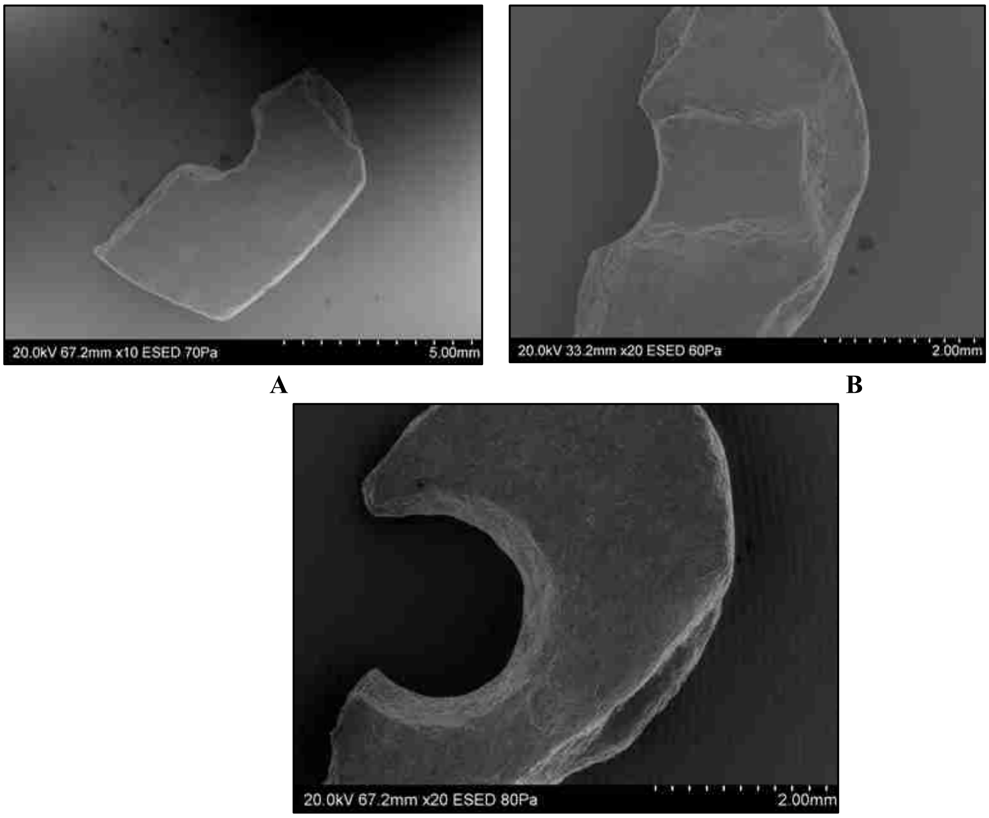


Figure 3.3.30. Finished phyllite beads from unit 4530: A) 4530.H.2; B) 4530.H.5; C) 4530.H.10; and D) 4530.H.11

There are three phyllite preforms in unit 4540, and all appear to be precursors to disc or ring beads (Figure 3.3.31). One of the three preforms, 4540.H.3, appears to have been drilled uniconically by hand, and gently abraded on two of its sides. The other two preforms, 4540.H.4 and 4540.H.5, were also drilled uniconically but most likely with a mechanical drill as determined by the regularity of the outline of the perforation. In all three instances the beads most likely broke during perforation. The latter two preforms are more rounded in shape in comparison with the more angular 4540.H3. The manufacturing marks along the lengths suggest that the phyllite beads were all shaped by abrasion rather than chipping or flaking. One of the preforms, 4540.H4 does not have a smooth face, as some of the plates of the phyllite have broken off on either side, most likely the result of damage.



A B C

Figure 3.3.31. Phyllite preforms from unit 4540, Building 18: A) 4540.H.3; B) 4540.H4; and C) 4540.H5

The final unit with production evidence in Building 18 was unit 4539. This unit contained one preform and one finished bead made from the same coloured phyllite (Figure 3.3.32). The broken preform was quite circular in shape before perforation, as opposed to the subrounded shapes we have previously seen. The perforation outline is quite regular in shape, although the marks within the perforation show rough but faint striations. The preform was perforated uniconically and most likely snapped during perforation. The finished ring bead, alternatively, was drilled biconically and the interior of the perforation was smooth and contained no manufacturing marks. Along the length of the bead, very faint striations could be seen, which may be from fine abrasion or may also reflect the platy nature of the phyllite.

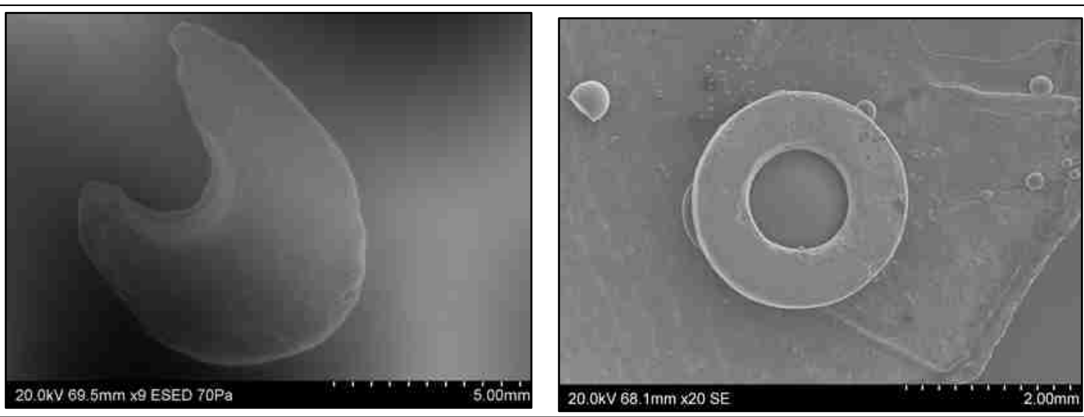


Figure 3.3.32. SEM images of phyllite preform 4539.H10 (left) and finished bead 4539.H9 in unit 4539 (right)

South.P

Space 329, an open yard area in settlement phase South.P, has a number of rich production contexts and beads from three units have been analysed for manufacturing marks: 17048, 16555, and 16236.

Unit 17048 contained a single tufa roughout, which was only perforated three quarters of the way down from one side (uniconical perforation). The outline of the perforation and the concentric parallel striations within the perforation both imply the use of a mechanical drill with a conical-shaped tool used for perforation (Figure 3.3.33). Two sides, and possibly a third one, have been abraded along the length of the roughout creating an angular shape.

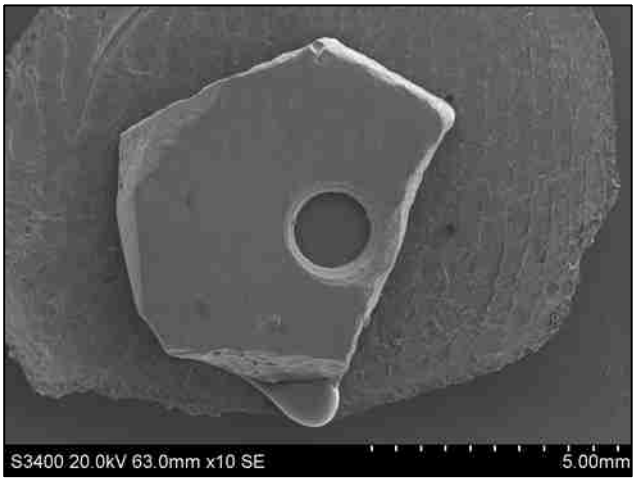


Figure 3.3.33. Tufa roughout 17048.H2 in unit 17048, Space 329

Both the front and back of the roughout (ends) also show abrasion marks created by rubbing the roughout against a flat ground stone palette or slab prior to perforation (Figure 3.3.34).

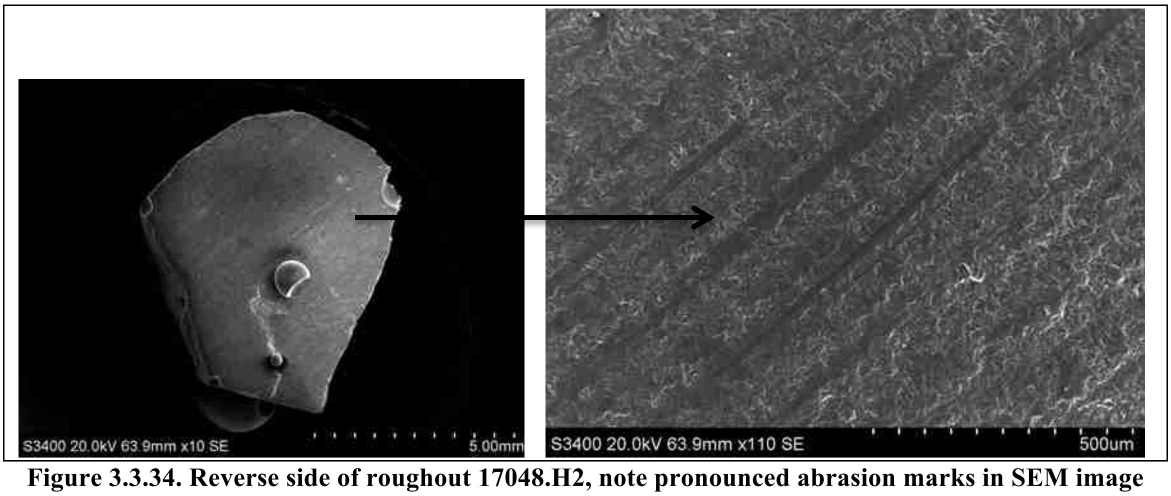


Figure 3.3.34. Reverse side of roughout 17048.H2, note pronounced abrasion marks in SEM image on right

Unit 16555 contained a total of six preforms made from the same tufa material found in unit 17048 (Figure 3.3.35). All six of the preforms are subrounded with some being more angular while others more rounded. Preforms 16555.H1 and 16555.H2 are both drilled biconically, although 16555.H1 is also drilled at an angle. Preform 16555.H1 has a slightly irregular outline with regard to its perforation and the marks within the perforation can be described as faint linear striations. It is likely that this preform had been perforated by hand. The second preform 16555.H2 and the rest (16555.H3a to 16555.H3d) all have much more regular outlines and the perforation marks appear to be faint concentric parallel striations but they appear slightly eroded or there are a higher number of impurities within the calcium carbonate composition of the tufa, making the marks more difficult to see on this particular type of tufa. Based on the SEM images, a mechanical drill was mostly likely to have been used, and the regular outline and straight down angle of perforation both indicate the use of a mechanical drill. In this unit a number of chert microdrills were also found. Not only does the proximity of the drills and preforms suggest that they were used to perforate the beads, but also the conical shape of the tip of the chert microdrills very much coincides with the conical shape of the perforation, making it extremely likely that these microdrills were used to perforate the tufa preforms found in this unit (Appendix D).

Some of the preforms in unit 16555 have abraded facets along their lengths, giving them an angular shape. All of the preforms have prominent abrasion marks on their ends or faces. Roughouts also found in Space 329 indicate that the faces were abraded flat before perforation.

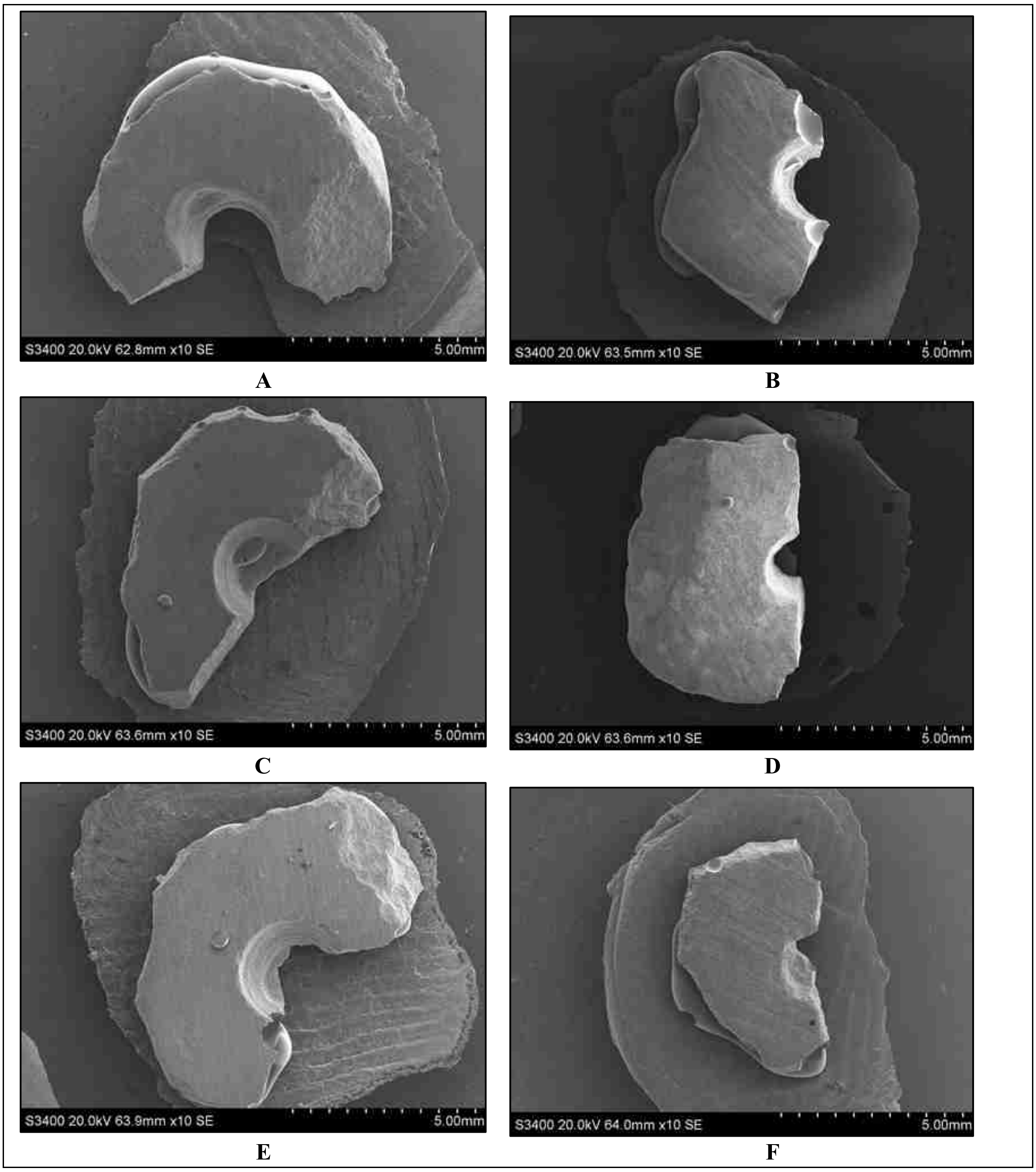
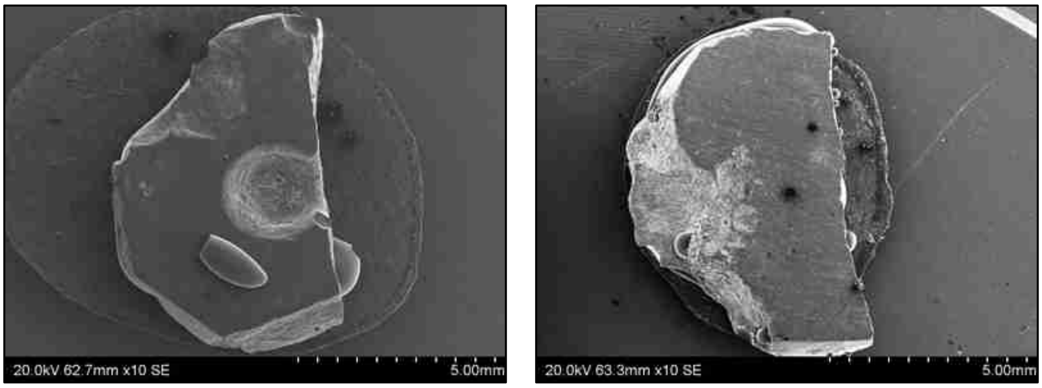


Figure 3.3.35. Six tufa preforms found in unit 16555 in Space 329: A) 16555.H1; B) 16555.H2; C) 16555.H3a; D) 16555.H3b; E) 16555.H3c; and F) 16555.H3d

Unit 16236, like 16555, has a number of tufa preforms (5 in total), but also includes a roughout. The roughout is subrounded in shape and has two to three abrasion facets along its length (Figure 3.3.36). Both ends of the bead also have prominent abrasion marks (Figure 3.3.36). The roughout is perforated straight down and only halfway from one side and therefore the perforation is an incomplete uniconical shape. The outline of the perforation is quite regular in shape; hence, the perforation was most likely made by a mechanical drill. The perforation marks, however, appear to be eroded and no marks can be distinguished. It is possible that the pressure put on the bead during perforation could have been the reason the bead snapped.



A B

Figure 3.3.36. Tufa roughout in unit 16236, Space 329: A) 16236.H2, B) 16236.H2 (reverse side)

The five tufa preforms found in unit 16236 are presented in Figure 3.3.37. As with previous examples, the preforms are generally subrounded in shape, some being more round while others are more angular. All preforms, with the exception of two, have abrasion marks on some part along their length and all but one preform has abrasion marks on the face of the bead. With regard to the perforations of the preforms, two are uniconical and straight (16236.H5a and 16236.H5d), one is perforated uniconically but on a slant (16236.H5e), while the remaining two were perforated biconically and straight down (16236.H5b and 16236.H5c). The outlines of all the perforations, with the exception of 16236.H5e, which may have been perforated by hand, appear quite circular and regular indicating the use of a mechanical type drill. The perforation marks however exhibit faint linear striations, which when combined with the regularity of the outline of the perforation also suggest the use of a mechanical drill. These preforms seem to have snapped during perforation. This unit provides us with examples of beads which snapped during both uniconical and biconical perforation.

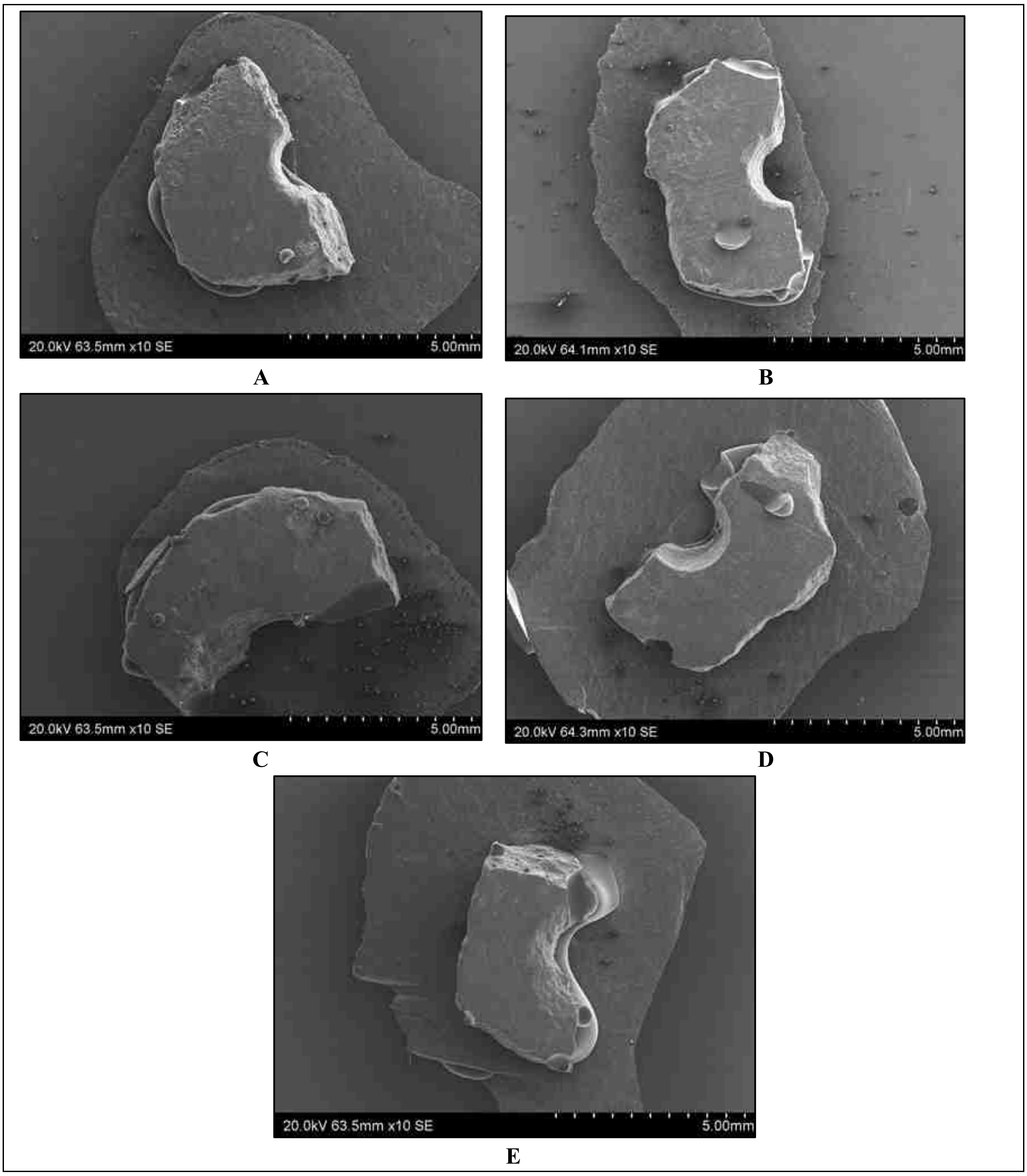


Figure 3.3.37. Five tufa preforms in unit 16236: A) 16236.H5a; B) 16236.H5b; C) 16236.H5e; D) 16236.H5c; and E) 16236.H5d

In Building 75, also in settlement phase South.P, two units were analysed for manufacturing marks. The first, unit 16565 contained three roughouts (16565.H5, 16565.H7, and 16565.H8) and two preforms made from dark red/brown tufa identical to that found in contemporary Space 329. All three roughouts were analysed for manufacture marks. They were of course not perforated, but their faces or ends did contain prominent abrasion marks as well as some sides of their subrounded lengths. In addition to the tufa ring bead manufacture data, there was also a preform (16567.H2) made from serpentinite (Figure 3.3.38). This preform was quite angular and square in shape created by a number of abrasion facets along its length. The face of the preform did contain some abrasion marks, but they were only concentrated in one area. The outline of the perforation does not appear to be regular or circular and the preform is perforated at a slight angle, which suggests that this preform could have been perforated by hand, but due to the state of the raw material, it is hard to say for sure.

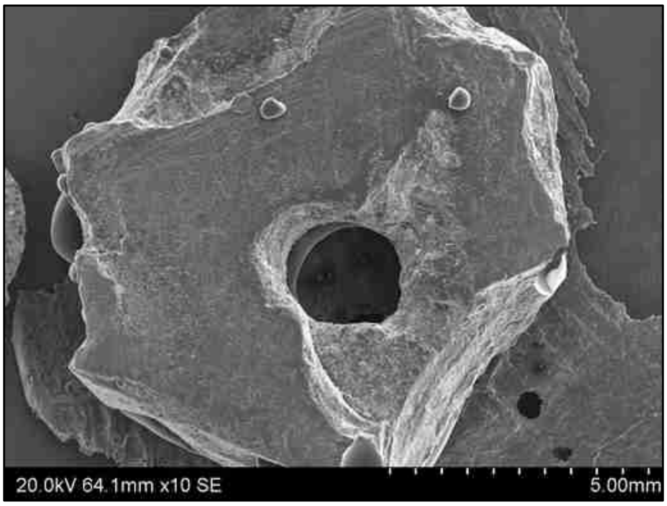


Figure 3.3.38. Serpentinite preform found in Building 75 (16567.H2)

South.R

A single finished bead was found in unit 16590 in Space 339, South.R (Figure 3.3.39). The calcite finished bead was found with a nodule of calcite and three ground stone tools, hence suggesting its original source may have been a production context before it was discarded in external midden Space 339. The calcite bead was biconically perforated via a mechanical drill, straight down, as seen by the regular outline, although the interior of the perforation is smooth and contains no marks. One side of the perforation is slightly more worn than the other, which leads us to believe that this bead may have been strung and used or worn at some point with the fibers of the string digging into one side of the perforation. The lengths have faint linear striations suggesting abrasion against a ground stone surface.

Figure 3.3.39. Finished bead in Space 339 (16590.H2)

North.I

Space 226, found in settlement phase North.I contains one preform (8864.H1) that was present in a production context (Figure 3.3.40). Its shape is again subrounded with a number of abrasion facets along its length. The face also has abrasion marks and a number of scratches on the soft steatite. The perforation has a perfectly circular outline and bold concentric parallel striations in its interior indicating the use of a mechanical drill.

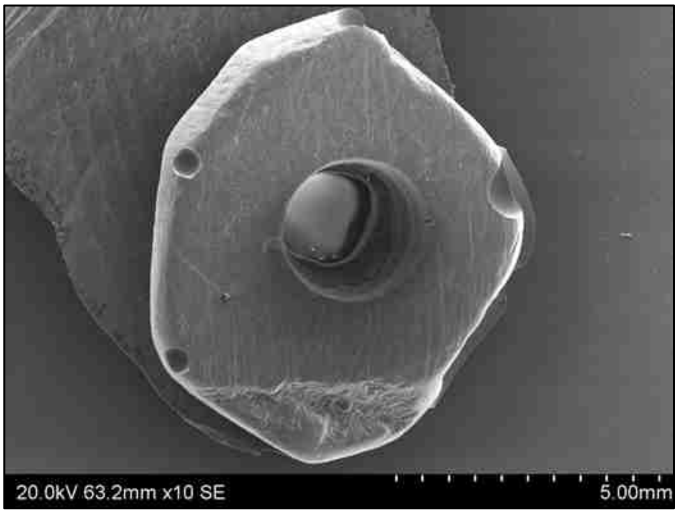


Figure 3.3.40. Steatite preform in Space 226 (8864.H1)

External midden Space 279, also located in settlement phase North.I, similarly contained a number of discarded production contexts, five of which contained beads which were analysed for manufacture marks: 12972, 13127, 13103, 13143, and 14120.

In unit 12972 there were two preforms, but only one could be analysed for manufacture marks. A preform made from chert was found with ground stone tools. The chert perform had no marks on its length or face, but it was roughly perforated from one side only, at an angle, and the outline was slightly irregular (Figure 3.3.41). The outline suggests that this preform was perforated by hand, although this would have been very difficult and time-consuming as chert is a hard raw material to perforate by hand.

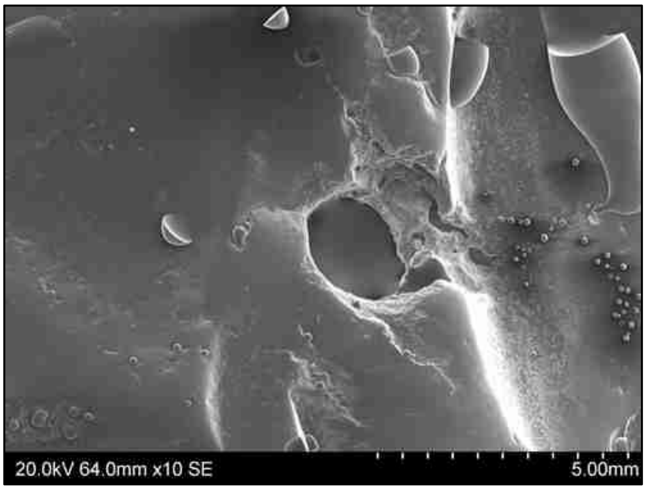
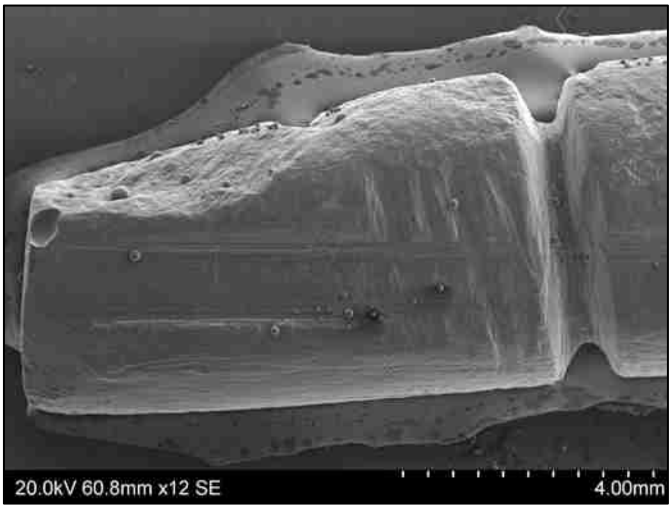
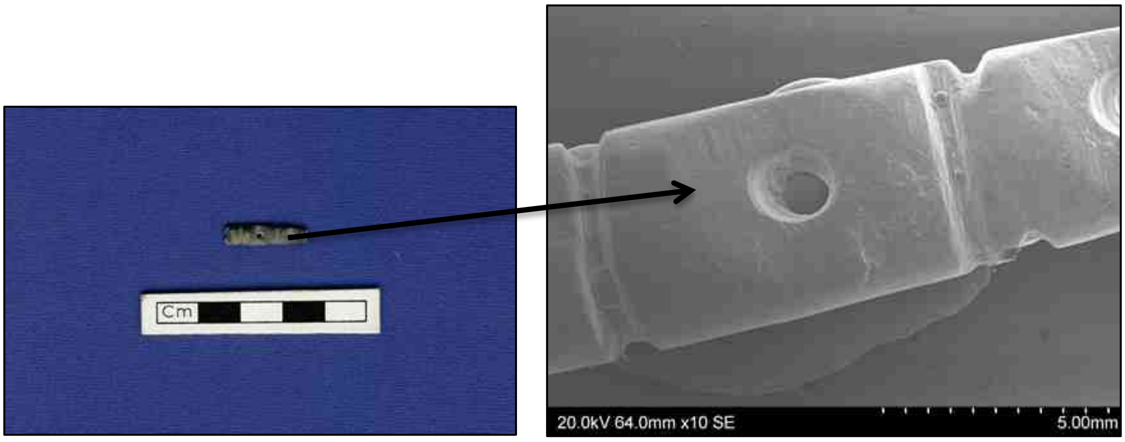


Figure 3.3.41. SEM image of the perforation of a chert preform in Space 279 (12972.H1)

Unit 13127 contains a preform of a spacer bead and four ground stone tools. The spacer bead is used to create rows of strung beads to wear. The spacer bead contains saw marks between the different sections, which would have subsequently been perforated (Figure 3.3.42). The sawing marks appear to have been created with an abrader knife. There are abrasion facets all over the body of the spacer preform. It was reduced to size and shaped using a fine abrasive surface, either a palette, abrader, or abrading slab. Figure 3.3.42b illustrates an example of a broken perforated steatite spacer bead (13199.X6) also found in Space 279. The sections of this spacer bead are also likely to have been made by the use of an abrader knife. The face or ends of the sections that were perforated were first abraded, creating an indentation. This indentation would have allowed a disc or ring bead to fit into the spacer bead snugly. The perforation was most likely made from a mechanical drill based on the outline of the perforation and the bold continuous concentric parallel striation found inside the perforation.



A



B

Figure 3.3.42. A) SEM image of one section of a steatite spacer preform from Space 279 (13127.H1); B) SEM image and photo of broken perforated spacer bead 13199.X6. Photo by K. Wright

Unit 13103, like unit 12972, contained a single roughout made of chert with a potential ground stone tool kit for bead making. The roughout is quite large in size and also quite siliceous (Figure 3.3.43a). There does not appear to be any abrasion marks on its surface but there is a pre-perforation peck or drilling mark in the centre of one of the ends (Figure 3.3.43b). Based on the outline of the peck, it appears to be created by hand, but the tool cannot be determined. Examples of pecking or minor hand drilling prior to mechanical perforation have been found on four different roughouts.

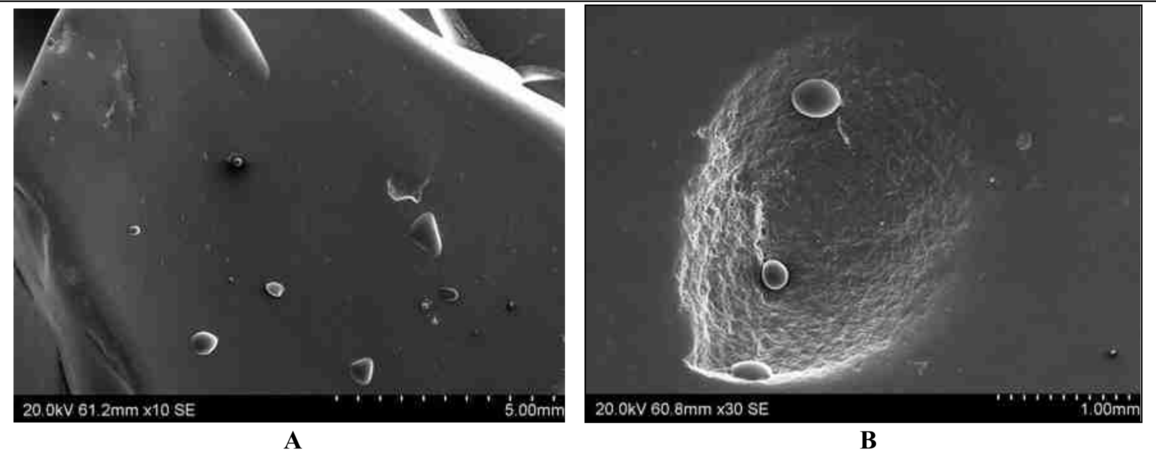


Figure 3.3.43. Chert roughout in unit 13103, Space 279 (13103.H4): A) roughout surface; and B) pre-perforation mark on one end only

Unit 13143 contains two ground stone tools and a steatite preform, which is subrounded in shape and there are fine linear striations indicating abrasion facets along the length of the preform (Figure 3.3.44). The face of the preform, however, is smooth and contains no marks. The perforation morphology reveals that the preform was perforated biconically and straight down. The outline of the perforation is circular and the interior of the perforation has fine linear striations, suggesting the use of a mechanical drill. This preform is a precursor to a disc or ring bead.

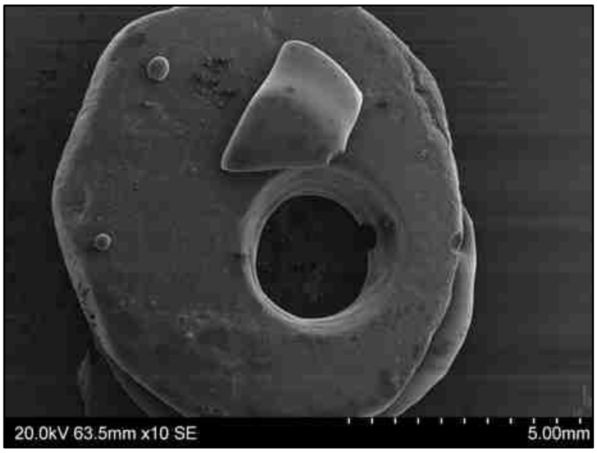


Figure 3.3.44. Steatite preform in unit 13143, Space 279 (13143.X9)

Finally, unit 14120 contains one fluorapatite preform (14120.H7) and one steatite preform (14120.H4). Both appear subrounded in shape (Figure 3.3.45a and d). The fluorapatite preform is an important find as it one of only a handful examples of the possible manufacture of variant bead types. This preform may be a precursor to a lenticular fluorapatite bead, and we do find finished examples of this type. There are abrasion marks found on one side of the flat length (Figure 3.3.45a) of the bead and some abrasion facets found along the end and the side of the length (Figure 3.3.45b) On the other side of the length there is a partial perforation along the length of the bead, which although broken, appears to be cylindrical in shape (Figure 3.3.45c). This preform may have broken during perforation. Similarly the steatite broken preform fragment also contains abrasion marks and scratches on its face and along on side of its length. The perforation is biconical, straight, and the outline is regular suggesting mechanical perforation. The perforation marks reveal that there are faint linear striations and also smooth areas. This could be a preservation issue but it also can be that the bead broke during the abrasion process while it was strung.

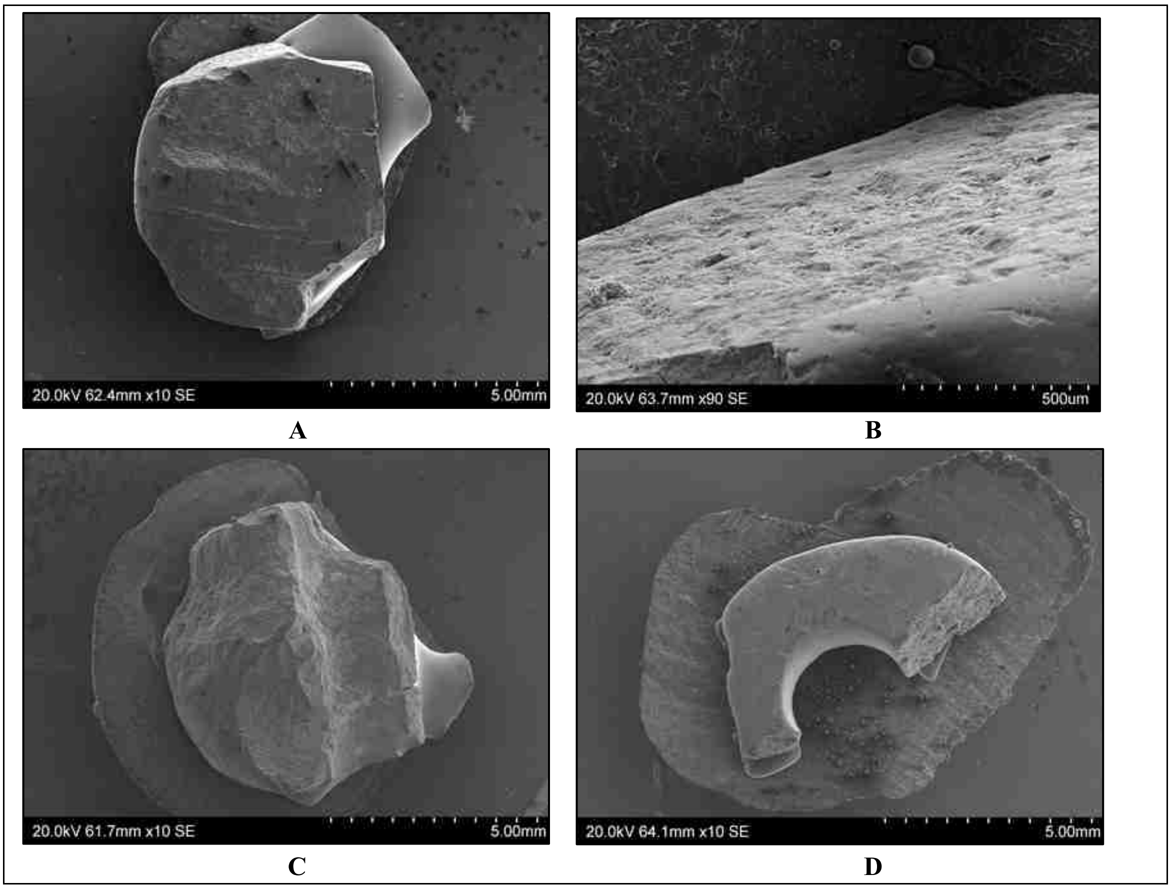


Figure 3.3.45. A) Fluorapatite preform for possible lenticular bead type (14120.H7); B) abrasion facet of A; C) reverse side of A, illustrating a partial perforation; and D) steatite preform (14120.H4)

Manufacture marks on variant bead types not found in production contexts

In addition to the roughouts and preforms analysed for manufacture marks in production contexts, there are also two examples of preforms of variant bead types found at Çatalhöyük (13174.X4 and 12501.H1) that can help us determine how non-disc or ring beads may have been manufactured. The first is a fluorapatite preform which may have been a precursor for a rounded barrel or lenticular bead, which was found in Space 279, in North.I (Figure 3.3.46). Like ring or disc preforms, the length of the preform appears to have been roughly abraded on different sides prior to perforation. The one undamaged side has also been roughly abraded. The bead was perforated biconically by a very thin cylindrical drill, straight from one side, and at an angle from the other (Figure 3.3.46b). This preform most likely snapped during the second perforation. The perforation marks indicate that the bead was perforated using a harder raw material and the parallel striations suggest that it was made using a mechanical drill, although a two-handed hafted drill is also possible, but unlikely (Figure 3.3.46c).

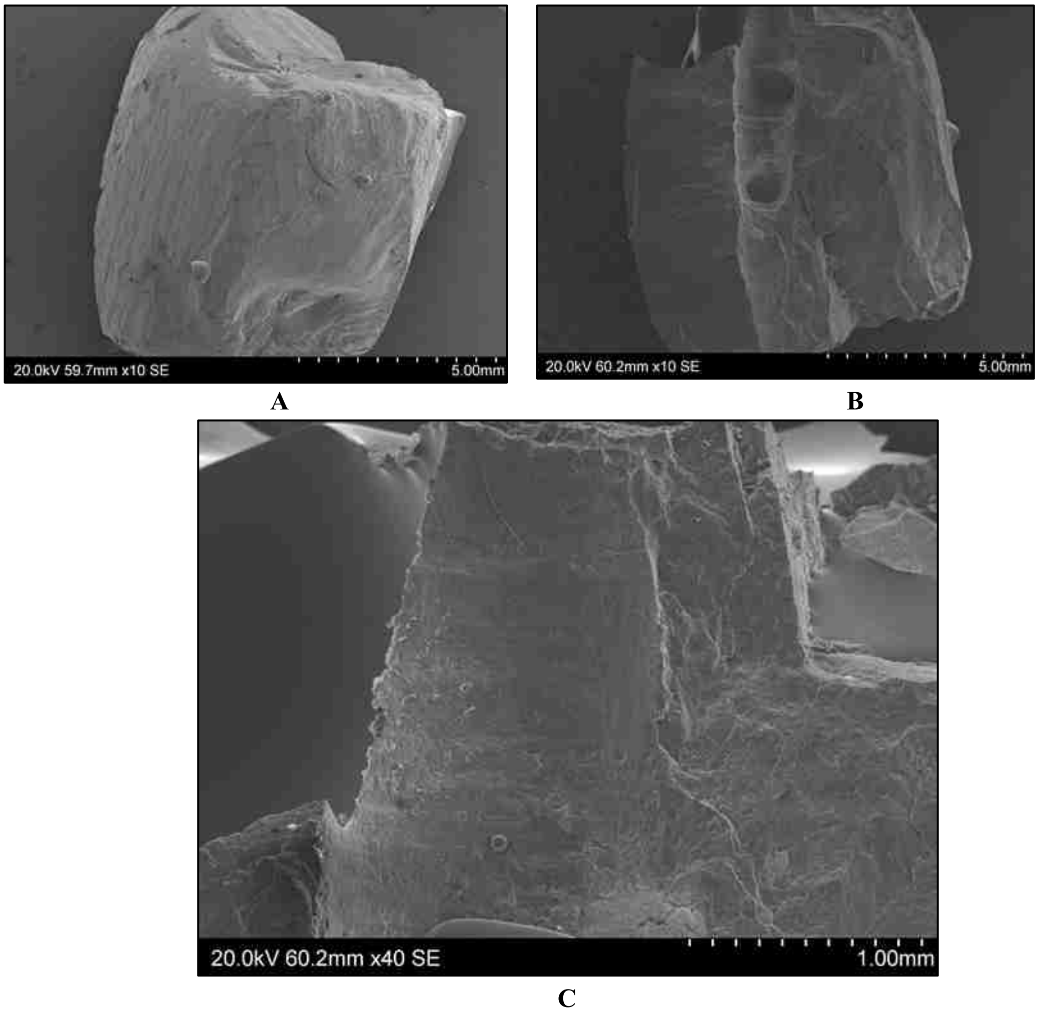


Figure 3.3.46. SEM images of a fluorapatite preform for rounded barrel or lenticular bead types from North.I (13174.X4): A) image of abraded length; B) perforation morphology of preform; and C) parallel striations in interior of perforation

The second preform is calcite preform, which may be an unfinished pendant, from external midden Space 261, in South Q (Figure 3.3.47). Both its face and lengths have been roughly abraded into shape, creating linear striations and abrasion facets (Figure 3.3.47a and b). Next the bead was perforated from both sides via a mechanical drill or two-handed drill. This is difficult to tell without the complete perforation. The perforation is slanted and not regular in outline which indicates hand drilling, but it is also possible that drilling first occurred in one place but was later started again as indicated by the what appear to be the convergence of two perforation outlines (see arrow in Figure 3.3.47a).

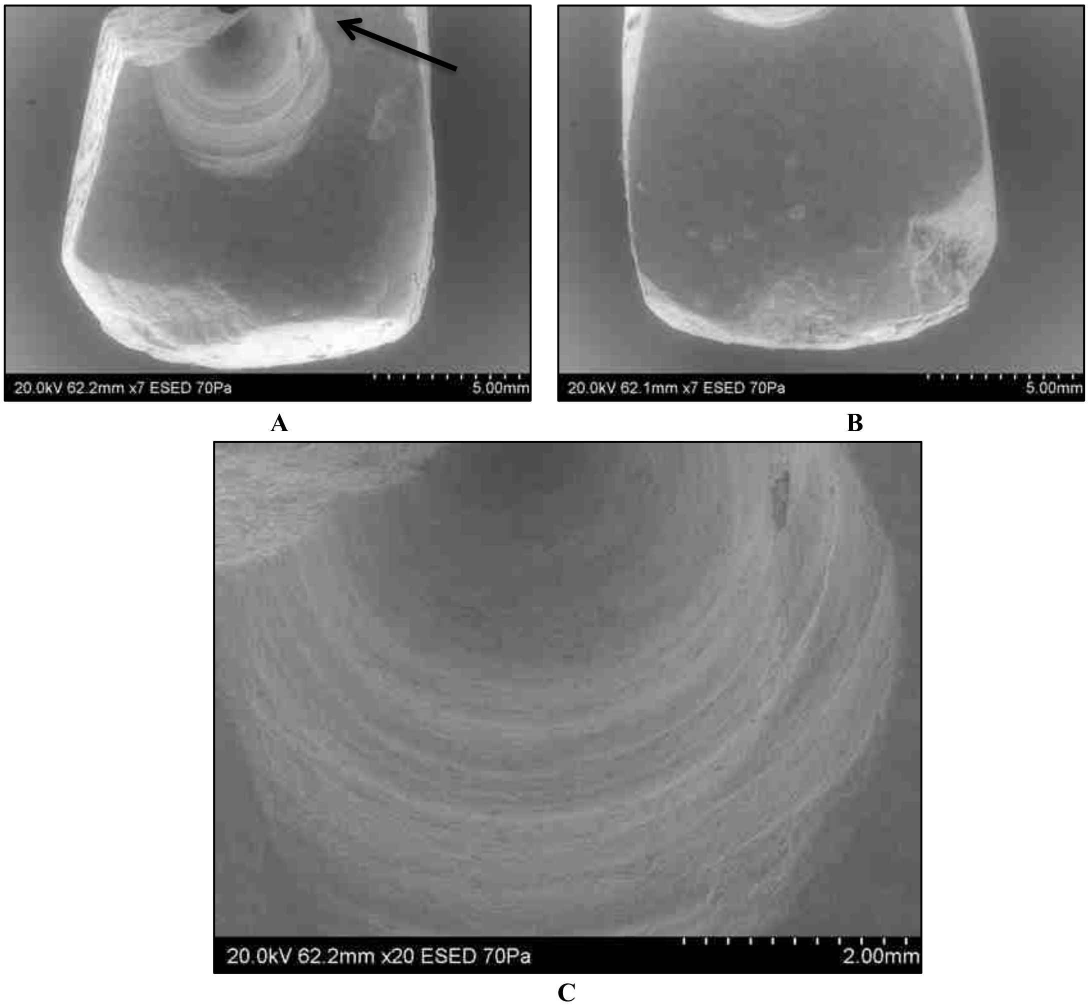


Figure 3.3.47. SEM images of a calcite pendant preform from South.Q (12501.H1): A) image illustrating abraded length and face, and the arrow highlights the possibility of two perforation outlines; B) reverse side of end with abrading; C) detailed image of perforation from one side

Variant bead types were therefore essentially manufactured following the same basic template of disc or ring beads, but each of basic steps were likely to be much more time-consuming and a certain degree of skill and experience with stone bead production would have been required, and this is discussed further in Chapter 4.3.

Summary of manufacture marks analyses and production contexts

- Regardless of raw material, manufacture marks analyses of production contexts revealed a number of patterns in stone bead manufacture. Only examples of the production of ring or disc beads can be found at Çatalhöyük, in both *in-situ* and in discarded secondary midden contexts.

- Roughouts were first shaped and reduced via chipping and abrasion or just abrasion as indicated by the abrasion facets and marks along the length of the bead. This created a subrounded, angular or round shape via the process of abrasion. Abrasion marks were also present on either end of the bead so that either end of the bead was first abraded flat before perforation.

- Perforations occurred at an early stage after the rough shaping of the bead. Drilling at such an early stage was a very sensible thing to do considering how easily a bead could be broken during perforation as all but two of these preforms attest. In order to facilitate the perforation process, roughouts may have been drilled preliminarily by hand or pecked at in order to create a well for the hafted drill bit of the mechanical drill or hand drill to sit in. This would have prevented the tip from slipping across the face of the bead.

- According to the regularity of the outline of perforations and the concentric parallel striations found within many of the preforms discussed above, the preforms were most likely drilled using a mechanical drill. Most of the preforms were only drilled from one side (uniconically and straight) before they snapped, but a few examples of preforms which snapped during the second perforation (biconical) also exist. This suggests that a successful perforation is more likely if a perforation is made from both sides (biconical and straight down). There is evidence for the use of a mechanical type drill from the earliest settlement excavated to date, South.G.

- The conical shape of the perforations suggests that the preforms were perforated with tools with conical-shaped tips. The tools would also have to be made of a raw material that is harder than the rock or mineral being perforated in order to leave marks. Tools such as chert or obsidian microdrills are both viable options (Appendix D).

- The marks exhibited in the perforations of preforms were different than those of the finished beads made of the same raw material. Many times the diameter of the perforation of the finished bead is larger and also there is an absence of or less prominent perforation marks within a finished bead. It is possible that the bead perforation slowly expanded and marks were erased when the beads were later strung during final abrasion, polishing, or use.

- The similarity in size of the beads, suggests that they may have been abraded together in a group. Before group abrasion, however, the beads were most likely abraded individually to create a more rounded shape to prevent any breakage. The faces of the preforms would have rubbed up against one another during group abrasion and the friction between the raw materials would have smoothed and to an extent polished the ends or faces of the bead. The use of group abrasion is also supported by the prevalence of sharp edges of ring and disc beads.

Manufacturing sequences and a discussion of these results regarding manufacturing marks studies and production contexts are presented in the next chapter.

3.4 Use Contexts: Burials in Detail

Beads are ubiquitous artefacts that can be found in a number of different contexts. So far, only production contexts have been closely examined in order to understand stone bead manufacture at Çatalhöyük. What is more difficult is determining how stone beads were used. One can assume that beads are simply made and used as ornamentation, but numerous archaeological and ethnographic studies have established their use as forms of currency and trade items, items of ritual and magic, fertility or warding off evil charms, or items illustrating power, authority, or status (Chapter 5). At Çatalhöyük, the only two clear examples of stone bead use are derived from the use of stone beads in burials and their presence in caches, clusters, or placed deposits. Distribution patterns relating to burials and hoards and special deposits were presented earlier in Section 3.1, and a brief summary of these results can be found below. This section aims to examine burials and mortuary practices and what they can tell us about stone bead use and their role within this ritualized context. A database of stone beads from burials is found in Appendix F.

In order to address this topic, a number of secondary questions were devised:

1. Do stone beads found within burials change over the span of the Neolithic at Çatalhöyük?
2. Can we differentiate between stone beads buried with men or women?
3. Can we differentiate between stone beads buried with different age groups?
4. How often do individual, one-of-a-kind items occur in burials? In other words, are stone beads generic or typical or could they be a reflection of the individual?
5. Were stone beads manufactured especially for a burial or were they previously worn or potential heirlooms?
6. What types of stone bead jewellery (anklets, bracelets, necklaces, etc.) were most frequently used in burials?
7. Are stone beads found on floors or in production contexts associated with a particular building the same as those found in the burials of that building? In other words, are households making their own beads to place in burials?

A major analysis of burials is beyond the scope of this study, and the results presented in this section hope to simply address the above questions with the dataset of stone beads from burials and buildings sampled in this project. Although according to the information provided by the Human Remains team, this dataset does include all the stone beads excavated thus far from burials found in secure Neolithic deposits. The only contexts not sampled are unstratified Neolithic or Chalcolithic deposits and foundation trenches made for the shelters at Çatalhöyük, which alone cannot be attributed to any settlement phase. A more detailed analysis of all burial goods at Çatalhöyük has been conducted by Nakamura and Meskell (in press).

In Chapter 2.4, the problematic nature of analysing burials was relayed, in terms of burials being an expression of mourners rather than that of the deceased as well as specific issues regarding stone beads at Çatalhöyük. Beads are generally quite small in size and unless they appear neatly and directly on a skeleton which has been very carefully excavated, it is difficult to determine whether beads found in the surrounding fill were a part of the assemblage on the skeleton, or whether they were buried with that particular skeleton in primary fill, or whether the beads may be a part of secondary fill and not related to the skeleton in question. Burials under floors of houses at Çatalhöyük were constantly being dug up, disturbed, and moved to make room for new burials, subsequently beads placed on skeletons or in burials were also disturbed. What we do know is that bead breakage percentages are quite low for both skeletons and burial fill (Section 3.1.5). Broken beads in burials could simply be the result of preservation or subsequent movement. Because the breakage percentages are so different between floors and burials, it does not appear that beads from burial fill are only the result of floor deposits mixing with burial deposits; it is far more likely that beads from burial fill were scattered into the burial, and did not remain intact due to movement (new burials and reburials being added or animals beneath house floors).

Beads were manufactured from a number of media, including stone, bone, shell, and clay. This study only takes into account beads made from stone. A number of necklaces, bracelets, or anklets were made from different media, and this differentiation could have been arbitrary, for example based on colour (bone or shell was used for the colour white, for example) rather than raw material type. In addition, by only looking at one type of media, where many have been used, it may be difficult to ascertain the complexity or significance of beads within a burial. This also leads to the problematic issue of comparing stone beads within burials. How can one compare beads within burials? Simple quantification does not work as one piece of jewellery can be comprised of a few hundred less hard single ring or disc beads, which may take the same amount of time to make as two more complex bead types made from a harder raw material. We can devise a system comparing aspects of raw material (rarity of the raw material in the assemblage and potential distance of source) and manufacturing techniques (number of perforations, made within a group or individually, hardness and toughness of raw material, and complexity of typology or amount of labour required) but even that is problematic at it is based on what we deem to be valuable today (raw material rarity, time, skill, etc.). The descriptive analyses conducted in Section 3.1 of this chapter showed that stone beads which were both more difficult to manufacture or were made from raw materials that were sourced hundreds of kilometres away, were just as likely to be found unbroken in a midden as in a burial or on a house floor. Our notions of value based on time, skill, and rarity may differ greatly than those of the Neolithic inhabitants of Çatalhöyük.

In Section 3.1, any potential relationships between context types (burials and placed deposits, among others) and qualitative variables (raw material, bead type, colour, and size) were discussed. The analyses revealed three main points with regard to hoards: 1) no real patterns pertaining to raw material use and colour can be observed; 2) this context category only contains more common bead forms, and a high concentration of naturally or manually perforated pebbles and stones in addition to round beads; and 3) this context category has the highest or second highest degree of variability in relation to its small sample size within all the descriptive variables assessed: bead size, raw material, colour, and bead type. What these observations may indicate is discussed in Chapter 5.

Similarly, preliminary observations can also be made regarding burials: 1) the most common bead types are found in all contexts, but the more variant forms are mostly found in external middens or burials, but this is also due to the large sample of beads which are derived from these contexts; 2) skeletons do however contain the highest percentage of beads that are size 5 and up, indicating that more larger sized beads are found on skeletons that any other context category; 3) consistently, burial fill and skeletons are the two contexts which contain the least amount of variability in regard to the descriptive variables assessed; 4) three bead types only associated with burials are the collared butterfly, plano-convex, and axe head beads; 5) beads found on skeletons depict the least variation of colours and only white, black, black with green, grey/green, pale to dark blue, pale green, pale pink/beige, and metallic coloured beads are found.

3.4.1 Stone beads sample and distribution of burials

All the burials found in the sampled buildings and spaces were analysed and compared, using a newly created stone beads burial database. In this database, basic variables to do with burial (age, sex, whether beads were found in fill or on the skeleton, and subsequently where on the body beads were placed if on skeleton) were correlated with descriptive variables (raw material, typology, colour, and size).

Of the total 22 spaces and 34 buildings sampled in the North and South areas, only 1 space and 13 buildings contained burials with stone beads. Table 3.4.1 summarizes the buildings and spaces that contain stone bead burials and the distribution of burials within each space or building and whether primary evidence (on skeletons) of stone beads can be found within these contexts.

Area and Phase	Building or Space	Number of burials with stone beads	Number of burials without stone beads	Total number of burials in context	Number of skeletons with beads
South.J	B.23	1	1	2	0
South.K	B.17	3	0	3	0
South.L	B.6	4	6	10	0
South.L	B.43	1	1	2	1
South.?M	B.50	1	11	12	1
South.?M	S.168	1	0	1	1
South.Q	B.53	2	6	8	1
South.Q	B.65	5	4	9	0
South.R	B.42	5	2	7	2
South.R	B.56	1	2	3	0
South.S	B.44	2	9	11	1
North.G	B.49	9	5	14	3
North.H	B.54	1	5	6	0
North.H	B.60	1	1	2	0
TOTAL	14	37	53	90	10

Table 3.4.1. Summary of sampled contexts with burials and the presence of stone beads between these burials

Table 3.4.1 illustrates that within 14 contexts there are a total of 90 burials, the vast majority under house floors. Of these 90 burials only 37 (41.1%) contain stone beads, either in fill or on the skeleton. Of these 37 burials, only 10 (27.0%) contain primary evidence of bead use, that is, stone beads found on skeletons. Essentially, 10 out of 90 burials (11.1%) contain primary evidence of stone bead use. This is a very small sample. Analyses were however conducted on all 37 burials that contained stone beads, despite the problems differentiating between primary and secondary fills.

Table 3.4.2 provides a detailed look at the 37 burials from the sampled contexts that contain stone beads. No burials appear in South.G, South.P, South.T, or North.I, and there is only one burial in South.J. Within phases, South.?M contains only two burials as does South.S and North.H. The remaining phases contain at least three or more examples of burials. All the stone beads (total of 801) from these 37 burials were examined, with over half found in a child burial in Building 43.

There are two examples of multiple burials, one in Building 42 and another in Building 49, but rest are single burials. The Human Remains lab at Çatalhöyük have identified and classified the remains of 5 neonates (at birth), 5 infants (0 to 3 years of age), 7 children (3 to 12 years of age), 3 adolescents (12 to 20 years of age), 4 young adults (20 to 30 years of age), 1 adult (approximately over 20 years of age), 2 middle adults (approximately between 30 and 40 years), 8 older adults (above the age of 50), and 2 individuals of unknown age. The age for one of the skeletons (F.2700) in building 53 could not be identified (Hager and Boz, in press). One amendment was made of this classification system for the purposes of analyses. The categories of adult (20+) and young adult (20-30) were combined, as there was only one example of an adult burial and the ages overlapped. From these categories we can see that stone beads are found in burials belonging to all age groups, from new-borns to the elderly.

The Human Remains team also determined the biological sex of most of the skeletons. They identified 8 females (21.6%), 8 males (21.6%), 2 of which could were most likely male, but could not be identified with certainty, 19 babies and children whose sex could not yet be determined due to young age (51.4%), and the sexes of the multiple remains found in the multiple burial in Building 42 is also unknown (5.4%). Stone beads are therefore found in both the burials of males and females.

Area & phase	Bldg/ Sp	Burial feature #	Age	Sex	Burial fill or skeleton	Total # of beads in burial
South.J	23	F.544	infant (0-3)	indeterminate	fill	1
South.K	17	F.576	infant (0-3)	indeterminate	fill	1
South.K	17	F.563	older adult (50+)	F	fill	6
South.K	17	F.564	infant (0-3)	indeterminate	fill	7
South.L	6	F.492	adult (20-30)	M	fill	2
South.L	6	F.513	older adult (50+)	F	fill	1
South.L	6	F.537	neonate	indeterminate	fill	1
South.L	6	F.460	adolescent (12-20)	M	fill	6
South.L	43	F.1860	child (3-12)	indeterminate	skeleton	437
South.?M	50	F.1710	older adult (50+)	F	skeleton and fill	17
South.?M	S168	F.417	neonate	indeterminate	skeleton and fill	11 (+ 436 not studied)
South.Q	53	F.2700	unknown	unknown	fill	1
South.Q	53	F.1532	adolescent (12-20)	indeterminate	skeleton	11
South.Q	65	F.2520	neonate	indeterminate	fill	2
South.Q	65	F.2521	neonate	indeterminate	fill	1
South.Q	65	F.2535	adolescent	indeterminate	fill	4
South.Q	65	F.2603	older adult (50+)	M	fill	1
South.Q	65	F.2604	older adult (50+)	M	fill	11
South.R	42	F.1516	infant (0-3)	indeterminate	skeleton	1
South.R	42	F.1517	older adult (50+)	F	skeleton and fill	3
South.R	42	F.1512	multiple burial unknown	multiple burial unknown	fill	10
South.R	42	F.1515	adult (20-30)	M?	fill	5
South.R	56	F.2082	adult (20-30)	M	fill	2
South.S	44	F.2050	child (3-12)	indeterminate	fill	3
South.S	44	F.1320	adult (20-30)	F	skeleton or fill	1
North.G	49	F.1492	older adult (50+)	M?	skeleton	1
North.G	49	F.4000	child (3-12) and middle adult (30-40)	F & indeterminate	skeleton (F) and fill	233
North.G	49	F.4011	child (3-12)	indeterminate	skeleton and fill	3
North.G	49	F.4012	neonate	indeterminate	fill	2
North.G	49	F.4014	child (3-12)	indeterminate	fill	1
North.G	49	F.4021	older adult (50+)	F	fill	2
North.G	49	F.4022	child (3-12)	indeterminate	fill	1
North.G	49	F.4023	infant (0-3)	indeterminate	fill	3
North.G	49	F.4024	middle adult (30-40)	M	fill	1
North.H	60	F.2232	adult (20-30)	F	fill	5
North.H	54	F.2156	child (3-12)	indeterminate	fill	1

Table 3.4.2. Detailed summary of burials including age and sex of skeletons

Stone beads are of course not the only artefacts to be found in burials. Nakamura and Meskell (in press) have conducted a study of burial assemblages at Çatalhöyük. According to them, there are up to fifty different objects found in burials but the vast majority only contain a single or perhaps two items (Nakamura and Meskell, in press). These other items include bone and obsidian tools, personal ornaments including rings and pendants, shells, animal bones and claws, clay balls, baskets, pigment lumps, and textiles, among others (Nakamura and Meskell, in press). The three most common finds which indicate "standard practice" in mortuary practices are baskets or matting of some type, the presence of pigment, and bead necklaces, of which there are a total of 11 (Nakamura and Meskell, in press). Nakamura and Meskell's study is pivotal in obtaining a general understanding of Neolithic burial practices at Çatalhöyük; in contrast, this section deals specifically with stone beads and what their presence may indicate. Nakamura and Meskell's findings will be further discussed with regard to stone beads in Chapter 5.

There are some discrepancies to address regarding distribution. One of the contexts, Building 6, contains a baby burial that is on display at the Konya Museum, Turkey. This burial could not be analysed as it was preserved and encased. The author was able to make some notes, specifically how the different coloured beads which were white, black, and pink, were preserved in necklace form (of approximately 345 beads) and how the beads were strung to create a colour pattern of black, pink, and white. Similarly, Space 168 also has a rich burial with approximately 436 stone beads but only 11 of these beads could be analysed as the rest were in storage at the Konya Museum and therefore could not be examined.

3.4.2 Analysis of stone beads on skeletons according to qualitative variables

First, beads found directly on the skeleton will be analysed, followed by a combined analysis of stone beads on skeletons as well as within burial fill. Analyses were divided in this way to make sure that the primary evidence of stone bead use could be directly associated with a skeleton. Each skeleton has an individual story to tell and the results from these burials are not muddled by beads found in burial fill, as there is a potential that these beads may have originated from floors or disturbed adjacent burials.

Within the burial sample, there are 11 instances where stone beads are used to make personal ornaments and placed on the body of the deceased, resulting in the use of 7 necklaces and 4 bracelets (Table 3.4.3). Seven of these examples convey the use of the stone beads as bracelets or necklaces, with much more certainty than the remaining 3 (1 bracelet and 2 necklaces) hence the presence of 3 question marks in the final column of Table 3.4.3. The child skeleton found in burial F.1860 was likely wearing more than one necklace and two bracelets (although they have been counted only once as they are in the same burial).

The necklaces were identified as such by the excavators due to the placement of beads near the neck, skull, and chest. In most instances, the twisted fiber remains used to string beads has not been preserved. Bracelets were positioned around the arms, for example, one bracelet was found near the right lower arm whereas another was placed or slid down to the elbow of the left arm.

As shown in Table 3.4.3, we have 2 types of personal ornamentation made using stone beads from 5 different phases that range from the earliest settlement phase with evidence of a burial with personal ornamentation in South.L to the later settlement phase of South.R. Both the South and North areas are represented, although there are only two examples from the North area.

Phase	Building or Space	Feature #	Age	Sex	Personal ornament
South.L	B.6	F.464	infant (0-3)	Indeterminate	bracelet?
South.L	B.43	F.1860	child (3-12)	Indeterminate	necklaces
South.L	B.43	F.1860	child (3-12)	Indeterminate	two bracelets
South.?M	B.50	F.1710	older adult (50+)	F	necklace?
South.?M	S.168	F.417	neonate	Indeterminate	necklace
North.G	B.49	F.4000	middle adult (30-40)	F	necklace
North.G	B.49	F.4011	child (3-12)	Indeterminate	necklace
South.Q	B.53	F.1532	adolescent (12-20)	Indeterminate	necklace?
South.Q	B.53	F.1532	adolescent (12-20)	Indeterminate	bracelet
South.R	B.42	F.1511	infant (0-3)	Indeterminate	necklace
South.R	B.42	F.1517	older adult (50+)	F	bracelet

Table 3.4.3. Summary of personal ornaments found in burial sample, presented in chronological order, from earliest to latest

Evidence of other forms of jewellery also exists in other burials. Most of these burials contain a single type of jewellery made from stone beads with the exception of two burials of a child from Building 43 (F. 1860) and an adolescent from Building 53 (F.1532) that contain both bracelets and necklaces. Examples of necklaces and bracelets are only found on females and those age groups whose biological sex characteristics cannot yet be determined from the remains due to their young age (neonates, infants, children and adolescents). Male and female burials were equally represented (21.6% each) yet only female skeletons contained evidence of stone bead jewellery. Of the 8 female burials, only 3 had evidence of jewellery associated with the skeleton. Of the 19 burials of indeterminate sex, only 7 had stone beads directly placed on the skeletons in the form of necklaces or bracelets.

It is also important to note that the bracelet found in burial F.1517 is also made of shell and fish bone in addition to stone beads. Similarly, the necklace found in burial F. 1710 also contains a bead made from bone and two beads made from boar teeth. Apart from these two examples, all the other necklaces and bracelets are made solely from stone beads.

The following data convey any patterns found between the 11 necklaces and bracelets found in burials. The distributions are calculated using the quantitative number (QN) as in previous analyses; however, in this case, we are more interested in the presence or absence of these qualitative variables, and what these mean. This is because some necklaces and bracelets consist of a single stone bead while others are made from a number of beads.

Distribution of raw materials found in jewellery

The raw materials used for necklaces and bracelets include: soft limestone, serpentinite, soft saccharoidal marble, steatite, phyllite, metabasalt, hard limestone or soft marble, fluorapatite, calcite, and hematite (Table A3.4.4). This list of raw materials is very small when compared to the potential of raw materials that could have been utilized (Section 3.1.1). Of these ten raw materials, six have been deemed as commonly used raw materials that make up the vast majority of the assemblage of stone beads at Çatalhöyük. All of these with the exception of 2 hematite (Mohs 5.5-6.5) and 5 fluorapatite (Mohs 5) beads, are quite soft (Mohs hardness of 2-4) and no other hard or harder raw materials such as carnelian or chert are present.

Stone bead jewellery could be made from a single raw material on its own, as one bead, or a single raw material used to make a strand of identical beads. An example of this can be seen with the disc shaped soft saccharoidal beads found in burial F.1860 (Figure 3.4.1). We also find that only a maximum of three raw materials were used together to create a necklace or bracelet, and an aesthetically pleasing alternating colour pattern was often created as seen in Figure 3.4.2.

Over the course of the settlement phases, we find that earlier examples of South.L and South.?M, and North.G contain more groups of beads, that is, the necklaces and bracelets are made from a concentration of beads, usually identical. During South.Q and South.R, however, we find more single stone beads or a fewer number of beads placed on the deceased during burial. These stone beads, from later settlement phases South.Q and South.R, are also only made from less commonly used raw materials, in other words, more variant forms of raw materials (fluorapatite and hematite), that are also harder, and in the case of hematite, also much tougher to manipulate.

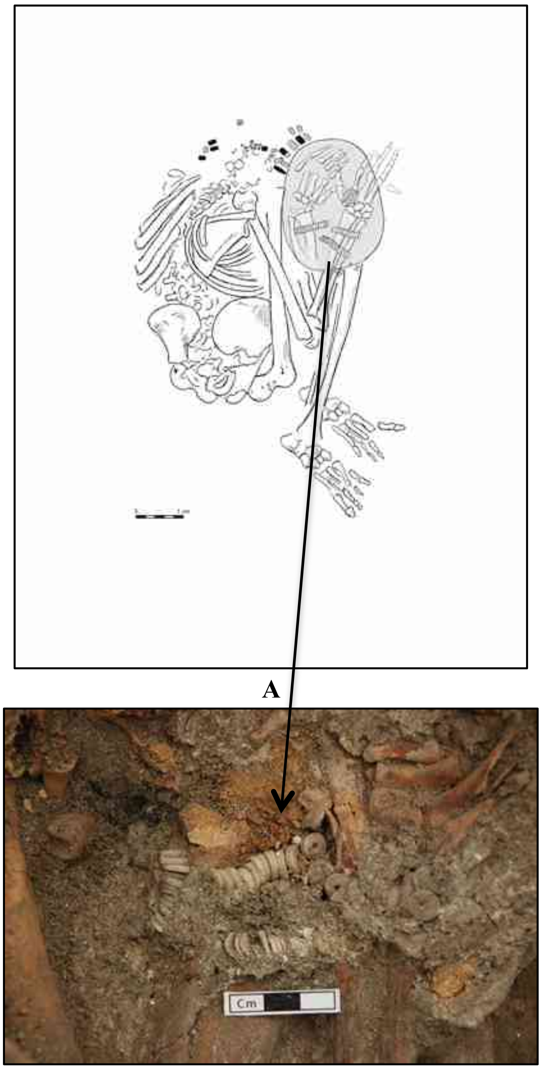


Figure 3.4.1. A) Drawing of child burial F.1860 by Lyla Pynch-Brock; and B) Identical disc shaped soft saccharoidal beads, worn together as a bracelet burial F.1860. Photo by J. Quinlan, Çatalhöyük Project

Figure 3.4.2. Serpentinite and soft saccharoidal marble axe head beads, depicting the use of alternating colours to form a necklace, from burial F.1860. Photo by J. Quinlan, Çatalhöyük Project

Distribution of bead types found in jewellery

There are 13 different bead types found on skeletons from a total of 23 bead types established in Section 3.1. These bead types include the most prevalent and common bead types of disc and ring beads, to lesser common forms of rounded barrel, barrel disc, and cylindrical beads, to bead types with even fewer examples such as lenticular, lenticular square, axe head, plano-convex, rectangular double perforation, conical, collared butterfly, and pendant (Table A3.4.5). The most common bead types, disc and ring, are also the most prevalent in number. With the exception of axe head beads (which are only found in one burial), the remaining bead types with the fewest examples across the site are found either on their own or in the case of burial F.1511, there are two hematite pendants.

If we compare bead types between burials, we find that just over half of the necklaces and bracelets are only made from one bead type. The highest number of bead types found on one skeleton are again in F.1860, which has five different types of beads and one indeterminate. This context is the first settlement phase to introduce non-disc or ring bead types. Burial F.1710 has four bead types, including a serpentinite plano-convex bead (Figure 3.4.3). Burials F.4000 of a female adult and F.1532 of an adolescent each contain three bead types (Figure 3.4.4).

Figure 3.4.3. Serpentinite plano-convex bead found in F.1710, one of four different bead types making a necklace. Photo by J. Quinlan, Çatalhöyük Research Project

Figure 3.4.4. Fluorapatite barrel disc (top) and rectangular double perforation bead (bottom) found in adolescent burial F.1532. Photo by J. Quinlan, Çatalhöyük Research Project

South.L therefore has the most bead types and up until North.G (South equivalents South.N and South.O) we find anywhere from 1 to 6 types, but after North.G not only are there no ring or disc beads (the most common types) there is also only one bead type comprising each necklace or bracelet until settlement phase South.R. As the presence of beads decrease within burials, the bead types become more elaborate and less in number (Figures 3.4.5 and 3.4.5b).

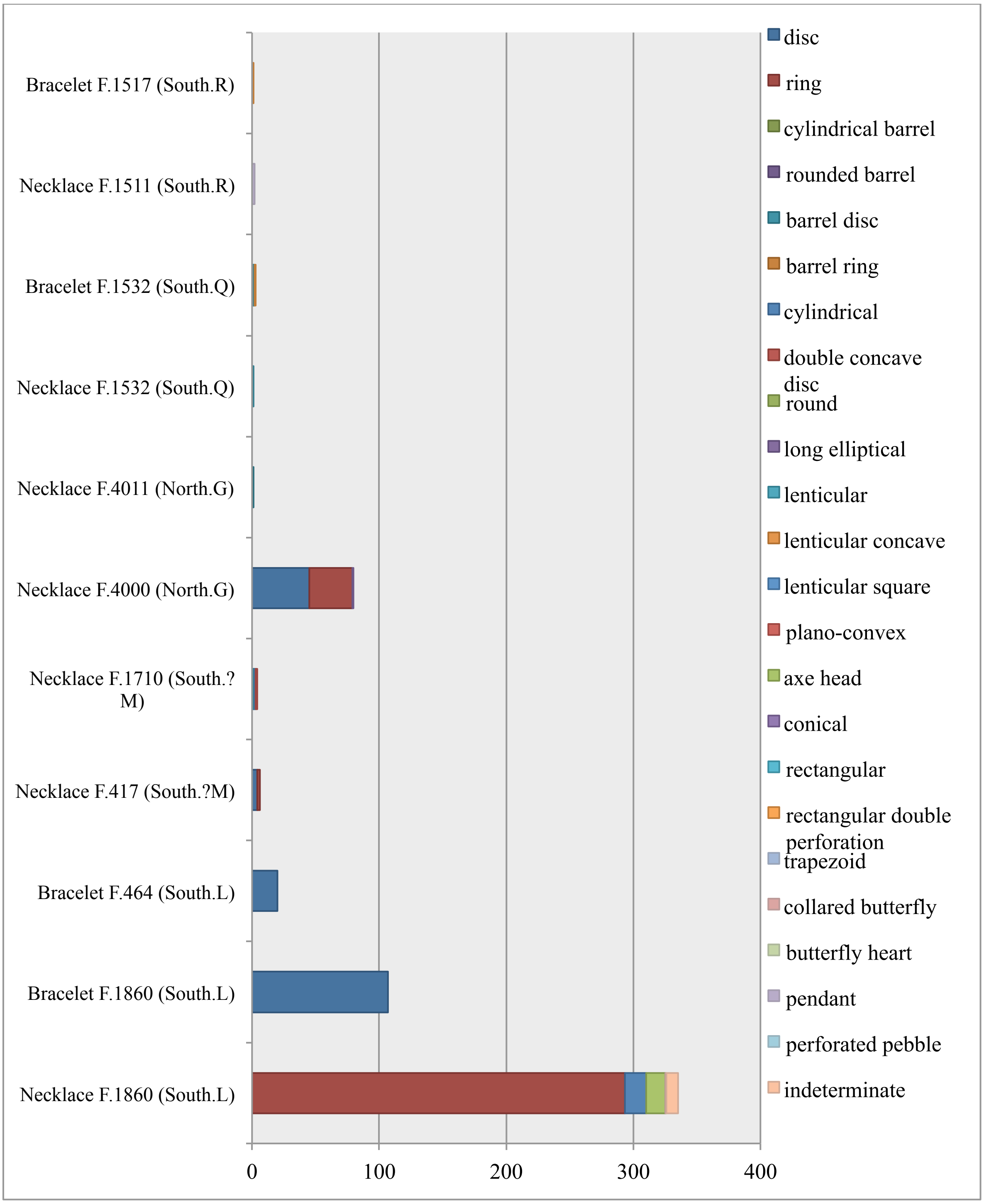


Figure 3.4.5. Frequency distribution of bead types found in necklaces and bracelets found on skeletons from South.L to South.R (QN=559.75)

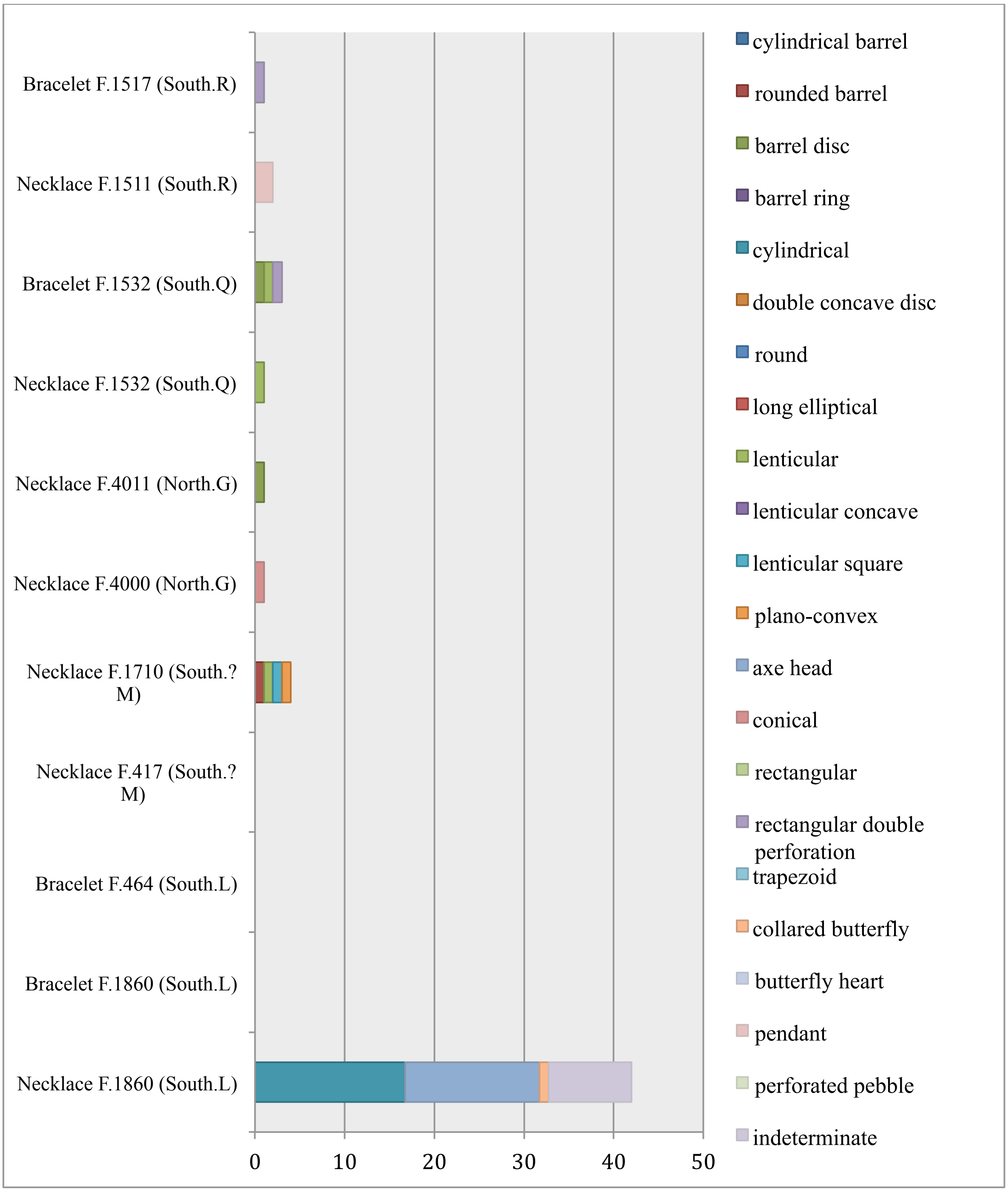


Figure 3.4.5b. Frequency distribution of variant bead types only found in necklaces and bracelets found on skeletons from South.L to South.R (QN=55)

When raw material use and bead types are compared, we find that the most common bead types are made from the most prevalently used raw materials, including metabasalt; however, more variant bead types are also made using more common raw materials, specifically serpentinite, soft saccharoidal marble, and steatite (Table A3.4.6). Although these variant forms are made with common raw materials, these raw materials can still be deemed special. For example, the serpentinite used to make the axe head and plano-convex beads is particularly green, rather than typical black with flecks of green, and has muddled dark and light veins (Figure 3.4.6; left). The soft saccharoidal marble also used to make axe head beads not only has a saccharoidal sheen but also dark veins and flecks running through many of the beads (Figure 3.4.6; right).

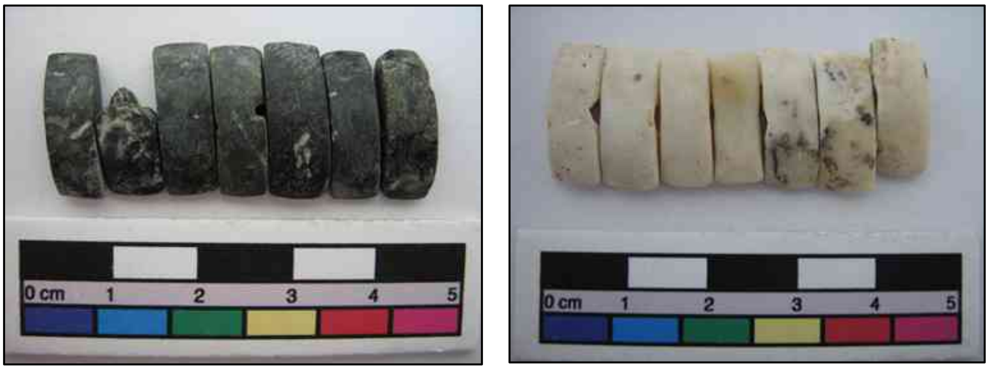


Figure 3.4.6. Serpentinite (left) and soft saccharoidal marble (right) axe head beads found in child burial F.1860

Similarly, the steatite highly polished conical bead found in a female adult burial F.4000 is also of significance, especially in comparison to the other steatite and serpentinite small disc and ring beads found within the burial. The remaining variant bead types are made from fluorapatite, calcite, and hematite.

Distribution of colour in jewellery

Of the potential 24 colours categorized and presented in Section 3.1, less than half of these are found on skeletons as necklaces and bracelets (Table A3.4.7). The most common colours are white (4 burials), black with green (3 burials), and tied three ways is green, pale green, and pale to dark blue. The following colours only appear in a single burial: black, grey/brown, grey/green, pale pink/beige, and metallic. Thus greens alone, or in combination, appear to play a prominent role in this selection of colours, which differs greatly to the predominant white, black, and red coloured assemblage.

As with raw materials, we find a maximum of three colours in any one given burial. For example, burial F.1532 had both a necklace made from a single blue coloured fluorapatite stone (Figure 3.4.7) and a bracelet made from white, pale to dark blue, and pale green colours.

Figure 3.4.7. Large fluorapatite lenticular bead used to make a necklace in adolescent burial F.1532. Photo by J. Quinlan, Çatalhöyük Project

Distribution of sizes in jewellery

Sizes 2 to 9 are represented in the sample of stone beads found on skeletons (Table A3.4.8). No size 1 beads were found on the skeletons, but they were found within burial fill, most likely due to their tiny size. Beads ranging in size from 10 to 20 are also not present, but the majority of beads of this size are perforated pebbles and freshwater limestone beads found in other contexts. The most prevalent size, that is the size found in most burials, is size 5 (5 burials), followed by size 2 and size 3 (4 burials), and finally, sizes 9 and 4 (3 burials). Based on the previous division of "larger sized" beads (size 5 and up) versus the more frequent and common sized beads (sizes 1-4) introduced in Section 3.1, we find that there are 11 examples of the use of typical-sized beads, and in this case, this represents sizes 2 to 4. Just over half of the examples (14), however, are between sizes 5 and 9. The 3 largest sized beads, size 9, are found in burials F.1860 (necklaces) and F.1532 (bracelet and necklace).

Concentrations of stone beads (those made of one type and size and found in great numbers) are sizes 2-4 and essentially represent disc and ring beads, and the third most common type, cylindrical beads. If we look at individual burials, we find that burial F.1860 has 7 sizes present in it (2 sizes of disc beads, 2 sizes of cylindrical beads, two sizes of axe head beads, and one sized collared butterfly bead), followed by F.1532 which has 4 different sizes and each bead found in F.1532 is a different size and original. Burial F.1710 similarly has four beads that are all different with regard to bead type, but in terms of size, two are both size 7, but the other two are different (Figure 3.4.8).

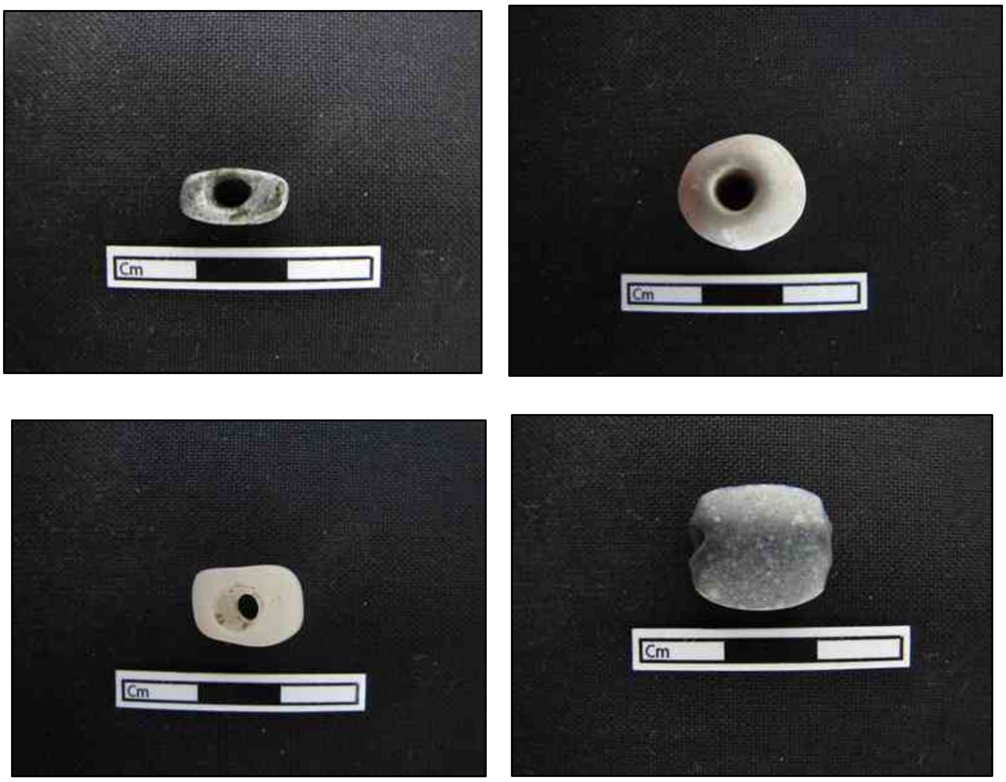


Figure 3.4.8. Stone beads from necklace found in burial F.1710. From left to right clockwise, 10829.X8, 10829.X11, 10829.X16, and 10829.X13

Over time, we once again see the "North.G divide" that we saw earlier with regard to raw material use and bead types. After North.G, we find only singular examples of beads ranging in size from 3 to 9, although there are many more larger sized beads due to the fact that there are no more examples of smaller beads made in groups which are typically between sizes 2 to 4. This can be seen in Figure 3.4.9 below.

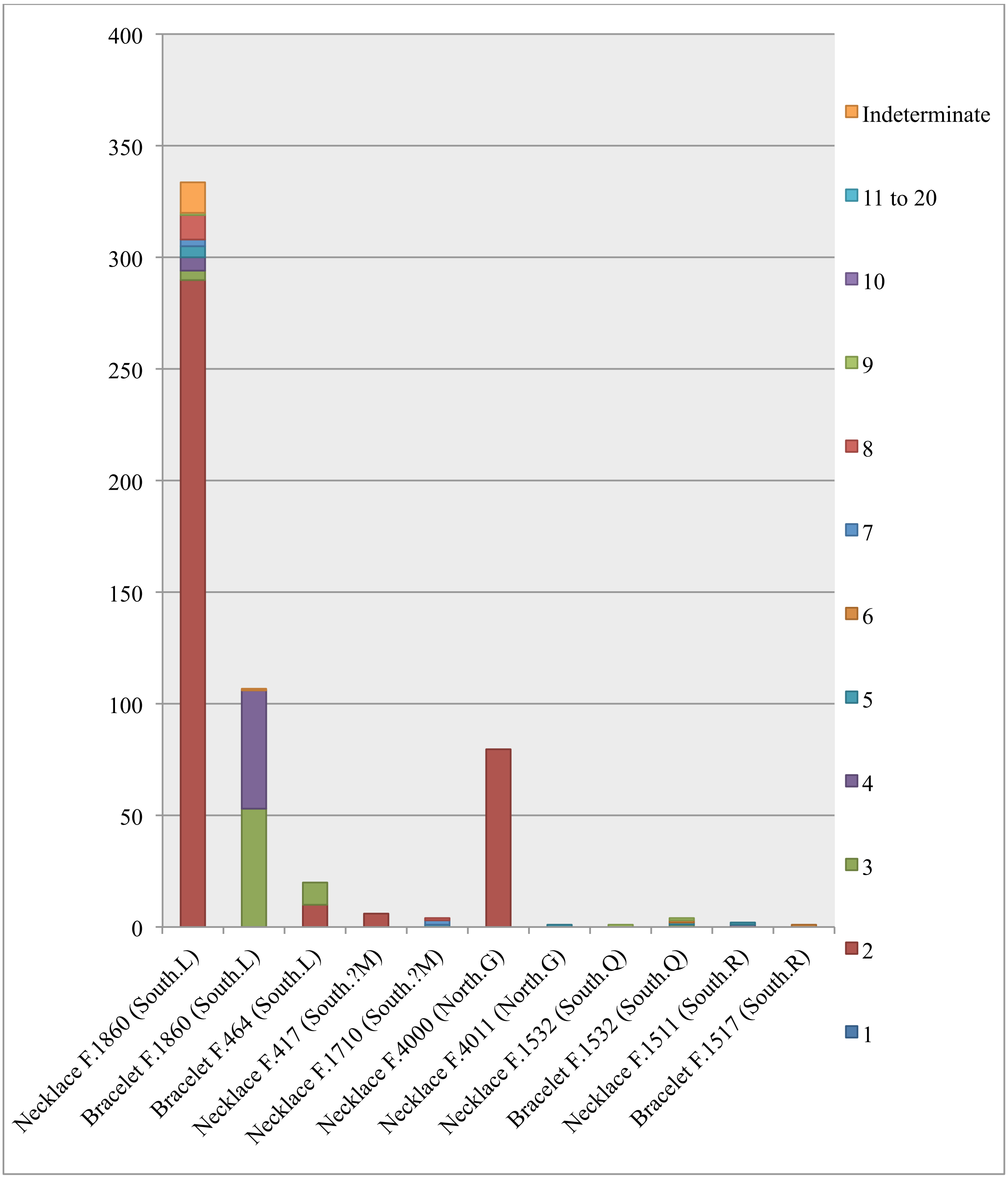


Figure 3.4.9. Distribution of sizes within individual burials from South.L to South.R

Freshness of stone beads within burials

Stone beads from burials F.1860, F.1710, F. 1532, F. 1511, and F. 417 were closely examined under an optical microscope to determine whether they had been freshly made and placed with or on the skeletons during burial or could these items have been used during the lifetime of the deceased by the deceased, a loved one, or someone from his or her household. Were these necklaces and bracelet heirlooms or perhaps simply made specifically to be buried with the individual?

The characteristics which indicate a lack of use include: crisp and sharp edges where they are supposed to be, crisp perforation edges with little or no damage which would have been caused by stringing; if raw material exhibits manufacture marks, then perforation marks present all around the interior of the perforation indicate a lack of stringing, and little or no scratches along the height and face of the bead.

There are of course preservation issues which must be taken into account, especially with regard to delicate and chalky raw materials, or wear that may occur naturally, such as natural erosion or movement by animals.

All five stone bead types featured as necklaces and bracelets in burial F.1860, in South.L, indicated no prior use. This includes the soft limestone ring, soft saccharoidal marble disc, soft saccharoidal marble and serpentinite cylindrical, and soft saccharoidal marble and serpentinite axe head beads. The serpentinite collared butterfly bead did appear to have some scratches on its surface, especially in comparison to the other serpentinite beads, although there was no sign of stringing within the perforation. The soft limestone beads were so delicate and small that it is unlikely they could have been worn without the risk of breakage prior to being placed in the burial.

There were 4 stone beads found directly on the skeleton in burial F.1710 (Figure 3.4.8). All four of these were not broken although the plano-convex serpentinite bead did have some scratches on it. The interior of the perforations once again did not indicate any use. The interior of the perforation of the calcite and serpentinite beads would have surely been affected if they had been strung and used, as they are not very hard.

Burial F.1532 is comprised of a necklace and a bracelet. The beads of the bracelet, made from fluorapatite and impure marble, do not appear to have been used, but the fluorapatite lenticular bead used to make the necklace is heavily scratched (Figure 3.4.7). Most of the scratching is in the form of linear marks indicating some abrasion marks left behind during the manufacturing process. This necklace made from a single bead may just have these scratches as there was no final polishing of the bead; perhaps there was a time constraint. The interior of all the beads do not contain any use marks within the perforation. Two of the beads in the bracelet, 12525.X3 (rectangular double perforation) and 12525.X4 (barrel disc), have some erosion and pitting along their height, which appears to be natural, but cannot be said with certainty.

Infant burial F.1511 contained two hematite pendants; one is angular and the second is more rounded in shape (Figure 3.4.10). These pendants were minimally worked and the platy nature of the hematite's tabular habit can be clearly seen. Whether these pendants are unfinished or made to appear this way is difficult to say, but hematite, and specifically, hematite with this habit is very difficult to work. It is likely that two natural formed minerals were found and perforated (Figure 3.4.9). The perforations of both these pendants appear crisp, well formed and there are no signs of use.

Figure 3.4.10. Hematite pendants found in burial F.1511

The neonate burial F.417 was buried with a necklace made from simple disc and ring beads made from hard limestone or soft marble and serpentinite. Both these raw materials are quite soft and one of the beads does not appear to have crisp edges, although the others all do. The interiors of the perforations also do not indicate any signs of use.

3.4.3 Analysis of qualitative variables according to age and sex of skeletons

In this section, stone beads from both skeletons and burial fill will be analysed according to the descriptive variables: raw material, bead type, colour, and size.

Raw materials

Stone beads from burial contexts were made from fifteen different raw materials. The raw materials that are present in the most age categories (not including the "unknown" age category) are serpentinite, steatite, phyllite, tufa, hard limestone or soft marble, and soft saccharoidal marble (Table A3.4.9). This is not surprising as these raw materials are the most commonly used raw materials in the stone bead assemblage. The only other commonly used raw material that is not present on this list is soft limestone. Soft limestone and the other remaining raw materials (metabasalt, fluorapatite, calcite, travertine, carnelian, hematite, gypsum, and natural metal minerals) are only present in 1 or 2 age categories.

Within individual age categories we find a variation in the number of raw materials used. The older adults category contains the most number of raw materials, but it also has the most number of burials. If we take this into account, we find that adolescents exhibit the highest degree of variability in terms of raw material use within a smaller number of burials. The age group that shows the least amount of variability are neonates.

If we take a closer look at less common and more variant forms of raw materials within burials we find that examples of fluorapatite and calcite are only found in adolescent and older adults age categories. In addition, adolescents and older adults also have the highest variability in relation to their sample size. The two examples of the unidentified natural metal minerals are each found in an adult and middle adult burial. Carnelian and gypsum stone beads are only found in older adult graves. The lone examples of hematite and travertine are found in infant and adult burials, respectively.

Raw material usage was also compared to the sex of the adult in the burial and the following raw materials were found in both male and female categories: serpentinite, soft saccharoidal marble, steatite, phyllite, tufa, and hard limestone or soft marble (Table A3.4.10). All these raw materials have previously been classified as the most prevalently used raw materials in the Çatalhöyük stone bead assemblage.

The remaining raw materials were all categorized under the indeterminate category, with the exception of carnelian and gypsum, which were both only found in the fill of male burials. No raw material only appeared in female burials, although metabasalt, fluorapatite, calcite, and natural metal minerals all appeared in both female and indeterminate categories.

If we look at the variation of raw materials found in each sex category, we find that males and females almost have the equivalent number of raw materials featured in their graves. The indeterminate or younger group on the other hand, has the most number of raw material types.

In summary, the most prevalently used raw materials are represented as such, both in terms of age and sex of the human remains found in burials. Adolescents appear to have the most types of raw materials buried with them and neonates the least. Less common raw materials appear in various age categories, but older adult and adolescent burials seem to have the most number of uncommon raw materials. Only carnelian and gypsum are raw materials that are only found in male burials, but essentially not many differences can be seen between the raw materials used to make stone beads in male or female burials.

Bead types

The bead types that are the most prevalent and represented in each of the age categories are disc and ring beads (Table A3.4.11). Next are barrel disc and cylindrical beads, which are represented in four and three categories, respectively. Rounded barrel, lenticular, rectangular double perforation, collared butterfly beads and pendants were only found in two age categories, whereas barrel ring, lenticular square, plano-convex, axe head, and conical beads were only found in one age category.

The age category featuring the most bead type variants are older adults, but adolescents have the highest variation of bead types within a small number of burials. As with the raw material category, neonate burials contain the least amount of variability in bead types.

If we only take into account the most complex and least common bead forms we find that burials of older adults contain the most number of types of variant beads, but adolescents still have a higher amount of variability (Figure 3.4.11).

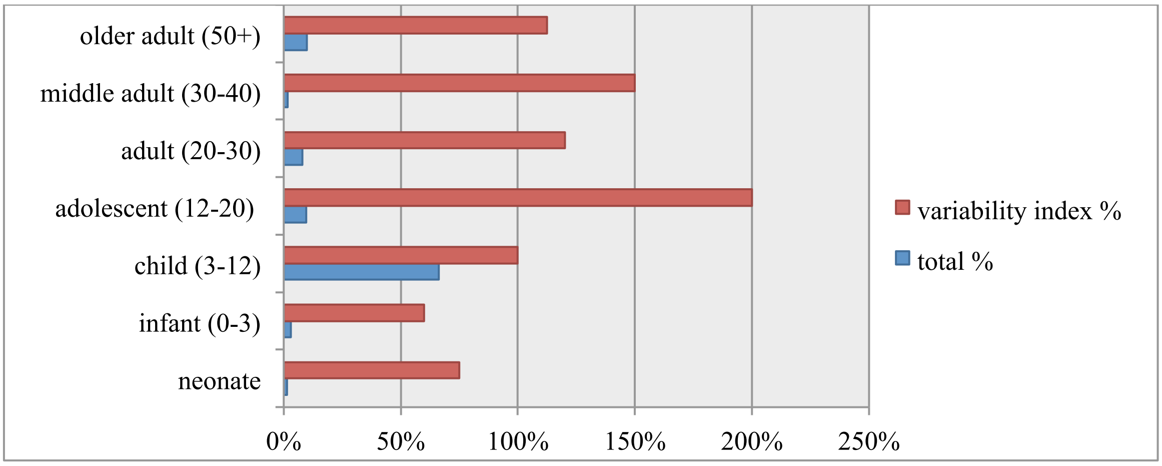


Figure 3.4.11. Percentage frequency of variant bead types and variability of variant bead types within age categories (QN=65.5)

Interestingly, when bead types are compared to sex categories, female burials contain the most bead types (12 in total) whereas male burials only contain disc, ring, barrel disc beads and pendants (Table A3.4.12). The indeterminate category, which represents young individuals who are too young for their sex to be determined via skeletal examination, contain the second highest variation (9 bead types). In terms of less common bead types, those are equally represented between the female and indeterminate category, although greatly lacking in the male burial group.

The only bead types which are found in both sex categories are disc, ring, and barrel disc beads; however, conical, lenticular square, plano-convex, cylindrical, and rounded barrel are only found in female burials.

In summary, adolescent burials and female burials appear to have the most variation in bead types, and men appear to have the least. Although the burial sample has an equal number of male and female burials, more of the older adult burials appear to be females. So whether this use in many bead types has to do with the burial being female, or an older adult, we cannot be sure.

Colours

The only stone bead colour to be represented in all age categories is black (Table. A3.4.13). White, dark grey/black, and dark red/brown are also featured in many of the age groups, all prevalent colour types found in the Çatalhöyük stone bead assemblage. Colours which only appear in one age category are light to dark brown (neonate), brown/green (infant), pale to dark blue (adolescent), blue/green (adult), and orange (older adult).

The age category that shows the most number of colour variants is adults, however when we take into account the number of burials per age category we find that adolescents again have the highest degree of variability within their group. The least amount of variability is surprisingly found in the older adult age category.

Interestingly, there are no blue coloured beads in neonate, infant, or child burials, but they are present in adolescent to older adult burials. In contrast, examples of metallic coloured beads only appear in younger burials or infants and children. The single example of orange is found in an older adult burial.

Female burials contain more colours within their burials than men and female but no real patterns can be discerned (Table A3.4.14). Blue/green coloured beads only appear in female burials, whereas the singular example of an orange coloured bead only appears in a male burial.

In summary, adult burials seem to feature the most variation of colours, but blue coloured beads do not appear in younger aged burials and metallic coloured beads only appear in younger aged burials. No real significant relationship between stone bead colours with male or female burials can be distinguished.

Bead sizes

The age category with the most number of bead sizes is the child category, but when we take into account sample size, we find that adolescents have the highest amount of variability of bead sizes within their age group (Table A3.4.15). The vast majority of beads are sizes 1 to 4 and found in most age categories. If we only take into account stone beads that are larger in size (sizes 5 and up) we find that they are equally represented in child, adolescent, and older adult burials, and larger beads are not found in neonate or infant burials.

Female burials have the most number of bead sizes, especially larger sized beads (Table A3.4.16). Male burials only have beads that are sizes 1 to 3, and a single bead that is size 6.

Burials and production contexts

Burials with stone beads were also compared to the production contexts found in Section 3.2. Surprisingly, none of the buildings or spaces which had evidence of production appear to have been producing beads found in burials. In fact, none of the buildings or spaces with production contexts even had burials with stone beads.

Only two settlement phases, South.R and South.J contain both burials with stone beads and a stone bead production context. In South.R, there are burials in Buildings 42 and 56 and the production context consists of evidence of stone bead production that had been discarded in external midden Space 129. Both contexts contain steatite ring beads but these appear to differ with regard to colour and raw material fabric.

Similarly a burial was found in Building 23 in South.J, but evidence of bead production was found in Building 18, which is adjacent to Building 23. Building 18 was only producing phyllite ring beads, and the burial of an infant (F.544) contained only two beads (one tufa quarter fragment and the other a phyllite half fragment) within the burial fill. The phyllite half fragment appears similar to the beads being produced in Building 18.

There is no evidence to suggest that stone beads that were being produced within buildings were also used in the burials found within these buildings.

Summary of stone beads used as jewellery in burials

Of the original 90 burials analysed, only 10 burials had primary evidence of stone bead use, that is, finished stone beads were placed onto the bodies of the deceased in the form of either necklaces or bracelets, or both. The results from jewellery analyses revealed that:

- Only females and those whose sex could not be determined due to young age (children) contained stone bead jewellery, but no real correlation could be made with age.

- The number of raw materials, bead types, and colours used for burials were only half or less of all the qualitative variables found in the entire stone bead assemblage at Çatalhöyük; therefore, a smaller repertoire of raw materials, bead types, and colours were placed on the deceased. Serpentinite, soft saccharoidal marble, and fluorapatite appear to be prominent raw materials, hence making greens, blacks, whites, and to a lesser degree – blues, also prominent colours used on skeletons on burials.

- In each of the examples, a maximum of three types of raw materials or colours were used to make a necklace or bracelet, or only a single type of raw material was used to make a necklace or bracelet with many identical beads (usually disc or ring), or only one or few individual beads were used to make a necklace or bracelet.

- Essentially, the more elaborate the bead, the fewer examples of it, the bigger its size, and the more likely it is to be placed on its own as a bracelet or necklace, especially in the later settlement phases.

- Necklaces or bracelets made from stone beads of different colours could also be strung by using alternating colours, creating a visually appealing contrasting pattern.

- Raw material use, bead type, and size analyses all indicate that after North.G, or South.N or South.O settlement phases, necklaces and bracelets are made using a single stone bead, and although this lone stone bead is generally made in a variant bead form, and of an uncommon raw material, colour, and larger in size, the initial propensity of placing large number of ring or disc beads falls out of fashion, and burials become less rich. This appears to be the norm regarding all burial goods at Çatalhöyük, a trend that was also noticed by Nakamura and Meskell (in press), but this will be discussed further in Chapter 5.

- Beads from 5 of these 10 burials were also assessed for "freshness", that is whether these stone beads had been used prior to them being placed in the burials. The stone beads appeared quite fresh and the perforations indicated that they had not been strung and used prior to internment.

These burials each tell us an individual story. What these burials convey to us, in terms of individuality, will be discussed in Chapter 5.

Summary of qualitative variables of stone beads in burials according to age and sex

According to the sample of stone beads found in burials, both on skeletons and within burial fill, we find that:

- The vast majority of beads (disc or ring beads made from commonly used raw materials, and generally between sizes 1 and 4) were found across all age groups and in both categories of sex.
- Adolescents appear to have the most types of raw materials and bead types buried with them and neonates the least.
- Less common raw materials appear in various age categories, but older adult and adolescent burials seem to have the most.
- Female burials contain more variant bead types and bigger sizes, but there are no major differences in colour and raw material use.
- Not much can be said with regard to colour, except for that the colour blue is only associated with adult burials (both young and old), and no blue beads are found in neonate, infant, or child burials.

In general, there are some differences, but more similarities, between the different age groups and sexes of burials with stone beads, and these differences and similarities will be discussed further in Chapter 5.

In the next chapter, Chapter 4, the results from stone bead production and manufacture studies will be discussed and examined. These discussions will help assess the overall social significance of stone bead production and use at Çatalhöyük and what stone beads tell us about Neolithic identities, ritual and symbolism, memory, interaction and exchange, raw material engagement and exploitation, daily domestic life, technology, relationships between people, and relationships between people and materials, and how these concepts relate to changes in stone bead use and production over the span of the Neolithic.

CHAPTER 4: STONE BEAD PRODUCTION AND ITS SOCIAL SIGNIFICANCE

In this chapter, the results presented in Chapter 3 regarding stone bead preferences, manufacturing techniques and sequences, and production contexts will be discussed, and I hope to demonstrate how each of these topics are interrelated and can inform us on not only how stone bead technologies changed over the course of the Neolithic, but also how stone bead production is intricately interwoven into the social fabric of Neolithic Çatalhöyük. One can go as far as to say that advances in stone bead technologies and production were not simply by-products of the Neolithic revolution, but in reciprocal fashion, stone bead technologies and production had a hand in what we today deem the Neolithic revolution. Stone bead technologies were a tangible form of constructing, maintaining, and propagating social ideologies and increasing social complexity within the Neolithic. Stone beads during the Neolithic revolution were much in demand due to their integral role within social and ritual life, and this can be demonstrated by the degree of skill used to make variant bead forms as well as evidence of craft specialization, discussed later in this chapter. The role of stone beads changed alongside the increasingly social complexity found in the Neolithic. At first, standardized stone beads were used to form, preserve, and propogate a communal identity as a method to promote social cohesion and to ease any potential competition and conflict caused by households living in such close proximity at Çatalhöyük. As the needs of society changed over the course of the Neolithic, and we see a greater emphasis on the individual and household, stone beads were actively used to create both personal and household identities and to communicate ideas as ritualized objects (Chapter 5). Stone bead makers adapted to meet these new needs by accessing new raw materials and manufacturing larger and variant bead types as well as continuing to make beads in the established technological tradition.

This chapter is divided into four main sections that discuss: 1) what raw material and colour preferences reveal in terms of Neolithic choices, availability, and broader themes of identity, interaction, and material engagement; 2) the production of stone beads at Çatalhöyük and how aspects of production relate to technology, daily life, and specialization; 3) manufacture techniques, preferences, and sequences, in addition to typological and size preferences and how these concepts address identity, interaction, and technology; and finally 4) how stone bead technologies change over the course of the Neolithic and what may have driven these changes.

4.1 Raw materials: preferences, availability, and procurement

4.1.1 Results summary of the raw materials assemblage at Çatalhöyük

The results presented in Chapter 3.1.1 reveal that there are over 30 different types of rocks and minerals identified in the stone bead assemblage at Çatalhöyük. Of the rocks and minerals, 88.6% of the total assemblage is made of soft limestone, serpentinite, phyllite, steatite, soft saccharoidal marble, hard limestone or soft marble and tufa (Table A3.1.7). The vast proportion of the assemblage is made from rocks rather than minerals. These rock groups broadly fall into limestones and marbles, which are all calcium carbonate variants that are either found in their sedimentary form (limestone or tufa) or metamorphic form (marbles), and metamorphic rocks of steatite, serpentinite, and phyllite.

If we translate these raw materials into colours, we find that they of course coincide with the most prominently used colour groups: reds to pinks, black, and whites to beiges. All three colour groups are, of course, the most commonly found colours in the environment.

These rocks are the most predominantly used raw materials throughout the occupation of the site during the Neolithic at Çatalhöyük, both within and between phases, in both the North and South areas of the East Mound; however, during the earlier settlement phases, South.G to South?M, these raw materials are essentially the *only* ones used. It was sometime after South.?M and prior to settlement phase South.P (both phases South.N to South.O had not yet been excavated as of the summer of 2010) that other raw materials were added to the assemblage of stone beads at Çatalhöyük. Therefore, in South.P, we find that all the remaining rocks and minerals listed above make an appearance from South.P and North.G onwards.

In South.P and North.G, we find that the newly introduced raw materials, which only make up approximately 10% of the stone bead assemblage, differ greatly in terms of colour and aesthetic properties from the more commonly used raw materials. Examples include fluorapatite, turquoise, carnelian, hematite, chert, gypsum, galena, barite, an unidentified naturally metal-rich stone, meerschaum, and biotite, among others. These new raw materials are much more bold and varied in comparison to the more commonly used raw materials, although these too now have a propensity to be bolder in choice and tend to highlight their more aesthetic properties during the later settlement phases. The expanded colour palette now includes a number of new colour groups: blues, greens, yellows, oranges and metallic.

This summary of raw material use at Çatalhöyük emphasizes the clear preferences and patterns in the choices made by Neolithic bead makers and bead consumers. Why were some raw materials preferred over other possibilities?

Technological choices, with regard to raw material selection and use, are made by taking into account the availability of the raw material, including trade and inter and intra-regional interaction, the techniques needed to procure the raw material from the source, and whether the properties of the raw material (such as hardness and toughness) are suitable for production (Tite 2001:446). Apart from these more practical reasons, cultural and social influences of bead wearers and users are also important factors in determining why specific raw materials were chosen (Tite 2001:446; Sillar and Tite 2000:17). Among these are aesthetic preferences (for example, colour, ability to be highly polished, various types of lustres, textures, and/or the presence of distinctive patterns, on the natural rock or mineral) (Kenoyer 2003b:14; Tite 2001:446), as well as symbolic beliefs associated with the possession and use of rocks and minerals (Miller 2007:49; Boivin 2004:2).

The majority of rocks and minerals used in stone bead production come from a potentially vast number of areas and sources surrounding Çatalhöyük, and the limestone hills to the north, south and west, in particular, contain rich deposits of both rocks and minerals used in stone bead production (Figure B4.1.1). Finding source locations for each rock or mineral is a huge geological project, and well beyond the scope of this dissertation; instead, the goal is so locate the closest possible substantial sources, based on the knowledge of local geology and by the aid of geological maps of the area (Hodder 2005; Kuzucuoğlu 2002; MTA 2002a; MTA 2002b). The author is deeply indebted to Çatalhöyük geologist Chris Doherty, for not only teaching her about Central Anatolian geology, but also helping her and working with her to identify potential source locations for the raw materials used in stone bead production at Çatalhöyük.

4.1.2 Raw materials that dominate the stone beads assemblage

The majority of commonly used raw materials are likely derived from the limestone hills semi-circling the alluvial fan of the Konya Plain, on which the site of Çatalhöyük is located. The closest possible sources of hard limestone or soft marble are the surrounding limestone hills, north, west and south of the site, approximately 15 to 20km away. A potential source for the soft saccharoidal marble is the hills in the north and east of the Konya Plain (the higher ground behind Yarma), whereas soft, chalky limestone can be found locally. Tufa is readily available along the edge of the Konya Basin. Nearby sources of serpentinite and steatite are approximately 15km south of the site. Pockets of phyllite and schist can also be found in the limestone hills south and west of the site, although the main exposures of marble, phyllite and schist can be found in the Taurus Mountains to the south, specifically those situated between Çatalhöyük and current day Alanya.

These are the closest substantial sources, and there may be pockets of these raw materials both closer and further away from site. But apart from the potentially local soft, chalky limestone, the rest of the raw materials were obtained further off-site. Why did bead makers not make use of more locally available raw materials?

Local options, or those 5 to 10km outside the vicinity of the village, were limited. The Çarşamba River, is also thought to have brought lime-rich sedimentary and metamorphic rocks into the Konya Plain in the form of river sediments (Türkmenoğlu *et al.* 2005:371); however, these pebbles would have been hard and durable polished pebbles, and the sedimentary and metamorphic rocks used for stone bead production were not hard or durable enough to make the journey from potential source locations and into the Konya Plain. Stone heavy residue samples also provide us with insight to the local geology and surrounding gravel around the site of Çatalhöyük, are also rich with lime-rich sediments and jasper, found both in pebble and fragment form (Figure 4.1.2). The local environment does contain at least three groups of clay, two of which are marl and soft lime, both calcareous, and possibly extracted from between the East and West Mounds at Çatalhöyük, and deposits of soft limestone were likely to have been found adjacent to or in and around clay deposits (Chris Doherty, personal communication). Much of this locally available limestone and marl is quite soft and chalky, and therefore less durable for use. For these reasons, it was therefore necessary to go beyond the local vicinity to obtain more suitable raw materials. These clay deposits were, however, used to manufacture clay beads, which are currently being studied by Milena Vasić for the Çatalhöyük Research Project.

Figure 4.1.2. An example of a typical stone heavy residue sample. This sample is from unit 16548, flot 8000, in South.P, note various limestone pebbles and pieces of purple jasper

As local options were limited, the people of Çatalhöyük looked further afield to find more suitable raw materials for stone bead production. The potential source locations of hard limestone or soft marble, serpentinite, steatite, phyllite, and tufa are approximately 15 to 20 km away from the site, and the location of soft saccharoidal marble and phyllite is perhaps just slightly further. Although these raw materials are not in the local vicinity of Çatalhöyük, their close proximity makes these raw materials readily accessible to the inhabitants of Çatalhöyük and could easily be retrieved during a day trip or collected while out shepherding. Whether people from Çatalhöyük consistently used the same known sources or whether raw materials were constantly scoured for cannot yet be determined, and only a geological survey of the region can help us understand the distribution of potential source locations.

Neolithic Çatalhöyük was a village of substantial size, which may have housed an impressive population of 3500 to 8000 people (Hodder and Cessford 2004:21; Hodder 2007:106). Its inhabitants could have only succeeded if they were familiar with and made full use of their local environment. For example they used berries, grains and both wild and domesticated animals for food, fibers for basketry, mats, satchels, clay and mud for construction, lime for plastering, and bone, clay, stone, and shell for ornaments or tools. These examples indicate that those responsible for hunting, shepherding, or collecting food, or supplies used for daily life activities, must have had extensive knowledge of both local and distant areas.

We know that the most predominantly used raw materials were available and accessible to the residents of Çatalhöyük, but why favour these specific materials over others? Raw material distribution patterns indicate that stone bead producers and consumers were quite conservative in their choices of raw material, and perhaps these preferences were due to the geological properties of the raw materials which made them suitable candidates for the production of stone beads.

Each of the commonly used raw materials possess a variety of traits which make them ideal raw materials to use, for both practical and aesthetic reasons. In terms of practicality, these raw materials have a total range of 2 to 5 on the Mohs scale of hardness with the average hardness of these raw materials at 3.3, and a median and mode of 3. Such a low hardness level makes these raw materials easy to reduce and perforate, given the ground stone and perforating tools available to bead makers. Despite their hardness, these raw materials were tough or durable enough to withstand abrasion and perforation without breaking. Finished beads, which were successfully manufactured, make up 94.1% of the bead assemblage, and preforms form only 3.3% (Table 2.1.3). If we only consider preforms, approximately just over half were found broken, most of which appear to have snapped during perforation (broken in two halves and only exhibiting evidence of a uniconical perforation). One would expect to find more broken preforms as successfully perforated preforms are more likely to be finished into their final forms, and unsuccessful preforms discarded. Considering that this small percentage of broken preforms are derived from over a 1000 years of Neolithic occupation at Çatalhöyük, this attests to the suitability of the raw materials used in stone bead production as well as the skill of the bead makers.

The balance between levels of hardness and toughness make these raw materials ideal choices for stone bead production. In addition, these same properties would have made the procurement of these raw materials from their source locations less difficult and laborious. It would have been relatively easy to break or strike off nodules of material and carry them to the settlement. And since average bead size of disc and ring beads was quite small, a small amount of material could go a long way.

The most commonly used raw materials also have a number of properties not necessarily relating to manufacture which may also make them desirable choices, namely their colour and appearance. The hard limestone or soft marble is opaque and highly polishable, leaving behind a smooth and shiny surface due to its compact and fine-grained texture. It can either be white to beige in colour or dark red to pale pink.

Soft saccharoidal marble, which is also polishable and opaque, is white or off-white in colour and is comprised of fine-grained recrystallized calcite crystals that have the appearance of granulated sugar (Figure 4.1.3a).

Soft limestone is also opaque and fine-grained but the grains are not as compact as the other examples thus far and like hard limestone or soft marble, it can either be white to beige or dark red to pale pink.

Tufa is also fine-grained, medium to densely-packed, polishable to a smooth finish, and may contain impurities of sediments which may appear as flecks of black or other colours within the dark red/brown to dark pink to pale pink/brown calcium carbonate matrix of the tufa (Figure 4.1.3b).

Serpentinite is also opaque and highly polishable, the end product being a smooth and shiny or smooth and slightly waxy surface due to the compact and fine- to coarse-grained texture (Figure 4.1.3c). Serpentinite is generally black with pale to dark green veins or flecks, and could also be pale to dark green with black veins and flecks depending on the ratio of green-coloured minerals such as antigorite, chrysotile, olivine, and chromite, among others (Pellant 1992:194). Earlier examples of serpentinite appear to be predominantly black with some flecks and veins of green (with one exception, a burial in Building 43, in South.L), and the serpentinite used during and after South.P appears to be more green in colour in comparison to earlier varieties.

Steatite is fine-grained, can be translucent with a waxy or resinous lustre, to opaque with a sheen (Figure 4.1.3d). Steatite colour choices are limited to black with a green tint, olive green, green/grey, or green/brown. In earlier settlement phases, the examples of steatite are opaque and sheen, and more translucent and waxy varieties are much more common during and after South.P.

Finally, phyllite is fine-grained and has a laminated structure. The phyllite used at Çatalhöyük especially has a high mica content, which leaves a sheen across the surface of the stone (Figure 4.1.3e). Phyllite is generally dark grey/black in colour and may have a slight undertone of green. Phyllite also displays an important property that may be advantageous during production. The laminated plates of the phyllite can fracture off the face of the bead, instantly multiplying the number of beads made (Wright 2010, in press; Schumann 1993).

Each of these raw materials were widely coveted within and between over a millennium of different settlement phases because they exhibit aesthetically pleasing qualities relating to colour, polishability and shine, sheen created by rocks with a high mica content and recrystallized calcite, and different textures and lustres, properties essentially culminating in shine, sparkle, and interesting textures – qualities still sought after and desired in jewellery today. These materials, especially those found in earlier levels before the onset of variation (in South.P onwards), tend to be variants of black, red, and white. This colour palette of red, black and white appears to have significance to the inhabitants of Çatalhöyük, not only in the use of stone beads, but also in producing the decorative motifs and wall paintings within the houses of Çatalhöyük, on wall installations made of wild animal bucrania and other bones, as well as on plastered human skulls. The significance of this colour palette is discussed later in this section.

These raw materials were exploited generation after generation, tried and tested, and used as a part of a technological tradition that spanned over the course of the Neolithic.

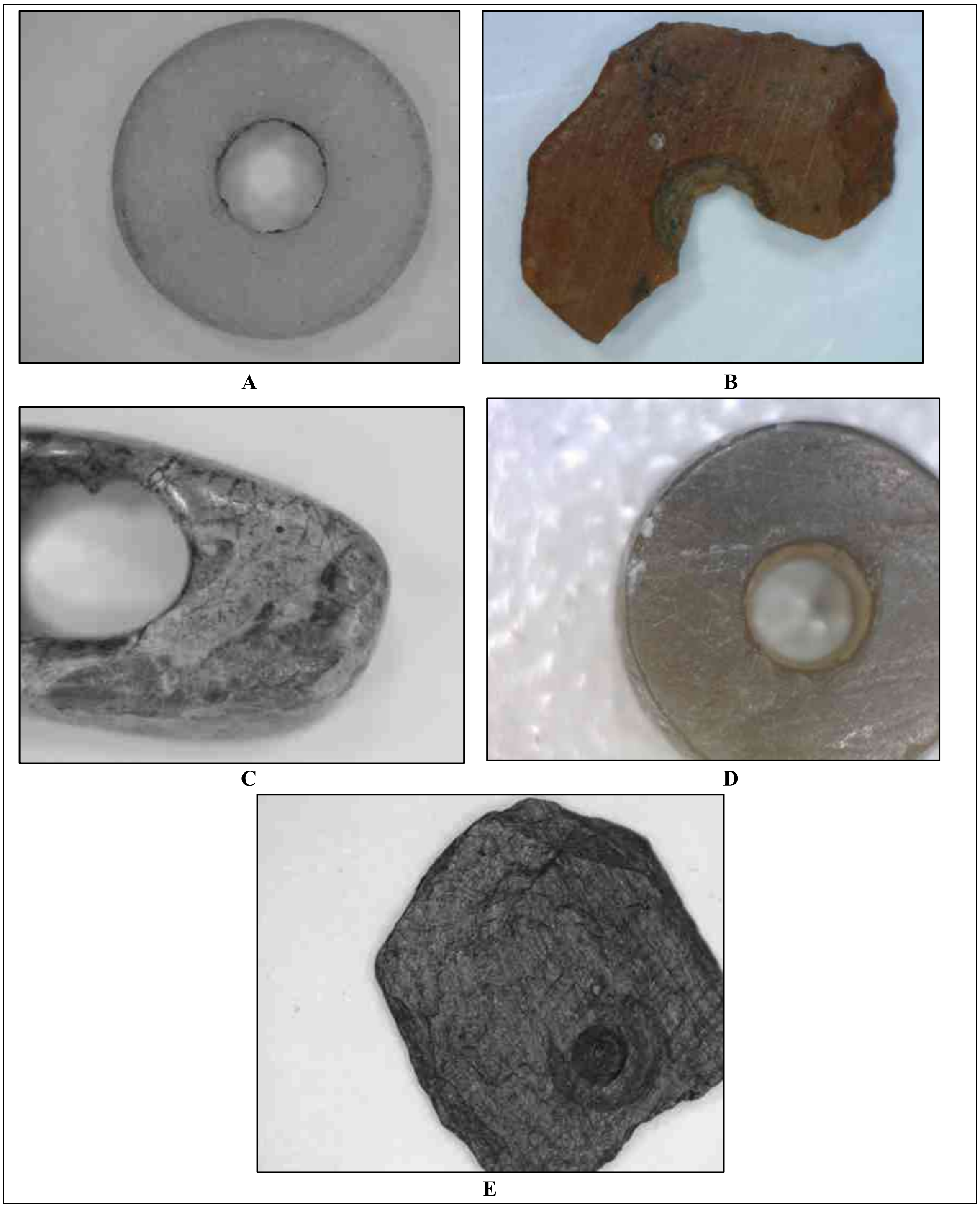


Figure 4.1.3. Photographs of beads taken with optical microscope illustrating examples of some aesthetic qualities: A) soft saccharoidal marble, note calcite "sugar-like" crystals; B) tufa, note fine-grains and presence of impurities; C) serpentinite, note the various shades of green; D) steatite, note translucent, waxy lustre; and E) phyllite, note micaceous sheen

4.1.3 Variant form of raw materials less prevalent in the stone beads assemblage

During South.P and North.G onwards, we find a number of new raw materials being exploited, in addition to those discussed above. Although these new raw materials only make up a small percentage of the total bead assemblage, (approximately 10%), they are much more varied in terms of availability, geological properties, and colour. Examples include metabasalt, fluorapatite, turquoise, travertine, carnelian, hematite, chert, gypsum, galena, barite, calcite, and freshwater limestone, among others. Another group of raw materials only occur once or twice in the entire assemblage: agate, diorite, meerschaum, and biotite are some of the more prominent examples.

Were these raw materials also accessible and readily available to the people of Çatalhöyük? These raw materials can be divided into two categories; those that are likely to be found within walking distance to the settlement (similar to the commonly used raw materials discussed above) and those that are much more likely to be found farther away. Those likely to be found closer to the site are hematite, galena, gypsum, calcite, and perhaps barite.

The limestone-rich geology of the Konya region forms an ideal environment for the formation of hematite. Hematite can essentially form anywhere there is limestone and iron-rich ochre (Chris Doherty, personal communication), therefore hematite could be formed both in and around the settlement as well as the surrounding limestone hills of Çatalhöyük. Despite its availability, we have only four examples of hematite use for beads, and it only accounts for less than 0.5% of the stone beads assemblage. We do know that ochre was highly coveted by the people of Çatalhöyük and it appeared to have an important role within all houses to some degree, both within burials and to create wall paintings and decorate platforms, benches, animal installations, and even baskets (Hodder 2006:190). Perhaps the opaque, shiny dark grey metallic lustre was not enough of an incentive to use hematite, as it is harder (hardness of 5 to 6) and quite brittle (less tough) to work with than those raw materials more commonly used by Neolithic bead makers.

Similar to hematite, potential substantial sources of galena and barite can also be found hosted in the limestone hills, north, west, and south of the settlement, as well as in old limestone deposits 10km west of current day Konya city. Like hematite, galena has an opaque, dark grey, shiny, metallic lustre, and can be quite brittle (less tough and durable) but unlike hematite, it is not very hard (hardness of 2.5), and therefore can easily be manipulated. The percentage of galena in the stone beads assemblage is approximately half that of hematite. Barite, on the other hand, occurs only twice and resembles soft saccharoidal marble but is slightly less hard (Mohs 3 to 3.5).

Pockets of gypsum, like hematite, can be potentially found around the settlement but substantial amounts can be sourced 5km east of the settlement, in what was once Konya Lake. Similarly, calcite can easily be found in and around the site, essentially anywhere there is limestone, as it forms within the cavities. Samples of stone heavy residue indicate the presence of gypsum and calcite nodules, which could have been used for stone bead production. Larger crystals of unworked calcite and gypsum can also be found in a number of contexts at Çatalhöyük (Figure 4.1.4). Gypsum and calcite have a hardness of 2 and 3, respectively, and both are not very tough minerals, and can easily be fractured. They can be transparent to translucent and have a vitreous or dull lustre, and can be found in a number of colours. Calcite used in stone bead production may be brown, orange, yellow, clear, or green, and gypsum can be white to beige to brown in colour. Calcite was used in three instances prior to South.P, but used more often after South.P and North.G. Gypsum and calcite were more available than even most of the commonly used raw materials, although they only make up just over 1% of the assemblage.

Figure 4.3.4. An example of calcite and gypsum crystals from unit 14559, midden deposit in Space 129, South area

There is only one example of a meerschaum bead in the Çatalhöyük stone bead assemblage and potential sources of meerschaum can be found close to the Konya Plain. Even today there is a major centre for meerschaum production in the city of Eskisehir (located approximately 300km from Çatalhöyük) in central Turkey. This bead was found in a cluster of bone and stone objects within a pit in Building 75, a building in which there was *in-situ* bead production, although this was the only bead present within the cluster. The fact that this is the only meerschaum bead and its location within Building 75 suggest that it could have been especially placed with this group of objects, as a placed deposit, although it is difficult to say with certainty.

The rest of newly introduced raw materials can be sourced further away than the Konya Plain in which Çatalhöyük is situated. Diorite, metabasalt, agate and biotite may have numerous substantial source locations, but they are more likely to be found near andesite sources (widely found in the ground stone assemblage) and are potentially within relatively close walking distance, or as far as Karadağ (located approximately 30 km southeast of Çatalhöyük, near the current day town of Karaman) and also in the Alacadağ volcanic uplands between Konya and Beyşehir (approximately 45km west of the site) (Figure B4.1.1). Diorite, agate, biotite, and other igneous rocks and minerals could have also been picked up from the streambed of the May River, which flows from the Alacadağ volcanic region to the Konya Plain (Wright 2010, in press) (Figure B4.1.1). Diorite appears twice, once in a midden and beneath a plastered floor, the only example of agate is found in what appears to be a cluster, and there is a single biotite preform on the floor of Building 75. There are far more examples of metabasalt use, as 2.2% of the assemblage is made from metabasalt. Metabasalt is a fixture in the ground stone assemblage long before its use for stone bead production (Karen Wright, personal communication). All four are dark in colour although the biotite also has minerals with a metallic lustre within its dark matrix and the metabasalt has a micaceous sheen. The biotite is very brittle and not hard at all, whereas the agate and diorite are both quite hard and much more difficult to perforate and abrade, perhaps why so few examples are present at Çatalhöyük. Metabasalt on the other hand, had a hardness of 4 and is visually very similar to phyllite.

Diorite, metabasalt, agate, and biotite were not the only rocks and minerals that may have been obtained from the Alacadağ region, west of Çatalhöyük. The naturally porous and beige-coloured freshwater limestone, found primarily in clusters and placed deposits, most likely came from within the Quaternary lake and alluvial deposits of the Konya Plain in which Çatalhöyük is situated or even as far as the bottom of Lake Beyşehir (Figure 4.1.1). The porous nature of the freshwater limestone meant that it could have been naturally perforated, and minimal, if any, manufacture was required, although some do appear to be perforated by hand. Freshwater limestone has a hardness of 3 to 4, similar to hard limestone or soft marble, and also similar in durability.

The largest concentration of freshwater limestone was found on the floor of the storage room of Building 56. It appears that a necklace of shells and freshwater limestone was placed on the floor prior to the abandonment of the Building (Figure 4.1.5). Other items left behind were a cluster of large stones, including an abrading slab, and a stone axe preform. Whether this necklace was placed here, as some sort of house-closing ritual, or whether it was accidentally left here, is hard to say, but one can argue that in the last phase of the building, apart from some obsidian debris in the dirty or activity area of the building, the building was left bare; therefore the presence of the necklace, axe preform, and cluster of ground stones could very well be significant closing deposits.

Figure 4.1.5. Freshwater limestone necklace on the floor of a storage room in Building 56, South.R. Photograph by J. Quinlan, Çatalhöyük Research Project

A major source of carnelian could once again be the volcanic Alacadağ region, as well as the volcanic and geologically diverse Cappadocia region, located approximately 200km northeast of Çatalhöyük. Even today, carnelian is deemed to be a semi-precious stone and was prized throughout antiquity, especially Egypt, Mesopotamia, and the Indus, for its translucency, vitreous lustre, and red colour (Rapp 2002:93). The vast majority of obsidian used at Çatalhöyük also came from two sources in the Cappadocian region (interaction and exchange are discussed in more detail below) and we know that at least some of the people from Çatalhöyük were interacting with this region.

The Neolithic or Aceramic Cappadocian site of Aşıklı Höyük, which just precedes Neolithic occupation at Çatalhöyük, contained a number of carnelian, limestone, steatite, and chrysoprase beads which were being manufactured long before settlement at Çatalhöyük (Figure 4.1.6). Whether pre-manufactured carnelian beads came to Çatalhöyük with the obsidian trade cannot be said with certainty, although none of the production contexts identified so far at Çatalhöyük indicate the presence of carnelian bead manufacture in any context associated with the life of a building. There is, however, at least one example of a carnelian preform found in an external midden in South.Q. Apart from one obsidian microdrill, no other tools indicate the perforation of harder rocks or minerals than those of the perforating tools, which are mostly made from chert and a few from obsidian. There is very limited evidence for bead production at Çatalhöyük, but perhaps future excavations will uncover more areas of production.

Figure 4.1.6. Carnelian beads from Aşıklı Höyük, Cappadocia, central Turkey (previously published in Esin and Harmankaya 1999:99)

Carnelian is a very difficult mineral to work with due to its toughness (can only be fractured via the percussion technique) and hardness (Mohs 7), in comparison to most other raw materials used for bead production at Çatalhöyük. But because the people of Çatalhöyük could knap chert and obsidian, they did possess some of the skills required to reduce the beads into a rough shape, although perforation was still quite difficult. Only a handful of examples of carnelian were found in the stone bead assemblage (0.3%), which attests to its lack of preference, lack of availability, and/or difficulty in manufacturing. Of the 8 examples of carnelian that have been excavated from the sampled contexts, only one is an unbroken and complete bead, the rest are all fragments. This suggests that carnelian may have been valued to an extent, as the few examples recovered, have a propensity to be used to their full potential and discarded only after they could no longer be used or worn.

Both low-grade and better turquoise found at Çatalhöyük most likely originated from somewhere in the Taurus Mountains region. The turquoise found at Çatalhöyük is blue/green or bright blue, smooth textured with a vitreous or dull lustre. Its colour is unique in the stone bead assemblage, although other blue minerals such as fluorapatite are also present. Turquoise is a durable but harder stone to manufacture (Mohs 5-6) than the average stone or mineral bead at Çatalhöyük, but not as hard as carnelian (Mohs 7). Interestingly, turquoise beads are only found in burial fill or in external middens, and none are broken, perhaps due to its tough nature. The only other blue mineral, fluorapatite is generally a pale to bright blue colour and also has a Mohs hardness of 5. Fluorapatite is also a durable material but not to the same extent as turquoise, as attested by the numerous broken fluorapatite beads. Fluorapatite has a much larger presence than turquoise and is the later settlement phases forms a significant 1.6% of the total stone bead assemblage. Potential fluorapatite sources remain unknown; however, it is likely that blue coloured fluorapatite may in fact be odontolite, which is produced by heating fossilized ivory, mammal tooth, or tusk. Fluorapatite beads have been identified as such due to their mineral composition, but some beads appear to be lighter or have white banding within their interior (Figure B4.1.2) while one bead and one roughout have white blotches on the surface of the bead (Figure 3.2.22), both which suggest the possibility of odontolite, although further analyses are needed for confirmation. The heating of fossilized ivory in order to make blue coloured odontolite was also found at another Near Eastern Neolithic site, Tell El-Kerkh, by Taniguchi *et al.* (2002), further strengthening the possibility that Çatalhöyük may have also engaged in this technology.

Potential sources for travertine, a calcium carbonate variant that forms in hot springs, could have been local, but also could have come from as far away as Antalya. Travertine is often banded and off-white to brown in colour. It is very similar to the most commonly used raw materials in terms of workability. It has a hardness of 3 to 4 and is a durable material to work with.

All of these raw materials that were added into the stone beads assemblage just before South.P and North.G onwards, represent more textures, colours and variety. For the first time, we find stone beads of varying shades of blue and green; yellow, true red, orange, and metallic also occur in smaller numbers. The inhabitants of Çatalhöyük may have been mimicking a similar transition to blue and green raw materials seen at other Neolithic sites in the Near East prior to and during this period (Bar-Yosef Mayer & Porat 2008; Wright & Garrard 2003). The addition of these colours to the already black, white, and red colour palette is discussed below.

We know that bead makers were successful and comfortable working with the more dominant raw materials used at Çatalhöyük, but some of the newly introduced raw materials such as carnelian, hematite, turquoise, diorite, and agate do require a higher degree of skill to be able to successfully and skilfully manipulate into a stone bead. This could also be why these beads were found in such low numbers. Other new additions such as galena, gypsum, travertine, calcite, meerschaum, biotite, metabasalt, fresh limestone, and to an extent fluorapatite, were not a far departure from those materials bead makers were already working with. Manufacturing methods of different raw materials will be closely examined in Section 4.3. Despite the expansion of the stone bead assemblage, we can say that Neolithic bead makers and users were actively engaging within their local and regional environments and beyond, but at the same time displaying tried and tested preferences.

4.1.4 Colour selection of raw materials at Çatalhöyük

The selection of raw materials was not only driven by availability but also by a very important aesthetic factor – colour. We find a shift in colour use over the course of Neolithic occupation at Çatalhöyük from a black (black, brown, and grey), white (white to beige), and red (dark red/brown to pale pink/beige) colour palette, to the addition of blues, greens, oranges, yellows, and metallic coloured beads. The fact that colour palettes can be differentiated at Çatalhöyük over time signifies the importance of colour to Neolithic peoples. In addition to stone beads, other media used to manufacture beads, such as bone and shell, may have also been raw materials specifically chosen for their colour. Bone would have been stark white in colour (Nerissa Russell, personal communication), and shell beads were mostly white, mother of pearl, or variants of white and beige.

The colour trio of red, black, and white was readily and significantly used in wall paintings (Figure 4.1.8), wild animal bone installations, baskets and decorative motifs within houses, and were created using pigments. Pigments were also found deposited within burials, on bone, shell, spatulas, baskets, or in nodule form beside the body (Figure 4.1.9)(Nakamura and Meskell, in press). Excavators have found evidence of red, blue, green, and yellow coloured pigments in burials, and occasionally these pigments were placed in shells, as a receptacle (Farid 2011; Nakamura and Meskell, in press). The presence of pigments in such ritualized contexts, and their use to decorate and modify ritualized and symbolic objects, indicates that there was a need to express ideas and beliefs using colours at Çatalhöyük, hence colour played a significant role in Neolithic life. But why were these colours sought after and used for all these various forms of symbolic expression at Çatalhöyük?

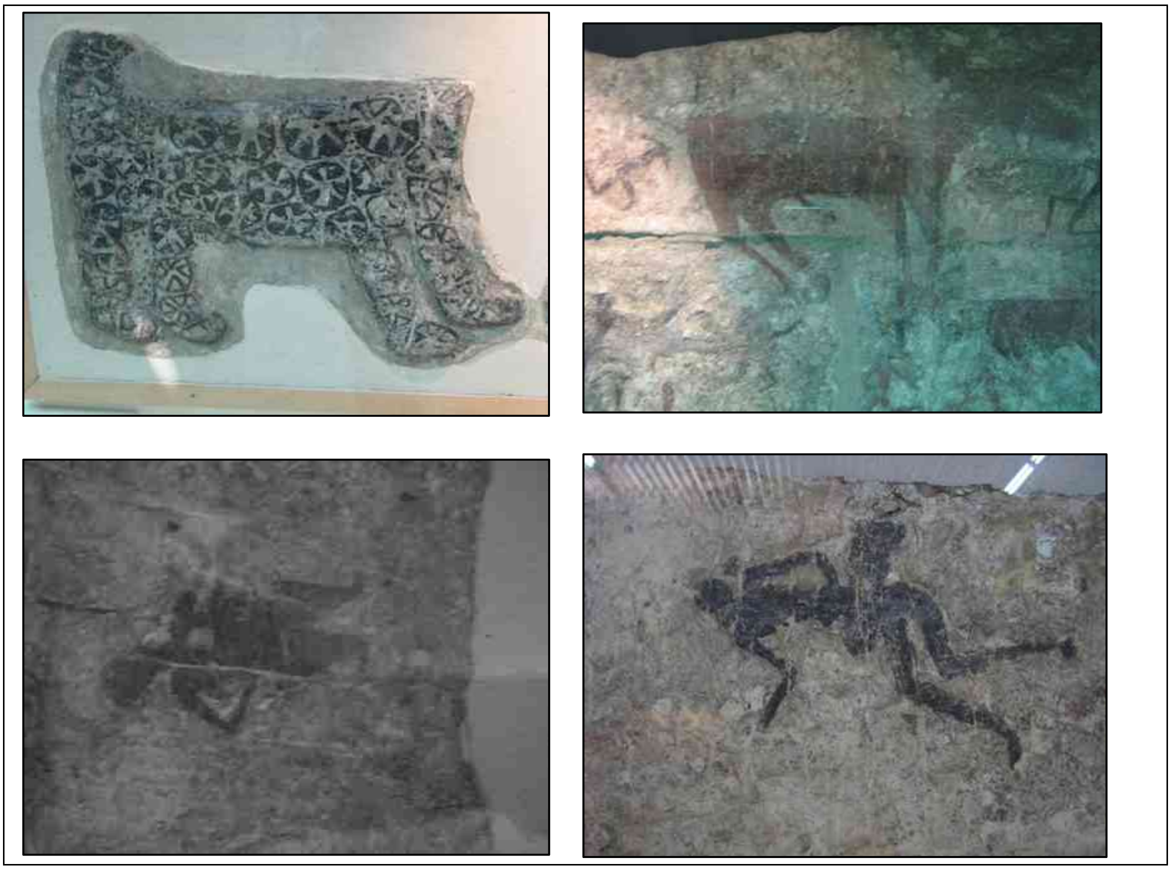


Figure 4.1.8. Wall reliefs from Çatalhöyük from Mellaart excavations, currently housed in the Anatolian Museum of Civilizations in Ankara, Turkey. Clockwise from left to right: black leopard relief on white plastered canvas, wild stag hunting relief, red and black pigment on white plastered canvas, detail of wild stag hunting relief of figure made using black pigment, and figure using red pigment

The preference of black, white, and red colour use at Çatalhöyük is one of many archaeological and ethnographical examples of the use of this colour combination within cultures. As far back as the Palaeolithic, humans and even their predecessors were collecting materials from which they could make red and black pigments and red, black, and white paints (Hutchings 1998:197-198; Hovers *et al.* 2003:491). Some materials used to manufacture red and black pigments and paints include ochre, cinnabar, henna, and blood for red, and soot, charcoal and manganese for black (Hutchings 1998:200). The colour white often formed the backdrop to the red and black pigments, in the form of plastered walls, animal or human bones, skulls, shells, and mixing white coloured materials such as clay or chalk, with water, could make white paint (Marshack, in Hovers *et al.* 2003:515). White paint made using this method would not be preserved as well as black or red coloured pigments (Marshack, in Hovers *et al.* 2003:515).

Figure 4.1.9. Skull with red pigment, found in a burial from the 1960s Mellaart excavations

There are numerous archaeological examples of early colour use, some of the most publicised include Upper Palaeolithic cave paintings in France and Spain and ochre burials found in both northern and southern parts of Africa, Russia, Near East, and North America (Hutchings 1998:198). These examples represent early humans procuring, processing, and using naturally occurring red, black, and white coloured pigments and paints to express abstract ideas and newly emerging symbolic systems.

One of the earliest examples of ochre collection and use in the Near East is at the 92,000-year-old site of Qafzeh Cave in Israel (Hovers *et al.* 2003:491). Hovers *et al.* were able demonstrate that ochre was being selected and procured for its colour, more so than any other property, and there was a general preference for more red and pink colours (Hovers *et al.* 2003:502). There is even evidence that some of the ochre was being heated in order to make it more red in colour (Hovers *et al.* 2003:502). Why was red ochre so significant to the people that used and were buried in Qafzeh cave? Hovers *et al.* state that the act of intentional burial (which is guided by a set of beliefs), and the presence of red ochre within these intentional burials, represents an abstract idea indicating early symbolic behaviour (Hovers *et al.* 2003:508). The use of colour and placement of ochre in the burials is a symbolic act. What the colour red itself symbolizes is much harder to discern. For this, ethnographic studies may prove useful.

One of the most in-depth and comprehensive analyses on colour and its symbolic use in ritual is an ethnographic study conducted by Turner on the Ndembu tribe of Zambia (1967). He observed that the colours red, white, and black were each different manifestations of certain qualities and powers bestowed by divine origin (Turner 1967:68). The colours were not randomly chosen to partake in rites and rituals, instead, each colour was significant as it symbolized certain principles, and all these principles combined in the form of a triad, forming a whole ideology associated with divinity, the cosmos, and social and moral life (Turner 1967:68). In Ndembu culture, white generally stood for positive notions of goodness, purity, health, life, and the prevention of bad luck, amongst many other beliefs (Turner 1967:69). In contrast, black stood for evil, misfortune, pollution, witchcraft, and death (Turner 1967:71). Red on the other hand, was associated with both good and evil, depending on its use (Turner 1967:70). The colour red is aligned with blood, in all its forms (human, animal, menstrual, blood shed in killing, and blood used in witchcraft) as well as power (those that contain blood have power). This symbolic use of colour is fundamental to their ideological belief system, which pervades every aspect of their society.

But how did these colours take on such characteristics? Turner found that these colour associations are based on a “primordial psychobiological experience” (Turner 1967:90), that is, they “epitomize the main kinds of universal human organic experience” (Turner 1967:88). Bodily fluids such as blood (red), urine, breast milk, semen (white) and excrement (black) all represent a “heightened physical experience”, associated with basic human needs and emotions, the foundation for forming social relationships, and sourced to divinity and the cosmos (Turner 1967:88-90). Turner found ethnographic parallels to his study with the Dogan of West Africa, Bushmen, Semang, Sakai, and Jakun, which live in the Malay Peninsula, Australian Aborigines, and the Cherokee in North America (1967:81-84).

Ethnographic and archaeological studies have stressed the symbolic nature of colour use within primitive societies, although it is naïve to simply paste ethnographic studies onto archaeological data. Such studies merely provide examples of how colours may be meaningful within cultures, and this may also have been the case at Çatalhöyük.

The main pattern found in these studies is a notion of contrast, not only of colours, but also of their meanings. The trio of black, white and red were used in unison but also split into combinations of two in contrast (Turner 1967:74,79). The most basic colour systems signify opposing notions such as dull or bright, light or dark, or warm or cold (King 2005:5). The red, white, and black coloured raw materials chosen for stone bead production at Çatalhöyük could have also been chosen for these reasons. There are examples of necklaces and bracelets made using beads of different colours that were put in an alternating order, for example black-red-black-red, etc., so bead wearers were adorning an aesthetically pleasing and perhaps symbolic contrast of colours. Similarly, the houses at Çatalhöyük were quite dark as there was only one opening in the rooftop and the main source of light was the oven and/or the hearth. The black and red painted decorative motifs and wall paintings starkly contrasted against the white plastered walls, benches, and platforms, drawing the eye’s attention immediately to these symbolic and literal representations. Wild, dangerous animals and hunting appear to be a major reoccurring theme at Çatalhöyük (Hodder and Meskell 2011:235). These colours are integral to the hunt as red may symbolize blood, flesh, and food; black may be represented by the presence of wild animal installations made from talons, claws, beaks, and perhaps also the obsidian used to kill and butcher them; and the colour white is the reminder of the hunt as seen in skulls, horns, and bones that make up wild animal installations as well as the remains of a wild animal feast associated with the hunt. Not only were these contrasts and colour combinations more visually appealing, but the contexts in which they are used suggest a deep reverence and devotion to them, and a means of symbolic and ritual expression for the people of Çatalhöyük.

In South.?M we have the first example of serpentinite beads which are much more green in colour in comparison to those found in the previous three settlement phases, and by the time we get to South.P, both greens and blues in all shades can be found in the archaeological record. It was a slow progression over a number of settlement phases before greens and blues become a fixture in the stone beads assemblage. How do blues and greens fit into previously existing black, red, and white colour palette at Çatalhöyük?

The natural presence of red and green in nature is significant and the fact that we are able to differentiate the colour red after black and white (based on Berlin and Kay's 1969 linguistic study of colour terms), suggests that it may be important in an evolutionary sense (King 2005:7). Colour is one way by which plants, animals, and insects can communicate with each other, by "attract[ing] or repel[ing] members of the same species, and [attracting] or repel[ling] members of different species" (King 2005:3). Plants, for example, bear bright and/or colourful fruits to ensure the successful propagation of their seeds (via the sense of sight), and the colour of these fruits (reds, pink, bright oranges and yellows) starkly contrasts the green coloured vegetation on which it grows (King 2005:3). Examples of ripened red coloured fruits, which would contrast against the green plants on which they are grown, include apples, tomatoes, raspberries, strawberries, figs, cherries, pomegranates, cranberries, red grapes, and lychees. The contrast between red and green is naturally present in our environments and indicates that we are drawn to contrasting colours.

Wright and Garrard (2003) also noticed the use of these naturally contrasting colours at the Jilat bead making sites in the Azraq region of Jordan. They observed that green was perhaps a response to this need to form a contrast with the pre-existing red colour, similar to the contrasting colours of white and black (2003:278). They also noted that these contrasting colours could have also had an opposite symbolic meaning, with red representing blood, animals, and death and green connoting fertility, vegetation, and life (Wright and Garrard 2003:278). At Çatalhöyük green and blue coloured beads are not added to the existing red, black, and white, colour palette until sometime between unexcavated settlement phases South.N and South.O, as by South.P they have become part of the assemblage. But why does it take until the Neolithic and specifically the Pottery Neolithic in central Anatolia and PPNB in the Levant for green and blue coloured beads to become so prominent?

Bar-Yosef Mayer and Porat (2008) attribute this emergence of the colours of green and blue, specifically with regard to bead use, with the advent of agriculture between the Natufian and Neolithic periods. They state that green and blue coloured beads were used as both "fertility charms" as well as "amulets to ward off the evil eye", both necessary as a coping mechanism to deal with increasing births and emerging health problems associated with sedentism (2008:8548-8549). Initially, plants may have been used medicinally to help with this issue (2008:8549). The importance of plants in terms of food and medicine, perhaps led people to seek out green coloured stones, which would ensure the successful fertility of humans as well as that of the plants and animals they depended on (2008:8549). The colours green and blue hence could have symbolised protection and may have ultimately been a superstitious way of trying to control one's environment.

One cannot help but also discuss the tradition and use of green and blue beads in both archaeological and ethnographic examples, although these parallels are millennia apart. In Mesopotamia, there are a number of references on cuneiform texts to the "evil eye" (Bar-Yosef Mayer and Porat 2008:8550 and references therein), a belief still found in parts of the Middle East, the Mediterranean region, and South Asia, among others.

The expansion in the procurement and manufacture of green and blue coloured raw materials into stone beads at Çatalhöyük is equivalent to the LPPNB, PPNC, and partially the Pottery Neolithic (total spanning from 7550-5925 cal. BC) in the Levant. In the Levant, they peak in their use during the PPNB, but were found as early as the Late Natufian at sites such as Rosh Horesha, Eynan, and Gilgal II (Bar-Yosef Mayer and Porat 2008:8549). During the Levantine PPNC and Pottery Neolithic there was a sharp decrease of beads, and especially green and blue coloured beads in the Levant. While their prevalence was declining in the Levant they were making their debut at Çatalhöyük and their use was gaining momentum. Çatalhöyük was however, very late to adopt the use of green and especially blue coloured beads. Even in central Anatolia we find the prevalent use of green coloured stone beads at the Cappadocian site of Aşıklı Höyük, which predates the settlement of Çatalhöyük. The assemblage at Aşıklı Höyük is predominantly comprised of contrasting colour scheme of red and green. Bead makers at Aşıklı Höyük were making use of red carnelian and limestone as well as green steatite and chrysoprase (Figure 4.1.10). These two colours were used separately and together in single pieces of jewellery, mostly found in burials. Despite close interaction between Çatalhöyük and the obsidian sources of the Cappadocian region, Çatalhöyük did not adopt the use of blue and green beads until mid-occupation of the mound.

Figure 4.1.10. Red limestone and green steatite disc and ring beads with bone spacer (centre)

Sagona (in Hovers *et al.* 2003:516) comments that if the colour red did indeed promote life and fertility then the contrasting colour blue could have been used to preserve and protect it, especially when "there was a conspicuous increase in personal wealth and prestige," making the colour blue the symbolic colour to ward off evil. This hypothesis would explain why blue beads are more frequently found during the peak of Neolithic culture (South.P and North.G onwards to South.T and North.I, respectively). We can hypothesize that as Neolithic social complexity increased at Çatalhöyük, so emerged the need for blue and green coloured stone beads. The appearance of blue and green beads corresponds with another phenomenon. Beads that are green and blue tend to be larger in size and take more variant bead forms in contrast to the small red, black, and white simple disc or ring beads. There is very little evidence for social stratification within society at Çatalhöyük; people more or less had the same standard of living and the homogeneity of bead types and colours across settlement phases also confirms this. Perhaps the use of these newly emerging blue and green coloured beads was a safe form of personal expression within a communal environment. This idea will be further examined and expanded on, in the section below and the next chapter on bead consumption.

Red, black, and white coloured raw materials are much more abundant in the environment and for each of these colours there are at least three to five different raw materials that can provide one with red, black, or white coloured raw materials for stone bead production. The options for green, and especially blue coloured raw materials are much more limited (only two to three options). Fluorapatite and turquoise are the only raw materials used to make blue beads; the closest sources of fluorapatite are yet unknown and turquoise most likely originates in the Taurus Mountains. It was therefore much more difficult to procure blue coloured raw materials. Also, if blue-coloured fluorapatite was indeed odontolite and being produced by heating fossilized ivory, teeth, or tusk, certain technological knowledge was necessary to do this.

Equally important to colour were the other properties of rocks and minerals used in stone bead production. Beads are essentially small, portable objects that were more than likely to have been worn against the skin in the form of a necklace, bracelet, armlet, or anklet. Cummings (2002:250) emphasises the sense of touch of Neolithic stone artefacts and suggests that size, weight, shape, density, temperature, and texture of an artefact are characteristics that relate to sense of touch. The vast majority of the raw materials used could be polished to a smooth texture and/or had a sheen or a shine to them. For some materials, especially those that are non-micaceous, a shine was only achievable by finely polishing the raw material smooth. The smooth texture makes wearing the beads more comfortable, and is also practical, as a smooth bead would not snag.

4.1.5 Availability, trade, and preferences of raw materials at Neolithic Çatalhöyük

The dominant assemblage at Çatalhöyük reveals clear preferences for certain raw materials and these conservative preferences form the basis of an established technological tradition of bead making which spans over the Neolithic. These raw materials could be easily obtained while out hunting, gathering food, collecting supplies for household maintenance, or shepherding, all activities which the inhabitants of Çatalhöyük engaged in and indicate their familiarity with the environment in their day-to-day lives. The closest possible source locations of the prevalently used raw materials for stone bead production are all in relatively close proximity to the settlement.

Not surprisingly, some of the raw materials added to the stone bead assemblage in the later settlement phases of Çatalhöyük – carnelian, hematite, turquoise, diorite, agate, and to a lesser degree fluorapatite, are much more challenging rocks and minerals to manipulate, especially in comparison to the more commonly used raw materials which dominate the assemblage. With the exception of hematite, the probable sources for each of these more variant forms of raw materials are a considerable distance away from Çatalhöyük.

Despite the lack of substantial production data for these more challenging raw materials, there is some evidence to suggest that these beads could have been made at Çatalhöyük, as determined by chert, fluorapatite and hematite preforms in production contexts and the presence of carnelian and fluorapatite preforms found as single examples in external middens (see Section 4.2 and 4.3). These examples admittedly are far and few in between. The lack of production data does suggest a real possibility that at least some of these beads may have made their way to site premade, but the data also suggests that at least some beads made from more challenging raw materials were also being made at Çatalhöyük. These raw materials were much more difficult to manipulate in comparison to those in the dominant assemblage; moreover, these raw materials were being reserved for the production of variant bead types which required a great deal of skill to manufacture. This may explain why they are present in such small numbers, but that can also be due to the fact that the more commonly used raw materials were so abundant, suitable and accessible, and easier to work hence preference was given to them. Whether or not these beads were made on-site cannot be determined with certainty, what we can say for sure is that these more challenging raw materials were acquired from further distances, and perhaps using established trade routes and trade relations with other villages, and preforms made from some of these raw materials do exist at Çatalhöyük, indicating some degree of production.

The raw materials used for stone bead production, particularly steatite and serpentinite were also used to manufacture figurines, decorative stone axes, pins, bracelets, and pieces of worked stone (Figure 4.1.11). Figure 4.1.11 illustrates a few examples of artefacts from the later phases at Çatalhöyük, both large and small, made from these commonly used raw materials. The manufacturers at Çatalhöyük who made these items understood these raw materials and were well versed in their acquisition, manufacture, and use. Interestingly, in all these examples these raw materials can be categorized as "technologies of enchantment" (Gell 1992:93), that is objects that are special and peak interest because of the level of technical skill involved. The technical process and skill of the craftsperson empowers these objects, and these objects become essential to the social development of a society (Gell 1992:43-44). These objects are not simply utilitarian objects, but like ornaments, ritualized, objects of desire, embedded with power or abstract meanings. These objects are made to grab our attention, engage us, and we give value to these items for the technical skills involved in their production as well as their aesthetic properties, similar to how we value gold or antiques today.

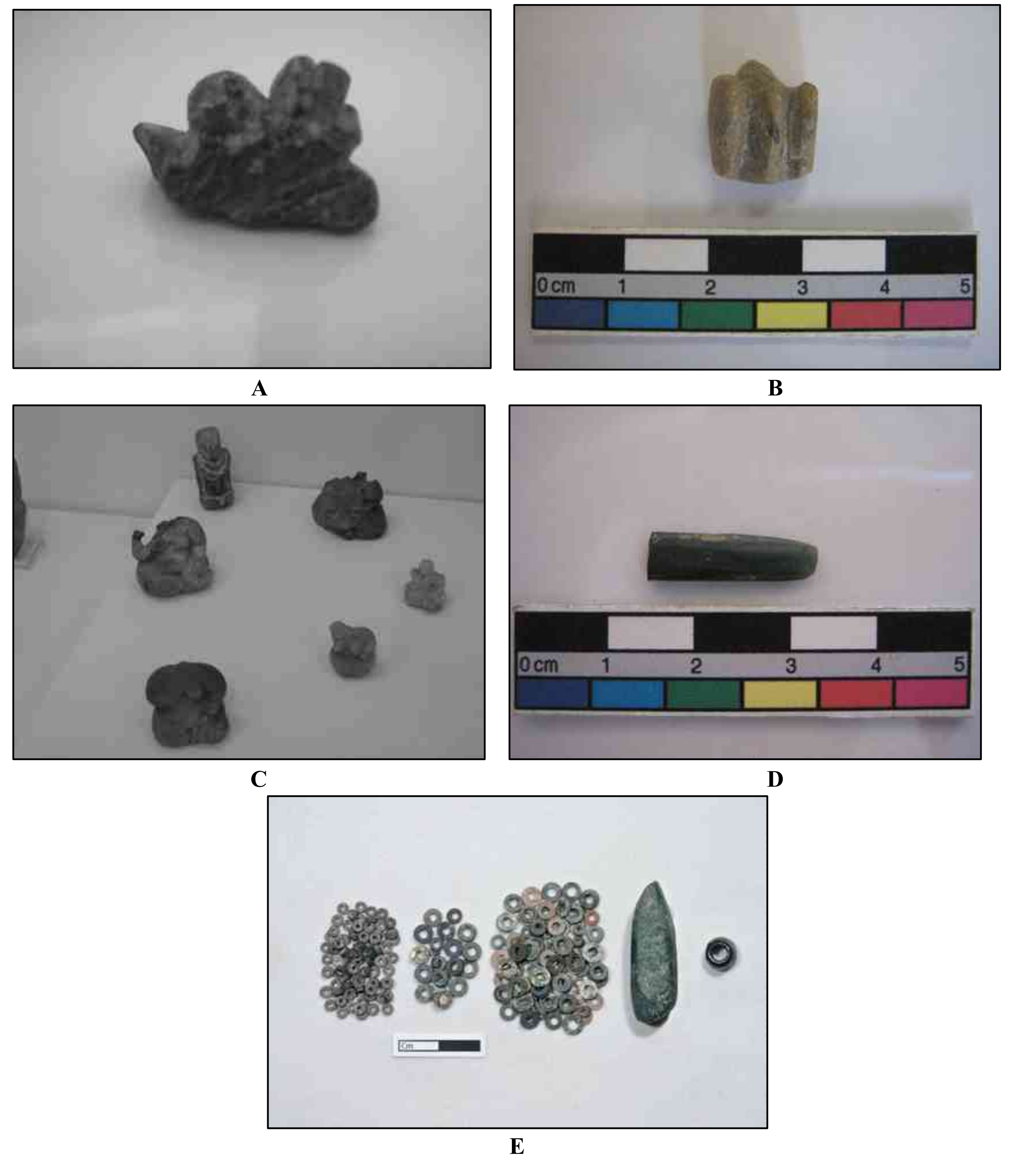


Figure 4.1.11. Examples of other objects found at Çatalhöyük made from stones also used in stone bead production: A) steatite figurine?; B) steatite worked stone; C) clay and stone figurines from Çatalhöyük at the Museum of Civilizations in Ankara; D) steatite pin?; and E) a variety of beads and a serpentinite axe head. Final photo by J. Quinlan, Çatalhöyük Research Project

From the earliest settlement phase, the people of Çatalhöyük had to look beyond their local region and to East Göllü Dağ and Nenezi Dağ in Cappadocia to find suitable obsidian sources for tool production (Carter 2011:3-4). It is more likely that those who first settled at Çatalhöyük already had prior knowledge of obsidian trade routes, which had been established in the Cappadocia region for millennia prior to Çatalhöyük (Carter 2011:5). In addition to the obsidian trade, the people of Çatalhöyük were also engaged in shell and fossil trade in order to make shell beads. The Taurus Mountains, Cappadocia, Alacadağ region, and areas near Antalya and Karaman all had potential source locations for new raw materials. Interestingly, shell and fossils used for shell bead production at Çatalhöyük have also been sourced to the Taurus Mountains, Karaman region, Mediterranean shore, and freshwater rivers and lakes in central Turkey (Daniella Bar-Yosef Mayer, personal communication).

We know that Çatalhöyük was interacting and trading with distant regions in central Turkey, but why do these materials only appear in the stone bead assemblage in South.P and North.G and not earlier? The answers may lie in the technological choices made by both bead makers and consumers. These preferences, on the whole, suggest significant changes and additions to an already established bead making technological tradition which may be a response to, or a result of, more widespread changes and increasing social complexity occurring within Neolithic society at Çatalhöyük, a phenomenon also demonstrated by the lithics at the site. Both Conolly (1999) and Carter (2011) state that during the phases of South.N and South.O, there is a widespread change in obsidian tool manufacture at Çatalhöyük, around the same time that new raw materials are introduced into the stone bead assemblage. It appears that changes in essential everyday technologies are occurring at Çatalhöyük. These changes were gradual and spanned well over a century.

The earlier settlement phases at Çatalhöyük reveal a very conservative and almost homogenous technological tradition of stone bead manufacture, especially with regard to raw material selection and colour use. The social and technological conformity seen in stone bead technology may be the result of the community at Çatalhöyük actively promoting social controls, social cohesion and coexistence, and by doing so, stone beads became material vehicles by which a shared communal identity could be created, propagated, and maintained (for example see Cauvin 2000a; 2000b; Kuijt 2000; 2002; 2008; Goring-Morris 2000; Verhoeven 2002a; 2007; Rollefson 1983; Hodder & Meskell 2011; Gifford-Gonzalez 2007; Meskell 2008; Last 1998). But as the Neolithic progresses and the population increases, there are shifts in technology, especially with regard to lithics and pottery, there are more elaborate wall painting and wild animal installations found within houses, and more lavish grave goods are placed in burials, particularly during settlement phases South.?M to South.Q; however, these do not appear to be attributed to social stratification, as they are seen throughout the site. So although the vast majority of the stone beads assemblage remains the same and continues to function as a medium of communal symbolic expression at Çatalhöyük, albeit constrained, the emergence of individual identities may reflect or contribute to increases in social complexity at Çatalhöyük (see Section 4.4).

4.2 Production contexts: distribution, organization, and craft specialization

All potential production contexts from the sampled buildings and spaces at Çatalhöyük were located and closely examined in Chapter 3.2 (Table 3.2.2). Surprisingly, of these 33 buildings and 22 spaces, only nine different buildings and spaces contained evidence of stone bead production, as defined by the set criteria, ranging from concentrations of unfinished beads or debitage, to the presence of two or more bead related components (finished beads, unfinished beads, tools, and/or debitage). Stone bead production contexts at Çatalhöyük can be divided into two main context categories: as *in-situ* or primary production contexts within buildings or external yards and production related, or non-primary contexts containing discarded deposits within external middens.

4.2.1 *Primary stone bead production contexts – building floors and external yards*

Surprisingly, only three *in-situ* stone bead production contexts were located during the current excavations at Çatalhöyük, and all three examples were found in the South area. The earliest example of stone bead production is in Building 18, during settlement phase South.J. During two occupation phases (as defined by the construction and use of ovens), we find evidence of the production of very small phyllite ring beads, in conjunction with bone beads. These beads were manufactured in the activity area surrounding the oven or hearth at one end of the building. It was in this area that obsidian and chert knapping, food processing, cooking, figurine production, and other such household activities took place. Three units within Building 18 had evidence of bead production, and in total only amounted to one roughout, three preforms, and 6 finished phyllite ring beads. No real bead making tools, apart from some bone points were present in Building 18.

Phyllite ring beads were not found in any other contexts of Building 18. During the early settlement phases, much of the stone beads are essentially very similar and limited in style, size, and raw material. Finished phyllite and ring or disc beads are also found on the floors of adjacent Building 23, but whether bead makers in Building 18 were only making beads for themselves or also for their neighbours cannot be determined. Of the single neonate burial in Building 18 and two neonate burials in Building 23, none of them contain any stone beads, and subsequently beads being produced in Building 18 were not found in the single burial excavated from Building 18.

The two other examples of *in-situ* stone bead production are in Building 75 and external yard Space 329, both contemporary contexts in settlement phase South.P. These two contexts have the highest production levels of all the contexts with evidence of stone bead production (Table 3.2.2). Within settlement phase South.P, only one building, two external yards, and two external middens have been excavated to date. Both Building 75 and Space 329 contain evidence of dark red/brown tufa disc or ring bead production. These contexts are significant as they are the first to contain not only unfinished beads and debitage, but also perforating tools used in stone bead manufacture.

Bead production in Building 75 is concentrated on the floors comprising the activity area on the eastern side of the building, near the oven and hearth of two occupation phases, similar to Building 18. A total of thirteen preforms and roughouts were found and in addition to ample tufa bead production, there is limited evidence for serpentinite bead production, in the form of two roughouts and one preform for a disc or ring bead. A single biotite preform was also found, although it may have been naturally shaped and perforated due to its geological properties. Similarly, Space 329 contains evidence of tufa bead production near the hearth and on the surface of the external yard, over two phases. A total of 14 preforms and roughouts were found in Space 329, which make up approximately 15% of all preforms and roughouts found within the sampled contexts at Çatalhöyük. Building 75 and Space 329 were contemporary in their use, and based on the common tufa production found in both contexts and their close proximity, it is possible that the same individual or group was engaged in bead making in both contexts. The various stages of bead manufacture were not divided amongst these contemporary contexts; each contained unfinished beads, perforating tools, and debitage.

Chert microdrills were used to perforate beads and the vast majority of these perforating tools found at Çatalhöyük were excavated from the tufa bead production contexts in Building 75 and Space 329. Few of the drills appear to be unused but most have dull tips indicating heavy use. Chert debitage from the knapping and retouching of these microdrills was also present, which suggests that bead maker(s) were also knapping or retouching the microdrills used for tufa bead production. If this was the case, this indicates that stone bead manufacturers were skilled in all aspects of bead production, including producing or modifying the tools associated with stone bead production.

Within settlement phase South.P, only one other context, an external yard also used as a midden, Space 333, contained some discarded evidence of stone bead production, the remaining two external middens had none. Finished dark/red tufa beads in any of the excavated building or spaces in settlement phase South.P are surprisingly non-existent. Like Building 18, of the three burials found in Building 75, not a single burial contains any stone beads, let alone the tufa or serpentinite beads being produced within the building. As expected, no burials were found in Space 329.

Unfortunately we are unable to attain the full account of stone bead production and use as both Building 18 and Building 75 were not fully excavated due to the deep sounding dug by Mellaart in Building 18 and heavy truncation in Building 75. The information we have suggests that these *in-situ* production contexts were producing simple ring or disc shaped beads made from accessible raw materials that are used throughout the occupation of the site. The beads being produced are not ending up in the burials of these households, and in the case of South.P, there are no examples of finished tufa beads within the entire settlement phase. This suggests that stone beads may not have only been produced for the use of household members. On the other hand, in South.J, we do find finished phyllite ring beads on the floors of Buildings 18 and 23 (located next to Building 18), which could have been produced in Building 18. Although these examples are limited, is it entirely possible that bead makers were making stone beads not just for their households, but also for others.

All three contexts with *in-situ* production have a number of similarities. Farid (2007:134) initially noticed that bead making activity in Building 18 can be associated with more than one oven phase, and therefore bead production was likely to be a regular activity within this household. This is true for both Buildings 18 and 75; remnants of stone bead production can be found associated with the use of two different oven phases, which may have spanned a number of years, in each of the buildings. It is interesting that most buildings contain no evidence of stone bead production, even in one of their many occupation phases, yet the two buildings that do, do so throughout their use. External yard Space 329 only has bead making activity associated with the construction and use of a single large hearth, but a hearth may not require the same sort of maintenance as an indoor oven, and could have easily been used for a longer period of time.

Like most other domestic activities at Çatalhöyük, bead production occurred near ovens, hearths, and entry ladders, usually along the southern wall of the building (Farid 2007:57; Hodder 2007:28). This area was spatially-defined, and lower in elevation than the adjacent areas (Farid 2007:57) and also defined by colour of flooring, as the adjacent floors were usually lighter in colour and were likely to have been plastered white, whereas the dirty areas are described as being ashy, "charcoal rich", and darker in colour

(Hodder 2007:28) due to their proximity near fire sources. This area of the house was suitable for the processing of tools, foods, and beads, as it affords more light to work in than other areas of the house due to the opening or entrance above, and light from ovens or hearths in this area. Once an activity was completed the remnants from this activity were not discarded immediately and may have been recycled and reused before being taken out of the building and thrown into the external middens (Farid 2007:135). The activity area would have contained a number of items such as tools and materials, readily available to the bead maker(s) to use. At Çatalhöyük there was a clear differentiation between activity areas and living spaces. This division of space ensured the plastered platforms and benches could be used for sleeping or sitting without bits of dangerous obsidian or sharp tools getting in the way (Farid 2007:57).

In addition to continuity and proximity to ovens and hearths, the *in-situ* production contexts also reveal that bead production occurred both within and outside buildings. It occurred in both the private domain of the house as well as an external yard, which may have been overlooked by houses other than that of the bead maker. Space 329 is only example of outdoor stone bead production at Çatalhöyük. Space 329 can be interpreted as a communal space, and if neighbouring buildings shared the large hearth, it is possible that more than one household was communally engaged in tufa bead production, or that Space 329 was an outdoor extension to stone bead production occurring in Building 75, or they may not have been contemporary (despite being in the same settlement phase, i.e. they may have been used weeks to years apart).

Another external yard, Space 333, also contained a cache of chert perforating tools in an activity area near a hearth, but no other bead related components were found. The non-primary discarded production contexts discussed in the next section were comprised of household refuse deposits, and therefore it does not appear that stone beads were produced within external middens. Most stone bead production appears to have been conducted inside buildings, as with other activities, such as obsidian knapping, basket weaving, and food processing. Considering the size of the buildings, not many people would be able to work together in the activity areas of the buildings, so if the majority of stone bead production was occurring indoors, then it is likely that only one or two people were producing beads at any given time.

The main problem with the South area data is that it provides us with a diachronic view of life at Çatalhöyük. We can see changes through time, but it is difficult to say, for example, whether Building 75 was a unique case or not, as it is the only building excavated within this settlement phase so far. The lack of synchronic excavations also makes it difficult to ascertain where the finished beads are ending up within the settlement phase. The North area at Çatalhöyük was specifically excavated in order to provide us with a synchronic perspective. Unfortunately, none of the eleven buildings in North.G or five buildings in North.H contained any evidence of stone bead production, but this could also be due to the fact that most of these buildings are not yet fully excavated. In fact, only 10 buildings have been fully excavated from construction to abandonment in the current excavations (Shahina Farid, personal communication). Even if we were to disregard the purposeful diachronic excavation method of the South area and simply look at the 17 buildings sampled within it, only two contain conclusive evidence of stone bead manufacture. The lack of production data can be attributed to the daily routines and life cycles of the buildings at Çatalhöyük.

Buildings were cleaned regularly, if not on a daily basis. The platforms and activity areas would have been cleaned and the waste material would have been swept into the fire and later raked out, and then thrown out into the external middens (Martin and Russell 2005:63; Farid 2007:57). Buildings were constructed, occupied, and then at the end of their use, cleaned, closed, and infilled (Farid 2007: 25). The materials used to infill the now abandoned building would have come from the same external middens in which daily household refuse was being deposited. As a number of production contexts were retrieved from external middens, it is possible that many more could be found within building infill, a context that was not sampled as it could not securely be associated with the building it was in or the external midden from which it originally came. The whole building closing process, specifically the intentional cleaning of the interior space, could potentially affect the presence or absence of production areas. Floors were also replastered, on either a monthly, seasonal, or yearly basis (Hodder 2007:32) and we do find both finished and unfinished beads stuck within or on top of layers of floor plaster. Buildings at Çatalhöyük were like living organisms; they were born, had their daily routines, evolved over time, and eventually died, through their construction, use, and eventual abandonment. These processes affect the data excavated from these buildings and such limitations must be kept in mind.

In addition to these factors, there is another impediment to studying stone bead production contexts. Apart from the nodules and primarily angular shatter of tufa which forms the debitage remains of tufa bead production in Building 75 and Space 329, the vast majority of commonly used raw materials appear to be reduced via abrasion against schist and sandstone palettes and abrading slabs for example (see Section 4.3), which leave very little evidence of debitage or waste products. The nodules of raw material procured from the source would have had to be initially reduced to at least roughout size via chipping using the percussion technique, as seen in with the tufa production in South.P, but there is very little evidence of reduction. There are examples of raw material nodules on-site, but very few are a part of bead production contexts (Table 3.2.1 and Table 3.2.2). So either there is very little waste being produced or some of the initial reduction of raw materials may be occurring off-site and perhaps close to source locations.

If all these factors are taken into account, there appears to be significant evidence to suggest the presence of craft specialization at Çatalhöyük. Buildings 18 and 75 appear to be typical Çatalhöyük households within their settlement phases in both size and shape, and there is no evidence to suggest social differentiation or production being controlled by or for elites with regard to stone bead production or any other production activities. According to the craft specialization framework devised by Costin (1991), the organization of stone bead production at Çatalhöyük appears to be independent, part-time, and at a household level. In terms of concentration or how specialists appear to be distributed, the primary production contexts suggest that they are most likely distributed throughout the settlement phases but this cannot be determined due to the diachronic excavation method of the South area.

4.2.2 Production related contexts - middens

The remaining six production contexts were discarded non-primary production contexts found in external middens Space 181 in South.G, Space 333 in South.P, Space 339 in South.R, Space 129 in South.S, and Spaces 226 and 279 in North.I (Table 3.2.2). These discarded production contexts were most likely household refuse deposits which originated from building floors as samples from activity areas within buildings and external midden deposits were essentially comprised of the same micro-artefacts (Hodder 2007:26; 2006:53; Martin and Russell 2005:65). The refuse deposits in external middens cannot be associated with specific adjacent buildings with certainty, but they can be linked to the settlement phase in which they are found. Units within a midden represent a single depositional activity, therefore these items if found in the same unit could have come from the same household of that particular occupation phase. Moreover, these items could have potentially been used together, and cleared and discarded from the same floor or area of the building.

Although these production contexts are not *in-situ*, they are still important to examine, as they supplement the limited primary production data. The non-primary production contexts reveal that production was occurring in settlement phases other than just South.J and South.P. These discarded production contexts also demonstrate the production of beads from raw materials other than simply phyllite and tufa, including hard limestone or soft marble, serpentinite, calcite, steatite, and soft saccharoidal marble, all commonly used raw materials. These commonly used raw materials only demonstrate the production of ring or disc beads. There is, however, an example of a steatite spacer preform in Space 279. Examples of harder raw materials, which are likely to be roughouts, such as chert and dolerite, were also found, but due to their large size their final bead shape is difficult to determine. There is, however, evidence of two fluorapatite beads which appear to be precursors to lenticular beads, both in Space 279, North.I, and hematite bead which may be a broken pendant preform, in Space 226, also in North.I.

The earliest external midden, Space 181, located in settlement phase South.G, contained a number of units with both hard limestone or soft marble and tufa ring bead production. This is the earliest evidence of stone bead production excavated so far. The methods of manufacture appear to be the same for both raw material forms, but whether these finished and unfinished beads came from a single household or many households cannot be determined. Unlike Building 75 and Space 329, finished beads are present, and the level of production appears to be similar to that Space 329, but not as prolific as the *in-situ* production contexts in Building 75.

The remaining external middens, Space 333, Space 339, Space 129, Space 226, and Space 279 contain only one or two components of bead production within each unit, usually either a preform or roughout with the addition of ground stone or perforating tools, which add to a low production level (Table 3.2.2). Space 279 contains six units with production evidence and therefore has a total production level of 13, making it the fourth context with the most production, albeit non-primary. As expected, there are no burials in these external middens, with the exception of an adult and infant burial in Space 279. Whether the bodies were laid or dumped in the midden cannot be determined, but there were no beads in this burial to compare to the production data.

Most production related contexts did not contain any finished beads made from the same raw materials as the production data, which is not unusual. But were there any finished examples of the raw materials and bead types being manufactured within production contexts in at least the same settlement phase? We found that South.P did not contain any finished beads that corresponded to the production data. Table

4.2.1 reveals that those beads made from more common raw materials did appear in their finished forms within the same settlement phase, and of course these raw materials were also used to make other objects (Section 4.1). So although we do not have any primary evidence for the production of non-disc or ring bead types made from these raw materials, they most likely were being manufactured on-site.

Settlement phase	Production data of raw material	Finished beads within settlement phase
South.G	hard limestone or soft marble ring	yes
	tufa ring	yes
South.J	phyllite ring	yes
South.P	tufa ring/disc	no
	pale green serpentinite ring/disc	no
	biotite disc?	no
South.R	calcite ring/disc	yes
	steatite ring/disc	yes
South.S	fluorapatite disc?	yes-to fluorapatite material, but no disc type
North.I	soft saccharoidal marble disc/ring	yes
	hematite disc/ring	no
	steatite disc/ring	yes
	chert indeterminate	no
	steatite spacer	yes
	fluorapatite lenticular (x2)	yes
	dolerite indeterminate	no

Table 4.2.1. Production and use contexts compared within settlement phases (settlement phases with primary production contexts in bold)

Can the production evidence tell us anything about the manufacture of more variant and harder raw materials which were adopted sometime after South.?M but before South.P? The non-primary production data from South.S and North.I reveal that beads from harder (Mohs >4) raw materials, primarily fluorapatite, chert, hematite, and perhaps dolerite were also being manufactured. In Table 4.2.1, we find that although there is some production data for these harder and less common raw materials, only fluorapatite finished beads are present within the settlement phases it is found in. There are no chert, hematite, or dolerite beads within the settlement phases that contain their production evidence. In fact, there is only one dolerite preform in Building 47 in North.H, a chert roughout and preform in Space 279 in North.I, and four examples (a roughout, preform, and two pendants) of hematite in North.I, North.G, and South.R, respectively. Fluorapatite beads are much more common and in fact are the most substantial of all the least used raw materials in the total bead assemblage. The production data for the manufacture of beads from harder materials is limited, and in proportion to the amount of variant beads found at Çatalhöyük; however, the few examples we do have reveal that some bead makers had the skills to manipulate and produce beads from more challenging raw materials than those most prevalently used, especially in the case of fluorapatite and hematite. Subsequently, if beads were being produced from these raw materials, then bead makers are not far off from producing beads from other harder raw materials found at Çatalhöyük such as carnelian, turquoise, diorite, and agate. These raw materials are also challenging to work with and require a great deal of skill and labour to produce a single bead. In addition, these harder materials are generally obtained via long distance trade and interaction and therefore perhaps not as available to bead makers as other raw materials which can be procured from the surrounding limestone hills and the Konya Plain. All these factors may be the reason why such few examples of these materials have been found at Çatalhöyük.

Tool assemblages related to stone bead production can also help us determine whether or not stone beads made from hard and challenging raw materials were likely to have been made at Çatalhöyük or not. The vast majority of perforating tools found in production contexts are chert microdrills which may have also been knapped and retouched by bead makers(s). These chert microdrills could have easily perforated the commonly used raw materials that were Mohs 4 or less, and the use-wear found on them also indicate this (Chapter 2.3 and Appendix D). The dull tips and lack of concentric parallel striations indicate that whatever these beads were perforating were less than seven on the Mohs scale of hardness. There is only one example of an obsidian microdrill that remains intact, whose use-wear indicates that it was used to perforate a raw material greater than Mohs 5 or 5.5.

The lack of evidence of production contexts, perforating tools suitable for harder raw materials, suggests that is was quite rare for Çatalhöyük bead makers to work with less common raw materials. It is just as possible that these beads were made on-site as it is that came to Çatalhöyük pre-made via the obsidian or shell trade for example, or perhaps by exogamous marriage practices. Their limited presence within the stone beads assemblage attests to their limited manufacture and use at Çatalhöyük; whether this was because they were more difficult to manufacture or that the availability of raw materials was limited, will be discussed further in relation to their consumption in the next chapter, Chapter 5.

4.2.3 Distribution of toolkits for stone bead production

In Chapter 3.2, a list of potential toolkits that could have been used in the production of stone beads, but found without any bead related components was also compiled and closely examined (Table 3.2.3). These tools, while not found in bead production contexts, were very likely to be used in stone bead production, based on their suitability, some use-wear, and results from preliminary experimental bead making. These toolkits, specifically ground stone toolkits, were most likely used for the production of a number of items by Neolithic peoples, including other ground stone tools, figurines, stone axes, and pigment and paint processing. These toolkits would have been multipurpose, used daily, and almost all households appear to have at least some ground stone tools. The various perforating tools are discussed in Section 4.3.2 and Appendix D.

The toolkits contained ground stone tools ideal for abrading and reducing stone beads. The fine andesite or sandstone abrading stones and palettes as well as schist palettes provide slightly different grades of abrasion and could effectively reduce the vast majority of raw materials used for stone bead production without gouging or breaking the beads. The large grains or porous surfaces in the more robust grinding and abrading slabs made from andesite and basalt can potentially break the much more delicate beads. Two tool types were however absent – capstones and drilling benches, both important components of the ground stone assemblage (Karen Wright, personal communication). This is discussed further in the next section.

The other potential *in-situ* bead making toolkits are found external yard Space 333 (South.P), a space that also has some non-primary production evidence and Buildings 58 and 52 in North.G, each with a cluster of ground stone tools on the floor. The remaining toolkits are all found in external midden deposits in South.Q to South.T and in North.I, which generally coincide with contexts that also contain evidence of non-primary production contexts. The distribution of toolkits within settlement phases is roughly similar to the presence of stone bead production contexts, both primary and non-primary.

4.2.4 Craft specialization and stone bead production at Çatalhöyük

The limited number of production contexts at Çatalhöyük suggests that perhaps not every house was engaged in stone bead production, particularly from North.G or South.N and South.O (unexcavated) onwards. Table 4.2.2 clearly illustrates that very few buildings and spaces within settlement phases South.G to South.?M have been excavated thus far, so it is not surprising that no production contexts were found in South.K, South.L, and South.?M, although earlier settlement phases, South.G and South.J, did contain some non-primary and primary production contexts, respectively. While no buildings or spaces have been excavated in settlement phases South.N and South.O, its contemporary settlement phase in the North area, North.G, contains a space and a number of buildings, some of which have been excavated, and some still in the process of being excavated. Of these twelve contexts, no production contexts have been found as of yet. South.P and North.H are contemporary phases that contain a total of ten contexts; from these ten contexts, three production contexts were found, two primary, and one non-primary, all located in the South area. South.Q contains seven contexts, none of which housed any production contexts. North.H and North.I overlap with the late South settlement phases South.P to South.T; therefore, in Table 4.2.2, contexts from North.H were relegated to South.P and contexts from North.I were aligned with South.R to South.T, in order to address the overlapping. South.R to South.T and contemporary phase North.I contained a total of 14 contexts, but only four non-primary contexts were found.

Table 4.2.2 succinctly summarizes that even settlement phases that contained more excavated buildings and spaces did not necessarily produce more stone bead production contexts. Moreover, the presence of production contexts within settlement phases corresponds to the overall number of beads found within each phase (disregarding the large burials in Building 43, South.L, and Building 49, North.G), so that the contexts with the most beads also contain the most production contexts (Table 4.2.2). South.P contains the most number of finished and unfinished beads, and it is the settlement phase with the most primary production data. The second context with the most abundant amount of beads is North.I, which contains four non-primary production contexts, although this is expected because most beads end up in either burials or external middens.

Settlement phase SOUTH	Settlement phase NORTH	Building/Space	Number of potential contexts (Buildings/Spaces)	Number of production contexts
South.G (n=93)		S.181	1	1 non-primary
South.J (n=59)		B.18, B.23	2	1 primary
South.K (n=71)		B.17, B.16, B.22	3	0
South.L (n=42)		B.6, B.43	2	0
South.?M (n=31)		B.50, S.168, S.169, S.105	4	0
South.N (n=0)	North.G (n=98)	B.58, B.59, B.52, B.64, B.51, B.49, B.48, B67. B.57, B.55, B.66, S.90	12	0
South.O (n=0)				
South.P (n=159)	North.H (n=18)	B.75, S.333, S.329, S.132, S.140, B.60, B.47, B.45, B.54, B.46	10	2 primary and 1 non-primary
South.Q (n=114)	North.H & North.I	S.314, B.65, S.299/305, S.260, S.261, B.68, B.53 (South only)	7	0
South.R (n=59)	North.I (n=134)	B.69, B.56, S.339, S.259, B.42, B.44, S.129, S.130, S.319, B.10, S.119, S.131, S.279, S.226	14	4 non-primary
South.S (n=36)				
South.T (n=11)				
TOTAL			55 contexts	3 primary, 6 non-primary

Table 4.2.2. Summary of Buildings and Spaces within the South and North areas by settlement phase, and the corresponding number of primary and non-primary production contexts found within them

Section 4.2.1 revealed that there is significant evidence for craft specialization based on: 1) contexts which contained evidence of primary stone bead production appeared to produce beads throughout the occupation of the building over a lengthy period, indicating bead production on a regular basis and perhaps even by different generations; 2) bead makers producing stone beads in these contexts were primarily working with one type of raw material, but were also experimenting with other raw materials; 3) bead makers only appear to be making disc or ring beads, with chert perforating tools that have mostly been found associated with stone bead production contexts. The chert microdrills are essentially specialized tools made for the perforation of beads, and chert debitage found within these contexts suggests that bead makers were retouching these chert microdrills in conjunction with the production of stone beads; 4) finished beads are not found in the contexts in which they are produced, either on the floors or within the burials of the buildings, therefore the household producing stone beads does not appear to be consuming; and 5) non-primary production contexts indicate the production of stone beads from raw materials with the same degree of relative hardness and toughness as those found in primary production contexts (Mohs 2-4) but also harder raw materials (Mohs 5-7), indicating that the bead makers at Çatalhöyük had the skillset to work with different raw materials.

Craft specialization has traditionally been associated with political and economic gain, especially within complex societies, and therefore harder to find within the Neolithic (Perlès and Vitelli 1999:96; Speilmann 2002:195), such as at Çatalhöyük, which appears to be more or less egalitarian throughout its occupation, based on burials, architecture, health, external midden refuse, etc. If we separate notions of hierarchy or production for elites, and focus at the level of a small-scale society, craft specialization in the context of stone beads simply refers to the fact that there are fewer producers and more consumers of stone beads (Costin 1991:43). Based on Costin's framework for identifying the presence of specialization (by looking at context, concentration, scale, and intensity of production) the factors mentioned above all indicate a situation where independent, dispersed, and part-time production is occurring at a household level at Çatalhöyük. There is no evidence of elite sponsorship with regard to stone bead production; hence the context of production is classified as independent (Costin 1991:8-9). Unfortunately it is harder to analyse the level of concentration, due largely to the amount of buildings and spaces excavated during some of the settlement phases, but according to the large amounts of beads (in both sampled and unsampled contexts), it is likely that stone bead production households were distributed throughout the site. The scale and intensity of production is also quite small, mostly individuals or households (based on the number of people that can work in an activity area of a building and the amount of bead related components found) working part-time in conjunction with other household duties (Costin 1991:15-16). According to Costin's eight part typology, the level of specialization at Çatalhöyük at the individual level would be as "autonomous individuals or households producing for unrestricted local consumption" (1991:8).

Hodder refers to the differential levels of production of items within the households at Çatalhöyük as "functional differentiation" (Hodder 2007:36), that is some households are linked to bead manufacture while others may contain more evidence of figurine manufacture, for example. Hodder believes that craft specialization at Çatalhöyük was limited and part-time, and primarily "house-based" (2006:180), and his findings are in line with the evidence of stone bead production at Çatalhöyük. Beads were more or less ubiquitous at Çatalhöyük; they were not goods only made for elites. The level of production found at Çatalhöyük is analogous to the organization and level of production within small-scale societies. There does not appear to be any social stratification at Çatalhöyük and stone bead producers have made beads and perhaps in return received food, supplies, or other goods.

If craft specialization was not the result of political or economic gains by elites or long distance trade, for example, then why did it come about? Stone beads were required and commissioned by the people of Çatalhöyük in order to fulfil societal requirements concerning communication, identity, magic and ritual, topics that are elaborated on in Section 4.4 and in the following chapter. Spielmann (2002:195) addresses this issue and states that craft specialization in small-scale societies resulted from the "demand for items critical for social reproduction" that she refers to as "socially valued goods". Socially valued goods were objects required for ritual use and objects needed for social relations by entire communities and it is the demand for these ritual objects that determined its level of production within the small-scale society (Spielmann (2002:195). Beads and other ornaments could have been used or worn in daily life, communal ceremonies, and even individualized ceremonies such as burials and their use in these contexts may have led to specialization (Spielmann 2002:198) (see Chapter 5).

If we consider the raw materials and tools being utilized for stone bead production, and the level of production at Çatalhöyük, the ratio of preforms and roughouts to finished beads is quite low. Not including unknown or indeterminate stone beads, there are a total of 23 roughouts, 73 preforms, and 1525 finished beads within the sampled stone bead assemblage spanning over a millennium. Unfinished beads make up only 4.8% of the stone beads assemblage. Granted, not many production contexts have been uncovered thus far, but this small proportion suggests that bead makers at Çatalhöyük were proficient in their craft. According to Costin specialized workers make fewer mistakes and "industries with fewer mistakes or more uniform products will be more specialized than those characterised by a large number of mistakes or less command over the productive process" (1991:40). It would be ideal if the dark red/brown tufa unfinished beads could be compared to the number of finished beads which were produced within the same settlement phase, in order to better understand the proficiency of stone bead production at Çatalhöyük. In addition, it is difficult to find evidence of bead makers-in-training or apprentices, based on the small number of unfinished beads, although a phyllite roughout in Building 18 may have been made by someone learning the trade or a child perhaps based on the two attempts to align the perforation from one side with the other (Figure 3.3.28).

The evidence suggests that stone bead production was indeed specialized, especially during the late Neolithic, but is there evidence to suggest that other objects at Çatalhöyük have a similar organization of production or similarly specialized? There is evidence to suggest that the production of clay balls, obsidian, brick, and some bone tools also may have been specialized, part-time and at a household level, which is in line with stone beads (Hodder 2006:181-182). Some buildings or households are also more involved with the production of one object over others, such as the impressive amount of ground stone found in Building 77 (Wright 2012, in press).

4.3 Manufacturing techniques, sequences, and preferences at Çatalhöyük

The results from the manufacturing marks studies presented in Chapter 3.3 were crucial to our understanding of how stone beads were manufactured, whether manufacturing sequences can be identified, and moreover what technical choices and preferences were made during the manufacturing process and the reasons for these choices. This section is mainly divided into two sections: the first addresses preferences in manufacture; and the second section discusses manufacturing techniques used in stone bead production at Çatalhöyük.

4.3.1 Bead types and sizes: manufacturing preferences at Çatalhöyük

Bead makers at Çatalhöyük had a number of decisions to make regarding raw material procurement and its manufacture into a finished bead. As we found in Section 4.1, the selection of raw materials was a process in itself that involved many choices and factors to be considered, both cultural and functional. Raw materials had to be able to take the forms cultivated by the cultural perceptions of both bead maker and bead user, which were of course inextricably linked. The bead manufacturer had a number of decisions to make regarding the final shape of the bead, what manufacturing techniques he or she would use to acquire this form, and how big or small the final form the bead would take. It appears that the selection of raw material, its manufacture into a certain bead type, and its final size, are all related processes in stone bead manufacture as determined by the results of qualitative analyses described in Chapter 3.1. Just as the qualitative variables of raw material and colour go hand in hand, so do bead type and bead size. When new bead types are introduced at Çatalhöyük, in addition to the more common simple disc or ring beads, the new bead types are clearly larger in size. New bead forms and larger sizes become more personal and conspicuous. So what preferences did bead makers and bead users have with regard to bead types and sizes, and how did these change over the span of the Neolithic at Çatalhöyük?

A total of 16 major bead types and 6 subtypes were identified amongst the sampled contexts. Figure 3.1.2 in Chapter 3 illustrates the 16 major types and photographs of subtypes are presented in Section 3.1.2.[7] The analyses conducted regarding bead types reveal that the vast majority of beads, approximately 85% consist of disc or ring beads, which are only differentiated by the size of the perforation in ratio to the diameter of the face of the bead. Ring and disc beads are essentially two ends of the same continuum, and divided only for the purposes of analyses. Disc and ring beads are prevalent throughout the Neolithic occupation at Çatalhöyük, both within and between settlement phases, and found in all the different sampled context types, followed by cylindrical and naturally or manually perforated pebbles. All four of the most frequent bead types are also the easiest to manufacture, and a number of disc and ring beads can be manufactured at a time (Section 4.3.3). All the remaining bead types which account for the remaining 10%, individually only make up 1% or less of the assemblage; these more variant bead types include the collared butterfly, butterfly heart, rectangular double perforation, lenticular, lenticular square, lenticular concave, plano-convex, axe head, double concave disc, round, long elliptical, cylindrical barrel, rounded barrel, conical, trapezoid, rectangular, and pendant.

Approximately just over half the stone beads assemblage is size 2 (2.6 – 5.0mm), followed by sizes 1 (0 – 2.5mm), and 3 (5.1 – 7.5mm), which all translate to 2.0 to 7.5mm along their largest or widest surface and correspond roughly percentage wise to the ring or disc beads that make up the bulk of the assemblage. Beads that are size 4 and larger (7.6 – 43.0mm) only appear in the assemblage during and proceeding settlement phase, South.L, and are associated with the emergence of variant bead types at Çatalhöyük.

The three settlement phases prior to South.L only appear to contain disc and ring beads, and their presence continues to dominate the assemblage throughout the remaining Neolithic occupation at Çatalhöyük. These beads are made from commonly used raw materials that can be divided into red to pink, black, and white to beige colour groups (Figure 4.3.1). The beads found in these three levels are unique in that over half of all the beads found within South.G to South.K are size 1, and only go up to a maximum size 3 (with the exception of two naturally perforated freshwater limestone pebbles that are sizes 5 and 6) (Figure 4.3.2). In fact, size 1 beads are basically ring beads with a diameter of only 2 to 2.5mm; they are incredibly small in size and smaller-sized disc or ring beads are more difficult to

[7] This is not to say that these are the only bead types found at Çatalhöyük, there are a few examples of beads not present in this typology found in late unstratified burials as eroded surfaces from the Neolithic (Space 1003, North area) as well as beads from the foundation trenches which may be Neolithic or Chalcolithic (Space 1006, North area), as well as stone beads which can be securely associated with Chalcolithic, Byzantine or Roman occupation. Stone beads from Space 1003 and Space 1006 could not be associated with a settlement phase and were therefore deemed as “unstratified” contexts, that may or may not have been occupied during the Neolithic, according to excavators.

manufacture than larger ones (Bednarik 2006, and observations made by author during experimental bead making). Why were such small beads being produced?

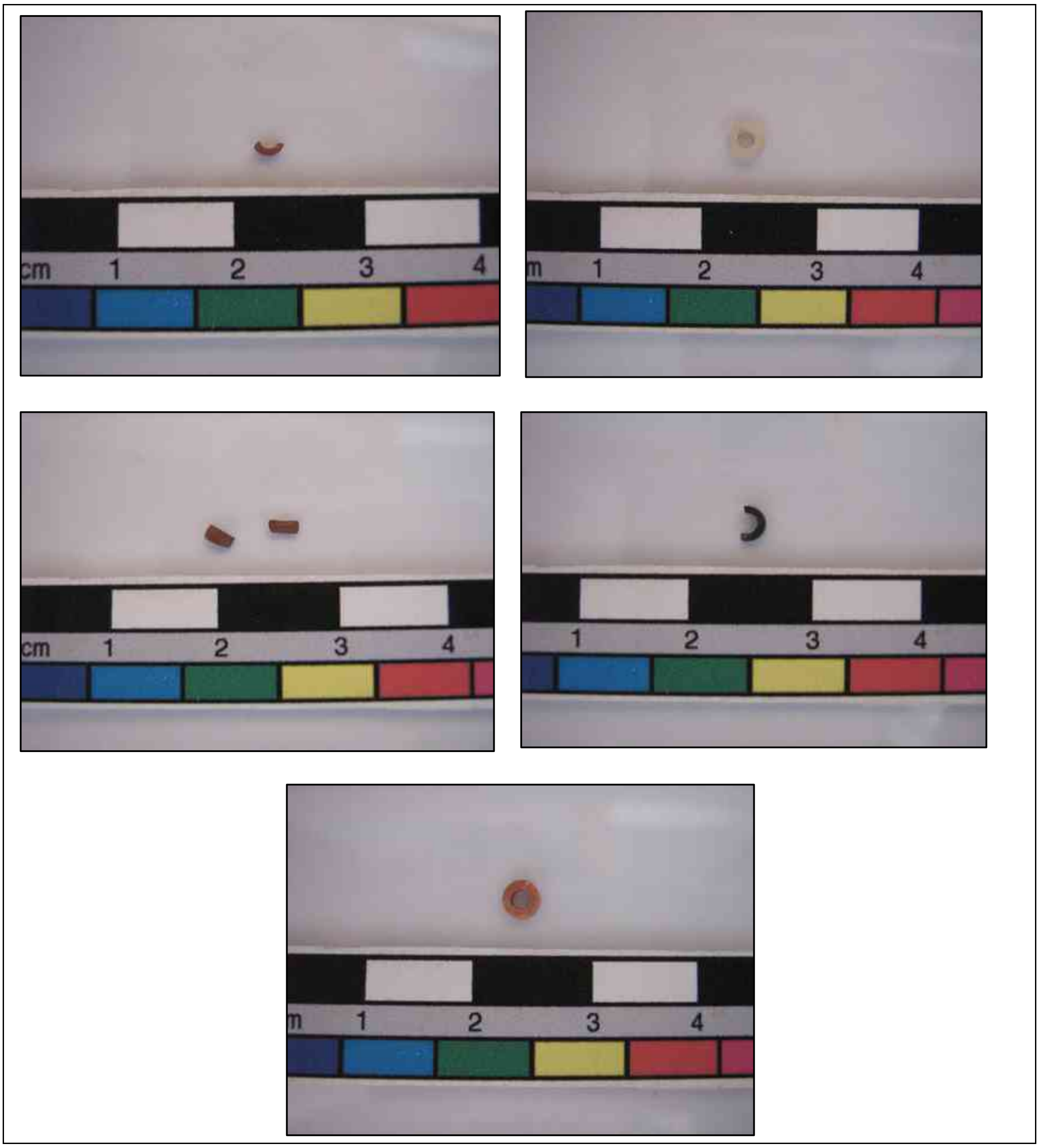


Figure 4.3.1. Examples of small red, black, and white coloured ring and disc stone beads from unit 4871, Space 181, South.G

With regard to the manufacturing process, small beads could be the result of the final abrasion process in which beads are strung in a line and abraded against an abrading slab to become a uniform size (see Section 4.3.3). If the initial preforms were not more or less even in size to begin with prior to being strung then they would have to be heavily abraded and may become quite small in the process of gaining uniformity. It is more likely, however, that bead makers at Çatalhöyük were purposely making small beads which may have been more difficult to produce and therefore required some degree of skill, but at the same time, if skilled, these beads may take less time to produce due to their small size (less depth to perforate and less perimeter to abrade). Perhaps it was this difficulty and the skills required which increased the ascribed value of the stone beads. The amount of effort and skill that went into making them may have made them "worth" more to the people of Çatalhöyük.

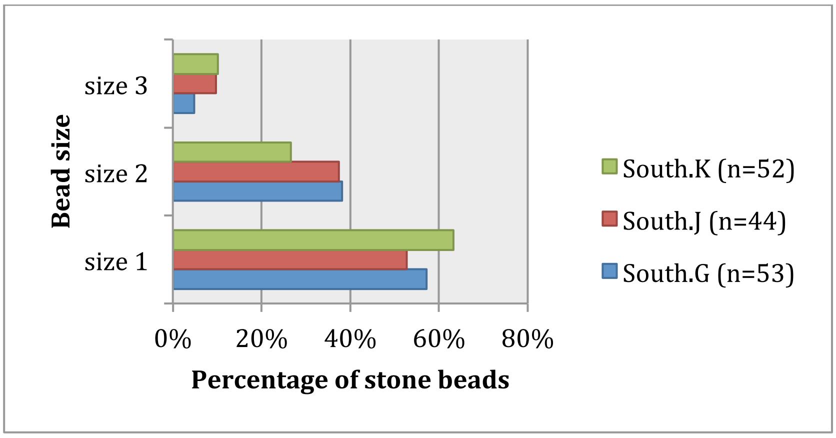


Figure 4.3.2. Percentage frequency of stone beads found in South.G to South.K, prior to the introduction of larger and variant bead types in South.L

South.G to South.K add up to quite a lengthy duration considering that the life span of a house could be anywhere from 45 to 90 years (Cessford 2005:78) and the total South.G levels may represent anywhere from 90 (68% probability) to 290 years (95% probability). It is estimated that there may have been around three or four building levels during the South.G phase alone not including the potential 90 to 180 years of occupation in both South.J and South.K (Cessford 2007:91). What can account for the uniformity seen in stone beads during such a lengthy period of time?

There may be practical reasons concerning manufacture techniques and raw material use (Section 4.1), as well as social, cultural, or ideological reasons. Most of the raw materials used for bead production were likely to have been obtained from the limestone hills surrounding Çatalhöyük so it does not appear that there were any constraints in the availability of commonly used raw materials. For this reason, this may not simply be a case of Neolithic bead makers making their raw materials go further by producing smaller but larger amounts of beads. One practical reason that can account for the level of uniformity is that according to manufacture marks studies, ring and disc beads were abraded in groups until uniform in size during the final abrasion process, so a number of beads, identical in diameter, could be made at the same time. But this practice alone cannot account for the stringent emphasis on homogeneity during the early Neolithic. Instead, we must also consider social factors to do with both stone production and use.

It appears that small, red, black, or white coloured disc or ring stone beads are the socially accepted type; and bead makers at Çatalhöyük were purposely making these beads in a relatively standardized manner during the early Neolithic. This uniformity suggests an adherence to a strict technological tradition for bead makers, but these beads were also guided by and made to fulfil the requirements and social specifications of the larger Çatalhöyük community. During this transition period into sedentary life, these stone beads may have served as a means to construct, maintain, and propagate a social or communal identity for the people of Çatalhöyük. Stone beads and personal ornaments in general, at Çatalhöyük, were therefore one of many media used to create and sustain a common communal culture or a "large – scale corporate identity" (Hodder 2007:26) which was needed in order for a large group of people to co-exist in such close proximity. There are no burials with any stone beads in South.G to South.K, so we have limited use contexts to help us better understand more about stone beads during this time; but the lack of stone beads in burials also substantiates notions of egalitarianism and social cohesion within the community.

Although the archetypal black, red, and white disc and ring beads remain the staples of the stone beads assemblage throughout the Neolithic at Çatalhöyük, in the proceeding settlement phases of South.L (Builidng 43) and South.?M (Building 50), we find evidence of bead types, also larger in size, not previously found at Çatalhöyük (South.G to South.K). These new bead types were all made from raw materials that had been previously used at Çatalhöyük, but perhaps some of the bead types were made from more aesthetically-pleasing variations of these raw materials. Interestingly, in both these cases, the new larger sized bead types were found only in burials, beneath the building platforms, worn by the deceased. The new bead types in a child burial in Building 43 included cylindrical, axe head, and collared butterfly beads (Figure 3.1.8) and the burial of an older female adult in Building 50 included rounded barrel, cylindrical, lenticular, lenticular square, and plano-convex beads (Figure 4.3.3). These new forms were found alongside the more traditional disc and ring beads already being used. It is highly significant that the use of new manufacturing techniques and the production of these more individualized and conspicuous ornaments was first used in a ritualized context. These two examples emphasize the symbolic role played by beads in Neolithic ritual practices, and the new additions in bead types may reflect the new or changing roles of stone beads at Çatalhöyük, which are discussed further in Section 4.3.3 and Chapter 5.

Figure 4.3.3. New bead types found on skeleton in burial F.1710 in Building 50, South.?M. Photo by J. Quinlain, Çatalhöyük Research Project

In addition to the adult female burial with stone beads (F.1710) in Building 50 (South.?M), another burial of an adult male (F.1710) within the same building contained an antler point or pressure flaker and a chert bead making toolkit (Figure 3.2.7). Significantly, two individuals, male and female, were found buried with bead making tools and five new elaborate bead types. The female was buried first and then later partially disturbed when room was made for the burial of the male in the centre of the platform. Whether this was a bead producing household, or the female was gifted the beads made by the male bead maker and subsequently buried with his tools (the tools do appear to be used), cannot be determined with certainty. What can be said is that these two individuals are special to those who buried them and time and effort was put into personalizing, gifting and adorning them prior to their burial.

New or variant bead types were first introduced before the use of new raw materials (which were most likely introduced sometime during South.N or South.O (unexcavated) and South.P). It makes practical sense for bead makers at Çatalhöyük to experiment with and construct new bead types from raw materials they were already familiar and that were already known to be ideally suited for stone bead production and the production of other non-utilitarian objects of social significance (Figure 4.1.9). If bead makers could successfully learn the manufacturing techniques and sequences associated with the production of these new bead types on previously used raw materials, they could then later transfer these skills to raw materials that were much harder to manipulate such as fluorapatite, hematite, or turquoise. Because of the choice of raw materials used to manufacture these new bead types, it is almost certain that these new bead types were manufactured at Çatalhöyük and were not simply brought to site through interaction. South.L and South.?M therefore represent a period of transition in stone bead technologies when bead makers were experimenting with bigger and bolder bead types.

From South.P onwards, until the end of Neolithic occupation at Çatalhöyük, twelve further bead types were added to the stone bead assemblage (Figure 4.3.4; Table A3.1.15). These new bead forms are produced from both previously used raw materials as well as newly introduced raw materials. The new raw materials were used to make new bead types and rarely, if ever, made into disc or ring beads. The new raw materials were kept for the production of larger and more elaborate bead types, which were visually very different from the more common standardized beads. In fact, there appears to be a general pattern in regard to the relationship between raw materials and bead types. The more elaborate the bead type, the larger its size, the more colourful (varied) or aesthetically different and generally less common the raw material. These beads were meant to be seen and stood out in comparison to the small and simple disc and ring beads. Size, colour, raw material selection – all these factors draw attention to the beads, and also perhaps to those wearing or using them.

There are also subtle modifications in the production of the standardized small ring or disc beads. The first is that the average size of ring and disc beads increases slightly. Second, the black and red coloured commonly used raw materials essentially remain the same throughout the Neolithic, but South.L onwards we find that the trend in using greener coloured serpentinite and steatite picks up and continues throughout the remainder of the Neolithic.

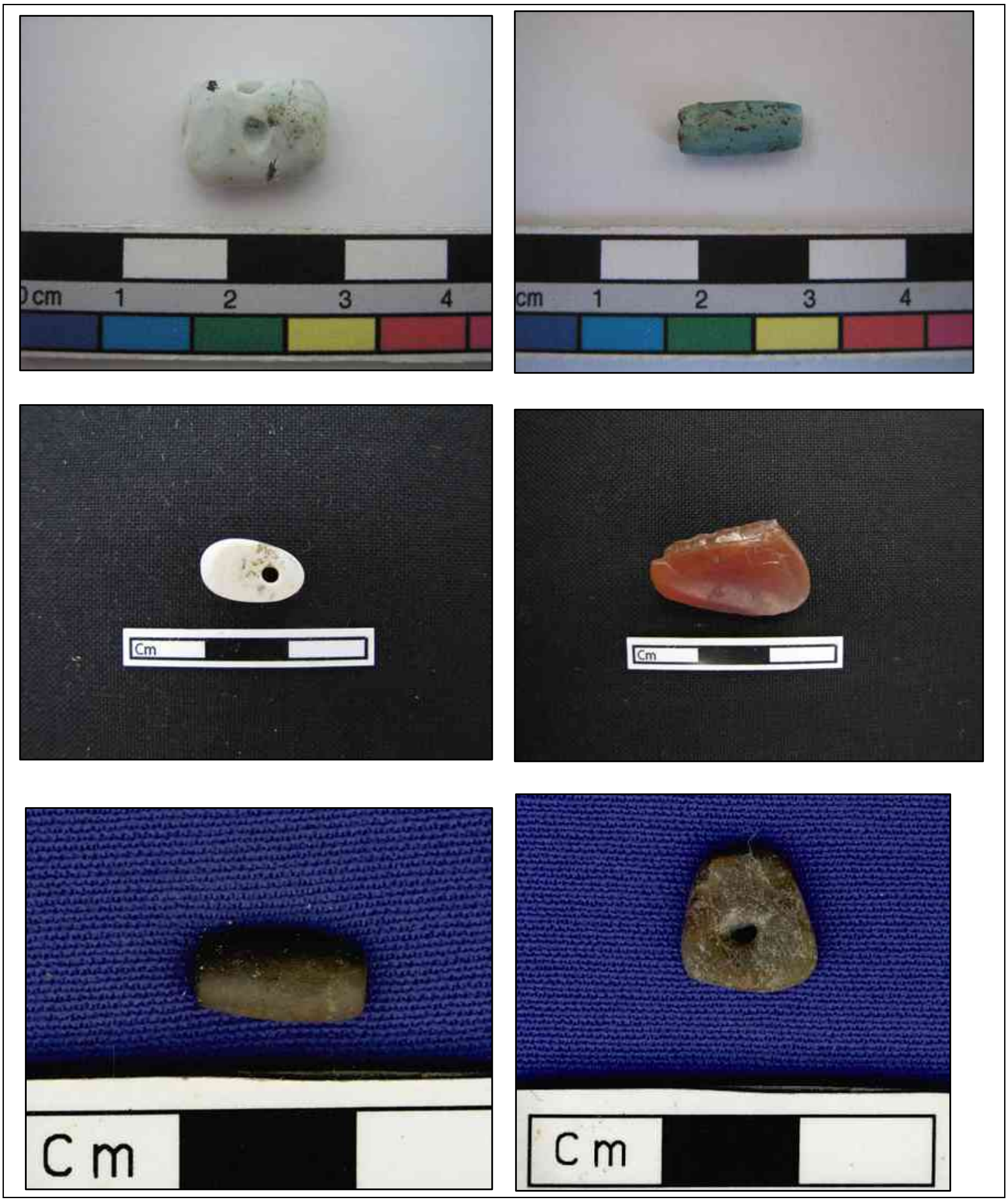


Figure 4.3.4. Stone bead types found in or after South.P (clockwise): rectangular double perforation, long elliptical, butterfly heart, trapezoid, cylindrical barrel, and pendant. Bottom two photos by K. Wright

Most of the new types of stone beads require more raw materials to produce them due to their larger sizes or more complex bead shapes. In earlier phases, stone beads may have been made smaller than necessary to reflect the skill of the bead maker due to the difficulty in manufacturing them as well as to perhaps ascribe more value to the bead, but now we find that skill is not simply determined by size, but also in the creation of more difficult yet elaborate bead types with more challenging raw materials. These new bead types required more time and labour as they had to be made individually and this may account for their relatively small presence within the stone beads assemblage. Some bead types are only found once so far, but further excavation may change this picture. These elaborate beads may have been used differently to the more uniform disc or ring beads, and this will be discussed in the next chapter.

How did these particular bead types come about after using the universal ring or disc beads for so long? The main commonality between these shapes is their symmetry. All shapes apart from the naturally or manually perforated pebbles are very symmetrical and therefore also aesthetically pleasing. The shapes of the elaborate beads are all derived from basic shapes – the circle, square, rectangle and triangle, although the collared butterfly is much more sophisticated due to its collared ends (Figure 3.1.2). The shapes could have also been derived from other everyday objects such as clay balls for cooking, fruits, berries, basket matting, obsidian mirrors, whorls, skulls, ovens, hearths, spots on the much revered leopard, and stone hammers (circle), knapped lithics, hand axes, geometric shapes as decorative motifs on walls and benches, wild animal horns (triangle), house shapes, platforms, ladders, decorative geometric motifs (rectangular or square). These shapes are all a part of Çatalhöyük life.

The greatest variation in bead types, raw material use, and bead sizes is found in settlement phases South.T and North.H, which appear at either end of the late Neolithic spectrum (Tables A3.1.15, A3.1.7, A3.1.36). These phases essentially span the late Neolithic, and therefore it is safe to say that South.P to South.T and North.H to North.I are the phases which show the most variability in stone bead use and that stone bead technologies peak during these phases (Figure 2.1.1). These five settlement phases may represent anywhere from approximately 225 to 450 years according to Cessford's estimate of a life span of a building (2005:78). The transitions and changes in stone bead technologies at Çatalhöyük were very slow and gradual and can be observed over the course of the Neolithic but are still framed within a conservative Neolithic context.

The vast majority of the conservative assemblage found from the earliest phase remains the same, with only minor changes in preference regarding colour selection (more green) and size (generally larger). Even when looking at the small percentage of variant bead forms there still appears to be some adherence to a technological tradition, even when smaller sample sizes are considered. For example, commonly used raw materials used throughout the Neolithic may be used to make more variant bead types, but more uncommon raw materials are generally reserved for variant bead types. The new and colourful raw materials used in the late Neolithic were meant to stand out in comparison to the more common standardized disc and ring beads. Green, blue, yellow, orange, and metallic coloured raw materials were manufactured to draw attention to them and stand out. Over the course of the Neolithic we see a gradual shift towards more personalized stone beads, that may reflect socially acceptable glimpses of individual tastes, preferences, and identities, all within the conservative and egalitarian Neolithic environment of Çatalhöyük. In terms of bead technology, bead makers were also becoming more competent and skilled as seen by the manufacture of variant bead types with challenging new raw materials. By South.P we find evidence that stone bead production was a specialized craft. Specialized bead makers were highly skilled craftspeople that made stone beads which reflected the demands of their community and the growing social complexities associated with a sedentary lifestyle at Çatalhöyük. Why these transitions occurred is discussed further in Section 4.3.3 and the next chapter.

4.3.2 Manufacturing techniques and sequences at Çatalhöyük

The results from the analyses of production contexts and manufacture marks studies presented in Chapter 3.2 and 3.3, respectively, can help us reconstruct the manufacturing process for stone beads at

Çatalhöyük. The main source of information regarding the manufacturing process is derived from manufacture marks analyses of unfinished beads, and at Çatalhöyük, the vast majority of these roughouts and preforms are precursors of ring and disc beads. There is, therefore, ample evidence to support the construction of a manufacturing sequence of disc or ring bead production; however, most other bead types are only found in a finished state and are void of manufacture marks, making it much more difficult to form a manufacturing sequence for them. First, a manufacturing sequence for ring and disc beads is presented, followed by examples of potential manufacturing sequences of variant bead types, and finally, a general discussion of manufacture techniques.

Manufacturing disc or ring beads at Çatalhöyük

There are five main steps in the production of stone disc or ring beads. Different methods of reduction may have been used for different raw materials, depending on their geological properties of toughness, hardness, and fracture. Most of our production evidence is derived from hard limestone or soft marble, tufa, phyllite, serpentinite, steatite, soft saccharoidal marble, and to a lesser extent, calcite, fluorapatite, chert, and hematite. Potential variations in methods of manufacture are discussed in each step.

Step 1

Raw materials were procured from the potential source locations discussed in Section 4.1, and it appears that small nodules or reduced nodules were brought to Çatalhöyük, based on debitage evidence found in production contexts, particularly Space 329. These nodules were reduced into angular shatter and flakes using the percussion technique with either a hard or soft hammer, depending on the geological properties of the raw material in question (Figure 4.3.5, Plate 1). The vast majority of raw materials were neither that hard or too tough to work, so this initial process would not have been too difficult. In addition, tools such as the antler point found alongside the bead toolkit in the burial in Building 50 (F.1709) may have also been used as a chisel between the hammer stone and raw material to more finely reduce nodules and larger pieces of angular shatter to the size of roughouts.

Step 2

Roughouts were shaped by creating two flat surfaces for perforation by abrading either end of the bead, followed by abrasion along the length of the bead, which formed distinct abrasion facets (Figure 4.3.5, Plate 2). Ground stone tools, such as grooved abraders, palettes, or abrading slabs were used to reduce beads via abrasion. These abrasion facets, along the perimeter of the bead, formed a subrounded or square shape. The roughout, which was approximately 10mm in diameter, and just over twice the size of the average finished ring or disc bead, was now ready for perforation.

Step 3

The roughout was then perforated into a preform. Perforation analyses reveal that the vast majority of beads were perforated biconically (from two sides) using a mechanical drill (for example, a pump, bow, or strap drill), but some were also perforated by hand (both one- and two-handed) (see Chapter 3.3). It appears that at least some beads were prepared for perforation. There are examples of roughouts that contain a peck mark or initial hand drilling indentation on the surface, where they would have subsequently been perforated. This indentation was created prior to perforation to both align the perforation from either side, as roughouts were drilled from both ends, and to create a well on the surface of the bead in which the tip of the chert microdrill or perforating tools could rest prior to drilling. When conducting bead making experiments, this step proved essential in creating a non-slip surface for drilling, and made the initial perforating process much easier (Chapter 2.3).

The roughout was then drilled straight down from one side first between half or three-quarters of the way through, and was then turned around and perforated from the other side, the remainder of the way through (Figure 4.3.5, Plate 3). There is a good reason why the majority of beads were drilled bi-conically as many preforms in the stone beads assemblage were only drilled uni-conically (from one side) and as a result, snapped during perforation, mostly likely due to the pressure of the drill and perhaps the brittleness of the raw material. This suggests that a successful perforation is more likely if a perforation is made from both sides (biconical and straight down) as opposed to one side (uniconical). Chert microdrills appear to be the main perforating tools used to perforate stone beads (also corroborated by bead making experiments and use-wear analyses (Appendix D), although there is also some evidence of obsidian microdrill use.

Abrasives, made from fine sand and water or fat, could have been used to make perforations easier and quicker (for example, Foreman 1978; Kenoyer 1992a; 1994; Kenoyer, Vidale and Bhan 1991; Possehl 1981), but there was very little evidence of their use at Çatalhöyük, which may be due to the already soft nature of the raw materials. Bead experiments indicated that the grains of less hard or compact raw materials became dislodged in the perforation and acted like an abrasive. This characteristic would be found with some of the raw materials used at Çatalhöyük such as soft limestone, tufa, hard limestone or soft marble, soft saccharoidal marble, and some forms of serpentinite and steatite. It is, however, much more likely that abrasives were used for perforating harder beads, but more bead experiments need to be conducted with harder raw materials as a means of comparison (Figure 2.3.15).

Step 4

After perforation, preforms were individually abraded along their length to create a more rounded shape and a relatively similar size (Figure 4.3.5, Plate 4). This step ensures that no preforms break during the final abrading process, which is next.

Step 5

Preforms were then strung together, most likely using twisted fibers made from sedge (Philippa Ryan, personal communication; Figure 3.3.20), and abraded in a vertical motion against fine-grained and dense sandstone or andesite abrading slabs (Figure 4.3.5, Plate 5). During this final process, the beads are abraded into their final circular shape and become uniform in diameter (Wright *et al.* 2008; Foreman 1978). This action is also most likely responsible for the smooth surface of the face of the bead. The faces of the preforms would have rubbed up against one another during group abrasion and the friction between the raw materials would have smoothened and to and extent polished the ends or faces of the bead. The use of group abrasion is also supported by the prevalence of sharp edges of ring and disc beads. It is possible that the perforation of the bead slowly expanded and became smooth during this final process of abrasion.

The basic techniques used for the reduction process during manufacture appear to be chipping, specifically in regard to the break down of nodules and larger shatter and flakes, and abrading, which is the main technique used to both shape and reduce the bead during the remaining disc or ring bead manufacturing process. The geological properties of more commonly used raw materials for stone bead production, particularly the low hardness and ideal level of toughness (strong enough to hold together but weak enough to manipulate), make abrasion an ideal method to shape roughouts and preforms. The manufacturing techniques developed and used by bead makers were well suited to both the raw materials used as well as the tools available to them. The manufacturing sequence for disc and ring stone beads is summarized in Table 4.3.1.

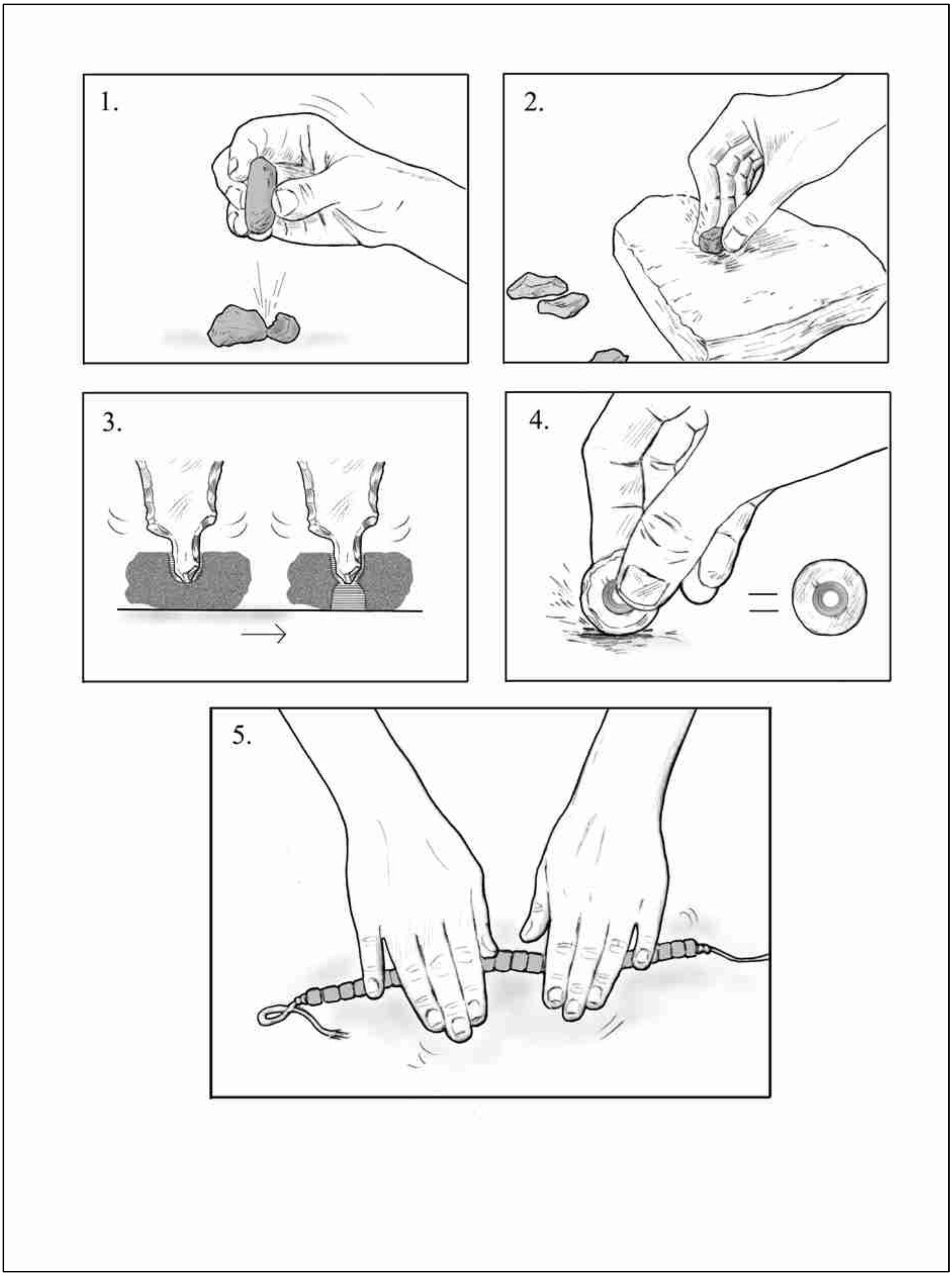


Figure 4.3.5. Illustration of stone disc or ring bead making manufacturing sequence. Drawing by Lyla Punch-Brock, Çatalhöyük Research Project

	Stage of manufacture	Methods	Tools	Evidence
1	Procure raw material and reduce nodules, angular shatter, and flakes into roughout size	-obtain raw materials via trade, quarrying, surface collection -this initial reduction can be done both off- and on-site	-hard and/or soft hammerstone	-primary tufa bead production contexts containing nodules, angular shatter, flakes, and debitage
2	Create roughout	-abrade both ends to create two flat parallel surface, ready for perforation, and along the length of the roughout forming a square or subrounded shape	-grooved abraders, palettes, or abrading slabs	-abrasion facets and marks (linear parallel striations) on the ends and length of roughout
3	Perforate roughout	-create a peck or indentation prior to perforation -perforate biconically/straight, biconically/slanted, uniform/straight, uniconically/straight or uniconically/slanted -with mechanical drill, one-handed drill, or two-handed drill	-mechanical drill -hand drill -drill/microdrill hafted in a stick for two-handed drill -chert drill or microdrill -obsidian microdrill, bone point or awl -may use sand and water or oil as abrasive	-perforation morphology, perforation marks, tool use-wear, and production context analyses
4	Abrade preform	-abrade individually to similar size and round shape	grooved abraders, palettes, or abrading slabs	-abrasion marks and facets on preforms
5	String and group abrade preforms into finished beads OR Individually abrade large disc or ring bead	-abrade strung beads vertically against abrading slab until even in diameter and smooth -abrade individual bead by abrading it vertical against a grooved abrader, palette, or abrading slab -also need to finely abrade the end of an individual bead	twisted fibers made from sedge – sandstone or fine andesite abrading slab -grooved abrader or palette may have been used for individual fine abrasion -possibly sand and water or oil as abrasive	-fine linear horizontal striations on length, smooth perforations, smooth ends of beads, and uniform size, interlocking strung beads, and sharp edges -more rounded edges for individual abrasion

Table 4.3.1. Template of manufacturing sequence for disc or ring stone bead production at Çatalhöyük

Similarly, the manufacturing techniques used to perforate stone roughouts successfully and without any breakage consisted of perforating from both sides. A peck or indentation prior to perforation could ensure a more successful and aligned perforation. Based on bead experiments, even after making approximately twenty perforations, the author still had trouble aligning the perforations from both sides, creating a perfect hourglass shape in cross section. But most beads analysed for manufacture marks studies appeared to be well-aligned and had perfect or almost perfect hourglass perforation morphologies, indicating that bead makers, even as early as South.G were successfully aligning perforations with minimal mistakes (Figure 4.3.6). As previously mentioned, very few preforms have perforation errors, which also attests to the proficiency and skill of bead makers.

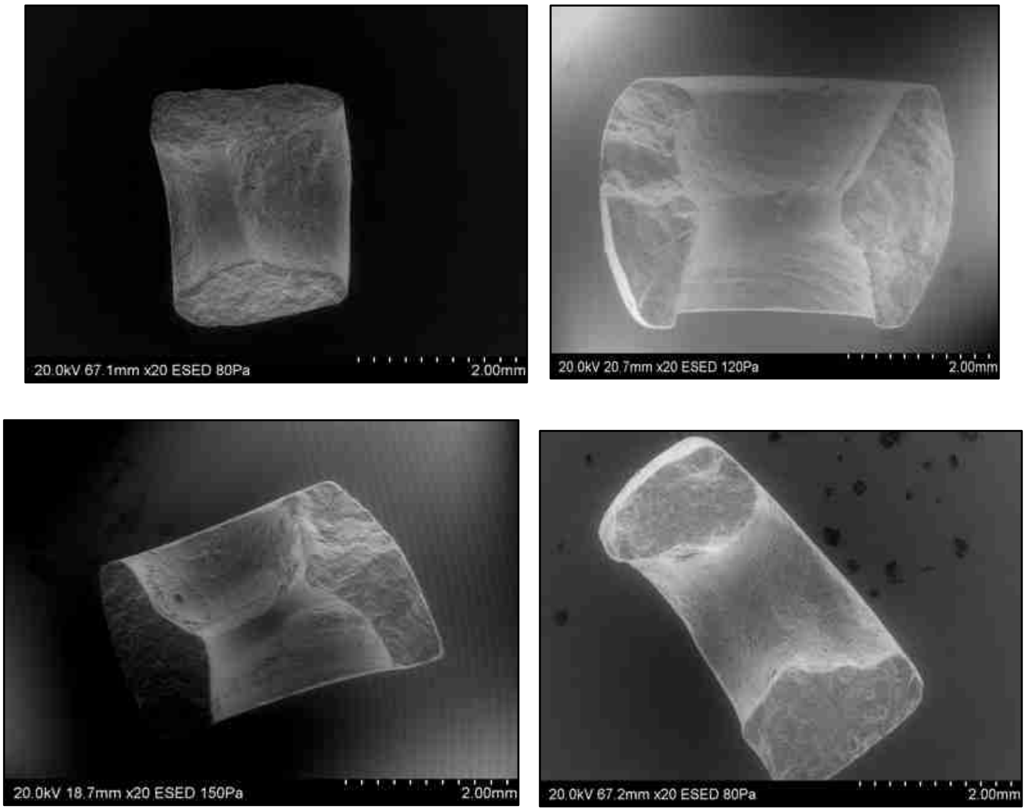


Figure 4.3.6. SEM images illustrate examples of well-aligned perforations (top) and almost well-aligned perforation morphologies of finished beads from South.G, all four images indicate a consistent level of skill

It is difficult to discern how long the process of bead manufacture took for one bead, and there are many variables to consider such as the tools used, methods of perforation employed, and the natural properties of raw materials used. According to an experiment undertaken by the author for the perforation of limestone (Mohs 2-3) similar to the hard limestone or soft marble raw material found at Çatalhöyük but slightly less hard, there is a substantial difference in the time it takes to perforate a relatively soft raw material and this directly depends on the drilling method employed (Table 4.3.2). The perforation time becomes even more important when perforating a harder raw material such as the tufa (Table 4.3.2). Although these experiments were only conducted once, and need to be repeated, one can see that the harder the raw material the longer it takes to perforate and time also depends on the method by which beads are perforated. If one was to perforate the average tufa 4mm (depth or height) disc or ring bead by hand, the process could take up to 13 minutes, and this explains why hand drilled perforations are not so prevalent. Even if a mechanical drill was used to make the same tufa bead, approximately 4 minutes could be used to make indentations and perforate through the material, and time is also needed to reduce and abrade the bead, and if it takes almost a minute to mechanically perforate through 1mm of tufa, it takes equally as much time, if not more, to manually abrade 1 mm of tufa against a sandstone abrading slab, based on experiments. The entire manufacturing process is difficult to estimate and the experiments conducted were by someone at an amateur level in comparison to the highly skilled bead makers at Çatalhöyük. Taking all this into consideration, the author conservatively estimates that to manufacture ten simple disc or ring tufa beads could have taken approximately two hours, for someone with an adequate skill level, not including the collection of raw materials.

Perforation method (flint microdrill)	Time needed to perforate 1mm of limestone (Mohs 2-3)	Time needed to perforate 1mm of tufa (Mohs 4)
1 hand	1 minute 29 seconds	3 minutes and 15 seconds
2 hand (hafted)	34 seconds	1 minute 2 seconds
Mechanical (bow drill)	14 seconds	51 seconds

Table 4.3.2. Basic experiment conducted to determine approximate time it takes to perforate limestone or tufa

It was essential to conduct at least some bead making experiments in order to understand how time-consuming, laborious, and the level of skill required in order to manufacture even simple ring or disc stone beads, let alone more variant bead types. A number of factors were found to affect the outcome of making a successful perforation such as the balance between the pressure required to perforate a roughout without snapping it, difficulty assessing how deep the perforation is so as not to break the roughout, preparing an indentation or peck prior to perforation, aligning the perforations correctly, and appreciating how difficult it is to make both large beads (long perforations) as well as small beads (difficult to perforate without breakage; must be manufactured with care). By working with stone and replicating some of the manufacturing processes, a number of insights were made from the perspective of the bead maker and the skillset required to make so many beads without errors was better appreciated.

The ground stone toolkits used to reduce, shape, and polish stone beads (using different grades of abrasive stone) were essential tools used in many aspects of daily life at Çatalhöyük; bead makers and non-bead makers alike would have been familiar with these tools. The absence of drilling benches and capstones is however unusual. Softer stones could be mechanically drilled without the weight of a capstone, however something is needed to hold the haft in place. It is possible that a pump or strap drill was being utilized instead of a bow drill.

Perforating tools, on the other hand, were much more particular to stone bead production. Based on the outline of perforation, its conical shape, the marks found within a perforation (Section 3.3), production data, and use-wear analyses (Appendix D), chert drills, and specifically microdrills were used to perforate through roughouts. Chert was an ideal raw material as it is harder than most of the raw materials at Çatalhöyük. Chert tools make up a very small proportion of the lithics assemblage at Çatalhöyük, but bead makers understood that chert was a much more robust raw material to knap and use to perforate stone due to the brittle nature of obsidian, although a few obsidian microdrills have also been found. Based on production data, bead makers were most likely also knapping chert microdrills in conjunction with stone beads, making them specialized tools. Interestingly, there is evidence for the use of a mechanical type drill from the earliest settlement phase excavated to date, South.G, so it is possible that the earliest settlers of Çatalhöyük brought this technology with them. At Aşıklı Höyük, a site in Cappadocia preceding Çatalhöyük, there is also evidence of the use of a mechanical drill, so it is possible that early settlers were making use of this technology (Bains *et al*., in prep.).

Manufacturing variant bead types at Çatalhöyük

There is very little evidence for the production of variant bead types at Çatalhöyük, with the exception of a few examples from non-primary production contexts and a few single examples found in midden deposits. The non-primary production contexts contain what appear to be two preforms for the production of lenticular fluorapatite beads (Figure 4.3.7b and f; Figure 3.3.45a-c), a hematite disc or ring bead or a broken pendant preform (Figure 4.3.7f), and a steatite spacer preform (Figure 3.3.42), all in North.I. The three single examples, found devoid of any production related components, are a fluorapatite rounded barrel or lenticular bead preform from North.I, a calcite pendant preform, and hand perforated piece of carnelian angular shatter which may also be a discarded preform, both from South.Q (Figure 4.3.7c-e). Some of these beads were analysed for manufacture marks (Chapter 3.3) and it was found that the basic bead making template used for the production of disc or ring beads essentially forms the main spine in the manufacturing sequence used to produce variant bead types. For some variant bead types the steps may be exactly the same but may take longer and require more skill, and for others, there may be some additional steps.

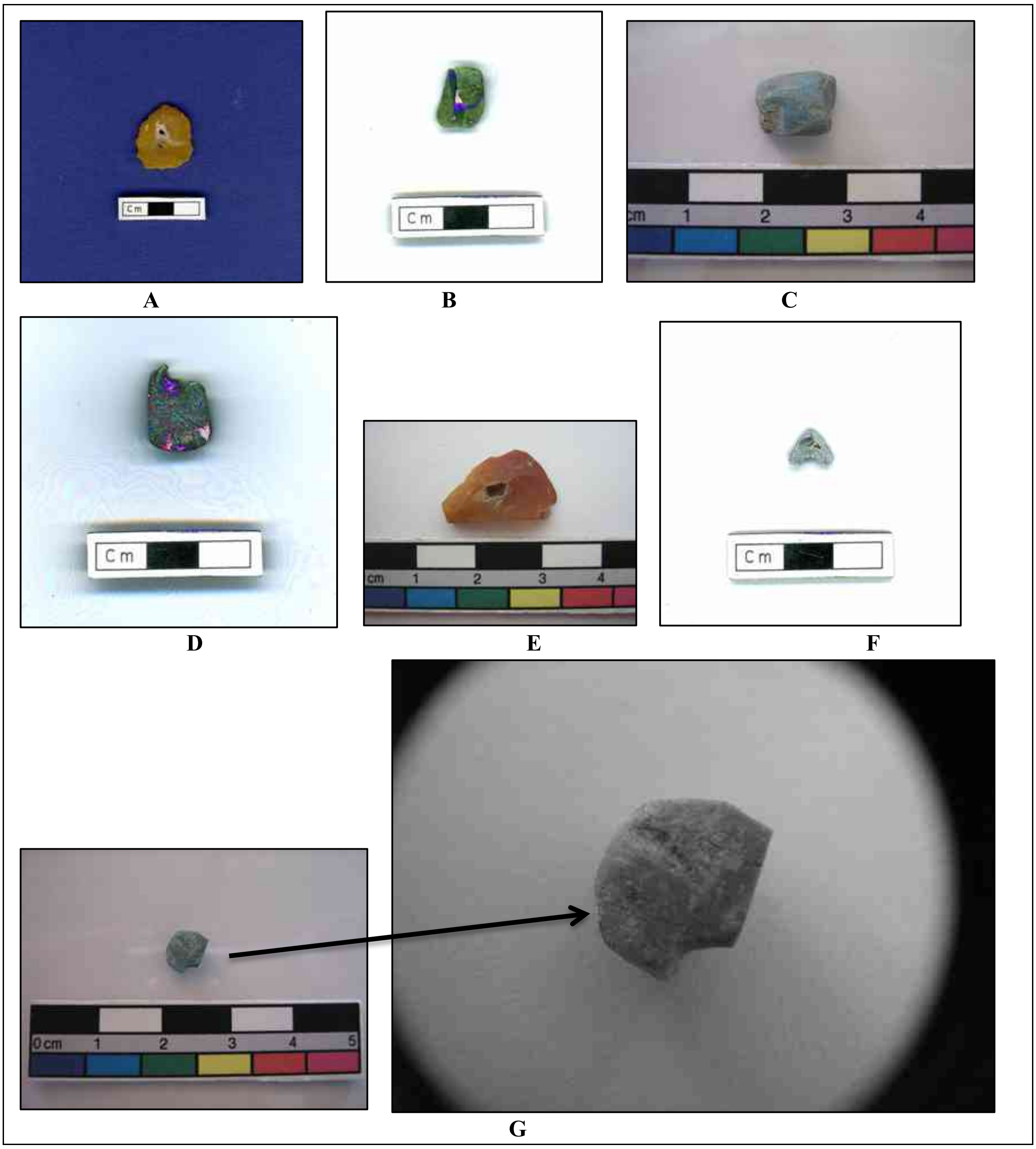


Figure 4.3.7. Potential preforms for variant bead types: A) 12972.H1, hand perforated chert flake; B) 12972.H7, possible fluorapatite lenticular bead preform; C) 13174.X4, possible rounded barrel or lenticular fluorapatite preform; D) 12501.H1, possible calcite pendant preform; and E) 17308.H2, hand perforated carnelian angular shatter; F) 8864.H2, possible hematite disc or ring preform or broken pendant preform; G) 14120.H7, possible fluorapatite lenticular bead preform. Photos of A, B, D, and F by K. Wright

The main differences are that variant bead types, with perhaps the exception of some shorter cylindrical beads, were made individually, and a useful tool in manufacturing individual beads is the grooved abrader, which could have abraded two or more sides at one time. In addition, the final polishing process for individual beads would have differed. The rounded edges suggest group or individual polishing with the use of abrasives to polish off all the manufacture marks and make the surface of the bead smooth. This could have been achieved by polishing beads in a tumbling process, in which beads are rolled around in a leather bag with abrasive (Gwinnett and Gorelick 1989:163; Gwinnett and Gorelick 1991:189; Wright *et al.* 2008:150; Kenoyer 1986:20), or by continuously abrading the surface using an abrasive paste on leather, for example. The beads made from very hard and siliceous raw materials such as carnelian would have had to been initially reduced via chipping rather than abrading. Carnelian beads (although we do not have enough to be examined for this) may have also been perforated using the punch technique that only involves partial drilling (Calley and Grace 1988:75). The carnelian bead is drilled half way through and the remaining unfinished perforation is struck from within the already half way drilled perforation and the remaining conical bit is removed (Calley and Grace 1988:75).

For those variant bead types that are present in the assemblage only once, one can see the level of skill and amount of work that went into manufacturing the bead, but it is difficult to compare the level of precision. A high level of precision would indicate a high level of skill. In the rich child burial found in Building 43 in South.L, we find that a number of identical beads were manufactured based on two new bead types, the axe head and cylindrical beads (Figure 4.3.8). The axe head beads, which are made from serpentinite and soft saccharoidal marble, were each made individually and possibly by the same individual, as they are made fresh for the burial (or previously not used) and from the same raw material batch. There is a high degree of precision amongst these beads; one can only see differences in in length and width upon close inspection (Figure 4.3.8a). Similarly, the cylindrical beads are quite similar but do differ both in height and diameter (4.3.8b). These differences are attributed to making each of these beads individually. The bead maker(s) in this case was skilled enough to plan and execute the manufacture of almost identical beads to a high degree of precision. By making more of the same unique variant bead forms, and placing them in the same context, the bead maker, or for whom the bead maker made these beads to place in the burial, is also making a big statement.

Figure 4.3.8. Serpentinite and soft saccharoidal stone beads found in F.1860, Building 43, South.L (top: axe head; bottom: cylindrical)

In other burials we find only single examples of other variant bead types although there are numerous examples of identical ring or disc beads which would have been made in batches (during final abrasion process) and therefore also most likely by the same individual. An example of such is a woman and child burial (F.4000), in Building 49, North.G, which contains 233 small disc or ring beads made from steatite, phyllite, metabasalt, and serpentinite (Figure 4.3.9).

Figure 4.3.9. Disc or ring beads from Burial F.4000, Building 49, North.G

Even in Building 75 and Space 329 we find evidence for the production of beads from the exact same materials, tufa and to a lesser extent, serpentinite. It is likely that the same person, household, or group of households were making these beads, although the scale of production suggests a single household. These examples demonstrate that there are some examples of individual bead makers, and that these can be particularly seen in single deposition events within burials or even similar *in-situ* production contexts.

Despite the lack of manufacturing data for variant bead forms, an attempt was made to devise manufacturing sequences for variant bead types based on manufacture marks studies and observations made throughout this project. These manufacturing sequences are however an estimation and may change with future experimental work and further excavation. Table 4.3.3 lists variant bead types and their potential manufacturing sequences. The sequences begin after the initial reduction of nodules, shatter, and flakes into approximately roughout size. It is very difficult to account for all the variables regarding stone bead manufacture such as the raw material used, the length of the perforation, and the manufacture of perfect curves and symmetry. Generally, more variant bead types are made by more special and challenging raw materials. The column labelled “Other factors” in Table 4.3.3 tries to account for these variables.

The bead types were also quantified (listed under “Level of complexity” in Table 4.3.3) in order to get a feel for which bead types were the most complex in their manufacture. Each manufacturing step accounts for a point and each additional factor accounts for two points, so as to emphasize the importance of that factor in the manufacture of the bead type. If there was an example for the use of a challenging raw material in a given bead type, this was accounted for, even though there may also have been examples of easier and more commonly used raw materials. The rating system for the level of complexity provides us with the highest possible levels for that given bead type.

Bead Type	Potential manufacturing sequence (after initial reduction into roughout size	Other factors	Level of complexity
perforated pebble (manually)	4		1
disc	2A-3A-4-3A-5B G/I		5
ring	2A-3A-4-3A-5B G/I		5
double concave disc	2A-3A-4-3A-5B-6		6
axe head	3A-2A-4-3A-5B-6		6
conical	3A-2A-4-3A-5B-6		6
trapezoid	2A-3A-4-3A-5B-6		6
spacer bead	3A-2A-7-2A-4-5A-6		7
plano-convex	3A-2A-4-3A-3A-5B-6		7
lenticular concave	3A-2A-4-3A-3A-5B-6	potential long perforation	7-9
lenticular square	3A-2A-4-3A-3A-5B-6	potential long perforation	7-9
cylindrical barrel	3A-2A-4-3A-5B-6	long perforation	8
round	2A-3A-4-3A/2A-5B-6	no edges	8
rounded barrel	2A-3A-4-3A-5B-6	hard raw material	8
barrel disc	2A-3A-4-3A-5B-6	hard raw material	8
barrel ring	2A-3A-4-3A-5B-6	hard raw material	8
rectangular	2A-3A-4-3A-5B-6	hard raw material	8
lenticular	3A-2A-4-3A-3A-5B-6	potential long perforation hard raw material	9-11
cylindrical	3A-2A-4-3A-5B-6 G/I	long perforation hard raw material	10
rectangular double perforation	2A-3A-4-4-3A-2A-5B	double perforation must meet hard raw material	11
butterfly heart	1-3A-2A-4-3A-5B-6	long perforation hard raw material	11
long elliptical	3A-2A-4-3A-3A-5B-6	long perforation hard raw material	11
collared butterfly	3A-2A-4-3A-3A-7?-5B-6	long perforation round collars	12

Figure 4.3.3. Summary of potential manufacturing sequences for all bead types (except pendants due to their variability) and a scale of difficulty in producing a given bead type. Legend: 1 – chipping; 2 – abrading end; 3 – abrading length; 4 – perforation; 5 – final abrading; 6 – polishing; 7 – sawing; A – abrading rough; B – abrading fine; G – group; I – Individual

Not surprisingly, the stone beads that are the most laborious and difficult to make are the collared butterfly, butterfly heart, long elliptical, and rectangular double perforation. These bead types are also some of the least frequent in the assemblage and some of the most variant (far from the norm). The easiest bead types to produce are manually perforated natural pebbles, disc, and ring beads. The most complex bead forms are made to such a high standard and require the skill, foresight, and execution of an experienced bead maker.

The techniques used by bead manufacturers at Çatalhöyük to produce ring and disc beads essentially remained the same throughout Neolithic occupation. These techniques were already well established early on in South.G, and continued to be used until the end of the Neolithic, which is well over a millennia in terms of time. These techniques and the tools used to perform them stood the test of time and were part of an established technological tradition that was strictly adhered to by bead makers. Any variations in raw material use or bead type seen in the late Neolithic would still have been tackled with the same arsenal of basic manufacture techniques with some minor adjustments. The lack of errors made in stone bead production attests to how deeply embedded these manufacturing practices and routines were to bead makers and how they were a vital part of their social makeup. Manufacturing techniques are learned through and based on traditions (Lemonneir 1993:3), and in the case of stone bead production at Çatalhöyük these traditions spanned over centuries, strengthening their efficacy and forming a strong *habitus* within the Çatalhöyük bead maker.

4.4 Reflections of the Neolithic: changing bead technologies at Çatalhöyük

In this chapter, a number of insights were made regarding raw material selection and procurement, the organization and level of production, and the manufacturing preferences, techniques, and sequences used by Neolithic bead makers at Çatalhöyük. The evidence regarding bead technologies thus far suggests that stone bead production was, at least by South.P onwards, a highly-skilled and part-time specialized craft practiced at a household level, and at its core was a technological tradition, comprised of technological knowledge and a shared technological *habitus*, that remained almost unchanged and central to the craft throughout Neolithic occupation.

In many ways Near Eastern Neolithic societies demonstrate a high degree of underlying conservatism (Goring-Morris and Belfer-Cohen 2002:69) and this also pertains to all forms of technology and of course even more so to established technological traditions, such as stone bead production at Çatalhöyük. Traditions are held by practicing them to the letter. Therefore, if manufacturing practices are learned through and based on traditions (Lemonnier 1993:3), as previously stated, then it is also likely that this technological tradition, that was so strictly adhered to, was taught and inherited from previous generations. At Çatalhöyük, an awareness and reverence for lineages and ancestries can be inferred from burial practices, the practice of skull caching, and the successive building of houses, one over another (Hodder 2007:108; 2006:147; and Cessford 2004a:20). In addition to this technological tradition being a tried, tested, and successful method, the bead makers at Çatalhöyük would have been making beads just as previous generations and their ancestors had, based on shared technological knowledge. By adhering to the technological tradition, bead makers were essentially venerating their ancestors, their ancestors' crafts, and subsequently, also keeping their memory alive. This concept of memory is discussed further in the next chapter on stone bead use within burials.

Both the method of manufacture and the resulting stone beads remained unchanged from the earliest phase excavated to date to almost half way through Neolithic occupation. During this period, the stone bead assemblage consisted almost entirely of small red, black, and white coloured disc or ring beads made from hard limestone or soft marble, phyllite, serpentinite, steatite, soft saccharoidal marble, tufa, and soft limestone. The standardization displayed to a small extent can be explained by the methods by which these beads were manufactured, primarily the group abrasion technique for final polishing, but the dominance of these beads in each and every settlement phase for over a millennium suggests that bead makers were guided by and catered to the requirements and social specifications of the Çatalhöyük community at large. The uniformity and conservatism in the assemblage reflect a high degree of conformity and suggest a desire to both maintain and strengthen a sense of communal identity.

This need to construct, maintain, and propagate a social or communal identity by the people of Çatalhöyük was likely the result of coping with the stresses of sedentism and large groups of people co-existing in such close proximity to each other. Stone beads and personal ornaments in general, at Çatalhöyük, were therefore one of many media used to create a communal identity and promote a cohesive society.

The village of Çatalhöyük was apparently the only one in the Konya Plain (based on a preliminary survey conducted by Baird (2002)), and although there were inter-regional interactions for trade purposes, it is possible that many villagers were only interacting with each other, on a daily basis, and in close proximity. The lives of these villagers were bound by co-dependence and this factor was essential to the processes of sedentism, agriculture, and domestication. This scenario would inevitably lead to potential competition or conflict, but this could be avoided or minimized by using material forms of social control developed by "community leaders", such as common mortuary practices, architecture, ritual, and even ornamentation, to ease competition and promote cooperation (Kuijt 2000:159).

As the Neolithic progressed, sometime during South.L to South.P (a time frame corresponding to approximately a quarter to half a millennium), the technological tradition, although still dominant, begins to see some new additions to the stone bead assemblage. First new bead types emerge, followed by the use of new raw materials. The first examples of new bead types are found in burials, a highly ritualized context, and placed on the deceased in the form of necklaces and bracelets, and other forms of jewellery. Other examples of ritual use include offerings of beads in house closings or in foundation deposits. By the second half of the Neolithic at Çatalhöyük, there are a number of new bead types made from new raw materials that were not only more difficult to work with, but also likely to have been derived from afar, and these beads required a great deal more labour and skill to manufacture. These beads also tended to be more colourful and the average size was a lot larger, hence, much more visible and drawing in much more attention to the wearer than those beads of the vast majority of the assemblage. Social complexity has long been associated with an increase in standardization, but in this case the opposite may be true. In the Neolithic, the creation of individual or household identities may be associated with an increase in social complexity but a decrease in standardization within the stone bead assemblage.

What can account for these new additions to the predominantly conservative assemblage? The emphasis is still on a collective identity but there now appears to be some room for manoeuvre and negotiation not previously seen. At some point, some degree of individuality is expected in ornamentation, because beads are such personal objects, especially if worn next to the body. Hodder (2006:228-231) has made preliminary observations of items and practices related to an increased sense of self, such as obsidian mirrors, burials, toilet practices, figurines, and stamp seals. These new beads may have given bead users and wearers a socially accepted outlet of individual expression that coincided with the increasing social complexity of the Neolithic. We find that co-habitation forced the people of Çatalhöyük to become "socialized into rules and roles, and that their sense of self was primarily associated with the house and its members" and subsequently the community at large, but at some point in this process "some sense of individual self, and the construction of individual bodily boundaries [become] more marked" (Hodder 2006:231), and perhaps the use of these new bead forms at Çatalhöyük is a conscious and deliberate method to express individuality, in such a constricted, conformist, and egalitarian society.

Devising and implementing a communal identity and a set of socialized rules was essential in order to promote cohesion. Personal ornaments, grave goods, wall paintings, installations, and other items associated with symbolism and ritual appear to be some of the only material goods which allowed some socially accepted form of individual and household expression, albeit within a confined social framework. In the late Neolithic, stone beads could have been used or worn in daily life, and in both communal (house closings, feasts, hunts, social gatherings, for example) and individual ceremonies (magic, personal rituals, burials, for example), and the demand created for stone beads for these contexts, propelled their manufacture and made stone bead production a highly skilled and specialized craft, albeit at a part-time and household level (Speilmann 2002:196). The use of stone beads in Neolithic rituals and burials is discussed in more detail in the next chapter.

Summary of manufacturing processes and production

- A number of social and cultural, as well as practical and functional factors contributed to the selection and use of both common and variant raw material forms. The vast majority could have potentially been found within walking distance to the site (although local options were limited) but some later variant varieties may have come from as far as Cappadocia or near the Mediterranean Sea.

- Colour choice for stone bead production appears to bear significance; specifically the use of red, black, and white, which are representative of other ritual and symbolic objects such as wall paintings, wild animal bone installations, decorative motifs, baskets, and painted shells. These colours dominate the assemblage and may reflect a reverence to hunting and wild and dangerous animals, themes commonly found at Çatalhöyük.

- Later in the Neolithic, new contrasting colours in the form of new raw materials are introduced, including blue and green coloured stones which were made into larger conspicuous bead types and may have served as amulets and/or used to communicate personal expression.

- A strong case can be made for part-time small-scale craft specialization at Çatalhöyük, as there appear to be fewer producers than consumers of stone beads. Based solely on data from *in-situ* production contexts, we find that not all households were engaged in stone bead production, and the houses that were, appear to be so on a regular basis, and making the same bead types from a particular raw material, using and manufacturing specialized microdrills found mostly in association with bead production. Furthermore, these households may have been making beads for others, as they do not appear to be consuming their own wares.

- Changes in stone bead technologies can be identified over the course of the Neolithic. In earlier settlements phases, we find that only very small, red, black, or white coloured disc or ring beads are manufactured. These appear to be the sole socially accepted types of beads, reflecting a high degree of uniformity, a strict adherence to a technological tradition that spanned generations and a focus on creating and sustaining a common communal identity. Although, these beads remain prominent throughout the Neolithic, we first find examples of larger and more variant bead types after South.L, significantly in burial contexts, and by South.P, a number of variant bead types have become a part of the assemblage. Variant bead types are larger in size, more varied in colour or aesthetically different, and generally made from less common raw materials. These technological changes, in the late Neolithic, reflect a gradual shift towards more personalized stone beads, that may reflect socially acceptable glimpses of individual tastes, preferences, and identities, all within the conservative and egalitarian Neolithic environment of Çatalhöyük.

- A manufacturing sequence for disc or ring beads was devised based on manufacturing marks and production data. The bead manufacturing process essentially involves manufacturing techniques of chipping, abrading, and perforating, which remain essentially the same throughout Neolithic occupation at Çatalhöyük. Potential bead making sequences for other bead types can also be estimated, based on the use of the same techniques, but in different sequences. These manufacturing techniques were based on an established technological tradition, comprised of proven methods, passed down from generation to generation, forming a strong *habitus* within Çatalhöyük bead makers.

- The social contribution of stone beads at Çatalhöyük is immense and one can see how it pervades all aspects of Neolithic life – from procurement to production to use. A huge amount of effort was made to manufacture something so small. The power of stone beads lies not in their size but their symbolic significance to Neolithic societies. This significance is attributed to their role as communicators, ritualized objects, and socially valued goods that became integral to the daily functioning of Neolithic societies (as seen in the next chapter).

CHAPTER 5: THE ROLE OF STONE BEADS IN NEOLITHIC LIFE

The study of stone bead technologies at Çatalhöyük provided important insights into the social role of bead making over the span of the Neolithic at Çatalhöyük (see Chapter 4). This chapter, on the other hand, focuses on their role as objects of daily use, and whether we can determine how these ubiquitous but socially significant objects came to play such a vital role in Neolithic daily life, symbolism, and ritual. Contextual analyses (Chapter 3.1 and 3.4) and depositional practices indicate that stone beads were very personal objects, worn next to the bodies of both the living and the dead at Çatalhöyük. Stone beads do not appear to have one clear function; instead, they appear to be multipurpose and versatile in their uses and subsequently encompass many aspects of Neolithic life. The symbolic nature of stone beads, their ubiquity, and their versatility are the main reasons why it is so difficult and challenging to find patterns of stone bead consumption at Çatalhöyük; although by looking at various forms of analyses and evidence and combining these results, some observations may be made.

This chapter is divided into three main sections: 1) a discussion of stone bead distribution patterns within the sampled contexts and the results from the contextual analyses in relation to the four main qualitative variables of raw material, bead type, colour, and size, which can help us assess any preferences in use or depositional practices; 2) a closer look at the context types, with particular emphasis on the two contexts that provide us with primary evidence of stone bead use, burials and placed deposits, and what these specific ritualized contexts may reveal in terms of Neolithic daily domestic life and beliefs; and 3) a brief discussion of stone bead use and its significance to the Neolithic people of Çatalhöyük and beyond.

5.1 Contextual analyses and Neolithic depositional practices

5.1.1 Distribution of stone beads according to context types

Contextual analyses can be very helpful in determining how stone beads were used but we must remember that the stone beads used by the people at Çatalhöyük had significance when they were used or worn, and the context in which they end up may not necessarily reflect their function, hence this context may not be the primary context in which they were used. A strategy to help determine whether the final context in which a bead was deposited is significant to its use or not is assessing whether deposition was intentional. Some contexts provide evidence of intentional bead placement such as burials and placed deposits, while building floors, external middens, or pit, post, and bin fill, may have been either intentional or unintentional. If there is evidence to suggest that these beads were placed in a certain context type intentionally, this may help us understand the reasons behind their use.

The basic distribution of the stone bead assemblage reveals that the two contexts which contain the most beads are external midden deposits and burial fill, and depending on whether the assemblage is assessed with or without the largest and richest burial in Building 43 (which skews the results due to the vast quantity of beads in a single context), either burial fill or external middens are the most prominent contexts in which beads are found, respectively (Figure 5.1.1). If we combine both mortuary contexts, fill and skeletons, we find that burials are the contexts with the most number of beads, or, if we leave out the burial from Building 43, we find that beads are found in burials and external middens in equal numbers

(Figure 5.1.2). Regardless of how we view the data, it is clear that stone beads are present in all contexts but are most prevalent in external middens and mortuary contexts, particularly burial fill.

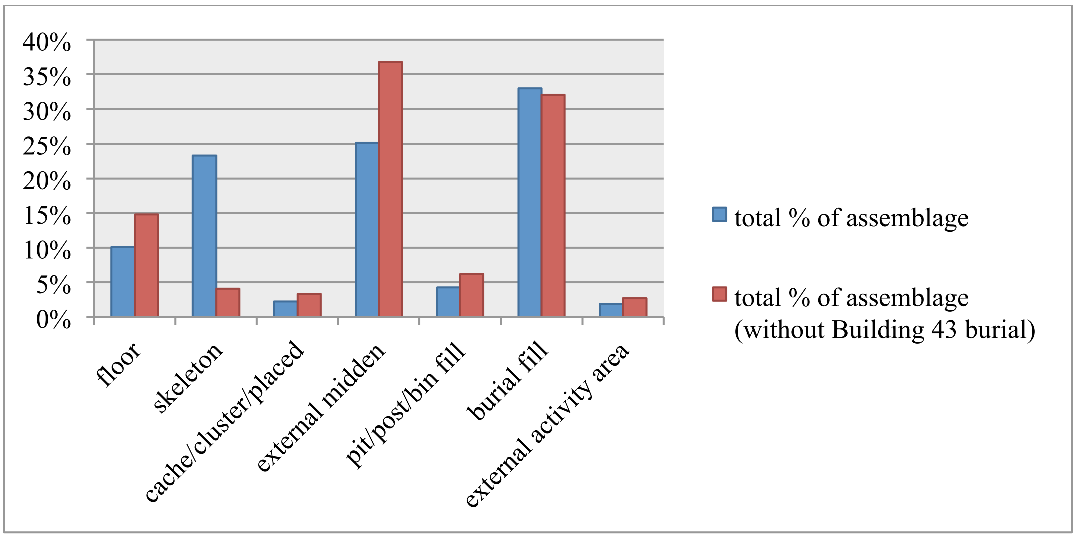


Figure 5.1.1. Percentage frequency of stone beads according to context type, with (blue) and without (red) the large Building 43 burial (N=1655; QN=1400.5)

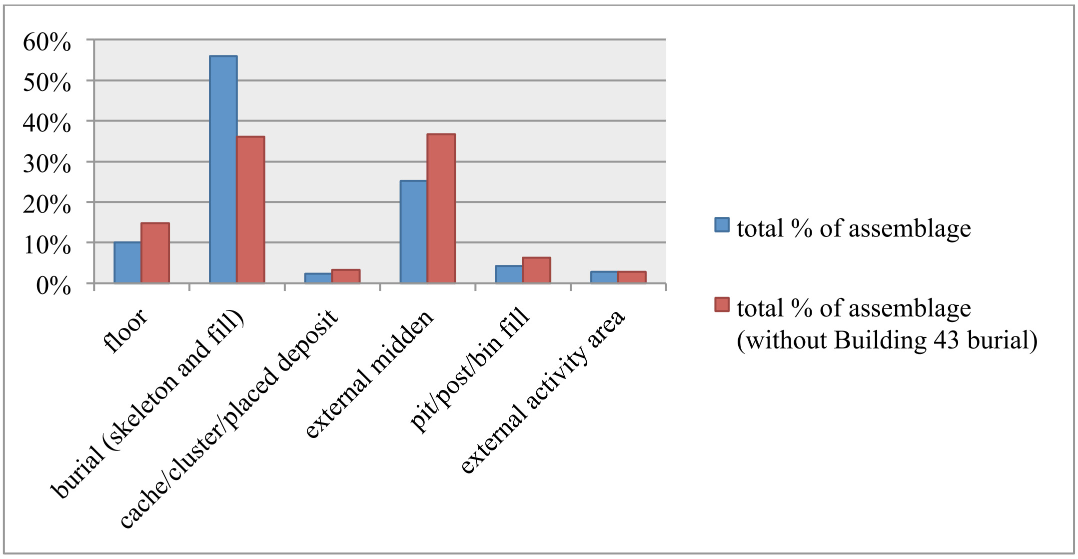


Figure 5.1.2. Percentage frequency of stone beads according to context type, with burial contexts combined, with and without the large Building 43 burial (N=1655; QN=1400.5)

Interestingly, just as many stone beads were being placed in burials as were thrown away with or without household refuse in external middens. Most of the stone beads found in burials were intentionally placed to adorn the bodies of the deceased or placed or scattered next to the bodies as grave goods, or perhaps fastened onto textiles (in burial fill). But why is such a substantial proportion of the stone bead assemblage found discarded in external middens? Have they been discarded because they have been deemed unusable or broken? Was the deposition of stone beads in external middens intentional or unintentional? One way to answer this question is to closely examine the state in which they were deposited, that is, whether they were broken or fragmented, or whether they were still complete and in good working order. In Chapter 3.1.5 the results from these calculations revealed that just over 85% of stone beads found in external middens remained intact and unbroken (Table 3.1.46). If external midden deposits are supposed to reflect the contents of building floors, then one would expect to find equal proportions of broken and complete beads in both these contexts; however, we find that there are significantly more complete beads in external middens than house floors, although much of this may be attributed to the larger sample size in external middens. In fact, floors and external activity areas where we expect to find lots of trampling and movement coincide with the breakage statistics, as these contexts have the most number of broken beads.

Similarly, one would expect to find the least number of broken beads within burials and caches, clusters, or placed deposits. This is true for burials as both skeletons and fill had the lowest breakage percentages. The low breakage percentage of beads in burial fill suggests that these beads were scattered or placed within the burials and were a part of the burial assemblage, not simply background noise, or beads mixed in from floor deposits. Occasionally, it can be difficult to associate beads from fill securely with a body, as at times, human remains were shifted or moved over due to a lack of burial space.

There appears, however, to be something very interesting happening with caches, clusters, and placed deposits, and pit, post, and bin fill. Pit, post, and bin fills were originally sampled, as there was some minute evidence of figurines, beads, and other small objects intentionally being placed in these contexts, both prior to and after building abandonment. Caches, clusters, and placed deposits were placed in this category after excavators felt that these clustered deposits had interesting contents, or were perhaps intentionally deposited or hoarded together. Breakage statistics revealed that although caches, clusters, and placed deposits had less than half the number of beads that were present in pit, post, or bin fill, twice as many (percentage-wise) were broken in this context. This leads one to question whether at least some of these special deposits ascribed by excavators actually were special, or whether there is something else going on here. We know beads were intentionally placed into burials and this accounts for the low breakage percentage, but caches, clusters, and placed deposits, are also supposed to be intentional deposits, so why does this context have less complete beads than pit, post, or bin fill? It could be that some bin, post, and pit fill may have been special deposits or that they are simply comprised of the same infill used to fill buildings, but once again we would then see a similar breakage percentage to that of external middens, as it was generally contents from external middens that were used to infill houses.

The contexts in which beads are found and even the state in which they are found have raised many questions. We must look at each context individually in order to determine what information, if any, these contexts can provide regarding stone bead use (Section 5.2). Before we do this, the results obtained from the contextual analyses of qualitative variables (Chapter 3.1) are examined which, like the breakage percentages presented above, also provide a small perspective on stone bead use. These various lines of evidence will culminate in Section 5.3.

5.1.2 Contextual analyses according to qualitative variables

The stone beads found in all of the sampled context categories were predominantly small disc or ring beads made from the most commonly used raw materials. This of course is not surprising, as these beads dominate the assemblage. There is, however, one small exception to this statement. Only four of the seven types of commonly used raw materials were found on skeletons, within burials.

The analyses of raw materials and colour groups within the context categories revealed that the new variant raw materials introduced during and after South.P are just as likely to appear in external middens as in burials. In fact, external middens have the highest number of raw material variants (that is, every raw material type is present in this context), although caches, clusters, and placed deposits and external activity areas have the highest variability of raw materials and colours used in relation to their sample size (Table A3.1.10). The lowest variability of raw material types and colour groups can be found in both types of burial contexts, fill and skeletons. With regard to colour groups, the only two contexts to contain all the different colour group types are external middens and floors, and the only three colour groups not present in every context category are yellow, orange, and metallic coloured beads. On the whole, there do not appear to be any marked patterns relating to raw material types or colours and their deposition, but it does seem that raw materials used to make stone beads for burials seem to have the least amount of variability, that is, fewer raw material types were used to manufacture beads in burials, in comparison to other contexts.

The analyses of bead types and bead sizes provided similar results to that of raw materials. This is due to the fact that uncommon raw material types are more likely to be manufactured into larger variant bead types. It appears that the contexts with the most variability in bead types and size in relation to their sample size are once again the two contexts with the least number of beads, external activity areas and caches, clusters, and placed deposits. The least amount of variability in bead types in relation to their sample size is found in both burial contexts, similar to that of raw materials (Table A3.1.17). The two contexts that exhibit the lowest variability in size, however, are burials (skeleton) and external middens.

If we focus on variant bead types, there are a number of single examples that are only found in burials (skeletons) or in external middens, and both these contexts contain the highest number of variants, or the most number of bead types (Table A3.1.17). Approximately 80% of variant beads are found in these two contexts. (Tables A3.1.17). Similarly, the majority of larger-sized beads (size 5 and up) are found in external middens and burials (skeletons) (Table A3.1.45). External activity areas and house floors, areas which see regular activity and use, contained little or no larger-sized beads, which suggests that these beads were not prone to being accidentally or unintentionally left behind in a context, especially in comparison to their smaller counterparts which were also made from both variant and common bead types and also found in both house floors and in external activity areas. This could simply be a result of the small sample sizes within these contexts, the small number of larger-sized beads, or that fact that larger beads were easier to detect on floors and activity areas in comparison to smaller sized beads. Despite all these possibilities, there is also a chance that these beads were intentionally deposited into the contexts in which they were found. These larger beads tended to be made from uncommon raw materials and into variant bead types; these beads were meant to be noticed and their distinctiveness set them apart from the rest of the assemblage. We also find that these larger beads were placed on the bodies of the deceased and worn as pendants (Section 5.2). If worn as jewellery, disc and ring beads were usually a part of a strand or chain of beads, in which larger and more elaborate bead types may also be present, but small, disc or ring beads never appear to be worn alone. A pendant worn alone may have been considered equivalent to or perhaps even more special than a necklace made from a strand of 50-disc beads.

These results show a distinct pattern with regard to the number of types of qualitative variables found within contexts as well as the variability of these types relative to sample sizes. Firstly, burials (both fill and skeletons) show the least amount of variability, and caches, clusters, and placed deposits, and external activity areas consistently show the highest degree of variability of raw materials, bead types, sizes, and colours, relative to sample size. Secondly, if we only take into account the highest number of types within a context category, external middens always contain the most types of raw materials, bead types, sizes, and colours, which may simply be a result of the large external midden sample size, but may also be indicative of other depositional practices discussed below. Some basic observations can be made when correlating qualitative variables to contexts, but there do not appear to be any straightforward links between any of these variables and any of the context categories; therefore, each context must be examined individually.

5.2 An individualized look at the sampled context categories at Çatalhöyük

5.2.1 External middens

A substantial number of stone beads were retrieved from external middens from both the North and South areas at Çatalhöyük. These middens were situated in between clusters of houses. External middens contained many forms of refuse – household, human waste, and even evidence of fire spots, which may have been used to control smells and get rid of excess waste (Hodder and Cessford 2004:29). Earlier, in Section 5.1.1, the breakage percentages of stone beads in external middens raised a number of questions, specifically, why were so many complete or unbroken stone beads found in middens? These beads could not have been discarded for practical reasons, as they still remained intact and functional. Even if some of these beads could be accounted for by accidentally falling off while working, or getting lost and swept up during cleaning, it is difficult to believe that so many, and especially larger-sized elaborate beads, ended up in external middens for this reason alone. This leads one to consider whether at least some of these beads had been intentionally discarded. In addition, this practice may also inform us on how the people of Çatalhöyük perceived stone beads in terms of value. Perhaps, these questions could be addressed by closely examining what types of beads were being discarded into external middens.

The breakage percentages of stone beads found in external middens revealed that regardless of whether a stone bead was made from an uncommon raw material and into a large elaborate bead type, or made into the small standardized disc and ring shape from commonly used raw materials, both types of stone beads were present in similar percentages (Table 3.1.49). These figures indicate that stone beads were being discarded despite the raw material they were made from, and the shape and size they were manufactured into. The similar breakage percentages also suggest the absence of any patterns or indications of intentional breaking of stone beads within external middens at Çatalhöyük.

The geological properties of raw materials (discussed in detail in the previous two chapters (Chapter 3.1 and Chapter 4.1) may account for the preservation of stone beads. Much of the assemblage was tough enough to manipulate without breaking, but soft enough to work. Material properties may have affected breakage percentages but they also validate the choice of raw materials used in stone bead production at Çatalhöyük.

Another way to determine whether stone beads were intentionally deposited into middens is to examine them for "freshness". On the whole, there appeared to be many more degrees of use found in external middens; we have everything from broken to heavily scratched, to fresh-looking, but these varying degrees of use may also be the result of raw material properties as many more types of raw materials were used to manufacture beads found in external middens than in burials. In order to assess these beads for freshness or use-wear with greater confidence, many more experiments on these raw material types need to be conducted.

Furthermore, larger-sized beads do not appear to be found accidentally or intentionally on house floors or activity areas, which suggests that their presence in external middens may have been intentional. Similarly, the breakage percentages of blue coloured beads, which were introduced into the stone bead sample in or just before South.P and made using fluorapatite and turquoise, also indicate that unbroken examples of these new and distinct variant bead forms are only found in burials, caches, clusters, and placed deposits, and external middens, once again grouping two contexts which indicate intent with external middens (Table 5.2.2).

The data presented above suggest that the distribution of beads in burials and external middens is similar and both contexts contain complete, small and large, standardized and elaborate beads. If the deposit of stone beads in burials is intentional, it may be that the similar assemblages and proportions may indicate that the deposition of complete beads in external middens may also have been purposely discarded. It is inconsistent that similar stone beads in one context are deemed to be used in a ritualized context as valued or perhaps even personalized gifts, but these same beads are interpreted to have no significance in another context. If many of the beads were broken, damaged, or could no longer be worn, it makes much more sense for them to be simply thrown out as refuse into external middens. But this is not the case.

Stone beads are used in mortuary contexts, as adornment or gifts to the deceased, as well as what appear to be commemorative deposits or beads used during ceremonies and rituals associated with significant moments in the life of a building (Figure 4.1.5). There is, therefore, evidence to suggest their use as objects (either offerings or objects symbolizing social and cultural meanings and ideas) frame ritualized contexts. Their various uses relating to ritual and their use in everyday life as personal ornaments demonstrate that stone beads were multipurpose objects, and perhaps their presence in external middens may also reflect some sort of function. A bead or a number of beads may have been manufactured or acquired to perform a certain ritual, function, or task, and when the task or ritual was completed, the bead(s) was then discarded. This may be one viable explanation for the large proportion of beads found in external middens. One can recognize that there is most likely something (perhaps related to ritual) going on here, but it is difficult to interpret these occurrences and get to the heart of prehistoric beliefs and ideologies (Bradley 2005:6).

Stone beads are not the only objects that are found unbroken in external middens at Çatalhöyük, examples of bone tools, obsidian and flint lithics, ground stone, clay balls, and figurines have also been found. With the exception of figurines, these objects may also be found within caches, clusters, and placed deposits, and some even in burials. Why are so many types of functional items discarded at Çatalhöyük? These practices may not appear practical to us, but they may simply be relaying different systems of value (Pollard 2001:315). There also may be rules involved with the manufacture, use, and discard of items, both ritual and utilitarian, which may have stemmed from the close and clustered living conditions at Çatalhöyük (Hodder and Cessford 2004:20). These items are, with the exception of figurines, also utilitarian tools used in everyday life; stone beads are however, symbolic objects and although the reasons behind depositional practices may be similar, the symbolic aspect of stone beads, in conjunction with their use in other ritualized contexts, suggest that they may have been discarded in a method different to that of the utilitarian objects.

Figurines are similar to beads in that they have more abstract uses but unlike beads, surprisingly, they were rarely placed in burials or placed deposits, and therefore void of any ritual framing (Nakamura and Meskell 2009:207, 226) (Figure 5.2.1). Stone beads, on the other hand, are also abstract objects, and like figurines, also found in external middens. Stone beads, however, were also used in burials and placed deposits. So there are some patterns of deposition, particularly when it comes to figurines and beads, both ubiquitous and abstract objects at Çatalhöyük. If figurines had specific depositional patterns which indicating intentional deposition into external middens, then it is also possible that stone beads were also intentionally deposited into this context.

Figure 5.2.1. Examples of figurines made from clay (left) and stone (right). Photos by J. Quinlan, Çatalhöyük Research Project

Elaborate beads and standardized beads were both used to perform similar functions, although some types may have been perceived to have more value or distinction (as indicated by blue coloured beads for example, see below). Regardless of perception, many of these beads made their way into external middens, unbroken. A number of factors may be involved in the disposal of stone beads into external middens. It could simply be a matter of discarding the beads of a deceased person, getting rid of beads that may be now considered tainted or impure, or even discarding old beads prior to undergoing rites of passage. These examples stress that one, all, or none of these examples, may in fact be viable, but almost impossible to interpret. The potential reasons why beads may have been discarded are almost as numerous as beads themselves. What the evidence does suggest is that it is likely that stone beads were intentionally thrown away, perhaps when they were no longer needed to perform the function for which they had been manufactured or acquired.

This depositional pattern is consistent with beads used for magic purposes in historical Malagasy magic from Madagascar. Stone beads or jewellery made from stone beads were thought to have a "hidden life force or agency" behind them (Graeber 1996:12) a concept also shown by Boivin (2004). The Malagasy primarily participated in two types of magic with stone beads; the first was *sampy*, by which charms were used for long-term protection and for larger social groups, and the second was *ody*, by which beads embodied wishes that were used for a single purpose or task by individuals, and once this purpose filled or task completed, the beads were then discarded (Graeber 1996:15-16). Examples of *ody* use include wishing for a safe journey or seeking the attention of a potential lover (Graeber 1996:16). Beads were used to embody powers and wishes bestowed by the bearers and kept hidden, until they were no longer needed. This practice indicates that the Malagasy used beads as important ritual objects suggesting that the presence of beads discarded in middens may be just as ritually charged as those found in burials.

Similarly, ancient Egyptians also used beads or amulets for magic purposes. They were both worn and/or carried by individuals for protection, in life and death (Brier 1981:144). The ancient Egyptian word for bead also meant luck, but the luck obtained from these beads heavily depended on the physical characteristics of the bead such as the raw material it was made from or its colour (Brier 1981:141). These amulets and beads are also ubiquitously found in ancient Egyptian archaeological sites, as are beads at Çatalhöyük.

It would be naïve to simply say that these studies regarding bead use by the Malagasy or those in ancient Egypt are directly analogous in detail and meaning to what was happening at Çatalhöyük. However, these two ethnographic and archaeological examples of bead use provide some insight into potential patterns of use, which may correspond to the depositional patterns we find in external middens at Çatalhöyük.

In Chapter 4.1, colour preferences of raw materials used for the production of stone beads was discussed. A chronology in colour can be constructed at Çatalhöyük; the earliest phases contained black, white, and red (broad colour groups) coloured beads, and these beads remained the three most prominent colours over the course of the Neolithic. In South.L, greener tones were introduced, and by the time we get to South.P, blue, metallic, yellow, and orange colour groups are also added to the stone bead assemblage. There are only a handful of examples of metallic, yellow and orange beads, but could the deposition and breakage percentages of green and blue coloured beads in external middens reveal clues to the usage of these beads? Is there any evidence to suggest that blue and green coloured stone beads may have been amulets or fertility charms, as proposed by Bar-Yosef Mayer and Porat (2008)?

There are examples of blue and green coloured beads in all types of contexts at Çatalhöyük, so neither colour is associated with a particular context. If we compare the breakage percentages of blue and green coloured beads in external middens, and also with examples of two prominent colours, red to pink (a colour group which consists of both durable and the least durable raw materials) and white (durable), we find that most green beads are not broken, but the ratio of broken to complete blue beads is essentially equivalent or higher (depending on whether we calculate the breakage percentage using QN or N) (Table 5.2.1). The sample size of blue beads is quite small in comparison to that of the other coloured beads, but blue beads do appear to have the highest breakage rate, and do not appear to be intentionally broken. This suggests that blue beads may have been used for longer or until broken more so than other coloured beads. But how do blue beads fare in other contexts?

	QN	N	Percentage (QN)
Green			
Complete	28	28	90.3%
Broken	3	7	9.7%
Blue			
Complete	7	7	48.3%
Broken	7.5	21	51.7%
White to beige			
Complete	44	44	89.3%
Broken	5.25	11	10.7%
Red to pink			
Complete	28	28	67.5%
Broken	13.5	40	32.5%

Table 5.2.1. Breakage percentages of different green, blue, white to beige, and red to pink coloured finished beads from external middens

Blue coloured beads are found in all contexts with the exception of floors, pit, post, and bin fill, and external activity areas (in essence areas that see activity) which only contain broken blue beads (Table 5.2.2). Whole beads are only found in burials, caches, clusters, and placed deposits, and external middens. In addition to their presence in these contexts, there are a limited number of blue beads made solely from fluorapatite (closest potential source unknown) and turquoise (most likely from the Taurus Mountains) and only into variant bead types. Furthermore, blue coloured beads have the highest breakage percentage, which indicate that they are more likely to be discarded broken than any other coloured beads. All these factors suggest that blue beads stand out in comparison to other coloured beads. It may be that blue beads were more valued, or had longer use lives, or had a different function than other beads, or all of the above. It is impossible to say with any certainty that these beads were in fact fertility charms or protective amulets, which has been suggested by other researchers (Bar-Yosef Mayer and Porat 2008, for example). If this were indeed the case, one would assume that there would be more. Objects which have been associated with fertility in both archaeological and ethnographic studies such as figurines or amulets are generally much more abundant. Sagona suggests the introduction of blue beads functioned to form a contrast to existing red coloured beads; moreover, if the colour red had connotations of life and fertility (as in the use of ochre), then blue was the colour that may have preserved these concepts, particularly in a time of increased entanglement, wealth, and prestige (in Hovers *et al*. 2003:516).

Context category	QN	N	Percentage (QN)
Floor			
Whole	0	0	0.0%
Broken	3.5	9	100.0%
Burial (skeleton)			
Whole	2	2	100.0%
Broken	0	0	0.0%
Cache, cluster, placed deposit			
Whole	3	3	85.7%
Broken	0.5	1	14.3%
External midden			
Whole	7	7	48.3%
Broken	7.5	21	51.7%
Pit, post, bin fill			
Whole	0	0	0.0%
Broken	0.25	1	100.0%
Burial (fill)			
Whole	3	3	75.0%
Broken	1	3	25.0%
External activity area			
Whole	0	0	0.0%
Broken	0.5	1	100.0%

Table 5.2.2. Breakage percentages of finished blue beads according to context

Whatever the reason for their introduction and use in the late Neolithic, blue beads do appear to be special. The manufacture and use of blue beads reveal a stark contrast to the manufacture and use of the standardized assemblage of red, black, and white coloured beads. In the late Neolithic, red, black, white, and green dominate the assemblage, and each of these colours were used to make both variant and conventional disc and ring beads. Blue beads, in contrast, are limited in number and feature in only variant bead forms. Blue beads may be quintessential examples of stone beads illustrating a safe form of personal expression or individual identity during this time at Çatalhöyük, which contrasts the dominant and uniform assemblage discussed above (also see Chapter 4.4). Furthermore, apart from creating a personal or household identity, these beads may also be early examples of individuals or households conspicuously demonstrating their personal or household wealth, in a socially acceptable manner, all within the conservative framework of a conformist and unstratified Neolithic society. At Çatalhöyük, there does not appear to be the presence of an emerging elite class, or even evidence of self-motivated aggrandizers using beads or prestige items for political, social, or economic gains and control. Instead, stone beads may be used as a means of initiating and differentiating oneself or a household from the community, in a non-threatening and benign manner. Social inequality within societies did not just emerge suddenly overnight, a number of processes and factors were involved and there are many methods by which aggrandizers may have sought out or maintained authority (Hayden 2007). Differentiating oneself or aligning oneself with a household, lineage, or ancestry through bead use may have been one of many potential steps towards asserting control or influence within the community, especially during the late Neolithic.

5.2.2 Burials

A brief summary of burial practices and burial assemblages at Çatalhöyük

Section 5.1.1 revealed that a significant proportion of beads were retrieved from burials at Çatalhöyük. The dead were buried beneath platforms, floors, benches, and within foundation deposits of houses; the dead, therefore, remained in close proximity to the living, a practice also found at other Near Eastern Neolithic sites (Boz and Hager, in press). Households were constantly interacting with the dead buried beneath them; older burials could be dug up and disturbed, in order to make room for new burials, hence we have evidence of a number of types of deposition including primary (the most common burial type), secondary, tertiary, primary disturbed, primary disturbed loose, and finally unknown (Boz and Hager, in press). Before burial, bodies of the dead could be bound or matted, placed in baskets (babies), and even adorned with pigment (Boz and Hager, in press). Binding may have been necessary to keep the body in a flexed position in order to successfully place it in a small hole dug up under a platform or floor (Guerrero *et al*. 2009:86). The tightly flexed position of the body could only be achieved either before (immediately after death) or as skeletal evidence suggests, more likely after (36 to 72 hours) the onset of *rigor mortis* (Boz and Hager, in press); if this were the case, then it is possible the living were exposed to the deceased for some time. Perhaps this gave households or family members enough time to perform all the rituals associated with death, which may have been public, private, or both.

The study of human remains at Çatalhöyük has also highlighted some other interesting practices, such as the removal of skulls after death. For most headless bodies, the skulls have not yet been found, although some plastered skulls have been found on their own, which may indicate the practice of remembering or venerating ancestors (Boz and Hager, in press). There is also evidence of the removal of bones from two bodies within burials from one building which were later reburied in another building, built over the original from which the bones were retrieved (Boz and Hager, in press), which suggest some sense of continuity between households and the people residing in them. New evidence at Çatalhöyük indicates that bodies buried beneath house floors may not have necessarily lived in these houses, based on the study of dental phenotypes, therefore it is likely that the social structure at Çatalhöyük can be described as being house-based rather than kin-based (Pilloud & Larsen 2011:519).

Figure 5.2.2. Photograph of male plastered skull, held by female in burial (F.1517) in Building 42, South.R. Photo by J. Quinlan, Çatalhöyük Research Project

The act of burial, the treatment of the body before burial, the addition of grave goods with the body, and the subsequent occasional removal of skulls or bones all indicate ritual behaviour and a set of beliefs associated with death and interment. Pigments, matting, cordage, baskets, have all been linked to various forms of body treatments prior to burial, but stone beads have typically been classified as burial gifts. Stone beads, however, like pigment, also adorn the dead or are scattered within the grave; therefore, it is too simple to say that stone beads are just burial goods, just as it would be to say that pigment is simply used to add colour to the body or burial or that the occasional use of a basket for a baby burial is just a receptacle. The use of these items prior to interment suggests that they all held symbolic significance in Neolithic mortuary rituals at Çatalhöyük.

Nakamura and Meskell (in press) recently conducted a detailed study of burial assemblages at Çatalhöyük and made a number of interesting observations. The first is that of all the burials excavated in the current excavations, only 40% of burials contained burial goods, but only 22% contained evidence of burial goods directly associated with the skeletons (Nakamura and Meskell, in press). A wide variety of burial goods (over 40 types) were found directly associated with the skeletons that are derived from every day life including: tools, personal ornaments, bone tools, incised tusks, animal bones, animal claws, obsidian and flint blades, clay balls, shells, ground stone and stone, baskets, pieces of pigment, textiles, wood remains, worked bone and stone, pieces of plaster, and a single stamp seal and stone bowl (Nakamura and Meskell, in press). Additionally in burial fill, examples of figurines, axe heads, pottery sherds, and projectiles were also found (Nakamura and Meskell, in press). Surprisingly, over 50% of object types were only found once, which is remarkable, considering most burials only have one or two object types (Nakamura and Meskell, in press). So despite some standard practices in burial, burial goods appear to be somewhat "personalized" (Nakamura and Meskell, in press). It therefore appears very few burials are buried with goods but when they are present, they may be quite diverse, making it difficult to see any patterns in the assemblage.

Stone beads in burials

The burial analyses conducted in this study only address the use of stone beads. Not only are there beads made of other media also present but other grave goods found with skeletons may also signify more complex burial patterns, beyond the scope of this study. These and other factors that may affect the analyses of burials are discussed in Chapter 2.4 and 3.4. This study simply aims to address whether we see changes in stone bead use in burials over time, if we can correlate stone beads with our notions of age or sex of the deceased, how personalized stone beads within burials are, and finally whether fresh or heavily used beads (potentially used during the life by the deceased or a heirloom) were placed in burials, and what these factors relay.

Beads found on skeletons within burials are our primary source of evidence that beads were, in fact, worn, with the exception of a few figurines showing ornamentation (see Nakamura and Meskell 2009). Additionally, there is some evidence of use-wear (Chapter 3.3). Most beads appeared to have been strung, which directly corresponds to the function of their perforation. In addition, beads found on skeletons indicate that some of the elaborate bead types could be worn on their own around the neck, arm or wrist, like a pendant. Small disc or ring beads were more likely to be worn in larger numbers as strands.

Patterns relating to age and sex within burials

The distribution of stone beads in burials according to age and sex revealed some interesting patterns (Chapter 3.4). Firstly, no large-sized beads (size 5 and up) were found on neonate and infant skeletons, but they were present in every other age group (Table A3.4.15). In addition, neonates, or newborns, show the least amount of variability in every descriptive category (raw material, bead type, and size) with the exception of colour (Tables A3.4.9, A3.4.11, and A3.4.15). This is because only ring or disc beads, either on their own or as beaded strands, appear to be worn by or placed with neonates. Infants also have a low degree of variability (in terms of bead sizes and bead types) but two pendants have been found in an infant burial (F.1511) (Figure 3.4.10). Since neonates were not buried with any variant bead types indicative of individual identity and expression, it is possible that neonates were not considered to have formed a personhood or a personal identity at birth, or that attachments, both material and ritual, were kept to a minimum at the death of newborns; however, considering the small number of neonate burials sampled, a larger sample size may prove otherwise.

Male and female burials were present in equal numbers but females tended to have a significantly higher number of beads, bead types (a total of 12), including more elaborate and larger-sized beads and bead strands, than men who had only four types present (Table A3.4.12). Children (indeterminate sex) also had a variety of bead types as well as strands of beads present in their burials in comparison to males. Not only do male burials contain fewer beads (which is mostly attributed to the fact that there are no strands of beads present), they contain mostly only standardized bead types. From eight male burials, there were only two variant bead types, a pendant and half a barrel disc bead, which in comparison to other variant bead types, are less elaborate and less complex to manufacture. Female skeletons and children were adorned with much more elaborate and varied bead styles. Strands of beads, made into bracelets and necklaces for example, were only reserved for women and children, an observation also made by Nakamura and Meskell (in press). There were no major differences with regard to raw materials and subsequently colours, with the exception of a small number of blue beads. Blue coloured beads were not found in male burials; they only occur in female and indeterminate, or child burials (Table A3.4.14).

Whilst acknowledging the small sample size, these results remain intriguing. Females and children were adorned and buried with not only more beads, but also many more types of elaborate beads, as well as special blue beads. Perhaps it was only considered appropriate for women and children (which may be female children only, although this is impossible to determine) to wear beads. It may also be that women and children needed added protection from death caused by childbirth or the many illnesses and diseases caused by living in close proximity to animals and unhygienic conditions. Variant bead types may have also promoted fertility as well as offering protection. Whether the differences found between beads used in male and female burials indicate gender-specific patterns, or how far these mortuary practices may reflect everyday life, is almost impossible to say, and requires further investigation, by looking at a number of burial objects in detail, including more stone beads. The stone beads worn by the deceased may not even reflect the individuals; instead, larger and more elaborate beads, which generally required more labour to manufacture, may have been bestowed upon women and children by their families or households, and may attest to the generosity or affections of those burying, rather than those receiving.

Older adult burials contained the most number of *variant* bead types, but adolescents seemed to have the most variability in bead type, raw materials, colours, and bead sizes, within a smaller number of burials (Tables A3.4.9, A3.4.11, and A3.4.13). The greater number of bead types present in older adult burials does not necessarily mean that they accumulated more in their lifetime, as attested by the adolescent burials which have a higher degree of variability considering the small number of burials within that age group. But is it possible that the older adults received the most elaborate and largest-sized beads because of their age (over 50)? Nakamura and Meskell (in press) also made this observation regarding the entire burial assemblage. Not only did the vast majority of burials of elders have grave goods, but they also contained some of the most diverse and elaborate burial assemblages (Nakamura and Meskell, in press). Nakamura and Meskell (in press) believe that these burial assemblages may be indicative of the status achieved by the elderly at Çatalhöyük, and to an extent, the fact that the most number of variant bead types are found in the burials of the older adults does agree with this notion; however, other age groups (with the exception of neonates, and infants to and extent), also feature a number of bead types, which may not be the result of achieved status. It could also be that over their lifetime, the elders may have built more relationships (by marriage, children, their marriages, grandchildren, and so on) within their families, households, and communities, and the rich and diverse burial assemblages buried with them may reflect all these entanglements and ties to people.

Do both sexes in the older age group contain elaborate bead types, or is it only the women? Of the eight burials of older individuals, there are five females and three males (Table 5.2.3). Three of the female burials contain only ring beads, one burial has ring beads and variant bead types, and the last only contains variant bead types. Two of the male burials contain ring beads, and the last one contains ring beads and half a broken barrel disc bead made from carnelian. The single example of a variant bead form found in the older adult burial is unfortunately found in fill and broken, which may indicate that its presence was not intentional. Regardless, the sample size is much too small, and even if we do take the variant bead type found in fill in F.2604, percentage wise, we cannot make much of a distinction between bead use by males and females in older adult burials.

Burial	Sex	Ring/Disc bead(s)	Variant bead(s)
F.513	F	✔	
F.563	F	✔	
F.1517	F	✔	✔ (skeleton)
F.4021	F	✔	
F.1710	F		✔ (skeleton)
F.1492	M?	✔	
F.2603	M	✔	
F.2604	M	✔	✔ (in fill)

Table 5.2.3. Checklist indicating the presence of conventional or variant type beads in burials of older adults (age 50 and over)

Variability in burials (skeleton and fill) in comparison to other contexts

Based on the contextual analyses of qualitative variables, it appears that burials (fill and skeleton) always had the lowest variability, with the exception of the size category, in which skeletons and external middens had the lowest variability. The low variability denotes that a smaller variety of raw materials, bead types, and colours were used to adorn the dead in burials, in comparison to other contexts.

Skeletons only wore up to a maximum of three different types of raw materials, which were mostly made from commonly used raw materials, with the exception of fluorapatite, calcite, and hematite, all which correspond to essentially pale pink/beige, black, black with green, blues, greens, white, and metallic colours (Table A3.4.4 and A3.4.7). Similarly, the number of bead types ranged from one to five types on a skeleton in any given burial (Table A3.4.5). With regard to size, there may have been a low degree of variability but the skeleton burial context category also contained the highest percentage of larger-sized beads (size 5 and up). Taking into account the small sample size of skeletons with stone beads (7 necklaces and 4 bracelets on 9 individuals), which span a lengthy period of time (from South.L to South.R), the stone beads burial assemblage remains surprisingly conservative, especially with regard to raw material use and colour.

Burial fill also exhibits low variability but there are many more different types of raw materials and colours found in burial fill (Table A3.1.10 and A3.1.31), although the number of bead types remains the same (Table A3.1.17). Bead type and size appear to be important qualities of stone beads used in burials. The most difficult bead type to manufacture was probably the collared butterfly bead (N=2) and both examples of this bead were found in burial contexts. A general pattern can be distinguished regarding stone beads found on skeletons. The more elaborate the bead, the larger its size, and the more likely it is to be placed on its own as a bracelet or necklace pendant, especially in later settlement phases after North.G (South equivalent unexcavated phases South.N and South.O), when we find that there are no more standardized stranded disc or ring necklaces or bracelets, only single elaborate pieces used to make one type of jewellery.

Nakamura and Meskell (in press) emphasized the high degree of variability of burial goods between burials as half of the objects interred were only found once. In general, there is less variability between stone beads found in burials in comparison to those found in other contexts; however, the stone bead burial assemblage is distinct from other contexts because of the high number of elaborate bead types present as well as having the highest percentage of larger-sized beads. In fact, three variant bead types were solely associated with mortuary contexts, and two of these only occur once (axe head, collared butterfly, and plano-convex). So although the stone bead burial assemblage may not show much variability, the numbers of large, elaborate, bead types in conjunction with the various combinations of jewellery that can be made from beads signify a high degree of personalization, especially considering the number of choices available. Stone beads, and other personal ornaments, by nature and function are meant to communicate and the variant bead types used in burials attest to the practice of personalization. Using statement pieces within burials would not only personalize or set out an individual identity of the deceased, their families, and household, but also ensure they were remembered and commemorated during this transition between life and death, from the realm of the household to the realm of the ancestors.

An example of personalization as related to stone beads is the burial of an adult male with a potential bead making toolkit, complete with chert drills and an antler pressure flaker (burial F.1709) in Building 50, in settlement phase South.?M, but even in this case, we cannot say for certain that this man was a bead maker, as this toolkit may simply be a gift bestowed onto him upon his death (Figure 3.2.7).

Use-wear or “freshness”

As mentioned earlier in the chapter, the beads sampled on skeletons for freshness in burials suggest the possibility that most beads were unworn or made just prior to burial, even those made from less durable and less hard raw materials. One fluorapatite lenticular bead appeared to still have some linear abrasion manufacturing marks on it, which are likely due to a lack of final polishing. It may be possible that this bead was not completely finished due to time constraints before being buried as a necklace in an adolescent burial (F.1532) (Figure 3.4.4). Heavy bead use may perhaps indicate the presence of heirlooms but none of the beads sampled showed any obvious evidence of heavy use, on their exterior surface or within their perforations.

According to the physical anthropologists at Çatalhöyük, the dead were buried most likely after *rigor mortis* had passed, which may be anywhere from 36 to 72 hours (Boz and Hager, in press), which does not appear to be a sufficient amount of time to procure raw materials and manufacture a large number of beads. If raw materials were at hand, it may be possible for a highly skilled bead maker to manufacture the bead types and quantities, found in, for example, burials F.1860, F.1710, or F.1532 (Table A3.4.5) in such a short space of time (Figures 3.4.1 to 3.44, 3.46 to 3.4.8). It is however more plausible that unused beads were kept in households or by individuals and these may have been gathered by the household for burial, or that a few individuals and households came together to manufacture beads especially for burials. Interestingly, it does not appear that stone beads were being retrieved from older burials that may have been disturbed or moved when making room for new burials, a practice commonly found in the British Neolithic (Jones 2004:171). Perhaps like the complete stone beads discarded into external middens, the beads had been manufactured or used to perform a particular function and not meant to be re-used.

The social significance of stone bead use in burials at Çatalhöyük

In this section, a number of observations are discussed, but the small sample of burials with beads, and moreover, the small number of stone beads found on skeletons, makes it difficult to see clear patterns of use. It is however, significant that very few people were buried with grave goods, and moreover, even fewer with stone beads. Stone beads, and personal ornaments in general, differ from other items placed in burials, such as tools, animal bones, clay balls, for example. These items may show some degree of variation but do not have the same level of personal expression as personal ornaments. Stone beads can be generic or distinctive and therefore much better indicators of individuality and expression within burials.

Just as changes in stone bead technologies can be mapped over the course of the Neolithic, so can stone bead preferences within burials. The earliest examples of burials were from settlement phases South.J and K, and these only contained disc and ring beads. In South.L, we find an example of a very rich stone bead burial of a child (F.1860), which contained the first example of the use of variant bead types. From

South.L to North.G or South.N/South.O, we find examples of strands of identical variant beads, variant beads on their own, strands of disc or ring beads, and disc or ring beads on their own. After these phases, we find a tendency for large, single, elaborate stone beads to be used. There is, therefore, a general shift from the use of standardized disc and ring beads to larger elaborate forms. It is also significant that the earliest examples of elaborate bead types are found in burials. The manufacture of these bead types may have been propelled by their use in mortuary rituals.

Stone beads appear to be made fresh or may have been unworn or unused prior to interment. If individuals were being buried after the onset of *rigor mortis* as suggested by skeletal evidence, new beads may have been manufactured during this time period, and this also provides families and households ample time to mourn and conduct mortuary rituals, which may have been performed either publically, privately, or both. If these burials were indeed public affairs, involving extended family members, neighbouring households, or larger portions of the community, the deceased may have been publically adorned with stone beads on his or her body or publically viewed wearing stone beads, as part of the funeral rites and customs. The conspicuous use of stone beads during these funerary rites would have made a bold statement regarding the deceased and his or her status and position within the household, as well as the position, status, and affection for the deceased felt by those gifting the beads. The use of stone beads and other objects of symbolic importance in burials provided a method for households to carve out separate identities from other households, groups, or communities, identities which were associated with a specific household, lineage, or ancestry, in a socially accepted manner so as not to threaten social cohesion. Moreover, the use of stone beads in mortuary rituals may be a means for some households to flaunt their ritual capabilities and prowess, and construct new social and household memories, histories, and ancestries.

Neolithic mortuary practices in the Near East have been associated with the construction and maintenance of social relations, identity, and memory (Kuijt 2008:178). The practice of removing, plastering, and depositing skulls and other human bones in other contexts at Çatalhöyük may indicate the creation of household memories and connections to ancestors (Hodder and Pels 2010:180; Hodder 2005:133). Removed human skulls, some which appear to have been used for a lengthy period of time, have been found in burials, abandonment deposits, at the base of house posts (Hodder and Pels 2010:179). In another example, teeth removed from one skull from an earlier building in a sequence of buildings constructed over one another have been found placed in the jaw of another individual in a later building (Hodder and Pels 2010:179) (Figure 5.2.3). There appears to be continuity within households who are differentiating themselves from other households by using these skulls to first form memories of an individual or individual household, and over time and even generations, these skulls may have come to represent collective memories of a more symbolic nature (Kuijt 2008:177). These practices highlight the need by some households to distinguish themselves, or individuals to align themselves with a household, lineage, or ancestry, and over time this would have resulted in households becoming more autonomous, leading to more socially segmented society (Kuijt *et al*. 2011:502).

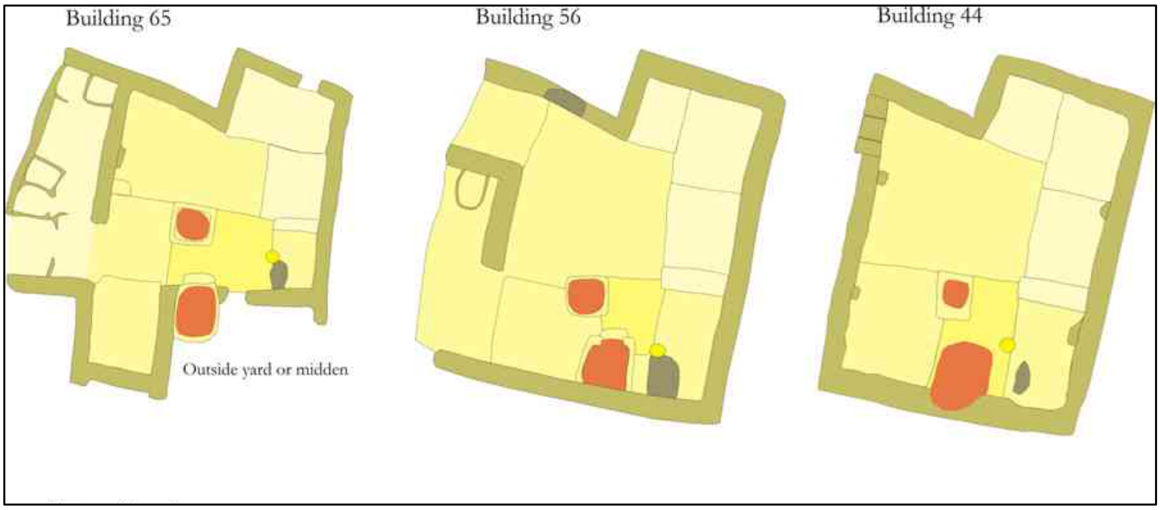


Figure 5.2.3. Sequence of building build above one another, presented earliest to latest. (Source: Çatalhöyük Research Project)

The distribution and ubiquity of beads at Çatalhöyük, as well as the relative degree of social equality found in most aspects of Çatalhöyük life do not indicate that any one individual, household, or group of households were controlling labour, trade, or resources to do with beads or any prestige items; hence there is no evidence aggrandizers promoting the use of certain items for their own political or economic gains (Hayden 2007:260). The use of beads and other symbolic objects in rituals associated with burials, may however, be a form of ritual aggrandizement, that is households competing for status and standing based on their ritual knowledge (Hayden 2007:261: Kuijt 2002:85), which may have been a vital link between their household, group, and its ancestry.

5.2.3 Caches, clusters, and placed deposits and pit/post/and bin fill

A very small percentage of beads were found in caches, clusters or placed deposits (2%) or fill from posts, pits, and bins (4%) (Figures 5.1.1 and 5.1.2). Caches, clusters, or placed deposits represent units with a group of homogenous or heterogeneous objects that may or may not have been intentionally placed within a house and/or been concealed. The breakage statistics revealed that it was not likely that all these contents had been intentionally placed within these contexts, due to the high breakage percentages, especially in comparison to burials (Table 3.1.46). Clusters, caches, and placed deposits, as well as post, bin, and pit fills were closely examined and only three contexts seemed to have some significance based on what appears to be intentional deposition and the specific nature of their context (its location and contents). Two of these contexts can be classified as clusters or placed deposits, and one as pit fill. Other contexts, classified under these categories, were not included because they appeared to be clusters of objects used as levelling deposits, debitage dumps, background noise, and were likely to be a part of building infill.

The first cluster (also discussed in Chapter 4.1) is in Building 56, in settlement phase South.R. A necklace of freshwater limestone and painted shells was found placed on the floor of a storage room prior to the abandonment of the house (Figures 5.2.3 and 4.1.6). The building was swept and cleaned out (only obsidian micro-artefacts remain in the activity area of the house), so it is entirely possible that this necklace was intentionally left here along with an abrading slab and a stone axe preform, perhaps as part of a house-closing ritual. The beads in this context appear to have been given to the house as a commemorative offering. Their location in the storage room, where foodstuffs, seeds, and grains were kept may indicate a connection to fecundity, marking it as the fertile centre of the house.

Figure 5.2.4. Clockwise from left to right: Three examples of hand perforated natural freshwater limestone beads and a painted shell

The second context is a rich deposit of large animal bones, including a large cattle humerus, that were left lying along a bench of Building 58, in settlement phase North.G (Figure 5.2.5). Among these bones is what is likely to be a roughout made from hematite (Figure 5.2.6). Whether this roughout was intentionally left with these bones cannot be said with certainty, but such deposits typically may be related to feasting. Feasting deposits are commonly found in the foundation or abandonment phases of buildings (Hodder 2006:172). Hematite is also a rare find in the stone bead assemblage at Çatalhöyük (N=4; Table A3.1.7), but this does not necessarily mean it is special in comparison to other variant raw materials. Right above this unit is building fill, so it is again possible that that these bones were intentionally left behind prior to closing, a situation similar to that of Building 56, discussed above.

Figure 5.2.5. Large bone cluster in unit 11930, Building 58, North.G. Photo by J. Quinlan, Çatalhöyük Research Project

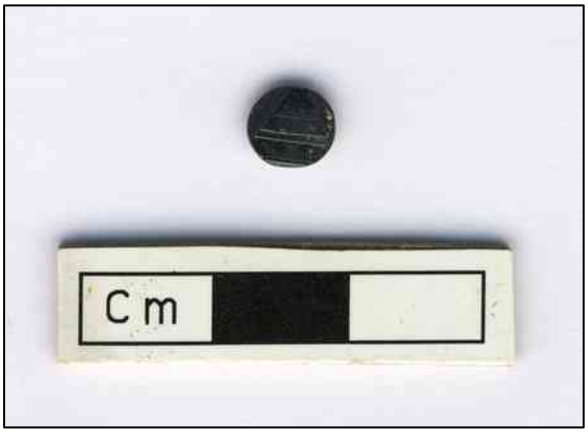


Figure 5.2.6. Hematite roughout (11930.H1) found in Building 58, North.G. Photo by K. Wright

Lastly, a pit cut was made through the floor of the entrance area of Building 64, in North.G, and within this pit, 37 complete and 7 fragments of soft limestone beads were found (Figure 5.2.7). These beads may have been stored here and forgotten or offered to the house. It is interesting that these beads were placed in a very heavy traffic area and that obsidian hoards are also found in this area of the home (Hodder 2006:175). These beads may have been stored, hoarded, offered to the dead (who also resided in the floors) or perhaps were intentionally placed here as a magical deposit which guarded the entry of the home. It is unlikely that we can determine which of these scenarios, if any, are plausible, without a more thorough study of all these types of contexts.

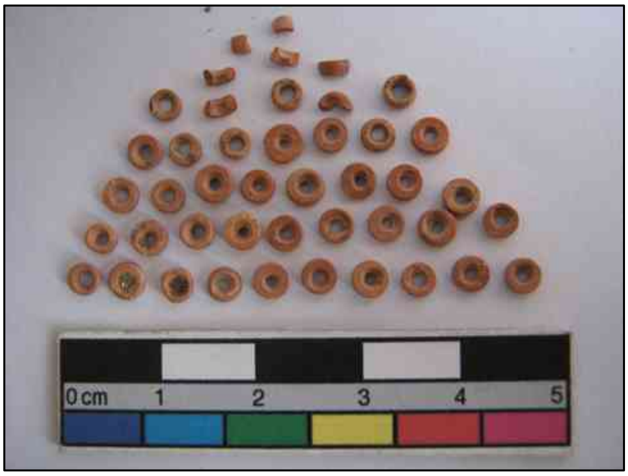


Figure 5.2.7. Soft limestone beads and bead fragments found in a pit cut through the floor of Building 64, in North.G

These three examples demonstrate why this context category was shown to have so much variability in relation to sample size according to the qualitative variables assessed. Not only are the stone beads especially varied, but also the contents found within these clusters and deposits may vary, making their interpretation very difficult. In general, these three contexts are too few and too small to make any generalizations. It does appear that these beads were intentionally placed in these houses and this action in itself suggests some sort of ritual action, such as an offering, prior to the discontinued use of a house. The closing of house is similar to the death of the house and beads are used as objects of ritual or commemorative offerings at this marked moment. Similarly, we find parallels with the use of beads during the death of individuals. In both instances, stone beads are used to acknowledge an ending but perhaps also a beginning.

Obsidian hoards and placed deposits at Çatalhöyük have been studied by Tristan Carter, who suggests that obsidian preforms and blanks, used to make different types of tools, were not simply buried for the purposes of storage but had ritual significance and their use was perhaps rule-bound (Carter 2011; 2007). The obsidian from these hoards may have been kept from batches of obsidian used for gift-giving and buried by the household (Carter 2011:9; 2007:352) (Figure 5.2.8). On the other hand, projectiles left in house closures may symbolise the death of the house, similar to how these projectiles would have been used in hunting (Carter 2011:10). Hodder associates the caches of obsidian with the other objects and people who are also buried beneath the house floors (Hodder 2006:175). If what was beneath floors was ritual space then the movement of objects (such as obsidian) created a sense of "aura", "renewal, and rebirth" (Hodder 2006:175). The stone beads found in pit fill may have been beads retained during gift giving, or an offering to someone buried beneath the house or an ancestor, but either notion is hard to support with such limited examples.

Figure 5.2.8. Example of obsidian hoard found in the South area. Photo by J. Quinlan, Çatalhöyük Research Project

Nakamura (2010), has also closely examined clusters and placed deposits at Çatalhöyük, some of which she believes may be magical deposits. Many of these deposits appear to be intentionally placed at various points during the life of building, and can be differentiated from midden fill and other deposits, by the combination of materials placed within these clusters (Nakamura 2010:310). There appears to be some general patterns associated with these deposits such as the presence of a single type of material placed within a larger group of another type of materials (Nakamura 2010:310), such as the hematite roughout found amongst the large cattle bones in Building 58, mentioned above. These deposits always appear in buildings and moreover, we see certain combinations of materials repeated throughout the settlement (Nakamura 2010:310). The extent of the significance of these deposits is difficult to ascertain, but the clusters of material may have had dedicatory, apotropaic, commemorative, or spiritual functions within households (Nakamura 2010).

The beads used in these clusters and placed deposits stand out both in terms of context and composition. It is possible that these beads were specifically manufactured or acquired for use in these contexts, which appear to be distinct in that they can be associated with important events within the life of a house, hence implying the use of stone beads in a ritualized context. Many more of these deposits as well as their contents need to be studied in detail in order to fully understand their significance. These deposits demonstrate yet another context in which stone beads appear to be used symbolically, and as a part of ritual life at Neolithic Çatalhöyük.

5.3 The social significance of stone bead use at Çatalhöyük

The household, both physically and metaphorically, appears to be the centre of Neolithic life at Çatalhöyük (Hodder 2006; 2003; Hodder and Cessford 2004) and perhaps even a living entity in its own right. Houses are constructed (born) and during this process special deposits may be placed in foundations or post-holes, among other elements of construction. Similarly houses are closed or abandoned (die) and again deposits, including stone beads, are placed on the floors of these building prior to infilling them. The involvement of stone beads in major milestones associated with the lives of people (burials, for example) and houses signifies their social and ritual importance. These examples of ritual bead use all share a common theme of life and death, and stone beads may be used to symbolically demarcate the passing from the realm of living (household) to the realm of dead (ancestors). Some households may be more fixated in ritual activities, as determined by the presence of burials, special deposits, wall paintings, the repetitive construction of buildings over one another, using and reusing wild animal installations, and retrieving skulls to keep, plaster, or rebury. Whether a deeper engagement with such practices was a form of ritual aggrandizement is difficult to say, what these practices do suggest, however, particularly secondary mortuary practices, is a focus on household memories, histories, lineages, and ancestries.

Although Neolithic rituals may be difficult to interpret and fully grasp, it appears that the involvement of stone beads in ritual activities, ceremonies, and performances may have created a demand for these objects, which propelled their manufacture and craft forward at Çatalhöyük (see Chapter 4.2 and 4.4). The changes found in stone bead technologies over the span of the Neolithic, discussed in the previous chapter, were most likely influenced by changes in ritual practice. Personal ornaments, grave goods, wall paintings, installations, and other items associated with symbolism and ritual, are the main material examples that illustrate varying degrees of individual and household expression at Çatalhöyük, in an otherwise conservative society that actively devised and implemented social rules and a common communal identity in order to promote social cohesion. The dominant uniform assemblage reflects this emphasis on a communal identity, but the diverse and elaborate beads initially found in burials, and then elsewhere, indicate emerging personal and household identities, carving out a sense of self, social memory, and history associated with a household and perhaps an ancestry, in a manner which did not threaten the basic social fabric of a large, and more or less egalitarian, Neolithic community. Identities were therefore actively moulded and negotiated and therefore a process rather than an agglomeration of static facts (Knapp 2008:32).

Stone beads are essentially "technologies of enchantment" (Gell 1992:93), objects made with technical skill that attract our attention and visually engage us, but are also embedded with power and/or symbolic and abstract meanings. This is likely to be the main reason that beads were used in ritualized contexts such as burials, placed deposits, and perhaps even external middens. The depositional practices and contextual analyses of various contexts support the idea that stone beads were multipurpose, socially valued goods that became integral to daily, ritual, and social life at Neolithic Çatalhöyük performing functions such as the communication of ideas, the forging of relationships, marking important transitions in the lives of people and households, and creating, maintaining and propagating identities, both communal and personal. Stone beads conspicuously performed an integral social role at Çatalhöyük; the story of their use is inextricably linked to all aspects of Neolithic life at Çatalhöyük, including identity, technology and symbolism and ritual.

Summary of stone bead roles at Çatalhöyük

- Stone beads were multipurpose and versatile objects that were used as protective, magical, or ritualistic objects on a daily basis, as well as to commemorate specific milestones and transition periods in the lives of both people and houses.

- Evidence suggests that beads may have been intentionally placed or discarded into external middens, perhaps when they were no longer needed to perform the function they had been manufactured or acquired to do.

- Breakage percentages, among other evidence, suggest that blue coloured beads were more significant than beads of other colours; perhaps because they were more valued due to the rarity of their colour, they had longer use lives, or they had a different function than other beads.

- A number of burial patterns regarding both age and gender were distinguished; the most striking pattern is that women and children tended to have greater quantities of beads, larger beads, and more variant bead types than men. In addition, blue coloured beads were also only found in the burials of women and children. These factors may suggest specific gendered cultural traits or perhaps a protective function as women and children were both susceptible to early deaths due to childbirth and disease, as determined by huge proportion of neonate to adolescent burials at Çatalhöyük.

- Although burials as a context show the least amount of variability, burials contained the highest percentage of larger sized beads and the most complex bead types, allowing a high degree of personalization and examples of both generic and individual expression. Trends in stone bead use in burials also change over the course of the Neolithic; early examples of beads within burials tend to be strands of beads made from disc or ring beads; but by the late Neolithic, only large, single, and elaborate statement beads are being placed within burials.

- The changes found in stone bead technologies over the span of the Neolithic, discussed in the previous chapter, were most likely influenced by changes in ritual practices at Çatalhöyük. The need to distinguish oneself or household from others by conspicuously demonstrating personal or household wealth, importance, or ritual knowledge, actively created social memories, histories and ancestries, increasing social complexity and was an important first step in social stratification.

CHAPTER 6: NEOLITHIC STONE BEAD STUDIES IN ANATOLIA AND CONCLUDING REMARKS

Overview of stone bead studies in Anatolia and future studies

Stone beads from only a handful of sites from Neolithic Turkey have been studied or even published. They are generally consigned to a couple of descriptive pages in the small finds chapter of an excavation report or monograph of a site or are left out completely. In a period marked by an increase in symbolism and ritual, it is surprising that beads, which epitomize one of the earliest forms of symbolism used by humans, have not been given as much attention in Neolithic Turkey as much more overt forms such as wall paintings, plastered skulls, and even figurines. Özdoğan (1999b:230) without actual demonstration, stated that stone beads at prehistoric sites such as Hallan Çemi, Çayönü, Nevalı Çori, and Cafer Höyük should be classified as works of art due simply to the level of specialized skill involved in their production. Although true, these beads are more than just works of art, they are social entities whose manufacture, use, and discard or deposition can inform us on many aspects of Neolithic life, including ritual and symbolism, interaction and exchange, raw material engagement, memory, daily life, and technology, among others.

A number of Neolithic sites in Central Anatolia (Pinarbaşi, Aşıklı Höyük, and Kaletepe), the Lake District (Halcılar) and Eastern or Southeastern Anatolia (Hallan Çemi, Nevalı Çori, Cafer Höyük, Göbekli Tepe and most of Çayönü and Gritille) predate Neolithic occupation at Çatalhöyük (based on Neolithic Anatolian chronologies provided by Hodder 2006 and Thissen 2002). Other sites, such as Canhasan III, Suberde, Musular, Mezraa Teleilat and Kumartepe, overlap in occupation and are therefore contemporary to Neolithic Çatalhöyük (Figures 6.1 and 6.2). There have been no publications concerning stone beads from Pinarbaşi, Kaletepe, Halcılar, Hallan Çemi, Gritille, Göbekli Tepe, Canhasan III, Suberde, and Musular, but some information is available from the remaining sites.

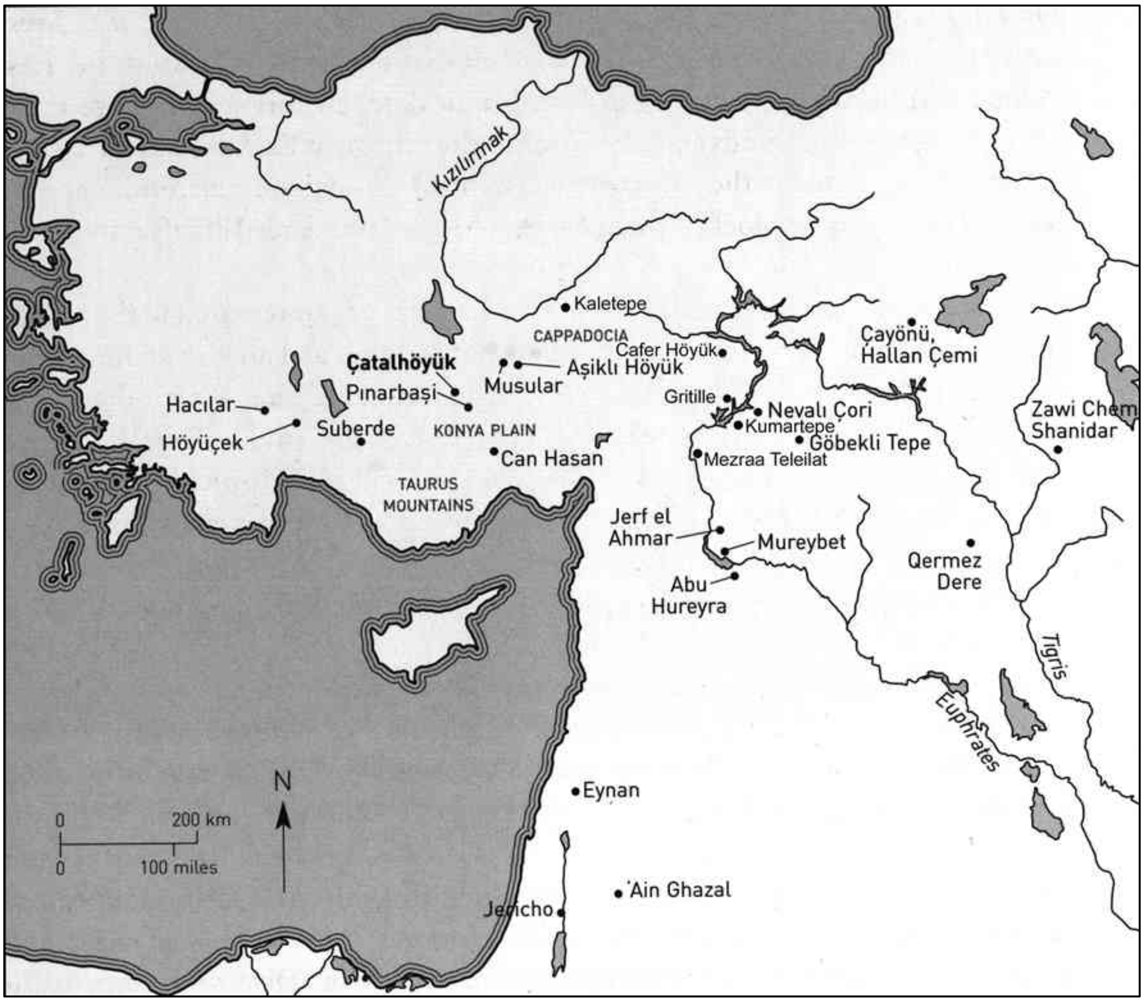


Figure 6.1. Map of Anatolian and Near Eastern sites mentioned in text (*Source*: Hodder 2006:15, Figure 5, map modified to include additional sites)

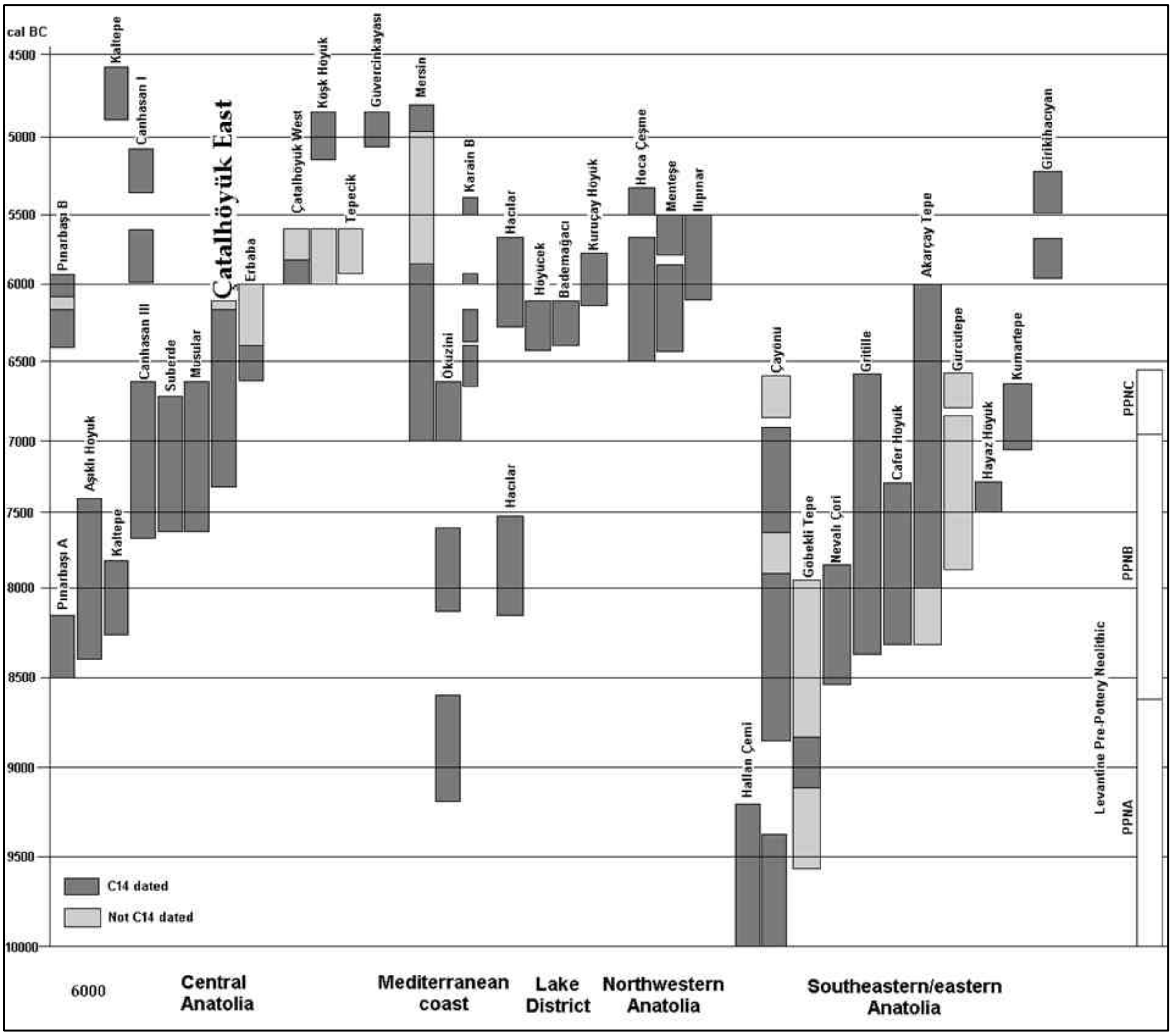


Figure 6.2. Chronology of Neolithic sites in Turkey (*Source:* Hodder 2006:44, Figure 19)

In Central Anatolia, the beads (made from all types of media) from Aşıklı Höyük are currently undergoing study by the author (Bains *et al.*, forthcoming). The stone beads from Aşıklı Höyük are primarily found in burials, and take the form of necklaces and bracelets, which are made from local materials and semiprecious stones such as carnelian and chrysoprase (Esin and Harmankaya 1999:127) (Figure 6.3). The beads from Aşıklı Höyük may predate those found in the earliest phases at Çatalhöyük, but they appear to be much more diverse and elaborate and display great technological prowess for such an early period (Figures 4.1.6 and 4.1.10). In comparison to the late Neolithic at Çatalhöyük, however, Aşıklı Höyük displays much less diversity. Bead makers at Aşıklı Höyük were utilizing very hard and tough raw materials at a very early stage (Figure 4.1.6); in fact, large carnelian beads were being produced at Aşıklı Höyük long before those manufactured and used during the 7th – 6th millennium at Mundigak and other parts of the Indus or Indo-Pakistan region previously regarded as the earliest examples of carnelian bead manufacture (Rapp 2002:93), whereas at Çatalhöyük, examples of carnelian do not appear in the stone bead assemblage until South.P.

Figure 6.3. Example of large chrysoprase bead from Aşıklı Höyük

Moving east from Aşıklı, we find that there are examples of green and red disc beads in the earliest levels at Cafer Höyük (Cauvin *et al.* 1999:91). Mid-way through occupation, however, we find "disc-like roundels" made from carnelian and a green coloured stone, as well as a single example of a barrel bead made from obsidian (Cauvin *et al.* 1999:94). In later levels, stone beads become quite prevalent but no production evidence has yet been found (Cauvin *et al.* 1999:98). In contrast, at Nevalı Çori, which for most of its occupation is contemporary with Cafer Höyük, more elaborate butterfly beads appear in all levels as well as flat beads with multiple perforations (Hauptmann 1999:77).

Stone beads are much better documented at Çayönü. Çayönü had a native copper industry and malachite beads were made in conjunction with copper objects and tools (Sagona and Zimansky 2009:74; Özdoğan 1999a:58). The stone bead assemblage at Çayönü is much more rich and diverse than that at Nevalı Çori and Cafer Höyük. Beads were made mostly from raw materials that were soft to medium hardness, as well as harder stones such as obsidian and quartz (Figure 6.4). In the early part of the First Stage, a number of round (disc?) beads and pear-shaped pendants have been found and by the end of this period there is a proliferation of bead types, including spacer beads and cylindrical beads, which become out of style in the Third stage (Özdoğan 1999a:57). In the Fourth Stage, we are back to simple round beads and pendants (Özdoğan 1999a:57). Flint borers resembling chert microdrills at Çatalhöyük have also been found at Çayönü. During the Second Stage, there is evidence of workshops in the western sector of the settlement specializing in stone ornaments and malachite and copper work (Özdoğan 1999a:46), so there is some evidence of production at Çayönü.

Figure 6.4. Stone pendants from Çayönü (*Source:* Özdoğan 1999:33, Figure 62)

As previously mentioned in Chapter 4, at Kumartepe, Calley and Grace (1988) have published what appears to be a bead making area or workshop in which both flint microborers and carnelian beads were manufactured. Carnelian cores were reduced into flakes and first perforated half way through with a drilling motion from one side and the remaining part of the perforation was removed using the punch technique, that is the drill struck the perforation so that the remaining conical-shaped piece of the perforation could be removed (1988:75, 80). Very few sites have evidence of *in-situ* production, and the sheer numbers of microborers (thousands) suggest that the production of carnelian beads at this site was at a significantly higher level than even that found in South.P, at Çatalhöyük. Similar to Kumartepe, Coşkunsu has studied microborers and cylindrical polished drills associated with bead production from Mezraa Teleilat (2008). Raw materials such as carnelian, agate, greenstone, obsidian and limestone were used to manufacture disk, butterfly, tubular, barrel, and elliptical beads, and pendants (Coşkunsu 2008:31-32). Not only do the beads appear to be so highly specialized, but so do the microborers and cylindrical polished drills used to perforate them (Coşkunsu 2008:35).

Most of the sites discussed above are situated in Eastern and Southeastern Turkey and therefore some regional differences are expected from Central Anatolia. Aşıklı Höyük, Nevalı Çori, and much of Çayönü are earlier than Çatalhöyük but some of the bead types, such as the butterfly bead, found at these early Neolithic sites are clearly much more elaborate and require high levels of skills to produce. The only parallels of such beads at Çatalhöyük are found in the late Neolithic assemblage and are few and far between. Bead makers at Çatalhöyük appear to prefer working with raw materials that are not as hard to manipulate, and given their location and the ample access to these suitable raw materials, they did not appear to have a reason to work with more difficult raw materials. Since they were knapping flint and obsidian, they had the basic skill set to work with carnelian, chrysophrase, and obsidian to make beads, but they chose to only minimally invest in these raw materials. Moreover, the conservatism seen at Çatalhöyük with regard to bead use reflects a strict adherence to a technological tradition that remained prevalent both within and between the phases of the Neolithic. Although we find clear patterns of colour preferences at Çatalhöyük, earlier sites were producing green coloured beads long before they were used at Çatalhöyük. Proper green coloured beads are not found in the assemblage until South.L, but further excavations may prove otherwise. Blue beads are not mentioned in any of the publications, and there are only two blue/green coloured beads at Aşıklı Höyük that the author is aware of. It would be interesting to see when these beads are introduced at various sites in Turkey during the Neolithic.

There is much more production evidence at the sites that overlap in occupation with Çatalhöyük – such as Çayönü, Kumartepe, and Mezraa Teleilat. In the latter two sites, the focus so far has primarily been on the lithic technologies used to perforate stone beads, but there is indication of specialization in bead and microdrill production during this period, which coincides mid-way through occupation at Çatalhöyük (around South.N, which has not yet been excavated to occupation levels). South.P is when we first find evidence of specialized bead production at Çatalhöyük and a similar situation is present in Eastern Turkey.

This overview highlights the fact that there is significant meaningful variability across the region, synchronically and diachronically, that needs to be studied. The lack of published data regarding stone beads stresses the need to examine personal ornaments at these and other sites from the Neolithic and Chalcolithic periods to determine the social significance of stone bead technologies both intra- and inter-regionally and the spread of bead materials, technologies, styles, and uses throughout Turkey and the Near East. This can be done by utilizing methodological methods used in this project which include closely examining both production and use contexts, identifying aesthetic and manufacturing preferences, and devising manufacturing sequences.

In order to fill the gaps at Çatalhöyük, stone beads from unexcavated phases South.N and South.O need to be studied, so as to better understand the transitions in bead technologies and use over the course of the Neolithic. It is also possible that further excavation at Çatalhöyük may reveal additional nuances in bead technologies and consumption. In addition to these future endeavours, further experiments in bead manufacture and technology need to be conducted, especially with regard to use-wear and the manufacture of beads from harder raw materials.

Overall achievements and conclusions

The data acquired and methodological methods devised in this project successfully addressed the research questions and fulfilled the set aims and objectives of this project. This project was able to determine:

- how and where stone beads were manufactured and with what raw materials and tools
- changes in aesthetic, manufacturing, and burial preferences
- the presence of production contexts, craft specialization, and the organization of production
- the use of beads as items of daily use, ritual, and commemoration
- the use of beads as tools to express both communal and individual identities

The overall conclusions presented below reveal that stone beads conspicuously performed a significant and integral social role and that the story of their use is inextricably linked to all aspects of Neolithic life at Çatalhöyük; hence addressing the two main research questions posed in Chapter 1.2 regarding the social significance of stone bead production and use at Çatalhöyük and whether stone bead technologies change over time.

- The study of stone bead technologies and personal ornaments in general can provide us with new perspectives on how the manufacture and use of such small, conspicuous, symbolic, and skilfully crafted objects could permeate into so many aspects of Neolithic life and society and play such a fundamental role in individual and communal identities and expression.

- Although preferences in raw materials, bead types, bead sizes, and colours change over the course of the Neolithic, at the core of the stone bead manufacture at Çatalhöyük was a technological tradition, consisting of technological knowledge and a shared technological *habitus*, and comprised of basic manufacturing techniques that remained almost unchanged and central to the craft.

- By the mid-Neolithic, stone bead technologies at Çatalhöyük strongly indicate the presence of a highly skilled and part-time specialized craft practiced at a household level. Bead makers were using these skills to manufacture beads as well as fulfilling demands created by the many uses of stone beads.

- The use of stone beads in such pivotal moments of life, death, ritual, and ceremony substantiate their ubiquitous presence and vouch for their social importance to the people of Çatalhöyük. Their socially significant roles in communication, expression of identities, and symbolism and ritual, all indicate that stone beads at Çatalhöyük were not simply by-products of the slow but steady social changes and developments that occurred over the course of the Neolithic period; in effect, they proved to be a valuable material means, actively and readily used by community leaders, individuals, and households, to achieve these social changes.

This dissertation provides a demonstration in the value of studying personal ornaments which permeate many aspects of life, and it is hoped that this thesis can serve as a reference study that may be used as a guide in future personal ornament studies.

BIBLIOGRAPHY

Allchin, B. 1979. The agate and carnelian industry of Western India and Pakistan. In: J. E. van Lohuizen de Leeuw (ed.), *South Asian Archaeology: Papers from the Third International Congress of the Association of South Asian Archaeology*. Leiden: E.S. Brill, 91-105.

Asouti, E. 2006. Beyond the Pre-Pottery Neolithic B interaction sphere. *Journal of World Prehistory* 20, 87-126.

Bains, R., Özbaşaran, M., Kayacan, N., and Astruc, L. (In preparation). Bead Industries at Aşıkı Höyük.

Baird, D. 2002. Early Holocene settlement in Central Anatolia: problems and prospects as seen from the Konya Plain. In: F. Gerard and L. Thissen (eds.), *The Neolithic of Central Anatolia*. Istanbul: Ege Yayınları, 139-159.

Baird, D. 2007. The Boncuklu project: the origins of sedentism, cultivation and herding in Central Anatolia. *Anatolian Archaeology* 13, 14-17.

Banning, E. B. 1998. The Neolithic Period: Triumphs of Architecture, Agriculture, and Art. *Near Eastern Archaeology* 61/4, 188-237.

Barthelemy de Saizieu, B. and Bouquillon, A. 1994. Steatite working at Mehrgarh during the Neolithic and Chalcolithic Periods: Quantitative distribution, characterization of material and manufacturing processes. In: A. Parpola and P. Koskikallio (eds.), *South Asian Archaeology 1993. Volume I. Proceedings of the Twelfth International Conference of the European Association of South Asian Archaeologists, Helsinki University 5-9 July 1993*. Helsinki: Suomalainen Tiedeakatemia, 47-70.

Bar-Yosef, O. and Belfer-Cohen, A. 1989. The Levantine "PPNB" interaction sphere. In: I. Hershkovitz (ed.), *People and culture in change: Proceedings of the second symposium on Upper Palaeolithic, Mesolithic and Neolithic populations of Europe and the Mediterranean Basin.* BAR International Series 508. Oxford: Archaeopress, 59-72.

Bar-Yosef, O. and Meadow, R. 1995. The origins of agriculture in the Near East. In: T. D. Price and A. N. Gebauer (eds.), *Last hunters, first farmers: New perspectives on the prehistoric transition to agriculture*. Sante Fe: School of American Research Press, 39-94.

Bar-Yosef Mayer, D. E., Porat, N., Gal, Z., Shalem, D., and Smithline, H. 2004. Steatite beads at Peqi'in: long distance trade and pyro-technology during the Chalcolithic of the Levant. *Journal of Archaeological Science* 31, 493-502.

Bar-Yosef Mayer, D. E., and Porat, N. 2008. Green stone beads at the dawn of agriculture. *Proceedings of the National Academy of Sciences* 105/25, 8548-8551.

Bead Study Trust. 2008. *Horace C. Beck the "Bead Man"*. Retrieved on 10 August 2011 from World Wide Web: http://www.beadstudytrust.org.uk/beck.html

Beck, H. C. 1928. Classification and Nomenclature of beads and pendants. *Archaeologia* 1, 1-76.

Bednarik, R. 2006. *Lecture No. 4. Beads, symbolism and self-awareness.* Semiotix Course: Cognition and symbolism in human evolution: www.chass.utoronto.ca:8080/epc/srb/cyber/rbednarik4.pdf

Berlin, B. and Kay, P. 1969. *Basic color terms: their universality and evolution*. London: University of California Press.

Boram-Hays, C. 2005. Borders of Beads: Questions of Identity in the Beadwork of the Zulu-Speaking People. *African Arts* summer, 38-49.

Bouquillon, A., Barthelemy de Saizieu, B., and Duval, A. 1994. Glazed steatite beads from Mehrgarh and Nausharo (Pakistani Baluchistan). *Journal of the Israel Prehistoric Society* 26, 74-122.

Boivin, N. 2004. From Veneration to Exploitation: Human Engagement with the Mineral World. In: N. Boivin and M. A. Owac (eds.), *Stones, Soils and Symbols: Cultural Perceptions of the Mineral World*. London: University College London Press, 1-30.

Bourdieu, P. 1977. *Outline of a Theory of Practice*. Translated from French by R. Nice. Cambridge: Cambridge University Press.

Bourdieu, P. 1990. *The Logic of Practice*. Translated from French by R. Nice. Oxford: Polity Press.

Boz, B. and Hager, L. (In press). Living above the dead: intramural burial practices at Çatalhöyük. In: I. Hodder (ed.), *Substantive Technologies from Çatalhöyük: reports from the 2000- 2008 seasons*. Los Angeles: Monographs of the Cotsen Institute of Archaeology, University of California at Los Angeles.

Bradley, R. 2005. *Ritual and Domestic Life in Prehistoric Europe*. London: Routledge.

Brier, B. 1981. *Ancient Egyptian magic*. New York: Quill.

Bril, B., Roux, V., & Dietrich, G. 2005. Stone Knapping: Khambhat (India), a unique opportunity? In: V. Roux & B. Bril (eds.), *Stone knapping: The necessary conditions for a uniquely hominid behaviour.* Cambridge: McDonald Institute, 53–71.

Calley, S. and R. Grace. 1988. Technology and Function of Micro-borers from Kumartepe (Turkey). In: S. Beyries (ed.), *Industries Lithiques: Tracéologie et Technologie, vol 1: aspects archéologiques*. Oxford: BAR International Series, 69-81.

Campbell, S. and E. Carter. 2006. Domuztepe Excavations, Domuztepe. S. Campbell and E. Carter (eds.), *Open Context.* Retrieved on 11October 2008 from the World Wide Web: http://www.opencontext.org/database/space.php?item=1_DT_Spatial

Carter, T. 2007. Of Blanks and Burials: Hoarding Obsidian at Neolithic Çatalhöyük. In: L. Astruc, D. Binder and F. Briois (eds.), *Technical Systems and Near Eastern PPN Communities: Proceedings of the 5th International Workshop. Fréjus, 2004.* Antibes: Éditions APDCA, 343-355.

Carter, T. 2011. A true gift of mother earth: the use and significance of obsidian at Çatalhöyük. *Anatolian Studies* 61, 1-19.

Cauvin, J. 2000a. *The Birth of the Gods and the Origins of Agriculture.* Translated from French by T. Watkins. Cambridge: Cambridge University Press.

Cauvin, J. 2000b. The Symbolic Foundations of the Neolithic Revolution in the Near East. In: I. Kuijt (ed.), *Life in Neolithic Farming Communities: Social organization, identity, and differentiation*. London: Kluwer Academic/Plenum Publishers, 235-251.

Cauvin, J., Aurenche, O., Cauvin, M. C., and Balkan-Atlı, N. 1999. In: M. Özdoğan and N. Başgelen (eds.), *Neolithic in Turkey: The cradle of civilization: New discoveries.* Istanbul: Arkeoloji ve Sanat Yayınları, 35-63.

Cessford, C. 2007. Level Pre-XII.E-A and Levels XII and XI, Spaces 181, 199 and 198. In: I. Hodder (ed.) *Excavating Çatalhöyük: South, North and KOPAL Area reports from the 1995-99 seasons.* Oxford: British Institute at Ankara, 59.

Childe, V. G. 1954. Rotary Motion. In: C. Singer (ed.), *A History of Technology from Early Times to fall of Ancient Empires. Vol. I.* Oxford: Clarendon Press, 187-215.

Coles, J. 1979. *Experimental Archaeology*. London: Academic Press.

Coşkunsu, G. 2008. Obsidian Assemblage of Mezraa Teleilat: Evidence of Cultural and Chronological Continuation from Late Pre-Pottery Neolithic to Pottery Neolithic. *Neo-Lithics* 2/7, 36-43.

Costin, C. L. 1986. *From Chiefdom to Empire State: Ceramic Economy Among the Prehispanic Wanka of Highland Peru*. Ph.D. dissertation, University of California, Los Angeles. Ann Arbor: University of Microfilms.

Costin, C. L. 1991. Craft Specialization: Issues in defining, documenting, and explaining the organization of production. *Archaeological Method and Theory* 3, 1-56.

Cummings, V. 2002. Experiencing Texture and Transformation in the British Neolithic. *Oxford Journal of Archaeology* 21/3, 249-261.

D'Errico, F. & Villa, P. 1997. Holes and grooves: the contribution of microscopy and taphonomy to the problem of art origins. *Journal of Human Evolution* 33/1, 1-31.

Deo, S. B. 2000. *Indian Beads: A Cultural and Technological Study.* Pune: Deccan College Post-Graduate and Research Institute.

Diamanti, J. 2003. Beads, Trade and Cultural Change. In: J. Lankton (ed.), *A Bead Timeline, Volume I: Prehistory to 1200 CE*. Washington: The Bead Society of Greater Washington, 8-13.

Dietler, M. and Herbich, I. 1998. Habitus, Techniques, Style: An Integrated Approach to the Social Understanding of Material Culture and Boundaries. In: M. T. Stark (ed.), *The Archaeology of Social Boundaries*, Washington: Smithsonian Institute Scholarly Press, 232-263.

Dobres, M. A. 1999. Technology's Links and Chaînes: The Processual Unfolding of Technique and Technician. In: M. A. Dobres and C. R. Hoffmann (eds.), *The Social Dynamics of Technology*. Oxford: Blackwell, 124-146.

Dobres, M. A. 2000. *Technology and Social Agency: Outlining a Practice Framework for Archaeology.* Oxford: Blackwell.

Düring, B. 2011. *The Prehistory of Asia Minor: From Complex Hunter-Gatherers to Early Urban Societies*. Cambridge: Cambridge University Press.

Esin, U. 1999. Introduction – The Neolithic in Turkey: A General Review. In: M. Özdoğan and N. Başgelen (eds.), *Neolithic in Turkey: The cradle of civilization: New discoveries*. Istanbul: Arkeoloji ve Sanat Yayınları, 13-24.

Esin, U. and S. Harmankaya. 1999. Aşıklı. In: M. Özdoğan and N. Başgelen (eds.), *Neolithic in Turkey: The cradle of civilization: New discoveries*. Istanbul: Arkeoloji ve Sanat Yayınları, 115-132.

Fabiano, M., Berna, F., and E. Borzatti von Löwenstern. 2004. Pre-Pottery Neolithic Amazonite bead Workshops in South Jordan. In: Secretariat du Congres (ed.), *Acts of the XIVth World Congress of the Union of Prehistoric and Protohistoric Sciences (UISPP) Liege (Belgium), September 2–8, 2001*. Oxford: BAR International Series, 265-275.

Farid, S. 2011. Çatalhöyük comes Home. *Archaeology International* 13. Retrieved on 25 February 2012 from the World Wide Web: http://www.ai-journal.com/article/view/ai.1313/67.

Farid, S. 2007. Introduction to the South Area Excavations. Level X Relative Heights, Buildings 23 & 18 and Building 9. Level IX Relative Heights, Building 2, Buildings 22 & 16 and Building 17. In: I. Hodder (ed.), *Excavating Çatalhöyük: South, North and KOPAL Area reports from the 1995-99 seasons.* London: British Institute at Ankara, 41-58.

Foreman, R. 1978. Disc Beads: Production by Primitive Techniques. *The Bead Journal* 3 3/4, 17-22.

Garfinkel, Y. 1987. Bead Manufacture on the Pre-Pottery Neolithic B Site of Yiftahel. *Mitekufat Haeven: Journal of the Israel Prehistoric Society* 20, 79-90.

Gell, A. 1992. The Technology of Enchantment and the Enchantment of Technology. In: J. Coote and A. Shelton (eds.), *Anthropology, Art, and Aesthetics*. Oxford: Oxford University Press, 40-63.

Gell, A. 1998. *Art and Agency: An Anthropological Theory*. Oxford: Clarendon Press.

Gifford-Gonzalez, D. 2009. On beasts in breasts. Another reading of women, wildness and danger at Çatalhöyük. *Archaeological Dialogues* 14/1, 91-111.

Giles, K. 2000. *An Archaeology of Social Identity: Guildhalls in York, c. 1350 – 1630*. Oxford: Archaeopress.

Goring-Morris, N. 2000. The Quick and the Dead: The Social Context of Aceramic Neolithic Mortuary Practices as seen from Kfar HaHoresh. In: Ian Kuijt (ed.), *Life in Neolithic Farming Communities: Social organization, identity, and differentiation*. London: Kluwer Academic/Plenum Publishers, 103-135

Goring-Morris, N. and Belfer-Cohen, A. 2002. Symbolic Behaviour from the Epipalaeolithic and Early Neolithic of the Near East: Preliminary Observations on Continuity and Change. In: H. G. K. Gebel, B. D. Hermansen, and C. H. Jensen (eds.), *Magic Practices and Ritual in the Near Eastern Neolithic: Proceedings of a Workshop held at the 2nd International Congress on the Archaeology of the Ancient Near East (ICANNE) Copenhagen University, May 2000*. Berlin: Ex Oriente, 67-79.

Grace, R. 1989. *Interpreting the Function of Stone Tools: The Quantification and Computerisation of Microwear Analysis*. Oxford: Archaeopress.

Graeber, D. 1996. Beads and Money: Notes toward a Theory of Wealth and Power. *American Ethnologist* 23/1, 4-24.

Gwinnett, A. J. and Gorelick, L. 1981. Beadmaking in Iran in the Early Bronze Age derived by Scanning Electron Microscopy. *Expedition* 23, 10-23.

Gwinnett, A. J. and Gorelick, L. 1983. Ancient Egyptian Stone Drilling: An Experimental Perspective on a Scholarly Disagreement, *Expedition* 25, 40-47.

Gwinnett, A. J. and Gorelick, L. 1989. Evidence for mass production polishing in ancient bead manufacture. *Archaeomaterials* 3, 163-168.

Gwinnett, A.J., and Gorelick, L. 1991. Bead Manufacture at Hajar ar-Rayhani, Yemen. *The Biblical Archaeologist* 54/4, 186-196.

Gwinnett, A.J. and Gorelick, L. 1999. A brief history of drills and drilling. *Beads: the Journal of the Society of Bead Researchers* 10/11, 49-56.

Guerrero, E., Molist, M., Kuijt, I., and Anfruns, J. 2009. Seated Memory: New Insights into Near Eastern Neolithic Mortuary Variability from Tell Halula, Syria. *Current Anthropology* 50/3, 379-391.

Hamilton, N. 2005a. The Beads. In: Hodder, I. (ed.), *Changing Materialities at Çatalhöyük: reports from the 1995-1999 seasons, Vol.5.* London: British Institute for Archaeology at Ankara, 325-332.

Hamilton, N. 2005b. Social Aspects of Burial. In: I. Hodder (ed.), *Inhabiting Çatalhöyük: reports from the 1995-1999 seasons, Volume 4.* London: British Institute for Archaeology at Ankara.

Halstead, P. 1989. The Economy has a Normal Surplus: Economic stability and social change among early farming communities of Thessaly, Greece. In: P. Halstead and J. O'Shea (eds.), *Bad Year Economics: Cultural Responses to Risk and Uncertainty*. Cambridge: Cambridge University Press, 68-80.

Hauptmann, H. 1999. The Urfa Region. In: M. Özdoğan and N. Başgelen (eds.), *Neolithic in Turkey: The cradle of civilization: New discoveries*. Istanbul: Arkeoloji ve Sanat Yayınları, 64-86.

Hayden, B. 1998. Contrasting Expectations in Theories of Domestication. In: A. B. Gebauer and T. Douglas Price (eds.), *Transitions to Agriculture in Prehistory*. Madison: Prehistory Press, 11-19.

Hayden, B. 2007. Richman, Poorman, Beggarman, Chief: the Dynamics of Social Inequality. In: G. M. Fienman and T. D. Price (eds.), *Archaeology at the Millenium: A Sourcebook.* New York: Springer, 231-272.

Hodder, I. 2003. *Archaeology beyond Dialogue*. Salt Lake City: University of Utah Press.

Hodder. I. 2004. Neo-thingness. In: J. Cherry, C. Scarre, and S. Shennan (eds.), *Explaining Social Change: Studies in honour of Colin Renfrew*. Cambridge: Mcdonald Institute of Archaeological Research, 45-52.

Hodder, I. and Cessford, C. 2004. Daily Practice and Social Memory at Çatalhöyük. *American Antiquity* 69/1, 17-40.

Hodder, I. 2005. Peopling Çatalhöyük and its Landscape. In: I. Hodder (ed.), *Excavations at Çatalhöyük, Volume 4. Inhabiting Çatalhöyük: Reports from the 1995-1999 seasons.* London: British Institute of Archaeology at Ankara Monograph No. 38, 1-31.

Hodder, I. 2006. *Çatalhöyük: The Leopard's Tale*. London: Thames & Hudson Ltd.

Hodder, I. 2007. Çatalhöyük in the Context of the Middle Eastern Neolithic. *Annual Review of Anthropology* 36, 105-120.

Hodder, I. and Pels, P. 2010. History houses: A new interpretation of architectural elaboration at Çatalhöyük. In: I. Hodder (ed.), *Religion in the emergence of civilization: Çatalhöyük as a case study*. Cambridge: Cambridge University Press, 300-331.

Hodder, I. and Meskell, L. 2011. A "Curious and Sometimes a Trifle Macabre Artistry": Some Aspects of Symbolism in Neolithic Turkey. *Current Anthropology* 52/2, 235-263.

Hole, F. 2000. Is size important? Function in hierarchy in Neolithic settlements. In: Ian Kuijt (ed.), *Life in Neolithic Farming Communities: Social organization, identity, and differentiation*. London: Kluwer Academic/Plenum Publishers, 191-209.

Hovers, E., Ilani, S., Bar-Yosef, O., and Vandermeersch, B. 2003. An Early Case of Color Symbolism: Ochre Use by Modern Humans in Qafzeh Cave. *Current Anthropology* 44/4, 491-522.

Hutchings, J. B. 1998. Colour in Anthropology and Folklore. In: K. Nassau (ed.), *Colour for Science, Art, and Technology.* Oxford: Elsevier, 195-208.

Insoll, T. 2004. *Archaeology, Ritual, Religion*. London: Routledge.

Jackson, B. 2005. Report on bead material identification. In: I. Hodder (ed.), *Excavations at Çatalhöyük, Volume 5. Changing Materialities at Çatalhöyük: reports from the 1995-1999 seasons.* London: British Institute for Archaeology at Ankara, 373-375.

Jenkins, R. 1992. *Pierre Bourdieu*. London: Routledge.

Jones, A. 2004. Matter and memory: colour, remembrance and the Neolithic/Bronze Age transition. In E. DeMarrais, C. Gosden, and C. Renfrew (eds.), *Rethinking materiality: the engagement of mind with the material world.* Cambridge: McDonald Institute for Archaeological Research, 167-178.

Joyce, R. A. 2005. Archaeology of the Body. *Annual Review of Anthropology* 34, 139-158.

Keller, C. M. 2001. Thought and Production: Insights of the Practitioner. In: M. B. Schiffer (ed.), *Anthropological Perspectives on Technology*. Albuquerque: University of New Mexico Press, 33-46.

Kenoyer, J. M. 1986. The Indus Bead Industry: Contributions to Bead Technology. *Ornament* 10/1, 18-23.

Kenoyer, J. M., Vidale, M., and Bhan, K. 1991. Contemporary stone beadmaking in Khambat, India: patterns of craft specialization and organization of production as reflected in the archaeological record. *World Archaeology* 23/1, 44-63.

Kenoyer, J. M. 1992. Harappan Craft Specialization and the Question of Urban Segregation and Stratification. *Eastern Anthropologist* 45/1-2, 39-54.

Kenoyer, J. M, and M. Vidale. 1992. A new look at stone drills of the Indus Valley Tradition. In: P. B. Vardiver, J. R. Druzik, G. S. Wheeler, and I. C. Freestone (eds.), *Material Issues in Art and Archaeology III*. San Francisco: Materials Research Society, 495-518.

Kenoyer, J. M. 1994. Experimental studies of Indus Valley technology at Harappa. In: A. Parpola and P. Koskikallio (eds.), *South Asian Archaeology 1993. Volume I. Proceedings of the Twelfth International Conference of the European Association of South Asian Archaeologists, Helsinki University 5-9 July 1993*. Helsinki: Suomalainen Tiedeakatemia, 345-362.

Kenoyer, J.M. 1997. Trade and Technology of the Indus Valley: New Insights from Harappa, Pakistan. *World Archaeology* 29/2, 262-280.

Kenoyer, J.M. 2003a. Bead technologies at Harappa, 3300 - 1900 BC: a comparative summary. In: C. Jarrige and V. Lefévre (eds.), *South Asian Archaeology 2001: Proceedings of the Sixteenth International Conference on South Asian Archaeology, European Association of South Asian Archaeologists, Paris, 2-6 July 2001. Volume I*. Paris: Éditions Recherche sur les Civilisations, 201-206.

Kenoyer, J. M. 2003b. The technology of stone beads: bead and pendant making techniques. In: J. Lankton (ed.), *A Bead Timeline, Volume I: Prehistory to 1200 CE*. Washington: The Bead Society of Greater Washington, 14-19.

King, T. 2005. Human Color Perception, Cognition, and Culture: Why "Red" is Always Red. *IS&T Reporter "The Window on Imaging"* 20/11, 1-7.

Knapp, A. B. 2008. *Prehistoric and Protohistoric Cyprus: Identity, Insularity, and Connectivity.* Oxford: Oxford University Press.

Kuhn, S., Stiner, M., Reese, D, and Güleç, E. 2001. Ornaments of the earliest Upper Paleolithic: New insights from the Levant. *Proceedings of the National Academy of Sciences of the United States of America* 98/13, 7641-7646.

Kuijt, I. 1996. Negotiating equality through ritual: A consideration of Late Natufian and Pre-Pottery Neolithic A period mortuary practices. *Journal of Anthropological Archaeology* 15, 313-336.

Kuijt, I. 2000. Keeping the Peace: Ritual, Skull Caching, and Community Integration in the Levantine Neolithic. In: I. Kuijt (ed.), *Life in Neolithic Farming Communities: Social organization, identity, and differentiation*. London: Kluwer Academic/Plenum Publishers, 137-164.

Kuijt, I. 2002. Reflections on ritual and the transmission of Authority in the Pre- Pottery Neolithic. In: H. G. K. Gebel, B. D. Hermansen, and C. H. Jensen (eds.), *Magic Practices and Ritual in the Near Eastern Neolithic: Proceedings of a Workshop held at the 2nd International Congress on the Archaeology of the Ancient Near East (ICANNE) Copenhagen University, May 2000*. Berlin: Ex Oriente, 81-90.

Kuijt, I. and Goring-Morris, N. 2002. Foraging, Farming, and Social Complexity in the Pre-Pottery Neolithic of the Southern Levant: A Review and Synthesis. *Journal of World Prehistory* 16/4, 361-440.

Kuijt, I. 2008. The Regeneration of Life: Neolithic Structures of Symbolic Remembering and Forgetting. *Current Anthropology* 49/2, 171-196.

Kuijt, I., Guerrero, E., Molist, M., and Anfruns, J. 2011. The changing Neolithic household: Household autonomy and social segmentation, Tell Halula, Syria. *Journal of Anthropological Archaeology* 30, 502-522.

Kuzucuoğlu, C. 2002. The environmental frame in Central Anatolia from the 9th to the 6th millennia cal BC: An introduction to the study of relations between environmental conditions and the development of human societies. In: F. Gérard and L. Thissen (eds.), *Central Anatolian Neolithic e-Workshop: The Neolithic of Central Anatolia: internal developments and external relations during the 9th – 6th millennia cal BC.* Istanbul: Ege Yayınları, 33-58.

Last, J. 1998. A Design for Life: Interpreting the Art of Çatalhöyük. *Journal of Material Culture* 3/3, 355-378.

Lemonnier, P. 1993. Introduction. In: P. Lemonnier (ed.), *Technical Choices: Transformation in material cultures since the Neolithic*. London: Routledge, 1-33.

Marshack, A., 2003. Comments. In: E. Hovers, S. Ilani, O. Bar-Yosef, and B. Vandermeersch (authors), An Early Case of Color Symbolism: Ochre Use by Modern Humans in Qafzeh Cave. *Current Anthropology* 44/4, 514-516.

Mathieu, J. R. 2002. Introduction – Experimental Archaeology: Replicating Past Objects, Behaviours, and Processes. In: J. Mathieu (ed.), *Replicating past Objects, Behaviours, and Processes*. Oxford: Archaeopress, 1-11.

Meskell, L. 1998. The nature of the beast: curating animals and ancestors at Çatalhöyük. *World Archaeology* 40/3, 373-389.

Meskell, L. M. and Joyce, R. A. 2003. *Embodied Lives: Figuring Ancient Maya and Egyptian Experience.* London: Routledge.

Meskell, L. 2008. The nature of the beast: curating animals and ancestors at Çatalhöyük. *World Archaeology* 40/3, 373-389.

Milić, M. 2008. Çatalhöyük Archive Report 2008: Chipped stone report – South area. Retrieved from the World Wide Web: http://www.catalhoyuk.com/downloads/Archive_Report_2008. *Çatalhöyük Archive Reports 2008*.

Miller, H. 2007. *Archaeological Approaches to Technology*. Burlington, MA: Academic Press.

MTA (Maden Tetkik ve Arama Genel Müdürüglü). 2002a. *Geological Map of Turkey, Adana Region*, No.14, (1:100,000). Ankara: General Directorate of Mineral Research and Exploration.

MTA (Maden Tetkik ve Arama Genel Müdürüglü). 2002b. *Geological Map of Turkey, Konya Region* (1:100,000). Ankara: General Directorate of Mineral Research and Exploration

Nakamura, C. and Meskell, L. 2009. Articulate Bodies: Forms and Figures at Çatalhöyük. *Journal of Archaeological Method and Theory* 16/3, 205-230.

Nakamura, C. 2010. Magical deposits at Çatalhöyük: A matter of time and place? In: I. Hodder (ed.), *Religion in the emergence of civilization: Çatalhöyük as a case study*. Cambridge: Cambridge University Press, 300-331.

Nakamura, C. and Meskell, L. (In press). Living above the dead: intramural burial practices at Çatalhöyük. In: I. Hodder (ed.), *Substantive Technologies from Çatalhöyük: reports from the 2000- 2008 seasons*. Los Angeles: Monographs of the Cotsen Institute of Archaeology, University of California at Los Angeles.

Orchard, W. C. 1975. *Beads and Beadwork of the American Indians*. New York: Museum of the American Indian Heye Foundation.

Özdoğan, M. 1999a. Çayönü. In: M. Özdoğan and N. Başgelen (eds.), *Neolithic in Turkey: The cradle of civilization: New discoveries*. Istanbul: Arkeoloji ve Sanat Yayınları, 35-63.

Özdoğan, M. 1999b. Concluding Remarks. In: M. Özdoğan and N. Başgelen (eds.), *Neolithic in Turkey: The cradle of civilization: New discoveries*. Istanbul: Arkeoloji ve Sanat Yayınları, 225-236.

Özdoğan, M. 2002. Defining the Neolithic of Central Anatolia. In: F. Gérard and L. Thissen (eds.), *Central Anatolian Neolithic e-Workshop: The Neolithic of Central Anatolia: internal developments and external relations during the 9th – 6th millennia cal BC.* Istanbul: Ege Yayınları, 253-262.

Pader, E. J. 1982. *Symbolism, social relations and the interpretation of mortuary remains*. Oxford: BAR International Series 130.

Pellant, C. 1992. *Rocks and Minerals.* London: Dorling Kindersley Limited.

Perlès C. and Vitelli, K.D. 1999. Craft Specialization in the Neolithic of Greece. In: P. Halstead (ed.), *Neolithic Society in Greece*. Sheffield: Sheffield Academic Press, 96-107.

Pilloud, M. A. and Larsen, C. S. 2011. ''Official'' and ''Practical'' Kin: Inferring Social and Community Structure from Dental Phenotype at Neolithic Çatalhöyük, Turkey.*American Journal of Physical Anthropology* 145, 519–530.

Pollard. J. 2001. The Aesthetics of Depositional Practice. *World Archaeology* 33/2, 315-333.

Possehl, G. 1981. Cambay Beadmaking: An Ancient Craft in Modern India. *Expedition* 23, 39-46.

Rapp, G. R. 2002. *Archaeominerology*. Berlin: Springer.

Rice. P. 1991. Specialization, standardization and diversity: a retrospect. In: R. Bishop and F. Lange (eds.), *The Ceramic Legacy of Anna O. Shepard*. Boulder: University of Colorado Press, 257-284.

Rollefson, G. O. 1983. Ritual and Ceremony at Neolithic Ain Ghazal (Jordan). *Paléorient* 9/2, 29-38.

Russell, N., and Martin, L. 2005. The Çatalhöyük mammal remains. In: I. Hodder (ed.), *Inhabiting Çatalhöyük: Reports from the 1995-1999 seasons, Çatalhöyük Research Project, Vol. 4.* London: British Institute of Archaeology at Ankara, 33-98.

Sagona, A. and Zimansky, P. 2009. *Ancient Turkey*. London: Routledge.

Sax, M. and Meeks, N. D. 1995. Methods of Engraving Mesopotamian Quartz Cylinder Seals. *Archaeometry* 37/1, 25-36.

Sax, M., McNabb, J., and Meeks, N. D. 1998. Methods of Engraving Mesopotamian Cylinder Seals: Experimental Confirmation. *Archaeometry* 40/1, 1-21.

Sax, M., Meeks, N.D., Michaelson, C, and Middleton, A.P. 2004. The identification of carving techniques on Chinese jade. *Journal of Archaeological Science* 31, 1413-1428.

Schumann, W. 1993. *Handbook of Rocks, Minerals, and Gemstones.* Translated by R. Bradshaw and K. A. G Mills. New York: Houghton Mifflin Company.

Semenov, S. A. 1973. *Prehistoric Technology: an experimental study of the oldest tools and artefacts from traces of manufacture and wear*. Translated by M.W. Thompson. Bath: Adams & Dart.

Sillar, B. and Tite, M.S. 2000. The Challenge of 'Technological Choices' for Materials Science Approaches in Archaeology. *Archaeometry* 41/1, 2-20.

Skibo, J. M. and Schiffer, M. B. 2001. Understanding Artifact Variability and Change: A Behavioral Framework. In: M. B. Schiffer (ed.), *Anthropological Perspectives on Technology*. Albuquerque: University of New Mexico Press, 33-46

Speilmann, K. A. 2002. Feasting, Craft Specialization, and the Ritual Mode of Production in Small-Scale Societies. *American Anthropologist* 104/1, 195-207.

Stein, G. J. 1996. Producers, Patrons, and Prestige: Craft Specialists and Emergent Elites in Mesopotamia from 5500-3100 B.C. In: B. Wailes (ed.), *Craft Specialization and Social Evolution: in Memory of V. Gordon Childe*. Philadelphia: University of Pennsylvania, 25-38.

Stevens, F. 2007. Identifying the body: representing self. Art, ornamentation and the body in later prehistoric Europe. In: J. Sofaer (ed.), *Material Identities*. London: Blackwell, 82-97.

Stocks, D. A. 1989. Ancient factory mass-production techniques: indications of large-scale stone bead manufacture during the Egyptian New Kingdom Period. *Antiquity* 63, 526-31.

Taniguchi, Y., Hirao, Y., Shimadzu, Y., and Tsuneki, A. 2002. The First Fake? Imitation Turquoise Beads Recovered from a Syrian Neolithic Site, Tell el-Kerkh. *Studies in Conservation* 47/3, 175-183.

Thissen, L. 2002. Time trajectories for the Neolithic of Central Anatolia. In: F. Gerard and L. Thissen (eds.), *The Neolithic of Central Anatolia*. Istanbul: Ege Yayınları, 13-26.

Tite, M. S. 2001. Overview – Materials Study in Archaeology. In: D. R. Brothwell and A. M Pollard (eds.), *Handbook of Archaeological Sciences*. Chichester: John Wiley & Sons, 443-448.

Türkmenoglu, A. G., Baysal, A., Toprak, V., and Göncüoglu, M. C. 2005. Raw material of ground stone from Çatalhöyük Neolithic site in Turkey. In: Hodder, I. (ed.) *Excavations at Çatalhöyük, Volume 5. Changing Materialities at Çatalhöyük: reports from the 1995-1999 seasons.* London: British Institute for Archaeology at Ankara.

Turner, V. 1967. *The Forest of Symbols: Aspects of Ndembu Ritual.* Ithaca: Cornell University Press.

Twigger, E. 2009. *Examination of evidence for craft specialisation in the Neolithic of the Near East.* Unpublished Ph.D University of Liverpool.

Twiss, K. C. 2007. The Neolithic of the Southern Levant. *Evolutionary Anthropology* 16, 24-35.

Twiss, K. C. 2008. Transformations in an early agricultural society: Feasting in the southern Levantine Pre-Pottery Neolithic. *Journal of Anthropological Archaeology* 27, 418-442.

Vanzetti, A. and M. Vidale. 1994. Formation processes of beads: defining different levels of craft skill among the early beadmakers of Mehrgarh. In: A. Parpola and P. Koskikallio (eds.), *South Asian Archaeology 1993. Volume II. Proceedings of the Twelfth International Conference of the European Association of South Asian Archaeologists, Helsinki University 5-9 July 1993*. Helsinki: Suomalainen Tiedeakatemia, 763-776.

Verhoeven, M. 2002a. Ritual and Ideology in the Pre-Pottery Neolithic B of the Levant and Southeast Anatolia. *Cambridge Archaeological Journal* 12/2, 233-258.

Verhoeven, M. 2002b. Ritual and its Investigation in Prehistory. In: H. G. K. Gebel, B. D. Hermansen, and C. H. Jensen (eds.), *Magic Practices and Ritual in the Near Eastern Neolithic: Proceedings of a Workshop held at the 2nd International Congress on the Archaeology of the Ancient Near East (ICANNE) Copenhagen University, May 2000*. Berlin: Ex Oriente, 5-39.

Verhoeven, M. 2007. Losing One's Head in the Neolithic: On the Interpretation of Headless Figurines. *Levant* 39, 175-183.

Vidale, M. 1989. Early Harappan Steatite, Faience and Paste Beads in a Necklace from Mehrgarh-Nausharo (Pakistan). *East and West* 39/1-4, 291-300.

Vidale, M. 1995. Early Beadmakers of the Indus Tradition: The Manufacturing Sequence of Talc Beads at Mehrgarh in the 5th Millenium B. C. *East and West* 45/1-4, 45-80.

Watkins, T. 1990. The origins of house and home. *World Archaeology* 21/3, 336-347.

Watkins, T. 2002. Memes, Memeplexes and the Emergence of Religion in the Neolithic. In: H. G. K. Gebel, B. D. Hermansen, and C. H. Jensen (eds.), *Magic Practices and Ritual in the Near Eastern Neolithic: Proceedings of a Workshop held at the 2nd International Congress on the Archaeology of the Ancient Near East (ICANNE) Copenhagen University, May 2000*. Berlin: Ex Oriente, pp. 41-47.

Watkins, T. 2008. Supra-Regional Networks in the Neolithic of Southwest Asia. *Journal of World Prehistory* 21, 139-171.

White, R. 1987. Beyond Art: Toward an Understanding of the Origins of Material Representation in Europe. *Annual Review of Anthropology* 21, 537-564.

White, R. 1992. Beyond Art: Toward an Understanding of the Origins of Material Representation in Europe. *Annual Review of Anthropology* 21, 537-564.

Williams, S. 1987. An "archae-logy" of Turkana beads. In: I. Hodder (ed.), *The archaeology of contextual meanings*. Cambridge: Cambridge University Press.

Wright K. I., and Garrard, A. N. 2003. Social identities and the expansion of stone beadmaking in Neolithic western Asia: new evidence from Jordan. *Antiquity* 77, 267-284.

Wright, K. I. 2005. Çatalhöyük Archive Report 2005: bead technology at Çatalhöyük, summer 2005. Retrieved from the World Wide Web: http://www.catalhoyuk.com/archive_reports/2005/. *Çatalhöyük Website Archive Reports* 2005.

Wright, K. I. 2006. Çatalhöyük Archive Report 2006: bead technology at Çatalhöyük, summer 2006. Retrieved from the World Wide Web: http://www.catalhoyuk.com/downloads/Archive_Report_2006.pdf. *Çatalhöyük Website Archive Reports* 2006.

Wright, K. I., Critchley, P., and Garrard, A. N. 2008. Social Technology and Expert Specialists: Insights from Two Neolithic Stone Bead Workshops in Eastern Jordan. *Levant* 40/2, 131-165.

Wright, K. I. 2010. (In press) Beads and the body: ornament technologies of Building 3 at Çatalhöyük (Chapter 17). In: R. Tringham & M. Stevanovic (eds.), *House Lives: Building, Inhabiting, Excavating a House at Çatalhöyük, Turkey. Reports from the BACH Area, Çatalhöyük, 1997-2003*. Los Angeles: Monographs of the Cotsen Institute of Archaeology, University of California at Los Angeles 17.1-17.44.

Wright, K. (In press). The Ground Stone Technologies of Çatalhöyük. In: I. Hodder (ed.), *Substantive Technologies from Çatalhöyük: reports from the 2000- 2008 seasons*. Los Angeles: Monographs of the Cotsen Institute of Archaeology, University of California at Los Angeles.