The properties of quartz

Symbolical and functional aspects of the quartz-sites on Mesolithic Södertörn

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Fig 1. *Photograph by author. A selection of the quartz found at Raä 305 Huddinge sn.*

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**Abstract**

This thesis concerns itself with quartz use in the Mesolithic Södertörn. By reviewing the most recent studies in quartz as a material and applying the knowledge of its physical properties as well as symbolical and social meaning I try to explain the quartz-sites common in the Södertörn area during this prehistoric period. Through a case study I look at the distribution of different kinds of quartz and use this information to better understand the function of the site in question and its role in the Södertörn area in general.
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1.1 Introduction

In the year of 2011 I started to study for my Masters Degree in Celtic and Viking archaeology at University of Glasgow. During my year there a course in Lithic analysis awoke my interest in lithics and the Stone Age, and from that interest this dissertation was born. An article about quartz knapping in present day Australia made me think of the Mesolithic quartz-sites I read about during my first year at university and I wanted to see if there was anything in these anthropological studies that could help further our knowledge of quartz use and quartz knapping in the Mesolithic Scandinavia. All my previous research has been deeply influenced by gender theory and this interest in post-processional thought and a critical perspective has stayed with me in this work even if it is more focused on the hard facts of archaeology than my usual interests in the field. Therefore I have been inspired by Latour and his actor/network theory as well as focusing on how quartz as a material has influenced the way people interacted with it, both as a practical raw material and as a symbol. What interests me is the materiality of quartz, the function within the stone that makes it behave in certain ways, both during production but also visual, audible and tangible traits. I believe that only when we understand how quartz reacts during production can we understand how this production took place and why. Similarly, the way humans interacted with the material out of practical reasons must have a more symbolical importance too. The two are interlinked, and by understanding the one we can gain a greater knowledge of the other.

1.2 Aim

My aim is to deepen the understanding of the materiality of quartz and its functional and symbolical purposes within the quartz-sites in Södertörn during the Mesolithic period. By refocusing on the properties of quartz and the way it acts as a raw material I believe I can understand the purposes for the quartz-sites in the outer archipelago, and the reason why people have chosen to deposit the quartz in this way. To do this I have formulated four research questions stated below.

1.3 Research questions

1. What are the functional properties of quartz as a raw material?
2. What are the symbolical and social functions of quartz as a raw material?
3. How did these two aspects of quartz impinge upon the quartz-sites on Mesolithic Södertörn?
4. What can the case study tell us about the quartz use in quartz-sites in general?
2 Theory and Methodology

2.1 Theory

Neo materialism

In this thesis I have tried to keep a critical perspective as my main focus, even though a large portion of my research is methodologically centred. The critical perspective represents several different sub-theories, the one most used here being the neo-materialistic theory inspired by Latour (2005). Unlike some other post-humanist theorists Latour does not assign any value to finding symmetry between the focus on humans and inhumans. Instead he suggests that symmetry is irrelevant as long as we do not presuppose human precedence over inhuman objects (Latour 2005:76). Inhuman objects have an agency of their own and shape the actions of man just as much as the actions of man shape the object. In fact Latour even suggests that objects can be the origin of change in a human society (Latour 2005:72).

Through the Actor Network Theory, or ANT, we are able to study not only human interaction with inanimate objects but also how the objects interact and change the humans. This leads us to the question of what agency really is and a need to clarify what I intend with the term is here needed. Dobres argues that you can either see agency as a multifaceted and changing concept, part unconscious part conscious, a string of contradictory qualities if you may (Dobres 2000:10). But this is of course a troublesome definition since it easily slips away and becomes something so abstract it is impossible to apply in research. The discussion of how agency should and/or can be defined is still ongoing and when it comes to the question of material culture the discourse gets even more complicated (Dobres 2000:12). In this dissertation I will be following the school of thought that argue like Latour that inanimate objects have the power to change their surrounding, even the human interacting with it.

Appadurai discusses the inner functions of economy in a very enlightening way. Economy is about the sacrifice of something you value to gain something else of equal but different value (Appadurai 1986:3f). He argues that it is through the exchange of things they gain a value. The action has created a structure that links politics to value and exchange (Appadurai 1986:3). Through these actions things gains a social life. Not only so, but a social value that is imbedded in the culture in a way that makes the actual exchange redundant; the value has been agreed upon in a collective and after that will continue to impact the interactions with and around the material, in the case of this study, quartz. In recent studies this value has also
been put in relationship to the changing geography and the cost of moving foreign lithic artefacts is argued to be seen in relationship to not only an economical value but as being depended on social networks, territoriality and practical limits on travel just to mention a few variables (Marwick et al 2011:99). Foreign objects have a higher value than what can be found close by due to access and demand.

Ethnographic comparisons
To use modern ethnographic comparisons is dangerous since it suggests a validation of civilisation patterns where there is a progression from “simple” hunter-gatherers to the “complicated, civilised culture in the western world” of today, something that in my opinion simply is not true at all. On the other hand we are easily blinded by our own culture when it comes to understanding other ways of organizing our social ties. It is therefore helpful to look at anthropological and ethnographic studies, not in the sense of them being the earlier chapter in the same book as our culture, but as a parallel evolution that if we broaden our own minds might inspire us to better understand the archaeological remains of prehistoric society.

2.2 Methodology
This dissertation is mostly a desk-based project where I by looking at previous and recent research try to create an holistic image of how quartz works as a functional material as well as what kinds of symbolical meaning that has been ascribed to quartz through prehistory. To concretize my argument I use an example site. I look at the area both by reviewing what has been published but more importantly by field studies and by conducting my own analyse of the quartz material of that site. By classifying the quartz in clearly visually distinguishable groups I try to understand how quartz might have been viewed as a raw material by the Mesolithic tribe that interacted with it. Patrik Gustafsson and Mikael Nordin have tried this before to a small extent in an excavation report (Gustafsson et al 2008:12). I also want to find out if it is of high quality or low quality, regional or imported and whether the knapping activity is more likely to be interpreted as a more functional production or as a symbolical or social action.
2.3 Process of research

My process of research was as stated above one part desk-based one part field-based. To get a better understanding of the site of my case study I looked at the documentation in ATA as well as went out to the storage unit in Tumba (Stockholm) where the actual artefacts were stored. During one week I went through the material focusing on the quartz. By categorizing the stones into visually clear markers such as colour, quality of grain and crystallizing I wanted to see if there were any distinguishable patterns between type of quartz and area of discovery. If that was the case I thought it would help me to better understand the function of the site as well as the quartz interaction with that site. This process was made harder since the system of documentation in the project did not fit my own system of categorizing and some time was spent copying the list of finds and re-organizing it in a way that made it possible for me to incorporate the data in my research. Unfortunately only a small fraction of the finds where given exact coordinates so my system had to be based on square metres and therefore a bit more general than ideal. I divided the finds in 1 m squares to see if the spread of the different quartz had any kind of pattern first not distinguished. It was a very time-consuming work to reorganize the finds to this pattern and try to figure out how to best show the spread in a pedagogical way. Since some of the find numbers actually contained up to 10-11 pieces I had to go back to the storage unit and split these numbers into several so that every piece would show up in my diagrams and spread sheets. Further complications came from the fact that the original list of findings was very unstructured. Some finds had the same find number but different coordinates and I had to go through the material once again to make sure that the right find was placed in the right square metre. During my second viewing I discovered that two different coordinates had been given in different tables to the same find in some cases. I did not know which of the coordinates that was the right one when they differed. In the cases where two coordinates where given to one find (one in written coordinates and one by a coded system used) I decided to go with the coordinates written out in the data overview. However this problem makes my analysis more of a hypothesis since I cannot prove that this spread of find is the actual spread on the site.
2.4 Previous research

Quartz was not considered as a separate research field until the 1980’s (Ballin 2008:73) and is often viewed as a second grade material. Recently a distinct typology for quartz has been developed to facilitate analysis of quartz artefacts, taking in to consideration the differences in material. This practice is, however, still debated (Ballin 2008:3). Ballin argues that a quartz artefact can not be classified as a tool, if it lacks the retouching that defines them (Ballin 2008:40), thus reducing all primary flakes to production waste. This view goes directly against much of the latest research that has shown wear patterns on primary reductions, meaning that they have been used as tools even if they lack any visual resemblance in the typologies created from flint material (Driscoll 2010:79).

Several archaeologists use experimental quartz knapping, with the aim to gain a deeper understanding of how the material behaves and the differentiation between lithic raw materials, while also gaining deeper understanding of how to interpret shards and flakes in the archaeological material. One of the earliest examples dates to the early 1990s (Callahan et al 1992). This study formulated fracture analysis. Fracture analysis takes into consideration how the physical properties of quartz translates into what kind of handicraft is used to produce useable artefacts, and what production chain leads to the material we find in field. The results of initial experimentation led to a deeper understanding of how quartz fractures upon impact; the secondary fractures where categorised and assigned to different knapping methods (Lindgren 2004b:171). Even though there was some variation between different knappers and the refuse produced, an overall schematic pattern was discovered illustrating that the platform-method generates more fragmented flakes and more fractured debitage, while bipolar reductions show a larger amount of whole flakes and less secondary fracturing. The theory underlines the importance of the physical properties of the raw material, showing how radial contra bending fractures decide how the stone shatters upon impact (Tallavaara 2010: 2443).
This fracture analysis was evaluated in 2010 (Tallavaara et al 2010) in a series of new experiments. In their article they show how the fracture analysis, though a good starting point, does not explain several patterns of fracturing when practically applied. The assumption that the differentiation in fracturing comes from the different knapping methods is undermined by their study (Tallavaara 2010:2442). Tallavaara et al points out that there were some major issues with fracture analysis and its application. Fracture analysis presupposed homogeneity among the experimental assemblages that were used for comparison, and likewise that there were no notable differences between real archaeological assemblages and their experimental counterparts (Tallavaara 2010:2443). To test if these assumptions where correct, they conducted a series of experimental knapping with four different knappers, using both hard and soft hammers, and different strength in impact. All the raw material came from the same chunk of vein quartz to rule out the raw materials’ impact on different fracture patterns (Tallavaara 2010:2445). Since the fracture analysis earlier had proven the difference between
bipolar and platform reduction all the reduction was done with the same method, freehand platform reduction (Tallavaara 2010:2445). The result of their study showed that fracture analysis needed to be re-evaluated before it could be applied to archaeological analysis since the difference in fragmentation patterns in their experiment was too great, despite the use of a single reduction method (Tallavaara 2010:2447). Instead other factors produced patterns, indicating that different level of hardness, and different types of indenter objects (Hammer stone, antler bone etc) related to different types of fragmentation (Tallavaara 2010:2445). Other factors were thickness of the flakes and the skill level of the knapper, but since we can assume that prehistoric people were more senior knappers then their modern counterparts this variation might be less visible in archaeological material (Tallavaara 2010:2445). The importance of the thickness of the flakes is demonstrated when it comes to their potential to break and shatter. Driscoll notes the same thing, stating that quartz flakes often are thicker then flakes in other finer grained material in archaeological sites (Driscoll 2011:741). The notable difference between soft and hard hammer stones is harder to apply on archaeological assemblages where secondary breakage and mixed methods of reduction is common (Tallevaara 2010:2446).

In 2011 Driscoll did a follow up study on vein quartz where he focused on the analysis of debitage with the purpose of devising frameworks for archaeological analysis of quartz assemblages (Driscoll 2011). Five different combinations of techniques were tried on four different kinds of quartz, since he felt that the differentiation between raw materials had not been taken in to consideration in the Tallevaara study (Driscoll 2011:736). He showed how many fragments he could securely classify by re-assembling the fragments straight after impact would have been unrecognisable in an archaeological context (Driscoll 2011:737). The conclusions of the study were that the grainier the material the more prone it was to shattering and fragmentation (Driscoll 2011:738). He also found that the bipolar reduction technique resulted in more diagnostic debitage than other direct percussion (Driscoll 2011: 739), supporting the results of fracture analysis. By combining different methods of reduction, materials and tools Driscoll managed to see even more patterns in the amount of fragmentation (Driscoll 2011:740). The most dramatic result of this experiment was the conclusion that almost 50% of flake fragments will be classified as debris and unclassified in any given assemblage (Driscoll 2011:742). However 55 % of the pieces in his experiment were clearly classified in line with fracture analysis. He also showed a significant difference between quartz and chert as raw materials, cohering with earlier research and the need for a
specific method of reduction and analysis for different raw materials. Just as Tallevaara, Driscoll also notes the relationship between choice of a hard hammer and siret breakage in the debitage (Driscoll 2011:744).
3 Quartz as a raw material, physical and symbolical properties

3.1 Quartz knapping

In this section I will briefly explain some of the terminology used in later chapters in regard to the methods of reduction. When studying lithic material there are several categories one needs to understand. Terms referring to the different kinds of debris we might find on a site and the different characterisations on these. Lastly I will try to quickly explain the most common types of reduction techniques used.

Chainé de opératoire has been used within lithic studies since the 1960s (Chapman et al 2007:85). As the name suggests the term refers to the chain of actions that result in production, in this case at lithic manufacturing sites. The start of the chainé de opératoire is the raw material. This is then reduced by knapping. A part of the stone is separated from the main core. This reduction can be done by several different methods. The most common one being bipolar reduction, where the core is rested upon an anvil of some sort, making the stone fracture from pressure radiating from both the distal (bottom) and proximal (top) end. This method is most common when the purpose is to produce flakes that mostly will be used unmodified (Lindgren 2004a:118). Another method of reduction is single platform or platform for short, where the core is held freely and the power of impact only comes from the hammer. Also called freehand platform reduction since the core is held freely in one hand, this method is a broad term containing many possible variations (Lindgren 2004a:118). In this method the knapper often prepare a platform before starting to remove flakes. The part separated from the core is what is referred to as a flake. Depending on the length/width ratio it can be classified in different categories and different parts of the flake has different names. The different shapes of the flake distinguish them into separate categories.
Remnants of the natural rock surface on the lithic artefact are called cortex. If you find cortex on a flake this means that it is a primary flake, whereas the absence of cortex leads to the conclusion that it is a secondary or tertiary flake.

In chapter 4.3, I will discuss a specific site in the Södertörn area. The finds of quartz at the site has been categorized by the excavator as well as reviewed by myself. The importance to clearly classify the different fragments as well as noting when and where cortex is present in an assemblage cannot be understated. It is through these details we can gain a deeper
understanding of the use of quartz in prehistoric times. Presence or absence of artefacts, and other distinguishable features can tell us what sort of activities that took place in a particular site. Absence of smaller fragments of flakes and lateral flakes in a site might for instance indicate that no actual manufacturing was taken place there, but that the flakes represented has been chosen for their quality and usability as tools (Sandén 1998:149). In a project from Estonia, the presence of quartz contra flint together with other data has been used to make a chronological division between Mesolithic and Neolithic source of food gathering and population movement (Kriiska 2011:86). Simply put, quartz has a lot to say if we learn how to listen. The study of quartz assemblages should not be viewed as troublesome because they do not conform to presupposed patterns based on other materials. Instead quartz has been argued to be the key to answering different questions that before have been untouchable. It has been called a highly suitable material to understand the human behaviour on a more individual level since it is directly linked to the knappers active decisions during knapping and therefore cultural norms in an almost anthropological way (Rankama 2003a:206).

3.3 The functional properties of quartz as a raw material

The tradition to use quartz as a raw material is ancient; and in large parts of present day Sweden, quartz was the most common raw material during the Mesolithic period especially in those areas where flint is not naturally found.

Fig 5. Approximate limit for the use of flint as a raw material in southern Sweden, black circle that marks the general area of this study added by author (Welinder 1973:46).
Quartz is a mineral of the silicate variety consisting of a crystal structure (Ballin 2008:43). This separates quartz from the similarly named metamorphic rock quartzite. Quartzite consists of a mixture of mainly quartz and other components such as sandstone and/or chert. It is often recognised by its glassy surface the translucent quality of the material. It is very hard, measuring 7 on the Mohs scale. The notion that “greasy quartz” has better shattering properties than other kinds, and that grain size matters was voiced by Ballin (Ballin 2008:49). It is harder to see burning on quartz than on other materials such as flint, but there are examples of heat treatment giving some kinds of quartz a more greasy lustre (Broadbent 1979:52) and as with bone quartz becomes brittle after heating. Because of this it becomes easier to quarry but less usable for tools. Quartz reacts in a very varied way to heating and burning. Some quartz turn white during extensive heating while others do not show any remarkable visual change (Broadbent 1979:52). Quartz can be geologically divided into two major groups, each with their own subdivisions. However in archaeological contexts we usually only refer the term to macrocrystalline quartz (see below).

Fig 6. *Chart of quartz and some of the more common subgroups. From* (Ballin 2008:44).

There are several large differences between for example flint and macrocrystalline quartz as workable materials for reduction. Where flint is finely grained and easily manipulated, quartz
has larger grains and therefore fractures in a more irregular and less predictable way (Andrefsky 1998:25). Just like flint quartz can be used as strike-a-lights. Each of the subgroups has its own distinct appearance and functionality such that most prehistoric people probably would have viewed them as different types of material (Ballin 2008:2). It would be beneficial for research to take this into consideration. Experimentation with thin sections of quartz to determine the grain size of different types of quartz has proven difficult (Driscoll 2011:735) since material that to the naked eye appears to be fine grained in thin section shows otherwise. The implication being that the prehistoric people using it as a raw material most likely would have viewed quartz as a finely grained material. We need to consider that knowledge of the raw materials’ different properties must have come from equal amounts of visual criteria as experience.

The difficulties in identifying and categorizing quartz have been called “the gravel effect” alluding to many quartz assemblages appearing to be largely diffuse pieces (Driscoll 2011:734). This might reflect a lack of ability to recognize pieces as functioning and deliberately formed tools, as they lack connections to the more easily interpretable flint counterparts (Lindgren 1998:98). It’s property of easy fracturing and naturally sharp edges made it possible for the prehistoric knapper to choose the flakes they deemed functional and to discard the ones not suitable for the particular task at hand. Callahan formulated this pick and choose-theory in the 1980s (Callahan 1987:63).

The fact that a majority of the flakes seem to not have been retouched is not a sign that they were not usable as tools, but rather the opposite. As early as 1935 the fact that many of the reductions where useable without further work was acknowledged (Engström 1935:36). It was also suggested that the large amount of debris in the sites could be explained by a surplus in raw material. The pieces sharp enough to use as tools where taken away and the rest simply left behind. This approach however does place a larger emphasis on the practicality of the shape, the usability rather than socially or symbolically defined shapes as is common in the interpretations of other lithic materials (Rankama 2003a:222).
3.4 The symbolical functions of quartz

Warren & Neighbour already stated in regard to a Scottish site that the separation of function in functional or symbolical is a social construction and cannot readily be applied to any time-period without caution (Warren & Neighbour 2004:91). The symbolical importance of quartz as a raw material has become more and more highlighted in recent research, one example dates back to the Palaeolithic in Portugal where it has been shown that quartz was sought out as a raw material, not because of its practicality but because of a collective tradition (Driscoll 2010:73). The importance of quartz in connotation to shamanic practices in ethnographic examples is important to remember (Driscoll 2010:73), and the Australian example shows how the brightness and iridescence of quartz and quartzite influenced the manufacturing traditions and areas of use ascribed to the material that was connected to life and ancestral power (Driscoll 2010:74). In both ancient Greece and in several arctic cultures quartz has been viewed as ice-stones (Nordin 2010:5), a connection easily made between the almost transparent mineral that can shift in colour just like ice shifts in colour in different light.

Nordin argues that the connection between sea, mountain and quartz ties them all together as symbols for immortality and eternity, alluring to how the islands and rocks where born out of the water by the drastic sea level changes during the period. One theory around the symbolical purpose of the Mesolithic quartz-sites in the Södertörn area is that it is a form of marking of territory as the wild nature is being claimed by nomadic tribes (Carlsson 1998:33). Quartz pebbles have in earlier research been associated with the moon and funerary rites during the Bronze Age on the British Isles (Warren & Neighbour 2004:89) especially on Isle of Lewis where the Calanais stone circle has strong connections to the lunar cycle (Warren & Neighbour 2004:91). It is not unusual to find knapping activities on these sites as well as signs of a ritual fragmentation of the quartz pebbles (Warren & Neighbour 2004:84). Ritual fragmentation is something that we recognise from the Neolithic era and that has been well discussed in archaeology (for example Tilley 1996, Chapman 2000). Though their research areas being of a much later date it is interesting to seek inspiration from theories around purposeful fragmentation when discussing quartz-sites in the Mesolithic. Tilley suggests that artefacts have a life history of their own and therefore are ritually killed and disposed of just like the human remains are during the Neolithic (Tilley 1996:241). Maybe more relevant to this study is the connection between purposeful fragmentation as a way to link people to places in the landscape (Chapman 2000:39). Since it is argued that fragmentation, sometimes completely random fragmentation, is a part of the practical chaîne de opératoir when it comes to quartz it can be hard to distinguish between functional production and a deeper symbolical
meaning behind the fragmented quartz found on quartz-sites from the Mesolithic era. Quartz triboluminescence properties, causing it to spark and even shine under water when rubbed together, and its reflective capacity make it easy to understand why it might have had a strong symbolism attached to it in prehistoric times, something confirmed by anthropological comparisons (Warren & Neighbour 2004:91). Although the example comes from different regional and historical areas than my research subject it highlights the complicated relationship between symbolical meaning and human interaction.

3.5 Quartz as a social factor

The focus on a social context within Mesolithic studies is quickly emerging but is quite new in the discourse (Finlay 2009:673). The importance of highlighting this question is however being more and more recognised. The connection between the functions of for example quartz and the symbolical beliefs tied to the material is arguably so intertwined that they are impossible to separate. It has even been suggested that there is no difference what so ever between what we today call practical aspects and the social interactions of humans in the Mesolithic era (Persson 2012:36). Persson uses the term “Hyper-sociability” in the sense that social interaction in the Mesolithic society included, not merely living human beings but animals, the dead and the landscape itself (Persson 2012:41). I would like to include artefacts to that list as well. Finlay states that:

“materiality also plays a central role in reproducing worldview and understandings of the wider environment” (Finlay 2009:673)

ANT suggests that the impact objects have on humans upon interaction is much greater then we often realize. Lindgren argues convincingly that technology has a strong social dimension as to its performing aspects (Lindgren 1998:111) as well as the symbolical importance placed on different materials and shapes (Lindgren 1998). In the example described in chapter 4.1 we will see how the activity of knapping can be socially entangled. Hiscock points out that the manufacturing of lithic artefacts is diverse and in his case study creatively and socially complex (Hiscock 2004:72) to a degree where the collaboration tactic of production actually dictates what flakes and reductions that are deemed functional (see chapter 4.1). It is not only the artefacts that have a social importance, Lindgren also reminds us that the places in themselves are active parts of the social dynamic (Lindgren 2004b:119).
There is an ongoing debate around what kind of society the Mesolithic people were living when they first came and settled in this part of present Sweden, and it is difficult to know for sure. The presumption that the Mesolithic would share their worldview with the circumpolar natives is for example built on a shaky ground but has repeatedly been used as an argument. According to this allegory the world of the Mesolithic people would have been divided in three areas, the upper, middle and lower world (Bergsvik 2009:607). This thought is something we recognise from the old Norse mythology and that is easy to turn to, but there is still no proof that this is directly applicable to the Mesolithic. Lindgren argues for an egalitarian society but rightly puts emphasis on the complex internal structures of egalitarian societies and how this is maintained through active actions in the group (Lindgren 2004a:108). A way to establish these roles is through activities such as tool manufacturing (Lindgren 2004b:116). One could say that the knowledge of knapping was an important social tool in creating an identity within the group (Lindgren 2004a:112), an identity that was just as flexible and changing in the Mesolithic era as it is today, depending on group constellations, gender, and age to mention a few examples. (Lindgren 2004a:110). Lindgren even says that the fact that the people of the Mesolithic era were nomadic must have complicated these identities even more than in the modern globalised society (Lindgren 2004a:110). Gustafsson talks about a totemistic cosmology where the humans only are an integral part of a cosmology containing the dead, animals, and the landscape around them (Gustafsson 1998:51), where the classification of groups goes beyond these categories and includes all of them. Tilley also argues for a totemistic worldview in his discussion of Nämforsen (Tilley 1991:129).
4 Case studies

4.1 An ethnographic example

There are, as earlier stated, several problems with using ethnographic data in archaeological research. However the inspiration for this thesis was born from reading and ethnographical article and I do believe there is knowledge to be gained from ethnographic and anthropological comparisons. We as researchers just need to be very careful in how we use these kinds of sources of information. (See Chapter 2.1)

Hiscock studied two elderly men of the Alyawerre in Australia as they where manufacturing blades for cutting out of quartzite by a technique dating back to the beginning of the twentieth century AD (Hiscock 2004:73). Even though this method is Australian in its origin Hiscock argues that it should not be viewed as geographically limited to Australia. Instead it should be viewed as one of many possible variables within the knapping technology. The problems of lithic typology has already been touched upon and Hiscock emphasizes this when he states that it reduces the possible objects of study in a lithic site when we assume that artefact shape is in direct correlation to a perceived and desired function and if that difference exists today it is not unlikely that it might have existed before (Hiscock 2004:71). The chaîne de opératoire on archaeological sites only rarely seem to be linear but are categorized by being complex and large in variability (Hiscock 2004:72). His study of Slippery and Billy when they in collaboration manufacture and choose blades for cutting tools shows a system where chance and luck is as important as skill and purpose.

The study took place over a period of 2 days when the elderly men first spent approximately 6 hours knapping stone in one designated area. The raw material was later transported to another site where the handles where attached with resin (Hiscock 2004:74). In the process of knapping Billy was using a technique Hiscock calls reverse knapping since the reduced flakes and debris flies past the knapper and lands behind him (See fig 6).
The distribution of debris stretched behind Billy up to 4 metres. Because of this scattering pattern the knapper did not have visual control over the debris he produced and therefore had an assistant, in this case Slippery sitting on his right side, slightly behind him. This position protected him from flying debris but also meant that he too had a limited visual control over the shatter produced (Hiscock 2004:74). Traditions also changed their behaviour and the way they valued potential blades. For example Billy was singing a traditional song meant to aid the production. At certain points in the song he assumed the outcome of the indention would be better than others and at those times exclaimed to let Slippery know to have is eyes ready
to find the good flake. In the same manner Billy said that he sometime felt that a flake would be just right and Slippery stated that he sometimes could hear from the sound of percussion when a useful blade had been stroked off. Even in cases when the outside observer could see that the flake in question had shattered the conviction of Billy and Slippery made them go back and pick up a potential blade earlier discarded and revalue it as suitable since the circumstances called for a good blade (Hiscock 2004:74). When they had a selection of 35 potential blades these where transported to the site where they would be fastened in to handles. The two men examined around six blades at the time negotiating pros and cons with them until they had enough. This meant that all of the blades had not been examined yet (Hiscock 2004:74). That means that several functioning blades never were chosen either to bring from the knapping site or indeed to be shafted afterwards, while other blades that might not have fitted as well with the desired criteria were deemed useful. Only blades that where nearly deemed functional were retouched and these seldom lived up to the standards of Billy and Slippery (Hiscock 2004:75). This lack of retouching is interesting since traditional typologies in archaeology demands retouching for something to be deemed a proper artefact in relation to production waste, and underlines the need to look differently at quartz assemblages than other types of stone tools as stated above (see chapter 2.4). Another interesting detail was the fact that Billy and Slippery had very specific things they looked for in a suitable blade, both when it came to size, sharpness shape but also colour, only the bright white coloured quartz was deemed suitable for blade production (Hiscock 2004:73), underlining the importance of visuality in the choice of raw material as well as the quality of the quartz from a more practical point of view. This preference for white quartz can be found in many archaeological examples, for example in Virginia, USA (Holland 1970:09). The case study of Slippery and Billy shows clearly that the production is a social act; in this case it was necessary to be two people involved. It also gives an example of how audible and tactile input steers the knappers judgement of the flakes produced.

4.2 Mesolithic culture in the Mälardalen area.

The cultural zones in present day Sweden during the time of first colonization have been heavily debated. For the most northern part of Sweden the colonization process went hand in hand with the disappearing ice around 8500 BP (Olofsson 2003:85). Rankama who has studied the situation in northern Finland suggests that we see the remnants of two different populations, one arriving from the south and one from east (Rankama 2003b:43) and populating the inland and the coast respectively. The two cultures being clearly separated
based on the differences in material culture. The question is then if this scenario is applicable on the Swedish area, and what this can tell us of the colonisation process in Södertörn. Olofsson says that he can detect influences from east in one site in northern Sweden but also emphasizes that one site is not enough to base a whole theory on and that there are influences from the south as well (Olofsson 2003:88).

I have already lightly touched upon the culture of the Mesolithic in Mälardalen and the different interpretations of it in chapter 3. However I think a short overview would be helpful before continuing the discussion about my case study specifically. The area of Gladö, Huddinge was then the outer archipelago gradually emerging from the ice of the previous Ice Age and the shrinking sea (more specific information see Chapter 4.2).

There are differences in the material culture between inland and coast, for example the size of the artefacts. At the Motala site in the inland the reduction as well as the cores are much smaller than the common size in any coast bound site, probably because it was harder to procure quartz in the mainland where it is mostly found in pebble-form along the rivers and lakes, affirmed by the fact that pebble sourcing dominates this area whereas vein-sourcing dominates the sea bound east (Wikell 2005:98). There is a clear lack of micro blades and micro blade cores in the coastal area (Molin & Wikell 2007/2008). Different archaeologists have different interpretations. Lindgren and Åkerlund sees the lack of microliths at the coast as a social and cultural choice whereas Gill instead has a more functionalistic explanation based on different hunting strategies demanding different tools (Wikell 2005:97). In Åkerlunds’ publication from 1996 she uses the climatic changes that characterized the area during the Mesolithic as a way to better understand the society of the prehistoric people. She argues that the cultural differences we can see in the archaeological evidence between the inland and the archipelago show a conscious decision from the archipelago inhabitants to be different from surrounding cultures (Åkerlund 1996:139). She argues that the activity in the archipelago was not seasonal movements from the inland area, but a cultural group on its own. Many other scholars, for example Manninen disagree with this opinion. By studying the lithic distribution in the very north of Finland Manninen believes that he finds convincing indications of a movement in between the coastline and the inland (Manninen 2004:107). The compilation Mesolithic Horizons has many articles touching upon the subject of settlement patterns and draws information not only from Sweden but widens the perspective both to Scandinavia and the world. The question of mobility is not always certain. New research from
Denmark has proven, through the age of wild animals at the time of death in occupational areas, that hunts have taken place all through the year in the same area (Carter 2009:120), more precisely the site of Ertebölle, active ca 4615-3890 BC (Carter 2009:116). Whether this is proof of a more permanent settlement as the author suggests or of different groups of humans coming and going in the same area is still not determined since the actual settlement has not been discovered. Ertebölle is much younger in use than the example sites of this thesis but it is important to remember to question what we grant as truth about the prehistoric societies. The level of mobility, and the ideological reasons behind this mobility as well as the purely practical are of high relevance if we are to fully understand the activities that resulted in the quartz-sites of Södertörn. The question of what time of year the sites in Södertörn were occupied is crucial for the interpretation of them. The relevance of quartz as a symbol for ice, or as a liminal marker is for example highly dependent on certain seasons of use, as will be discussed in Chapter 5.1.

The first settlers were hunter/gatherers travelling out in the archipelago to hunt for food, especially sea living mammals such as seal. During the Mesolithic period the sea became more and more salty, and this supported a high number of sea living species, the fishing was therefore most likely good, whereas the land-living mammals were more scarce in the archipelago, even if there might have existed elks on the larger islands from time to time (Åkerlund 1996:34). Seal hunting has been a common food source around the Baltic Sea up until modern times (Broadbent 1979:187). Different seals have different behaviours and Broadbent argues that the prehistoric hunting techniques most likely were adapted around the prey's natural behaviour, which is why I advocate that ring seal most likely was hunted by net during the Mesolithic rather than harpooned or clubbed. The netting seasons have anthropologically been located to either the dark winter when large nets were used, or the summer months (Broadbent 1979: 187f). Seal hunting has in historical times mostly been a collective effort and it is not unreasonable to think that so was the case in the Mesolithic as well.

When arriving in the new unknown territory they chose to stay on the shores of the emerging islands. Why so? There have been many different explanations. From a functional perspective one could argue that this was one of the safest places. Close to the boats, and with a clear over-view over the sea that made it possible to spot newcomers whether they would be friendly or hostile. However, this explanation does not give a reason for the refusal to settle
on the higher spots in the landscape even though that would have given a similar tactical advantage (Bergsvik 2009:606). There are other patterns in settlement than the occupation on beaches. Among common traits in Mesolithic sites in the archipelago is a tendency to face large and/or strange rock formations (Welinder 1977:14) as well as facing south and being placed on easily drained terrain. The Mesolithic people often revisited places in the archipelago but there are seldom any signs of continuity. In the ever-changing landscape the memory of places have been argued to have been imbedded by the relationship between people rather than a landmark or ritual deposits (Ahlbeck et al 2011:86f), a strategy that makes sense in a landscape that continued to change, even if it does not explain the relationship between landmarks and the choice of location.

The discussion of the shores being a liminal space, and a crossroad between different socially constructed areas has taken several forms in the ongoing discussions. According to a binary construction of the Mesolithic world view the sea and the land could be divided in terms of land/sea, secure/insecure, wild/controlled, nature/culture and so on, but that makes us ask the question why land necessarily would be secure and not the sea (Bergsvik 2009:606). The settlers came from the sea to unknown islands, and predators on the inland would have been just as lethal as storm at sea. A second interpretation also makes the shores a liminal space, just because the shore is the meeting place between two areas that both are dangerous and both are safe at the same time. The Mesolithic people depended on both land and sea to survive and it is likely that they felt comfortable in the wilderness while still keeping a respect for the clear dangers of their lives. Bergsvik compares the Mesolithic settlements on shores with the practise to place rock carvings in close proximity to water as well, thus making a point of the importance of these meetings between land and sea (Bergsvik 2009:607), which supports Tilley’s discussions concerning Nämforsen a rock-carving site in Northern Sweden (Tilley 1991). Lindgren has talked about how repeated actions can tame the unknown and make it familiar and proposes that the settlement in new territory can be an example of such “routinization” (Lindgren 2009:612). Bergsvik points out votive offerings in both the inland as well as in to the sea that might support the theory that both these areas were seen in some regard as wild and dangerous, a theory going against the view voiced of Ahlbeck et al above. The crossroad between the two areas might have had the security of being both land and sea and neither (Bergsvik 2009:607), an interpretation I find interesting since liminal spaces often are interpreted as dangerous rather then safe. We still should not forget the animistic qualities of many hunter-gatherers, which probably was true for the Mesolithic as well.
(Tilley 1991:129). The dependency on nature to sustain them would have been the basis of a mutual respect and communion with nature (Bergman 2007/2208:16). She suggests that the landscape and outcrops in the surroundings would have been ascribed meaning above functionality, including them in a common worldview during colonization. The importance of shores in the context of Mesolithic culture has been acknowledged for a long time, and is not specific to the Mesolithic era or the general geographical area (Wikell et al 2003:65). It has often been given a purely practical explanation, with a focus on water as a transportation route and food source. There are several examples from later periods of a strong dependency on marine food groups such as seal, and Mesolithic sites with remnants of seal eating are not uncommon (Ahlbeck et al 2003:6). Today hardly anyone would argue a purely practical explanation to the focus toward the shores, which makes the theory of two danger zones above the more fascinating. The sea levels were changing rapidly during this period, at times so quickly that they would have been detectable during a life span (Åkerlund 1996:34), which must been important for the way the shores where viewed by the Mesolithic people.

The social construction of the Mesolithic society is as already stated probably always going to be partly obscured, but there have been several attempts in bridging the gap of time past. In his article about the different usage of different kinds of wooden materials in the Mesolithic period Price comes to the conclusion that technological decisions can help us understand a wider scope of the Mesolithic culture such as sustenance practices, settlement patterns and social context (Price 2009:683). He argues that materials can have values that are socially constructed and he gives a deeper meaning to the choice of material to certain objects, this is seen in both choice of material as well as choice of certain places where certain actions are played out (Price 2009:687). Perhaps this way of structuring the society can be related to the quartz-sites we see in the Mesolithic archipelago as well. He argues that different knowledge of production, hunting, gathering, differentiation between who knows what about different things, creates diverse interactions between individuals in a society and different relationships to people, objects, and even physical places in the landscape (Price 2009:684). He makes a point of separating between this being a way of categorizing the meaning of places, objects and actions but rather pointing to this reasoning as a tool to highlight that these things had different meanings due to different people performing different actions in relation to one another (Price 2009:687). These patterns do not govern behaviour but provide a way social context can be interpreted (Price 2009:688).
4.3 A Mesolithic site in Mälardalen.

Gladö, part of Huddinge parish in Södermanland County has many archaeological sites dating to the Mesolithic period. A part of the central Södertörn area, it now lies in the north/west corner of woodland on top of a hill stretching east to southwest (Gustafsson 2005:7).

Fig 8. Map over the area (www.eniro.se marking made by author)

The site was discovered together with 15 other similar large sites and 7 sites with solitary finds of quartz, when the area was prospected impending exploitation of the area (Kihlstedt 1993:8). Approximately 600 m to the northeast a quartz mine has been discovered; it is worth noting that it is in the area closest to the quartz mine that the stray finds of quartz have been found. The highest landmark in the area lays 95 metres above sea level, but the site of discussion is a bit further down in the landscape, 70 metres above sea level. Assuming it was placed by the past shoreline, this would put the date of the site to ca 9000 BP, (Gustafsson 2005:8). This places the activity at the site to the beginning of the Boreal period when Scandinavia was getting successively warmer after the Ice Age. As the ice melted and the land started to rise, areas earlier covered in ice were revealed and subsequently occupied by hunter and gatherers. Södertörn started to emerge around 10850-9550 BP (Knutsson et al
The dating of the site and indeed quartz-sites in general is uncertain, and often solely based on sea levels. There are however indications that these sites indeed were placed close to the Mesolithic shoreline, such as by their placement in certain altitudes and by the fact that they do not seem to exist more than 85 metres above sea level (Gustafsson 2005:8).

![Overview map of Raä 305 and surrounding Mesolithic sites, including a quartz vein, marked K, in the close vicinity. A series of small dots marks dwelling places, X marks finds and o marks other kinds of historical sites (Kihlstedt 1993).](image)

Fig 9. Overview map of Raä 305 and surrounding Mesolithic sites, including a quartz vein, marked K, in the close vicinity. A series of small dots marks dwelling places, X marks finds and o marks other kinds of historical sites (Kihlstedt 1993).

An argument against this hypothesis would be that we do not expect to find these sites on these high levels and therefore have bypassed them in earlier research. However since these parts of the Swedish mainland are well studied, this argument is not well founded. A project in western Norway where several test pits were dug also concurred with this notions since there was an obvious lack of finds in what would have been the inland in the Mesolithic period (Bergsvik 2009:604).
The exact timing of the Södertörn colonisation is still uncertain but there are indications of activity as early as around 9200 BP with frequent finds dating to around 8000 BP (Knutsson et al 2011:47), making the site on Gladö relatively early in the colonisation process.

The site has a vague slope east/southeast ending in a steeper hang. Sheltered by the mountain on the west, north and south, the eastern side ends in a small dale that, at the time of occupation, would have been filled with water. This environment is very typical of the Mesolithic quartz-sites of the area, which seem to be found on sheltered shelves in the landscape, once shores overlooking the sea. The finds at Gladö 305 consist of knapped stone, mainly quartz distributed in four concentrations and a circular context marked by a darker soil and sharp-edged fragments of quartz measuring approximately 1.4 m in diameter. The four concentrations were discovered in corresponding corners of the excavated area. In the southwest corner surrounding and including the dark coloured context mentioned above the edges of the concentration were clearly separated, whereas the line between distribution-areas was more obscured with the other concentrations. Although a possible structure has been found on the site it is not enough to support that this was any kind of permanent living arrangement but rather an area of production, as indicated by the concentration of sharp edged flakes within the context.
Fig 10. The finds from within the dark coloured context. no 8276, 8277, 8278, 8279, 8290, 8292, 8291, 8438, 8439, 8444 seen from upper right corner to lower left corner. Photograph by the author.

Where the assemblage was very varied both in quality and colour, with a range from milky white quartz to pink and yellow (see below) the context was a bit more dominated by white quartz of the milky variety.

Fig 11. Circle diagram of the different shades of quartz in the assemblage.
Fig 12. Circle diagram of the different coloured quartz fragments found inside and in the edges of the dark coloured context.

Fig 13. Sketch of the excavated area with distribution patterns marked (Gustafsson 2005:15).

942 finds where collected during the excavation, among which quartz was the dominating raw material (896 quartz finds). Only one classified tool has been found, a fragment of the retouched cutting edge from a scraper. (Gustafsson 2005:14).

<table>
<thead>
<tr>
<th>Material</th>
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<th>No</th>
<th>Weight in gram</th>
<th>Bipolar (bp) / Platform (pf)</th>
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<td>282,3</td>
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<td>51,2</td>
<td>5 bp, 1 pf</td>
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<td>Flake</td>
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<td>115,6</td>
<td>2 bp, 7 pf</td>
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<td>401,82</td>
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<td>Type</td>
<td>Quantity</td>
<td>Size</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>------------</td>
<td>----------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
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<tr>
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</tr>
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<td></td>
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<tr>
<td></td>
<td>Flake fragment</td>
<td>1</td>
<td>1,4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refuse</td>
<td>2</td>
<td>13,3</td>
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<td></td>
<td>Flake fragment</td>
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The categories used above are standard when it comes to analysis of lithics. Flake, flake fragments, core and core fragments are self-explanatory but a clarification of the other categories might be beneficial. Shard relates to small fragments or splinters of stone, often produced when a flake shatter upon impact or when first breaking a nodule into manageable pieces that later can be used as cores. Another common source for these small fragments is when a core, flake or artefact is being retouched to make it more aesthetically pleasing or when flaws in the material are removed prior to further work. Refuse, or waste as it also might be called, is the word attached to the material left after a more standardized item has been made. These two categories, shards and refuse do overlap a bit and it is a question of preference and personal opinion to separate the two in some instances. Further more Gustafsson uses the category undetermined for those artefacts that have no clear indicators. Another word commonly used in lithic studies is chunk, referring to a piece that is not slim enough to be a blade or a flake, nor small enough to be a shard. A chunk is not a word for unknown forms but a specific reference to a shape.

Of further interest then is to see if the quartz used at the site comes from the quartz vein in the area, Gladö 308:3 600 m north/east of the site, or has been imported, and whether or not it is high or poor quality quartz. The answer to these questions are crucial if we fully want to understand the function of Raä 305 and how it relates to other similar sites in the area. Therefore I divided the quartz artefacts in different categories based on visual qualities. My reasoning was that the visual differences is very obvious to anyone and most likely one of the ways prehistoric people divided the raw material in to different groups together with size of crystalline and quality of fracturing. The categories became first based on colour and then on quality of grain size.
4.4 Analysis of Gladö 305

Fig 15. Map of quartz distribution at the site

As seen on the map above the quartz is concentrated to the north/west corner whereas the south/east corner has very few finds. There does not seem to be any heightened activity around the large bolder in the middle of the south side of the trench.
As you can see the majority was found on level 1 and 2. The II:1, II:2 column might possibly be the same as other categories but since the documentation used to separate systems both are shown here. A lot of the finds did not have any levels marked in the list of findings, which makes this an uncertain picture with only 569 pieces in the diagram. Still I believe that it will give us a general idea of the levels the finds were discovered at. We do for example not see two separate peaks in activity at the site, which could have been a sign of continuity of the site.
The fine quality quartz shows a more uneven spread over the trench. Even if there still is a strong concentration in the corner with the context it is also an overall stronger representation in the rest of the trench with what could be interpreted as a concentration in the south/west corner. Other than that the trend of the finds is to decrease in number on a scale from the north/west corner downwards to the south/east.

Fig 17. Map of fine quality quartz
Fig 18. Map of medium quality quartz

As with the fine quality quartz the medium quality variety has the same spread-pattern from north/west to south/east.
The same tendency can be observed with the poor quality quartz. However, note how there is an absence of poor quality quartz around the context that had a strong concentration of the high quality variety.
Even if we still can see the gradual shift in amount of quartz the white quartz seem a bit more evenly spread over the trench. A reason for this is that white quartz is easier to spot against the dark dirt than for example the grey counterpart. As you can see of the map below the grey quartz is more clearly overrepresented around the context in the north/west corner, possibly because this part of the trench was more carefully dug out during the excavation due to the context in the area.

Fig 20. Map of the distribution of white quartz
Fig 21. Map of distribution of grey quartz
Fig 22. Map of distribution of pink quartz

As you can see the pattern of pink quartz follows in line with the other spreads presented above. Although the decrease of find is not as even as in some of the other categories.
As seen from the maps above, made from the finds registered at the storage unit in Tumba, there is a high concentration of quartz in the north/west corner of the trench around the dark coloured context. This picture does not correlate with the description from the publication that described concentrations in all four corners of the trench. One reason for this might be that I have registered small and large quartz fragments alike; visually the larger pieces might have created concentrations in all corners. Another explanation might be that some finds seem to be missing and another that there was some confusion as to what coordinates belonged to the finds as described in chapter 2.3.
Among the finds several find numbers were missing from the findings, explaining how my total of pieces are lower than the reported 896 items. In my research I have only had access to 749 pieces of quartz. The largest amount was white, 352. Next in line came different shades of grey 261 pieces and finally yellow 77, and pink 59. This large variety of colour is very fitting since the closest quartz quarry (Gladö 308:3) also is varied with smoky quartz, rose quartz and milky white quartz existing in the same vein (Lindgren 2004b:199). I could also easily observe that a majority of the pieces even when very different in colour came from the same vein since there where gradual differences changing from dark grey to pink, and transparent white. The quartz quarry at Gladö has been dated based on m a s l to 9000BP, and would therefore be temporary with the quartz-site of Gladö 305. It is located ca 600 m from the quartz-site of Gladö 305, making it easy to access. The only exception might be the pieces that seem to be pebble-sourced rather than vein-sourced. The presence of cortex in the assemblage indicates that the site was used for lithic production starting with the first steps of raw-material use. It is hardly surprising that the largest categories with cortex present are shards and flake fragments. Both these categories can be seen as tightly connected to production, with the small shards, (often only a couple of mm in size) possibly being the remnants of a clean up process where miscolouring and flaws in the stone structure have been removed from nodules or flakes before further manipulation.

![Bar chart](image)

**Fig 24.** Table of artefacts with visible cortex. It also includes possible cortex and is divided into colour and quality.
Fig. 25. Proportions of different categories with cortex in comparison to total amount in the whole assemblage.

Fig 26. Table of the possible pebble-sourced quartz.

As you can see there were only white and grey examples of pebble-sourced quartz. The quality of the different colours was relatively homogenous, with the white pieces being of fine quality with one exception of medium quality, and the grey being of medium quality with one exception being of poor quality. This might indicate that the white/grey pieces come from the same nodule, especially as one of the white pieces was a core. All the white artefacts were also of the milky variety. However their spread in the trench is relatively scattered. The milky
white and one of the grey pieces were found in the south part of the trench on either side of the big block of stone, while the rest of the grey pieces were discovered in the middle of the trench slightly to the north and metres apart. Whether the fragments come from the same pebble or not it is still a minority of the finds and the majority of the quartz assemblage has most likely been sourced from the vein quarry. Even if there might be pebble source material among the ventral (inner part of the raw material without cortex) fragments at the site these are probably in a minority as well.

Fig 27. Distribution map of finds with cortex left. Over all 52 pieces with cortex or possible cortex was found.
Since there are strong concentrations around the context no matter what categories that are used for the analysis it might be interesting with a more detailed report of the contents of the actual context.

![Circle diagram of the different kinds of lithic finds in and around the dark coloured context. As you can see all stages of production are present.](image)

We find every part of the production chain, from shards to chunks, and there are also examples of raw material and pieces with cortex. Many of the artefacts found in the context are from the same source and of a high quality; only one artefact was deemed being of poor quality of the 63 pieces found in the area. All pieces also seem to come from the same vein-source except for one piece that might have a different origin. If you remember figure 12, you will remember how large a majority of the finds inside the context that were white.
5. The properties of Quartz- Implications

5.1 Discussion

Raä 305
From the composition of the finds with indications of raw material, refuse deposits and more purposeful acts of reduction such as flakes, there is little doubt that the site has been used for knapping activity. If the goal of this reduction had been to leave the knapped quartz behind as a social marker in the landscape one would not assume to find remnants of such a conscious chaîne de opératoire. Below you see a table of the amount of artefacts with cortex or possible cortex left. The total number amounts to 54 artefacts, dominantly grey or white in colour. 22 were classified as poor quality based on coarse grain sizes, 15 where deemed to be medium in quality and 18 of fine quality suitable for controlled knapping. 7 of the artefacts where deemed as uncertain when it came to cortex and of the others 6 had indications to be pebble sourced, 2 grey of poor quality and 4 white of fine to medium quality) while the majority had indications on vein sourcing.

At another site from the same time period and general area, (Raä 485, Riksten 9:2 Botkyrka parish Södermanland) not only knapped quartz but flint, burnt hazelnut shells and seal bones were discovered as well as cooking pits and hearths along the shore. This was interpreted as signs that the site had been used temporarily in connection to the seal-hunt and the absence of retouched objects among the lithic finds was interpreted as a sign that the site was used for production and that the useable tools were removed from the site (Grusmark 2006:11). It is unclear if the same can be said as readily of Gladö 305, mostly since there are no hearths or remnants of cooking at the site, not even pottery. Likewise some retouched pieces have been discovered. However a majority of these are flake fragments and might have been discarded after breakage. The absence of hearths and any bone material from seal or seabirds indicates that Gladö 305 should be viewed as a site that never was used for everyday life. Another explanation could be that the remnants of cooking pits and/or houses are placed further away in the close vicinity. However, we know from other similar sites that hearths and cooking pits often are placed along the shores, and therefore should have shown up in the excavation. All stadiums of production are to be found within the four square metres containing and surrounding the context. The site does however have some of the criteria stated by Welinder
to be ubiquitous when it comes to Mesolithic sites. As you can see from the map in figure 9 there is a hill that at the time of activity at the site would have been an island straight to the east of the shore, perhaps this can be seen as one of the rocks or landmarks that often seem to exist in the vicinity of Mesolithic sites. This brief comparison shows that there is a diversity of different kinds of quartz-sites in the Södertörn area, and that the functions of these sites have been varied, as well as their importance for the Mesolithic people using them. In chapter 4.2 we talked about two slightly different views of how the Mesolithic people interacted with the landscape around them. I believe that the fact that they actively seem to have searched out shores with these prominent features in the vicinity speaks for a world-view where the landscape was characterized and given a meaning as suggested by Bergman (Bergman 2006/2007:16). This does not mean that Bergsviks theory around shores as a safe zone on the edge of two oppositions loose any value. The view of land and sea, wilderness and familiarity, danger and safety could very well have been intermingled and in need of balancing against eachother.

A wider scope.
Because of quartz fragmenting qualities it is not very hard to quarry. Easily visible as veins of white and shimmering against the grey of the surrounding rock, and the quartz often detach from the surrounding stone in easily portable pieces of 1 dm³ (Lindgren 2004b: 204). Therefore it is not surprising that the traces of working in the immediate area of the quarry are slim to none. Instead the raw material has been easy to transport to the surrounding shores where it has been further processed. Lindgren interprets this as a sign of the social function of stone knapping and its performing qualities (Lindgren 2004b:205), the stone knapping took place somewhere where it could be seen and imbedded with social importance. The question of hoarding is not new to the time-period or area. For example Welinder interpreted a deposition of two picked axes in close proximity to each other as a possible active deposition for later distribution as early as 1977 (Åkerlund 1996:35). This can be part of the explanation of the quartz-sites too. We saw in the ethnographic example in chapter 4.1 that pieces that had earlier been discarded could be viewed as functional when being reviewed a second time. Perhaps something similar has been happening at the quartz-sites where the first reworking of the raw material has taken place. The pieces that have been viewed as fit for use with little to none retouch have been removed and the rest left where they fell. When returning to the site new usable pieces might have been discovered among the rubble along with newly produced flakes. Examples of Mesolithic quartz caches as well as an ethnographic example from the
Nunamiut Eskimos exists (Alakärppä 1998:11) even if they concern mainly raw material. There are examples from other Mesolithic sites where that there has been quite brutal smashing of quartz. This is not necessarily a form of symbolical or ritual fragmentation, but rather a technique used to get suitable pieces that are sharp enough to use as tools without any further retouch (Bengtsson 1998:57). The theory of the quartz on the shores being some sort of storage for already fragmented but useable quartz pieces demands a continuity of use. When the site was said to have four concentrations this could have been interpreted as four separate activities, however, as earlier discussed this is not the picture gained from the maps of distribution made for this thesis. Looking at the distribution maps above we see a large concentration around the dark coloured context. We ought to remember that the presence of a dark coloured context might have made the excavators extra careful in their work and therefore made them notice smaller fragments and also collect smaller pieces than in other parts of the trench, hence making the spreadsheet unbalanced. It is however clear that a majority of the finds in the Tumba storage unit have been found around the dark coloured context and scattered around the northwest corner of the trench.

The Mesolithic people were just as complex as we are today, and so was their world-view and social and cultural processes. Exactly what these consisted of is probably something we never will know for sure even if many of the theories discussed in chapter 3.4 might be a start. However the exact time of year that these sites in the outer archipelago were used will change likely interpretations. For example it has been suggested that the quartz was left on the shores as a way to claim a new and wild landscape. The brilliant and glistening white is suggested to signal from a long distance that the site has been visited before, separating it from the surrounding wilderness. However much of the quartz found at the example site of Gladö 305 is not white but grey, a colour not as visually striking. Another factor is whether the sites were used in summer or wintertime. If there is a connection to seal hunt as has been suggested both scenarios are plausible. However if it were a question of wintertime ice- fishing, the quartz would not stand out but be covered in snow. Hence it would be a sign only known by the people placing it there to begin with. For the theory to work it suggests a spring /summer occupation. The theory of the shore as being a safe place between two both dangerous and familiar zones, the sea and the inland, intrigues me. Maybe the shores were a natural place for important actions? The knapping of quartz must have been socially and culturally important since it was a vital part of survival to have good sharp tools. If Lindgrens’ theory of quartz knapping as a way to manifest social structure within a group is correct, it makes sense that it
would take place on the open shore, the most accessible and visually open place in the surrounding landscape. The sound of knapping activities would have carried over the water to other shores nearby. The physical properties of quartz made the action of knapping by fragmentation and selection very suitable, which might have been a breeding ground for symbolical ideas around why some quartz was to be left behind, as an offering to the places that gave people quartz or as a memory imprinted in the landscape.

5.2 Conclusions
There is no doubt that quartz as a material has had more than a functional meaning to the Mesolithic people. Its crucial part as raw material for tools has been imbedded with other meanings, as a social action in its production and as a symbolical, or even religious carrier of meaning. The properties of quartz, how it shatters and behave in correlation to the knapper have shaped the way it has been handled. In a way quartz has shaped the mind of man just as much as man has shaped quartz into useable tools. In a barren archipelago landscape the veins of quartz have stood out against the grey cliffs and rocks giving prosperity to a new landscape that has been populated by hunter-gatherers. The value of these easily accessible deposits of vein quartz must have been great. Because of its fracturing ability it has been used differently than other materials and there are indication of formal shape being of less importance than the pieces functional value. What at first might look as a random smashing of quartz raw material might be a part of a practical chaîne de opératoire where the useable pieces has been collected and the useless shards and splinters left behind. The minor finds of whole flakes in the site of Gladö 305 supports this.
Quartz as a material has created the archaeologically defined “quartz group”. This is a common way to distinguish between different cultures in archaeology and it leads to whole cultures sometimes being reduced to a shard of a specific type of pottery. This is of course an over simplification but I believe in a grain of truth in these assumptions. If things as easily can influence people as the other way around it is only logical that the choice of quartz as raw material was significant for the Mesolithic people in the Södertörn archipelago on a deeper level than convenience and easy access. We have seen some of the suggested meanings of quartz that draws from majorly ethnographic examples. Quartz has been seen as ice and the moon, been connected to ancestors and the dead as well as had its functional importance. We might never be able to do more than speculate about the true nature of its symbolical value in the Mesolithic era, but we can certainly see that such a value existed. This does not mean that I believe that the Mesolithic hunter-gatherers in the archipelago was a complete separate
group than the ones further in the inland where for example micro burins exists in greater extent. I mean that the identification between man and nature, man and tool is strong even today. We use the things in our everyday life to define who we are, and that is nothing new but a part of how human interaction works.

In the case of my example site as shown by the cortex present as well as representations of every step of lithic production, we can see that the site has been a manufacturing site, where the majority if not all of the raw material has been collected locally. The accessibility of the quarry was probably even greater when the journey could be done on water rather than by foot. The high amount of shards and production waste also adds to the picture of Gladö 305 as a knapping site. The position of the site is probably a result of part social and symbolical purposes as functionality. Accessibility and closeness to the quarry is certainly one of the reasons why this particular site was chosen, but the placement on the shore also has connection to the shore as a liminal space, where two areas of nature both important to survival and full of danger connected. The placement in relation to the opposite island is also in line with a pattern for Mesolithic site, making it easy to find in a changing landscape. The distribution pattern of the quartz at the site is also worthy of discussion. The concentration of quartz to the corner with the dark coloured context indicates that this is the main area of production, and especially the context seem to relate to high to medium quality quartz from the same vein-source. Possibly the context is the remnant of a small construction dedicated to knapping, maybe a roof for shelter. With its size of 1.4 m in diameter it is a bit too small for being a functional sleeping place, but large enough to accommodate one person sitting up and knapping. If similar constructions are known from other places this might be a plausible explanation.

There has been a trend in research to cluster all quartz-sites in the archipelago together when in reality these sites are diverse when it comes to use and meaning. This is most easily seen in the official categorization of quartz-sites as dwellings in the registers. Some of these sites have probably been dwelling places but not all. Other sites might have been connected to hunting and some, like Gladö 305 has a direct link to a deliberate lithic production. I believe I have shown that these separate uses have been imbedded with different symbolical meaning. There is still a need in Mesolithic research to better separate these different sites from each other to get a more nuanced picture of the people who used these sites and their activities and beliefs. It is easy to be caught up in symbolical explanations but I think that the practicality of
action should not be forgotten. The shores covered with knapped quartz can be seen as much as a storage for future reuse of functional pieces of quartz as symbolical markings in the wilderness of the archipelago. The one explanation does not make the other one redundant. I hope that future research will continue to try and find out what different use the quartz-sites in Södertörn had, and how this impact on its ritual, social, and symbolical importance in the landscape of the mind as well as the physical landscape.
6. Summary

In this thesis I have discussed quartz as an active agent in its relationship to the humans who used it for tool production in the Mesolithic era. By taking the shattering properties and visual and tactile peculiarities into consideration I wanted to put emphasis of how people have changed and developed their behaviour around the materiality of quartz. I also briefly discussed the theories around the social and symbolical role of quartz in the Mesolithic hunter-gatherers worldview. The distribution pattern at my example site was contradictory to the original report and the reasons why this might have happened might have been discrepancy in the coordinates of the finds, the absence of some finds from the storage unit and/or the human factor. For example the area with the highest amount of knapped quartz was around the only separate context, which might have made the excavators more thorough in this area than others. I do however still believe that the context has a connection to the knapping activities on the site. There are no signs of people living at the site, but it seems to be a manufacturing place with traces of every step in lithic production present. This is not unusual for the period and area and the symbolical function of having certain places where knapping has taken place separated both from dwellings and quarries have been debated in recent years. There has been a variety of different functions for what we today call quartz-sites and these functions need to be closer discussed and compared. The function of sites like Gladö 305 is arguably not only to produce lithic tools but has had a deeper symbolical meaning. The placement on the shore ties into the theories of liminality and the cross roads between to areas, land and sea, that both were crucial for survival but at the same time at times dangerous. Accessibility probably plays a part as well as visibility. There are theories of the deposits of haphazardly knapped materials as symbolical markers of territorial claims but I believe there might be a more practical explanation as well where the quartz can be seen as deposits or storage for future use as well as visual or symbolical markers.
Bibliography:

Ahlbeck M et al 2003 *Unversökningsprogram- Mesolitiska lämningar I östra Mellansverige* Arkeologikonsult Upplands Väsby

Ahlbeck et al 2011 Minne och myt: Landskapets märken och depåer under tidigneolitikum och senmesolitikum på Södertörn *Location, Selection and Memory* p 45-66 Skrifter från Arkeologikonsult nr 1 p67-92 Upplands Väsby

Alakärppä J et al 1998 Raw material sources and use of Quartz in Kemi-Tornio area *Third Flint Alternatives Conference at Uppsala* Opia 16 Institutionen för Arkeologi och Antik Historia 5-21 Uppsala


Appadurai A. 1986 *Social life of Things: Commodities in Cultural Perspective* New York: Cambridge University Press

Ballin T 2008 *Quartz technology in Scottish prehistory* Scottish Archaeological Internet Report 26 Society of Antiquaries of Scotland

Bengtsson L 1998 Dilemmas in interpreting a Mesolithic site area *Third Flint Alternatives Conference at Uppsala* Opia 16 Institutionen för Arkeologi och Antik Historia 55-60 Uppsala

Nergman I. 2006/2007 Roasting pit and social space *Current Swedish archaeology* vol 15-16 p 7-20 Stockholm


Broadbent N 1979 *Coastal resources and settlement stability* Aun 3 Uppsala
Callahan E. 1987 *An evaluation of the Lithic Technology in Middle Sweden during the Mesolithic and Neolithic* AUN 8 Upppsala

Callahan E, Forsberg L, Knutsson K, Lindgren C 1991 Frakturbilder, kulturhistoriska kommentarer till det säregna sönderfallet vid bearbetning av kvarts *Tor* 24, p 27-63 Uppsala

Carlsson A 1998 *Tolkande arkeologi och svensk forntidshistoria- Stenåldern* Stockholm

Studies in Archaeology 17

Carter R. 2009 One pig does not a winter make- New seasonal evidence at the Early Mesolithic sites of Holmgaard and Mullerup and the Late Mesolithic site of Ertebölle in Denmark *Mesolithic Horizons I* p 115-121 Oxbow Books Oxford

Chapman J. 2000 *Fragmentation in archaeology- people places and broken objects* Routledge


Driscoll K 2010 *Understanding quartz technology in early prehistoric Ireland vol 1* phd UCD School of Archaeology


Engström T. 1935 *Från stenålderns boplatskultur vid Bråviken* KVHAA Handlingar 37:6 Stockholm

Finlay N 2009 Introduction *Mesolithic Horizons II* p 673-674 Oxbow Books Oxford

Gustafsson P 1998 The earliest Stone Age Occupation of Eastern Middle Sweden *Current Swedish Archaeology vol 6* p 47-62 Stockholm


Holland C.G. 1970 *An archaeological Survey of Southwest Virginia Smithsonian contribution to Anthropology issue 12* Washington


Knutsson H et al 2011 *The fractual selection Location, Selection and Memory p 45-66* Skrifter från Arkeologikonsult nr 1 Upplands Väsby

Kriiska et al 2011 *Stone Age Flint Technology in South-Western Estonia: Results from Pärnu Bay Area Mesolithic interfaces- variability in lithic technologies in eastern Fennoscandia* The archaeological society of Finland

Latour 2005 *Third space of uncertainty: Objects to Have Agency Reassembling the social: an introduction to Actor-Network theory p 63-86* Oxford University Press

Lindgren C. 1998 *Shapes of quartz and shape of minds Third Flint Alternatives Conference at Uppsala* Opia 16 Institutionen för Arkeologi och Antik Historia 95-103Uppsala

Lindgren C. 2004a *Quartz and People: technological and social strategies during the Mesolithic in Eastern Central Sweden Coast to Coast –arrival p 105-122* Stockholm
Lindgren C. 2004b *Människor och kvarts* Stockholm studies in archaeology 29
Riksantikvarieämbetet Arkeologiska Undersökningar skrifter no 54 Coast to Coast books no. 11 Vällingby

Lindgren C 2009 between the rock and the sea: site location and ritual practise in the Mesolithic in eastern central Sweden *Mesolithic Horizons II* p 610-613 Oxbow Books Oxford


Marwick B. et al 2011 *Keeping your edge: recent approaches to the organization of Stone artefact technology* BAR International series Archaeopress Oxford

Molin F & Wikell R 2007/2008 Microblade technology in quartz during the Mesolithic in Eastern Middle Sweden *Current Swedish Archaeology* vol. 15-16 p 137-156 Stockholm

Nordin A 2010 *Från Kvarts till Plats – Ett försök att förstå den symboliska dimensionen hos mesolitiska kvartsplatser på Södertörn* Uppsats II in archaeology Stockholm University (Unpublished)

Olofsson A 2003 Early colonization of Northern Norrland: technology chronology, and culture *Pioneer settlement in the Mesolithic of northern Sweden* Umeå University Department of Archaeology and Sami Studies

Persson C. 2012 *Den hemliga sjön, en resa till det småländska inlandet för 9000 år sedan* Göteborg

Price S 2009 Wood and wild animals: Towards an understanding of the Mesolithic world *Mesolithic Horizons* p 683-689 Oxbow Books Oxford

Rankama T. 2003a Quartz analyses of Stone Age house sites in Tervola, southern Finnish Lapland *Uniting Sea* p 204-223 Opia 33 Uppsala

Sandén E. 1998 Using quartz fractures in interpreting a Stone Age site *Third Flint Alternatives Conference at Uppsala* 141-154 Uppsala


Tilley C. 1996 *An ethnography of the Neolithic* Cambridge University Press Cambridge

Warren G & Neighbour T. 2004 Quality Quartz: working stone at a bronze age kerbed Cairn at Olcote, near Calanais, Isle of Lewis *Norwegian Archaeological review* 37:2 83-94 Taylor and Francis Online


Åkerlund A 1996 *Human responses to shore displacement* Studier från UV Stockholm Arkeologiska undersökningar nr 16 Riksantikvarieämbetet
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